

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY &
SCIENCES::TIRUPATI (AUTONOMOUS)**

Karakambadi Road, Venkatapuram (Vi), Tirupati.

**INVESTMENT ANALYSIS AND PORTFOLIO MANAGEMENT
(22MBA0303)**

**MASTER OF BUSINESS ADMINISTRATION
(III SEMESTER)**

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UNIT-I

Introduction to Investment: Definition, Objectives, Various Investment avenues, Process of Investment, Investment and Speculation.

Learning Outcomes:

After learning this Lesson, you will be able to understand the concepts related to Investment/Capital, Various Investment avenues and the Process of Investment to start your investment.

Investment Analysis and Portfolio Management is a growing field in the area of finance. It aims at creating a better understanding of the various concepts/principles related to investment analysis and portfolio management.

Investment Analysis is a broad term for many different methods of valuating investments, industry sectors, and economic trends. ... Investment analysis is a key to a sound portfolio management strategy.

Process of Capital Formation : Involves three distinct, although inter-related activities.

(i) Savings: The ability by which resources are set aside and become available for other purpose.

(ii) Finance: The activity by which claims to resources are either assembled from those released by domestic savings, obtained from abroad, or specially created usually as bank deposits or notes and then placed in the hands of the investor.

(iii) Investments: The activity by which resources are actually committed to production.

The financial system is a link between the savers (savings – surplus economic units) and the investors (savings – deficit economic units). It is made up of all those channels through which savings become available for investment.

Introduction

Investment is the commitment of money that have been saved by deferring the consumption and purchasing an asset, either real or financial with an expectation that it could yield some positive future returns. There is a plethora of **investment** avenues, each associated with varied risk-return trade-offs. **Investment** is the act of putting money to work to start or expand a business or project or the purchase of an asset, with the goal of earning income or capital appreciation. **Investment** is oriented toward future returns, and thus entails some degree of risk.

Financial investment is the allocation of money of assets that are expected to yield some gain over a period of time. It is an exchange of financial claims such as stocks and bonds for money. They are expected to yield returns and experience capital growth over the years. Thus, **investment may be defined** as “a commitment of funds made in the expectation of some positive rate of return”. Expectation of return is an essential element of investment.

Definition of Investment is it involves making of a sacrifice in the present with the hope of deriving future benefits. Investment has many meanings and facets. The two most important features of an investment are current sacrifice and future benefit.

Since the return is expected to be realized in future, there is a possibility that the return actually realized is lower than the return expected to be realized. This possibility of variation in the actual return is known as investment risk. Thus, every investment involves return and risk.

Characteristics of Investment

All investments are characterized by certain features. Let us analyse these characteristic features of investment.

Return

All investments are characterized by the expectation of a return. In fact, investments are made with the primary objective of deriving a return. The return may be received in the form of yield plus capital appreciation. The difference between the sale price and the purchase price is capital appreciation.

The dividend or interest received from the investment is the yield. Different types of investments promise different rates of return. The return from an investment depends upon the nature of the investment, the maturity period and a host of other factors.

Risk

Risk is inherent in any investment. This risk may relate to loss of capital, delay in repayment of capital, non-payment of interest, or variability of returns. While some investments like government securities and bank deposits are almost riskless, others are more risky.

The risk of an investment depends on the following factors.

1. The longer the maturity period, the larger is the risk.
2. The lower the credit worthiness of the borrower, the higher is the risk.
3. The risk varies with the nature of investment. Investments in ownership securities like equity shares carry higher risk compared to investments in debt instruments like debentures and bonds.

Risk and return of an investment are related. Normally, the higher the risk, the higher is the return.

Safety

The safety of an investment implies the certainty of return of capital without loss of money or time. Safety is another feature which an investor desires for his investments. Every investor expects to get back his capital on maturity without loss and without delay.

Liquidity

An investment which is easily saleable or marketable without loss of money and without loss of time is said to possess liquidity. Some investments like company deposits, bank deposits, P.O. Deposits, NSC, NSS, etc. are not marketable. Some investment instruments like preference shares and debentures are marketable, but there are no buyers in many cases and hence their liquidity is negligible. Equity shares of companies listed on stock exchanges are easily marketable through the stock exchanges.

An investor generally prefers liquidity for his investments, safety of his funds, a good return with minimum risk or minimization of risk and maximization of return.

Objectives of Investment

An investor has various alternative avenues of investment for his savings to flow to. Savings kept as cash are barren and do not earn anything. Hence, savings are invested in assets depending on their risk and return characteristics. The objectives of the investor are minimizing the risk involved in investment and maximize the return from the investment. Our savings kept as cash are not only barren because they do not earn anything, but also loses its value to the extent of rise in prices. Thus, rise in prices or inflation erodes the value of money. Savings are invested to provide a hedge or protection against inflation. If the investment cannot earn as much as the rise in prices, the real rate of return would be negative. Thus, if inflation is at an average annual rate of ten percent, then the return from an investment should be above ten percent to induce savings to flow into investment.

Thus, the objectives of an investor can be stated as:

- Maximisation of return.
- Minimization of risk.
- Hedge against inflation.
- Maintaining Liquidity.
- Increasing safety.
- Tax saving.

Investors, in general, desire to earn as large returns as possible with the minimum of risk. Risk here may be understood as the probability that actual returns realized from an investment may be different from the expected return. If we consider the financial assets available for investment, we can classify them into different risk categories. Government securities would constitute the low risk category as they are practically risk free. Debentures and preference shares of companies may be classified as medium risk assets. Equity shares of companies would form the high risk category of financial assets. An investor would be prepared to assume higher risk only if he expects to get proportionately higher returns. There is a trade-off between risk and return. The expected return of an investment is directly proportional to its risk. Thus, in the financial market, there are different financial assets with varying risk-return combinations.

Investment Avenues

There are a large number of investment avenues for savers in India. Some of them are marketable and liquid while others are non marketable. Some of them are highly risky while some others are almost riskless. The investor has to choose proper avenues from among them depending on his preferences, needs and ability to assume risk.

The investment avenues can be broadly categorized under the following heads:

1. Corporate securities : Corporate securities are the securities issued by joint stock companies in the private sector. These include equity shares, preference shares and debentures. Equity shares have variable dividend and hence belong to the high risk-high return category, while preference shares and debentures have fixed returns with lower risk.

2. Deposits in banks and non-banking companies : Among the non-corporate investments, the most popular are deposits with banks such as savings accounts and fixed deposits. Savings deposits have low interest rates whereas fixed deposits have higher interest rates varying with the period of maturity. Interest is payable quarterly or half-yearly. Fixed deposits may also be recurring deposits wherein savings are deposited at regular intervals. Some banks have reinvestment plans wherein the interest is reinvested as it gets accrued. The principal and accumulated interests are paid on maturity.

Joint stock companies also accept fixed deposits from the public. The maturity period varies from three to five years. Fixed deposits in companies have high risk since they are unsecured, but they promise higher returns than bank deposits. Fixed deposit in non-banking financial companies (NBFCs) is another investment avenue open to savers. NBFCs include leasing companies, investment companies, chit funds, etc. Deposits in NSFCs carry higher returns with higher risk compared to bank deposits.

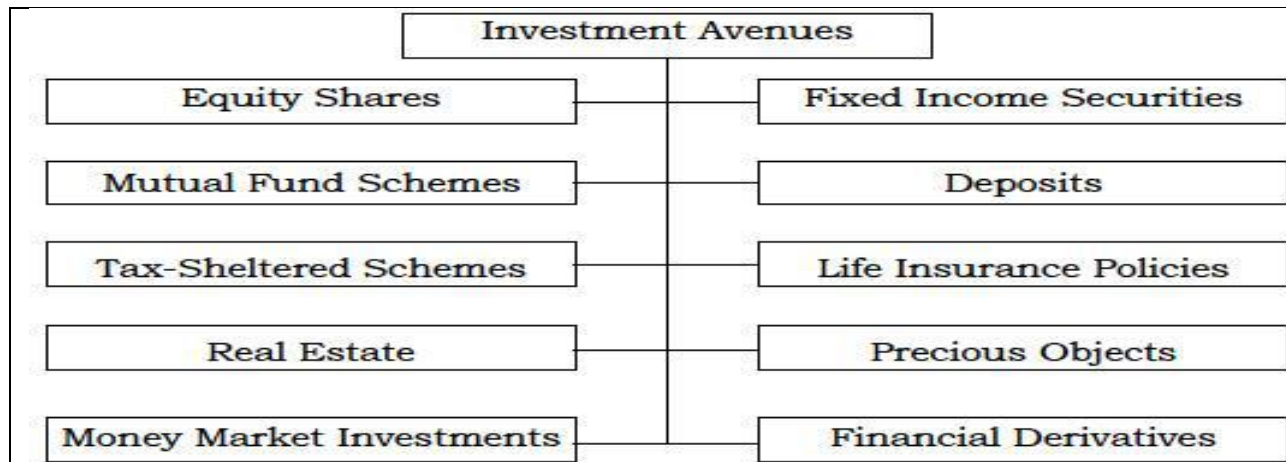
3. UTI and other mutual fund schemes : Mutual funds offer various investment schemes to investors. UTI is the oldest and the largest mutual fund in the country. Unit Scheme 1964, Unit Linked Insurance Plan 1971, Master Share, Master Equity Plans, Master gain, etc. are some of the popular schemes of UTI. A number of commercial banks and financial institutions have set up mutual funds. Recently mutual funds have been set up in the private sector also.

4. Post office deposits and certificates : The investment avenues provided by post offices are generally non-marketable. Moreover, the major investments in post office enjoy tax concessions also. Post office accepts savings deposits as well as fixed deposits from the public. There is also recurring deposit scheme which is an instrument of regular monthly savings. Six-year National Savings Certificates (NSC) are issued by post office to investors. The interest on the amount invested is compounded half-yearly and is payable along with the principal at the time of maturity which is six years from the date of issue. Indira Vikas Patra and Kisan Vikas Patra are savings certificates issued by post officers.

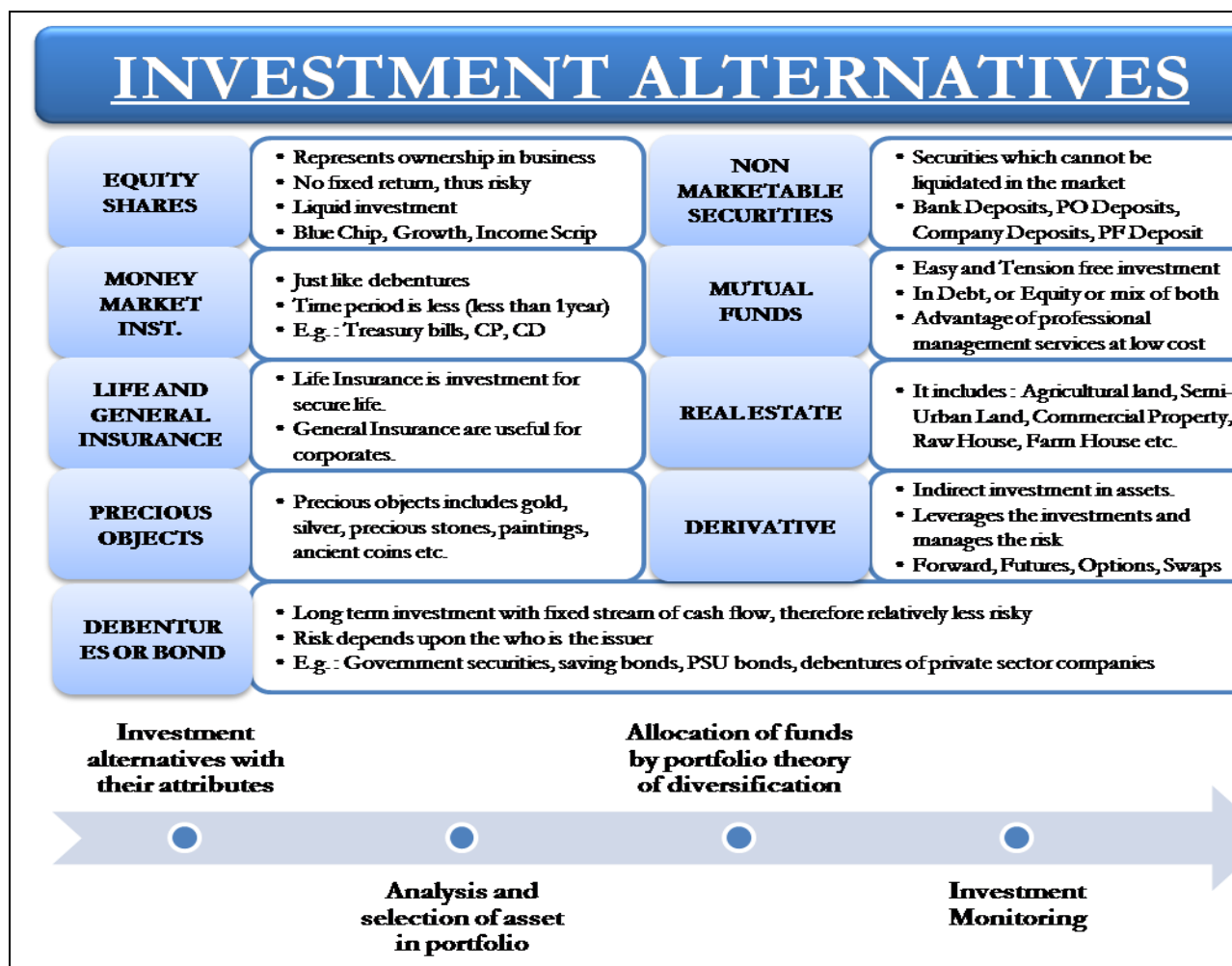
5. Life insurance policies : The Life Insurance Corporation (LIC) offers many investment schemes to investors. These schemes have the additional facility of life insurance cover. Some of the schemes of LIC are whole Life Policies, Convertible Whole Life Assurance Policies, Endowment Assurance Policies, Jeevan Saathi, Money Back Plan, Jeevan Dhara, Marriage Endowment Plan etc.

6. Provident fund schemes : Provident fund schemes are compulsory deposit schemes applicable to employees in the public and private sectors. There are three kinds of provident funds applicable to different sectors of employment, namely Statutory Provident Fund, Recognised Provident Fund and Unrecognised Provident Fund.

7. Government and semi-government securities. : The government and semi-Government bodies like the public sector undertakings borrow money from the public through the issue of government securities and public sector bonds. These are less risky avenues of investment because of the credibility of the government and government undertakings. Further, the following charts will help you to understand more about Avenues of Investment.



Investment Alternatives



Process of Investment

The investment process involves a series of activities leading to the purchase of securities or other investment alternatives.

The process can be divided into five stages:

- i) Framing of the investment policy
- ii) Investment analysis
- iii) Valuation
- iv) Portfolio construction
- v) Portfolio evaluation.

These can be explained below :

i) Framing of the investment policy:

For systematic functioning, the government or investor, formulates the investment policy before proceeding to invest. The essential ingredients of the policy are:

- a) *Investible funds:* Funds may be generated through savings or from borrowings. If the funds are borrowed, the investor has to be extra careful in the selection of investment alternatives. He must make sure that the returns are higher than the interest he pays.

- b) *Objectives:* The objectives are framed on the premises of the required rate of return, need for regular income, risk perception and the need for liquidity. The risk taker's objective is to earn a high rate of return in the form of capital appreciation whereas the primary objective of the risk-averse is the safety of principal.
- c) *Knowledge:* Knowledge about investment alternatives and markets plays a key role in policy formulation. Investment alternatives range from security to real estate. The risk and return associated with investment alternatives differ from each other. The investor should be aware of the stock market structure and functions of the brokers. The modes of operations are different in the BSE, NSE and OTCEI. Brokerage charges are also different. Knowledge about stock exchanges enables an investor to trade the stock intelligently.
- ii) **Security Analysis:**

Securities to be brought are scrutinized through market, industry and company analyses after the formulation of investment policy.

 - a) *Market analysis :* The growth in Gross Domestic product and inflation is reflected in stock prices. Recession in the economy results in a bear market. Stock prices may fluctuate in the short run but in the long run, they move in trends. The investor can fix his entry and exit points through technical analysis.
 - b) *Industry analysis:* An analysis of the performance, prospectus and problems of an industry of interest is known as industry analysis. The risk factors related to the automobile industry are different from those related to the information technology industry. The performance of an industry reflects the performance of the companies it consists of.
 - c) *Company analysis:* The purpose of company analysis is to help the investors make better decisions. The company's earnings, profitability, operating analysis, capital structure and management have to be screened. A company with a high product market share is able to create wealth for investors in the form of capital appreciation.
- iii) **Valuation:**

Valuation helps the investor determine the return and risk expected from an investment in common stock.

Intrinsic value of the share is measured through the book value of the share and price earning ratio. Simple discounting models can be adopted to value the shares.

Future value of securities can be estimated by using a simple statistical technique like trend analysis. The analysis of the historical behavioral of price enables the investor to predict the future value.
- iv) **Construction of a portfolio:**

A portfolio is a combination of securities. By constructing a portfolio, investors attempt to spread risk by not putting all their eggs into one basket and it also helps to meet their goals and objectives.

 - a) *Diversification:* The main objective of diversification is the reduction of risk in the form of loss of capital and income. A diversified portfolio is comparatively less

risky than holding a single portfolio. Several models are available to diversify a portfolio.

Debt and equity diversification: Debt instruments provide assured returns with limited capital appreciation. Common stock provide income and capital gain but with a flavor of uncertainty.

Industry diversification: Banking industry shares may provide regular returns but with limited capital appreciation. Information technology stocks yield higher returns and capital appreciation.

Company diversification: Securities from different companies are purchased to reduce the risk.

Technical and fundamental analysts suggest the investors to buy the securities.

b) Selection and Allocation: Securities have to be selected based on the level of diversification and funds are allocated for selected securities.

v) **Portfolio Evaluation:**

It is the process which is concerned with assessing the performance of the portfolio over a selected period of time in terms of return and risk.

a) Appraisal: Developments in the economy, industry and relevant companies from which stocks are bought have to be appraised. The appraisal warns of the loss and steps can be taken to avoid such losses.

b) Revision: It depends on the results of the appraisal. Low-yielding securities with high risk are replaced with high-yielding securities with low risk factor. The investor periodically revises the components of the portfolio to keep the return at a level.

Process of Investment

Stages of the Investment Process				
I	II	III	IV	V
Investment Policy	Investment Analysis	Investment Valuation	Portfolio Construction	Portfolio Evaluation
⇓	⇓	⇓	⇓	⇓
Investible Funds	Market	Intrinsic Value	Diversification	Appraisal
Objectives	Industry	Future Value	Selection and Allocation	Revision
Knowledge	Company			

Investment Vs Speculation

Investment and speculation are two terms which are closely related. Both involve purchase of assets like shares and securities. Traditionally, investment is distinguished from speculation with respect to three factors, viz. (1) risk, (2) capital gain and (3) time period.

Risk

It refers to the possibility of incurring a loss in a financial transaction. It arises from the possibility of variation in returns from an investment. Risk is invariably related to return. Higher return is associated with higher risk.

No investment is completely risk free. An investor generally commits his funds to low risk investment, whereas a speculator commits his funds to higher risk investments. A speculator is prepared to take higher risks in order to achieve higher returns.

Capital Gain

The speculator's motive is to achieve profits through price changes, i.e. he is interested in capital gains rather than the income from the investment. If purchase of securities is preceded by proper investigation and analysis to receive a stable return and capital appreciation over a period of time, it is investment.

Thus, speculation is associated with buying low and selling high with the hope of making large capital gains. A speculator consequently engages in frequent buying and selling transactions.

Time Period

Investment is long-term in nature, whereas speculation is short-term. An investor commits his funds for a longer period and waits for his return. But a speculator is interested in short-term trade gains through buying and selling of investment instruments.

Analysis of these distinctions helps us to identify the role of an investor and a speculator. An investor is interested in a good rate of return earned on a rather consistent basis for a relatively longer period of time. He evaluates the worth of a security before investing in it. A speculator seeks opportunities promising very large returns earned rather quickly. He is interested in market action and price movements. Consequently, speculation is more risky than investment.

Basically, both investment and speculation aim at good returns. The difference is in motives and methods. As a result, the distinction between investment and speculation is not very wide. Investment is sometimes described as a well grounded and carefully planned speculation.

Investment Vs Gambling

Investment has also to be distinguished from gambling. Typical examples of gambling are horse races, card games, lotteries, etc. Gambling consists in taking high risks not only for high returns, but also for thrill and excitement. Gambling is unplanned and non scientific, without knowledge of the nature of the risk involved. It is surrounded by uncertainty and is based on tips and rumors. In gambling artificial and unnecessary risks are created for increasing the returns. Investment is an attempt to carefully plan, evaluate and allocate funds to various investment outlets which offer safety of principal and moderate and continuous return over a long period of time. Gambling is quite the opposite of investment.

Types of Investors

Investors may be individuals and institutions. Individual investors operate alongside institutional investors in the investment arena. However, their characteristics are different.

Individual investors are large in number but their investable resources are comparatively smaller. They generally lack the skill to carry out extensive evaluation and analysis before investing. Moreover, they do not have the time and resources to engage in such an analysis.

Institutional investors, on the other hand, are the organizations with surplus funds who engage in investment activities. Mutual funds, investment companies, banking and non-banking companies, insurance corporations, etc. are the organizations with large amounts of surplus funds to be invested in various profitable avenues.

These institutional investors are fewer in number compared to individual investors, but their investable resources are much larger. The institutional investors engage professional fund managers to carry out extensive analysis and evaluation of different investment opportunities.

As a result their investment activity tends to be more rational and scientific. They have a better chance of maximizing returns and minimizing risk. The professional investors and the unskilled individual investors combine to make the investment arena dynamic.

Introduction to Stock Markets : Objectives, Trading Mechanism, Stock index, Types of index, IPO Process.

Learning Outcomes:

After learning this Lesson, you will be able to understand the concepts related to Stock markets, and the importance of Stock exchange as regulatory body to protect the investor's protection.

Pre-Requisites:

Financial Markets

Generally speaking, there is no specific place or location to indicate a financial market. Wherever a financial transaction takes place, it is deemed to have taken place in the financial market. Hence financial markets are pervasive in nature since financial transactions are themselves very pervasive throughout the economic system. For instance, issue of equity shares, granting of loan by term lending institutions, deposit of money into a bank, purchase of debentures, sale of shares and so on.

However, financial markets can be referred to as those centers and arrangements which facilitate buying and selling of financial assets, claims and services. Sometimes, we do find the existence of a specific place or location for a financial market as in the case of stock exchange.

Classification of Financial Markets

(a) Unorganised Markets : In these markets there are a number of money lenders, indigenous bankers, traders etc., who lend money to the public. Indigenous bankers also collect deposits from the public. There are also private finance companies, chit funds etc., whose activities are not controlled by the RBI. Recently the RBI has taken steps to bring private finance companies and chit funds under its strict control by issuing non-banking financial companies (Reserve Bank) Directions, 1998. The RBI has already taken some steps to bring the unorganized sector under the organized fold. They have not been successful. The regulations concerning their financial dealings are still inadequate and their financial instruments have not been standardized.

(b) Organised Markets : In the organized markets, there are standardized rules and regulations governing their financial dealings. There is also a high degree of institutionalization and instrumentalisation. These markets are subject to strict supervision and control by the RBI or other regulatory bodies.

These organized markets can be further classified into two. They are :

(i) Capital market

(ii) Money market

Capital Market : The capital market is a market for financial assets which have a long or indefinite maturity. Generally, it deals with long term securities which have a maturity period of above one year. Capital market may be further divided into three namely :

(i) Industrial securities market

- (ii) Government securities market and
- (iii) Long term loans market

I. Industrial securities market

As the very name implies, it is a market for industrial securities namely: (i) Equity shares or ordinary shares, (ii) Preference shares, and (iii) Debentures or bonds. It is a market where industrial concerns raise their capital or debt by issuing appropriate instruments. It can be further subdivided into two. They are :

- (i) Primary market or New issue market**
- (ii) Secondary market or Stock exchange**

Primary Market : Primary market is a market for new issues or new financial claims. Hence it is also called New Issue market. The primary market deals with those securities which are issued to the public for the first time. In the primary market, borrowers exchange new financial securities for long term funds. Thus, primary market facilitates capital formation.

There are three ways by which a company may raise capital in a primary market. They are :

- (i) Public issue
- (ii) Rights issue
- (iii) Private placement

The most common method of raising capital by new companies is through sale of securities to the public. It is called public issue. When an existing company wants to raise additional capital, securities are first offered to the existing shareholders on a pre-emptive basis. It is called rights issue. Private placement is a way of selling securities privately to a small group of investors.

Secondary Market : Secondary market is a market for secondary sale of securities. In other words, securities which have already passed through the new issue market are traded in this market. Generally, such securities are quoted in the stock exchange and it provides a continuous and regular market for buying and selling of securities. This market consists of all stock exchanges recognized by the Government of India. The stock exchanges in India are regulated under the Securities Contracts (Regulation) Act, 1956. The Bombay Stock Exchange is the principal stock exchange in India which sets the tone of the other stock markets.

Introduction to Stock Markets

A **stock exchange** is an **exchange** where **stockbrokers** and **traders** can buy and sell **shares** (equity **stock**), **bonds**, and other **securities**. Many large companies have their stocks listed on a stock exchange. This makes the stock more liquid and thus more attractive to many investors. The exchange may also act as a guarantor of settlement. These and other stocks may also be traded "over the counter" (OTC), that is, through a dealer. Some large companies will have their stock listed on more than one exchange in different countries, so as to attract international investors.

Stock exchanges may also cover other types of securities, such as fixed-interest securities (bonds) or (less frequently) derivatives, which are more likely to be traded OTC. Trade in stock markets means the transfer (in exchange for money) of a stock or security from a seller to a buyer. This requires these two parties to agree on a price. **Equities** (stocks or shares) confer an ownership interest in a particular company.

Participants in the stock market range from small individual **stock investors** to larger investors, who can be based anywhere in the world, and may include **banks**, **insurance** companies, **pension funds** and **hedge funds**. Their buy or sell orders may be executed on their behalf by a stock exchange **trader**.

Some exchanges are physical locations where transactions are carried out on a trading floor, by a method known as **open outcry**. This method is used in some stock exchanges and **commodities exchanges**, and involves traders shouting bid and offer prices. The other type of stock exchange has a network of computers where trades are made electronically. An example of such an exchange is the **NASDAQ**.

A potential buyer *bids* a specific price for a stock, and a potential seller *asks* a specific price for the same stock. Buying or selling *at the market* means you will accept *any* ask price or bid price for the stock. When the bid and ask prices match, a sale takes place, on a first-come, first-served basis if there are multiple bidders at a given price.

The purpose of a stock exchange is to facilitate the exchange of securities between buyers and sellers, thus providing a **marketplace**. The exchanges provide real-time trading information on the listed securities, facilitating **price discovery**.

Stock Exchange in India

The concept of stock markets came to India in 1875, when Bombay Stock Exchange (BSE) was established as 'The Native Share and Stock brokers Association' a voluntary non-profit making association. We all know it, the Bhaji (Sabji) market in your neighborhood is a place where vegetables are bought and sold. Like Bhaji (Sabji) market, a stock market is a place where stocks shares are bought and sold. The stock market determines the day's price for a stock through a process of bid and offer. You have right to bid and buy a stock shares and offer to sell the stock shares at a valuable price.

Buyers compete with each other for the best bid and get their highest price quoted to purchase a particular Stock Market Shares. Similarly, sellers compete with each other for the lowest price quoted to sell the stock. When a match is made between the best bid and the best offer a trade is executed. In automated exchanges high speed computers do this entire job. Stocks of various companies are listed on stock exchanges. Presently there are 23 stock markets in India. The Bombay Stock Exchange (BSE), the National Stock Exchange (NSE) and the Calcutta Stock Exchange (CSE) are the three large stock exchanges. There are many small regional exchanges located in state capitals and other major cities.

The National Stock Exchange of India (NSEI), with its scrip-less trading system, can be regarded as a milestone in the development of stock market in India. In short, stock exchanges, as secondary market in industrial securities, furnish an important mechanism of imparting liquidity in Indian capital market.

There are 23 stock exchanges in India. But among these stock exchanges there are four famous stock exchanges in India namely Bombay Stock Exchange (BSE) National Stock Exchange (NSE), Over the Counter Exchange of India (OTCEI) and Inter-Connected Stock Exchange of India (ICSEI).

BSE's index is known by the name SENSEX (Sensitive Index) which shows 30 top trading companies. Nifty (National Fifty) is the index of NSE, displays 50 most traded companies. BSE started as an Association of persons in 1875, which was accredited as a stock exchange in 1957.

In India, there are two major stock exchanges - NSE or National Stock Exchange & BSE or Bombay Stock Exchange. BSE is the oldest stock exchange in Asia while NSE is the largest in the country. Sensex & Nifty are indexes or indicators that offer a general idea about whether most of the stocks have gone up or down.

Stock Exchange Market

The expression 'stock market' refers to the market that enables the trading of company stocks (collective shares), other securities, and derivatives. Bonds are still traditionally traded in an informal, over-the-counter market known as the bond market. Commodities are traded in commodities markets, and derivatives are traded in a variety of markets (but, like bonds, mostly 'over-the-counter').

Role of Stock Exchanges

Stock exchange apart from being hub of primary and secondary market, they have very important role to play in the economy of the country. Some of them are listed below:

- **Raising capital for businesses**
- **Mobilizing savings for investment**
- **Facilitating company growth**
- **Profit sharing**
- **Corporate governance**
- **Creating investment opportunities for small investors**
- **Government capital raising for development projects**
- **Barometer of the economy**

Functions of Stock Market

- i) Established for the purpose of assisting, regulating and controlling business of buying, selling and dealing in securities
- ii) Provides a market for the trading of securities to individuals and organizations seeking to invest their saving or excess funds through the purchase of securities
- iii) Provides a physical location for buying and selling securities that have been listed for trading on that exchange
- iv) Establishes rules for fair trading practices and regulates the trading activities of its members according to those rules
- v) Ensure transparency by providing information to the investor and helps in intelligent decision making about the particular stock based on information

Objectives of Stock Markets

The main objectives of stock market are:

- i) **Raising Money for Business:** Stock exchanges around the world enable companies around the world to raise money. Nowadays, they're mostly electronic markets where licensed stock brokerages, and the traders representing them, buy and sell shares. Through exchanges, private companies sell stock in the form of publicly traded shares. Those wishing to invest in stock place buy or sell orders through regulated brokerage firms.
- ii) **Capital Formation:** The primary function of a stock exchange is to help companies raise money. To accomplish this task, ownership in a private corporation is sold to the public in the form of shares of stock. Funds received from the sale of stock contribute to the firm's capital formation. Companies plan to use the newly-raised funds to invest in productive business assets and grow revenues and profits. This positive business expansion then may be reflected in a higher stock trading price.
- iii) **Security and Transparency:** The legitimate sale of stock on any exchange requires reliable and accurate information. By requiring a high level of transparency from all trading companies, the stock exchange creates a more secure environment for investors, which helps them to determine the risks of investing.
- iv) **Trading of Stocks:** An organized and regulated stock exchange facilitates the efficient trading of stock and other investment vehicles. Without this highly controlled and coordinated stock exchange, the global trading of stock would not be possible. Through the stock exchange, any individual or company may buy or sell shares in another company. In fact at any one time, there are thousands of company shares being traded through millions of individual transactions.

Trading Mechanism

Trading Mechanism of Securities. Basically **stock exchange** is an entity that provides facility or service to the broker and **trader** to **trade** on **stocks**, bonds, derivatives. In India we have two **stock exchanges** - BSE and NSE.

Trading Procedure :

- i) **Selecting a Broker or Sub-broker :** When a person wishes to **trade** in the stock market, it cannot do so in his/her individual capacity. The transactions can only occur through a broker or a sub-broker. So according to one's requirement, a broker must be appointed. Now such a broker can be an individual or a **partnership** or a company or a **financial institution** (like banks). They must be registered under SEBI. Once such a broker is appointed you can buy/sell shares on the stock exchange.
- ii) **Opening a Demat Account :** Since the reforms, all securities are now in electronic format. There are no issues of physical shares/securities anymore. So an investor must open a dematerialized account, i.e. a Demat account to hold and trade in such electronic securities. So you or your broker will open a Demat account with the depository participant. Currently, in India, there are two depository participants, namely Central Depository Services Ltd. (CDSL) and National Depository Services Ltd. (NDSL).

iii) **Placing Orders** : And then the investor will actually place an order to buy or sell shares. The order will be placed with his broker, or the individual can transact online if the broker provides such services. One thing of essential importance is that the order /instructions should be very clear. Example: Buy 100 shares of XYZ Co. for a price of Rs. 140/- or less.

Then the broker will act according to your transactions and place an order for the shares at the price mentioned or an even better price if available. The broker will issue an order confirmation slip to the investor.

iv) **Execution of the Order** : Once the broker receives the order from the investor, he executes it. Within 24 hours of this, the broker must issue a Contract Note. This document contains all the information about the transactions, like the number of shares transacted, the price, date and time of the transaction, brokerage amount, etc.

Contract Note is an important document. In the case of a legal dispute, it is evidence of the transaction. It also contains the Unique Order Code assigned to it by the stock exchange.

v) **Settlement** : Here the actual securities are transferred from the buyer to the seller. And the funds will also be transferred. Here too the broker will deal with the transfer. There are two types of settlements,

On the *Spot settlement*: Here we exchange the funds immediately and the settlement follows the T+2 pattern. So a transaction occurring on Monday will be settled by Wednesday (by the second working day)

Forward Settlement: Simply means both parties have decided the settlement will take place on some future date. It can be T+% or T+9 etc.

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| Step 1 : Finding a Broker |
| Step 2 : Opening an Account with the Broker |
| Step 3 : Placing the Order |
| Step 4 : Executing the Order |
| Step 5 : Preparation of Contract Notes |
| Step 6 : Settlement of Contracts |

Stock Index

A **stock index**, or **stock market index**, is an **index** that measures a **stock market**, or a subset of the stock market, that helps investors compare current price levels with past prices to calculate market performance. It is computed from the prices of selected **stocks** (typically a **weighted arithmetic mean**).

Two of the primary criteria of an index are that it is *investable* and *transparent*. The method of its construction are specified. Investors can invest in a stock market index by buying an **index fund**, which are structured as either a **mutual fund** or an **exchange-traded fund**, and "track" an index. The difference between an index fund's performance and the index, if any, is called *tracking error*.

The movements of the prices in global, regional or local markets are captured in price indices called stock market indices, of which there are many, e.g. the **S&P**, the **FTSE** and the **Euronext** indices. Such indices are usually **market capitalization** weighted, with the

weights reflecting the contribution of the stock to the index. The constituents of the index are reviewed frequently to include/exclude stocks in order to reflect the changing business environment.

The **BSE SENSEX** (also known as the S&P Bombay Stock Exchange Sensitive Index or simply the **SENSEX**) is a free-float market-weighted stock market index of 30 well-established and financially sound companies listed on **Bombay Stock Exchange**. The 30 component companies which are some of the largest and most actively traded stocks, are representative of various industrial sectors of the Indian economy. Published since 1 January 1986, the S&P BSE SENSEX is regarded as the pulse of the domestic stock markets in India. The base value of the SENSEX was taken as 100 on 1 April 1979 and its base year as 1978–79. On 25 July 2001 BSE launched **DOLLEX-30**, a dollar-linked version of the SENSEX. The normal trading time for equity market is between 9:15 am to 03:30 pm, Monday to Friday.

The **NIFTY 50** is a benchmark Indian stock market index that represents the weighted average of 50 of the largest Indian companies listed on the **National Stock Exchange**. It is one of the two main stock indices used in India, the other being the **BSE SENSEX**. Nifty 50 is owned and managed by **NSE Indices** (previously known as India Index Services & Products Limited), which is a wholly owned subsidiary of the NSE Strategic Investment Corporation Limited. **NSE Indices** had a marketing and licensing agreement with **Standard & Poor's** for co-branding equity indices until 2013. The Nifty 50 index was launched on 22 April 1996, and is one of the many stock indices of Nifty.

Types of index

A **stock index** or **stock market index** is a measurement of a section of the stock market. From among the stocks listed on the exchange, some similar stocks are selected and grouped together to form an index.

The values of the grouped stocks are used to calculate the value of the index (typically a weighted average). Any change in the price of the stocks leads to a change in the index value. An index is thus indicative of the changes in the market and used by investors and financial managers to describe the market and to compare the return on specific investments.

1. Broad Market Indices

These indices are broad-market indices, consisting of the large, liquid stocks listed on the Exchange. They serve as a benchmark for measuring the performance of the stocks or portfolios such as mutual fund investments.

In Bombay Stock Exchange (BSE)

SENSEX

The BSE SENSEX (S&P Bombay Stock Exchange Sensitive Index), also-called the BSE 30 or simply the SENSEX, is a free float market weighted stock market index of 30 well established and financially sound companies listed on Bombay Stock Exchange . The 30 component companies which are some of the largest and most actively traded stocks, are representative of various industrial of the Indian economy. Sensensex is the stock market index indicator for the BSE. It was first published in 1986.

How is Sensex calculated ?

The calculation of Sensex is done by a Free-Float method that came into existence from September 1, 2003. The level of Sensex is a direct indication of the performance of 30 stocks in the market. The free-float method takes into account the proportion of the shares that can be readily traded in the market. This does not include the ones held by various shareholders and promoters or other locked-in shares not available in the market.

First, the market capitalization is taken into account. This is done by multiplying all the shares issued by the company with the price of its stock. Then BSE determines a Free-float factor that is a multiple of the market capitalization of the company. This helps in determining the free-float market capitalization based on the details submitted by the company. Then, Ratio and Proportion are used based on the base index of 100. This helps to determine the Sensex.

Other Indices :

- S&P BSE Consumer Discretionary Goods & Services
- S&P BSE Basic Materials
- S&P BSE LargeCap
- S&P BSE AllCap
- S&P BSE MidCap
- S&P BSE SmallCap

In National Stock Exchange (NSE)

NIFTY

The NIFTY 50 index is National Stock Exchange of India's benchmark stock market index for Indian equity market. Nifty is owned and managed by India Index service & products (IISL) . The NIFTY 50 covers 13 sectors of the Indian economy and offers investment managers exposure to the Indian market in one portfolio.

Nifty is the market indicator of NSE. It ideally is a collection of 50 stocks but presently has 51 listed in it. It is also referred to as Nifty 50 and CNX Nifty by some as it is owned.

How is Nifty calculated ?

Nifty is also calculated through the free-float market capitalization weighted method. Just like Sensex, Nifty also follows a mathematical formula based to know the market capitalization. It multiplies the Equity capital with a price to derive the market capitalization. To determine the Free-float market capitalization, equity capital is multiplied by a price which is further multiplied with IWF, which is the factor for determining the number of shares available for trading freely in the market. The Index is determined on a daily basis by taking into consideration the current market value divided by base market capital and then multiplied by the Base Index Value of 1000.

Other Indices

- NIFTY 50 Index
- NIFTY Next 50 Index
- NIFTY 100 Index
- NIFTY 200 Index

- NIFTY 500 Index
- NIFTY Midcap 150 Index
- NIFTY Midcap 50 Index
- NIFTY Full Midcap 100 Index
- NIFTY Free Float Midcap 100 Index
- NIFTY Smallcap 250 Index
- NIFTY Smallcap 50 Index
- NIFTY Full Smallcap 100 Index
- NIFTY Free Float Smallcap 100 Index
- NIFTY LargeMidcap 250 Index
- NIFTY MidSmallcap 400 Index

2. Sectoral Indices

The Market Sector Indices summarizes the performance of stocks grouped by specific market sectors. This allows investors to benchmark the performance of a particular stock market sector or industry.

In National Stock Exchange (NSE)

Sectoral Indices in NSE are :

Nifty Auto Index : The Nifty Auto Index is designed to reflect the behavior and performance of the Automobiles sector which includes manufacturer of cars & motorcycles, heavy vehicles, auto ancillaries, tyres, etc. The Nifty Auto Index comprises of 15 stocks that are listed on the National Stock Exchange.

Nifty Bank Index : Nifty Bank Index is an index comprised of the most liquid and large capitalized Indian Banking stocks. It provides investors and market intermediaries with a benchmark that captures the capital market performance of Indian Banks. The index has 12 stocks from the banking sector which trade on the National Stock Exchange.

Nifty Financial Services Index : The Nifty Financial Services Index is designed to reflect the behavior and performance of the Indian financial market which includes banks, financial institutions and housing finance and other financial services companies. The Nifty Finance Index comprises of 15 stocks that are listed on the National Stock Exchange (NSE).

Nifty FMCG Index : FMCGs (Fast Moving Consumer Goods) are those goods and products, which are non-durable, mass consumption products and available off the shelf. The Nifty FMCG Index comprises of maximum of 15 companies who manufacture such products which are listed on the National Stock Exchange (NSE).

Nifty IT Index : Information Technology (IT) industry has played a major role in the Indian economy. In order to have a good benchmark of the Indian IT sector, IISL has developed the Nifty IT sector index. Nifty IT provides investors and market intermediaries with an appropriate benchmark that captures the performance of the IT segment of the market. Companies in this index are those that have more than 50% of their turnover from IT related activities like IT Infrastructure , IT Education and Software Training , Telecommunication Services and Networking Infrastructure, Software Development, Hardware Manufacturer's, Vending, Support and Maintenance.

Nifty Media Index :The Nifty Media Index is designed to reflect the behavior and performance of the Media & Entertainment sector including printing and publishing. The Nifty Media Index comprises of stocks that are listed on the National Stock Exchange (NSE).

Nifty Metal Index :The Nifty Metal Index is designed to reflect the behavior and performance of the Metals sector including mining. The Nifty Metal Index comprises of maximum of 15 stocks that are listed on the National Stock Exchange.

Nifty Pharma Index :Pharmaceuticals sector is one of the key sectors where Indian companies have created a global brand for themselves besides software. Indian companies have taken advantage of the opportunities in the regulated generics market in the western countries and made deep inroads especially in providing low cost equivalents of expensive drugs. Pharma outsourcing into India and low cost Healthcare services are expected to be the key areas of growth in the near future. In addition, the inherent potential of biotechnology has also attracted many new companies and this is also a key growth area for Indian companies. IISL has developed Nifty Pharma Index to capture the performance of the companies in this sector.

Nifty Private Bank Index :The Nifty Private Bank Index is designed to reflect the performance of the banks from private sector. The Nifty Private Bank Index comprises of 10 stocks that are listed on the National Stock Exchange (NSE).

Nifty PSU Bank Index : The Indian banking system, reaping the benefits of strong credit off take and improved risk management practices.The public sector banks with their existing widespread branch network have been primarily increasing their IT related expenditure. The core profitability of the public sector banks continue to rise on the back of improving operating efficiencies.Consolidation would further improve PSU banks' competitive edge against their private counterparts in servicing customers — both retail and corporate — in the international and domestic markets. Recognizing these changing dynamics of Indian banking industry, IISL has developed Nifty PSU Bank Index to capture the performance of the PSU banks.

Nifty Realty Index : Real estate sector in India is witnessing significant growth. Recent dynamics of the market reflected the opportunity of creating wealth across real estate companies, as proven by recent listings of real estate companies resulting into prominent growth in public funds and private equity. The main growth thrust is coming due to favorable demographics, increasing purchasing power, existence of customer friendly banks & housing finance companies, professionalism in the real estate sector and favourable reforms initiated by the government to attract global investors.

In Bombay Stock Exchange (BSE)

Sectoral Indices in BSE are :

- S&P BSE TECK
- S&P BSE Information Technology
- S&P BSE CONSUMER DURABLES
- S&P BSE Fast Moving Consumer Goods
- S&P BSE POWER

S&P BSE India Infrastructure Index
S&P BSE OIL & GAS
S&P BSE AUTO
S&P BSE PSU
S&P BSE Healthcare
S&P BSE CAPITAL GOODS
S&P BSE BANKEX
S&P BSE METAL
S&P BSE REALTY

3. Thematic Indices

Our Thematic Indexes reflect the performance of various broad investment themes. Thematic investing seeks to identify specific social, economic, industrial, environmental or demographic trends and their long-term secular, cyclical and structural influences on the world's economies and markets.

In National Stock Exchange (NSE)

Nifty Commodities Index
Nifty CPSE Index
Nifty Corporate Group Indices
Nifty Energy Index
Nifty India Consumption Index
Nifty Infrastructure Index
Nifty MNC Index
Nifty PSE Index
Nifty Services Sector Index
Nifty100 Liquid 15 Index
Nifty Midcap Liquid 15 Index
Nifty Shariah 25 Index
Nifty50 Shariah
Nifty500 Shariah Index

In Bombay Stock Exchange (BSE)

S&P BSE GREENEX
S&P BSE CARBONEX

4. Strategy Indices

Strategy indices are designed on the basis of quantitative models / investment strategies to provide a single value for the aggregate performance of a number of companies.

In National Stock Exchange (NSE)

NIFTY Multi-Factor Indices
NIFTY 50 Equal Weight Index
NIFTY 100 Equal Weight Index
NIFTY 100 Low Volatility 30 Index

NIFTY Alpha 50 Index
NIFTY 50 Arbitrage Index
NIFTY 50 Futures Index
NIFTY 50 USD Index
NIFTY Dividend Opportunities 50 Index
NIFTY High Beta 50 Index
NIFTY Low Volatility 50 Index
NIFTY 50 Dividend Points Index
NIFTY Quality 30 Index
NIFTY50 Value 20 Index
NIFTY Growth Sectors 15 Index
NIFTY50 PR 1x Inverse Index
NIFTY50 TR 1x Inverse Index
NIFTY 50 PR 2x Leverage Index
In Bombay Stock Exchange (BSE)
S&P BSE IPO
S&P BSE SME IPO
S&P BSE DOLLEX 30
S&P BSE DOLLEX 100
S&P BSE DOLLEX 200

Initial Public Offering (IPO)

The **Initial Public Offering (IPO)** Process is where a previously unlisted company sells new or existing securities. The issuing company creates these instruments for the express purpose of raising funds to further finance business activities and expansion. ... Thus, an **IPO** is also commonly known as “going public”.

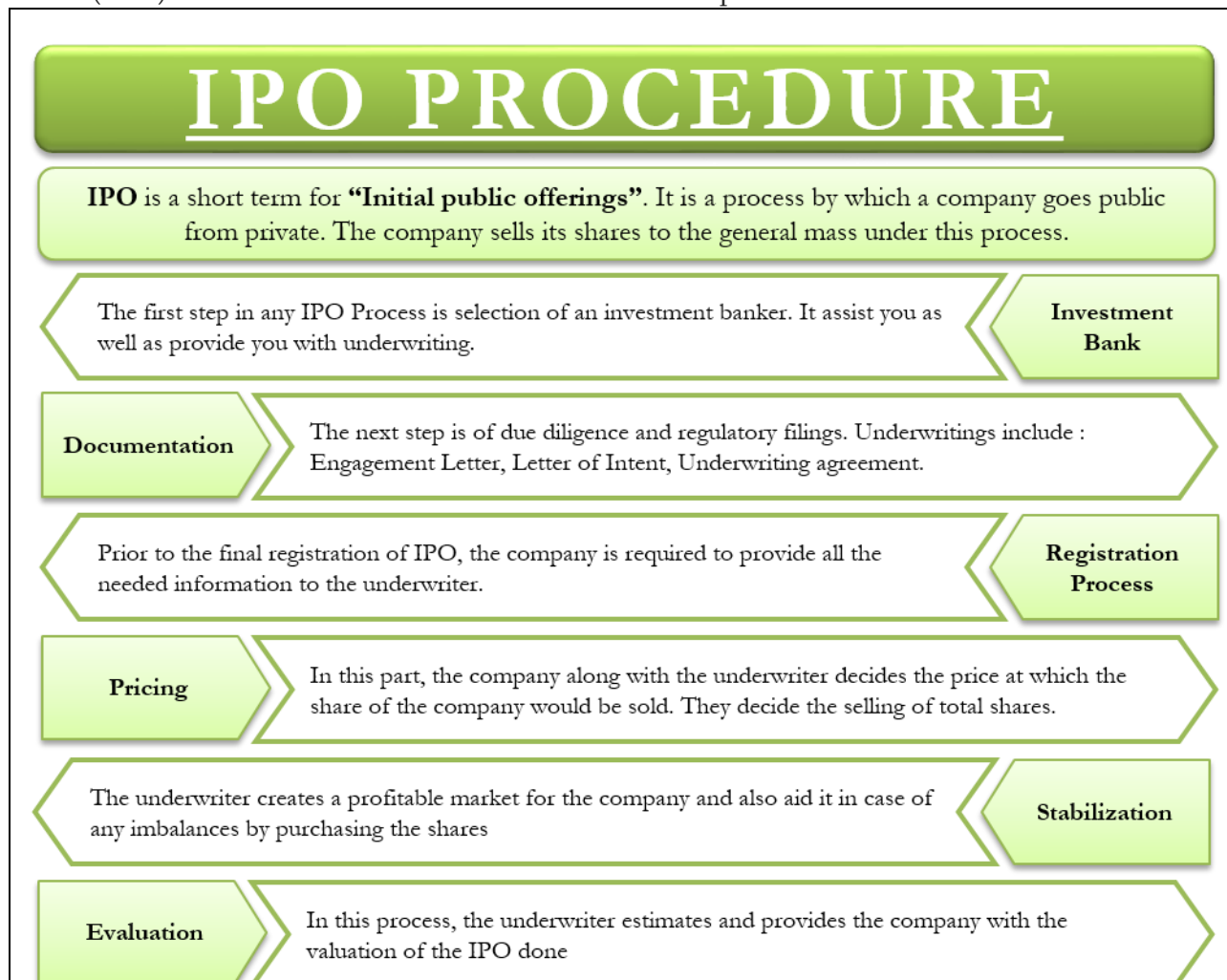
Initial public offering (IPO) or **stock market launch** is a type of **public offering** in which shares of a company are sold to **institutional investors** and usually also retail (individual) investors. An IPO is **underwritten** by one or more **investment banks**, who also arrange for the shares to be listed on one or more **stock exchanges**. Through this process, colloquially known as *floating*, or *going public*, a **privately held company** is transformed into a **public company**. Initial public offerings can be used to raise new equity capital for companies, to **monetize** the investments of private shareholders such as company founders or private equity investors, and to enable easy trading of existing holdings or future capital raising by becoming publicly traded.

After the IPO, shares are traded freely in the open market at what is known as the free float. Stock exchanges stipulate a minimum free float both in absolute terms (the total value as determined by the share price multiplied by the number of shares sold to the public) and as a proportion of the total share capital (i.e., the number of shares sold to the public divided by the total shares outstanding). Although IPO offers many benefits, there are also significant costs involved, chiefly those associated with the process such as banking and legal fees, and the ongoing requirement to disclose important and sometimes sensitive information.

Details of the proposed offering are disclosed to potential purchasers in the form of a lengthy document known as a **prospectus**. Most companies undertake an IPO with the assistance of an **investment banking** firm acting in the capacity of an **underwriter**. Underwriters provide several services, including help with correctly assessing the value of shares (share price) and establishing a public market for shares (initial sale). Alternative methods such as the **Dutch auction** have also been explored and applied for several IPOs.

IPO Process

Companies typically go public to raise huge amount of capital in exchange for securities. Once a private company is convinced about the need to become a public company, it kick-starts the **process of IPO**. Companies which want to go public follow a process that exchanges adhere to. The **IPO process** is quite complicated. So, what are steps taken, to make an initial public offer? One should note that the entire IPO process is regulated by the 'Securities and Exchange Board of India (SEBI)'. This is to check the likelihood of a scam and protect investor interest.



UNIT-2

Risk & Return analysis in Investment: Measurement of Risk and Return, Revenue Return and Holding Period Return – Calculation of Expected return, Risk factors, Risk classification – Systematic risk – Unsystematic risk – Standard deviation – Variance– Beta.

Learning Outcomes:

After learning this Lesson, you will be able to identify the various risks in Investments and understand the returns perceptions. Also understand the various tools used for analyzing the investments in risk evasion to select the investments that are available in the market.

Introduction:

Individual securities have risk return characteristics of their own. The future return expected from a security is variable and this variability of returns is termed risk. It is rare to find investors investing their entire wealth in a single security. This is because most investors have an aversion to risk. It is hoped that if money is invested in several securities simultaneously, the loss in one will be compensated by the gain in others. Thus, holding more than one security at a time is an attempt to spread and minimize risk by not putting all our eggs in one basket. Most investors thus tend to invest in a group of securities rather than a single security.

Such a group of securities held together as an investment is what is known as a portfolio. The process of creating such a portfolio is called diversification. It is an attempt to spread and minimize the risk in investment. This is sought to be achieved by holding different types of securities across different industry groups.

From a given set of securities, any number of portfolios can be constructed. A rational investor attempts to find the most efficient of these portfolios. The efficiency of each portfolio can be evaluated only in terms of the expected return and risk of the portfolio as such. Thus, determining the expected return and risk of different portfolios is a primary step in portfolio management.

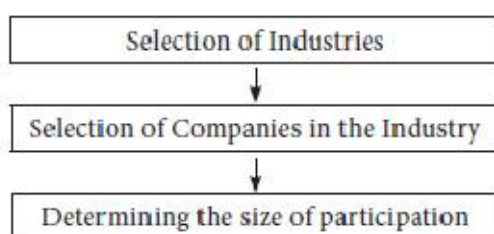
Risk and Return Analysis

The traditional approach to portfolio building has some basic assumptions. First, the individual prefers larger to smaller returns from securities. To achieve this goal, **the investor has to take more risk**. The ability to achieve higher returns is dependent upon his **ability to judge risk** and his **ability to take specific risks**. The risks are namely interest rate risk, purchasing power risk, financial risk and market risk. The investor analyses the varying degrees of risk and constructs his portfolio. At first, he establishes the minimum income that he must have to avoid hardships under most adverse economic condition and then he decides risk of loss of income that can be tolerated. The investor makes a series of compromises on risk and non-risk factors like taxation and marketability after he has assessed the major risk categories, which he is trying to minimize.

Diversification

Once the asset mix is determined and the risk and return are analysed, the final step is the diversification of portfolio. Financial risk can be minimized by commitments to top-quality bonds, but these securities offer poor resistance to inflation. Stocks provide better inflation protection than bonds but are more vulnerable to financial risks. Good quality convertibles may balance the financial risk and purchasing power risk. According to the investor's need for income and risk tolerance level portfolio is diversified. In the bond portfolio, the investor has to strike a balance between the short term and long term bonds.

Short term fixed income securities offer more risk to income and long term fixed income securities offer more risk to principal. In the stock portfolio, he has to adopt the following steps which are shown in the following figure:



The investor has to select the industries appropriate to his investment objectives. Each industry corresponds to specific goals of the investor. The sales of some industries like two wheelers and steel tend to move in tandem with the business cycle, the housing industry sales move counter cyclically. If regular income is the criterion then industries, which resist the trade cycle should be selected. Likewise, the investor has to select one or two companies from each industry. The selection of the company depends upon its growth, yield, expected earnings, past earnings, expected price earning ratio, dividend and the amount spent on research and development. Selecting the best company is widely followed by all the investors but this depends upon the investors' knowledge and perceptions regarding the company. The final step in this process is to determine the number of shares of each stock to be purchased. This involves determining the number of different stocks that is required to give adequate diversification. Depending upon the size of the portfolio, equal amount is allocated to each stock. The investor has to purchase round lots to avoid transaction costs.

Modern Approach

The traditional approach is a comprehensive financial plan for the individual. It takes into account the individual needs such as housing, life insurance and pension plans. But these types of financial planning approaches are not done in the Markowitz approach. Markowitz gives more attention to the process of selecting the portfolio. His planning can be applied more in the selection of common stocks portfolio than the bond portfolio. The stocks are not selected on the basis of need for income or appreciation. But the selection is based on the risk and return analysis. Return includes the market return and dividend. The investor

needs return and it may be either in the form of market return or dividend. They are assumed to be indifferent towards the form of return.

From the list of stocks quoted at the Bombay Stock Exchange or at any other regional stock exchange, the investor selects roughly some group of shares say of 10 or 15 stocks. For these stocks' expected return and risk would be calculated. The investor is assumed to have the objective of maximizing the expected return and minimising the risk. Further, it is assumed that investors would take up risk in a situation when adequately rewarded for it. This implies that individuals would prefer the portfolio of highest expected return for a given level of risk. In the modern approach, the final step is asset allocation process that is to choose the portfolio that meets the requirement of the investor. The risk taker i.e. who are willing to accept a higher probability of risk for getting the expected return would choose high risk portfolio. Investor with lower tolerance for risk would choose low level risk portfolio. The risk neutral investor would choose the medium level risk portfolio.

RISK

Risk is a situation wherein objective probability distribution of the values a variable is known, even though the exact values it would take are not known. The objective probability is one which is supported by rigorous theory, past experience, and the laws of chance. The risk can be defined as the chance that the expected or prospective advantage, gain, profit or return may not materialise; that the actual outcome of investment may be less than the expected outcome. The greater the variability or dispersion in the possible outcomes, or the broader the range of possible outcomes, the greater the risk.

Risk Factors

The variance and standard deviation of return serve as the alternative statistical measures of the risk of the security in an absolute sense. Covariance measures the risk of the security relative to other securities in a portfolio. Value-at-risk is a statistical measure of the riskiness of financial assets or portfolios of assets.

In influencing the fixed prices, there are two categories of factors,. They are

☐ Risk factors:

- ✓ Terms of issue offer or provision in Debenture Trust Deed.
- ✓ Earnings power
- ✓ Liquidity
- ✓ Management

☐ Non-Risk factors:

- ✓ Legal and procedural difficulties
- ✓ Market and marketability
- ✓ Incentives and call factors
- ✓ Tax factors

Types of Risk/ Risk Classification

The variability in a security's total return that is directly associated with the overall movements in the general market or economy is called **systematic risk**. This risk cannot be diversified. The systematic risk arises due to the fluctuations of the macroeconomic fundamentals like interest rate, inflation etc.

The variability in a security's total return that is not related to the overall market variability is called **unsystematic risk**. This type of risk can be diversified and it is specific to individual entity i.e. individual company. The unsystematic risk can also be called as idiosyncratic risk.

A. Types of Systematic Risk

Market Risk (Beta) :

Beta indicates the extent to which the risk of a given asset is non-diversifiable; it is a coefficient measuring a security's relative volatility. Statistically, beta is the covariance of a security's return with that of the market for a security class. It is the slope of the regression line relating a security return with the market return. The security with a higher (than 1) beta is more volatile than the market, and the asset with a lower (than 1) beta would rise or fall more slowly than the market.

Interest Rate Risk :

Interest rate risk is the variability in return on security due to changes in the level of market interest rates. Interest rate risk has two parts.

First, the **price risk** resulting from the inverse relationship between the security price and interest rates.

Second, the **reinvestment risk** resulting from the uncertainty about the interest rate at which the future coupon income or principal can be reinvested.

These two parts of interest rate risk move in opposite directions.

Inflation Risk:

Inflation risk is also known as purchasing power risk as there is always a chance or possibility that the purchasing power of invested money will decline, or that the real (inflation-adjusted) return will decline due to inflation. Inflation risk is really the risk of unanticipated or uncertain inflation.

Exchange Rate or Currency Risk:

Exchange rate risk refers to cash-flow variability experienced by economic units engaged in international transactions or international exchange, on account of uncertain or unexpected changes in exchange rates.

There is no exchange rate risk under the fixed exchange rate system, while it is the highest under the freely floating exchange rate system.

Country Risk:

Country risk is the degree to which political and economic unrest affect the securities of issuers doing business in a particular country. It is the probability of loss due to political instability in the buyer's country resulting in inability to pay for imports.

B.Types of UnSystematic Risk

Business Risk:

Business risk is the uncertainty of income flows that is caused by the nature of a firm's business. This risk has two components: internal and external. The former results from the operating conditions or operating efficiency of the firm, and it is manageable within or by the firm. The latter is the result of operating conditions which the firm faces but which are beyond its control. Business risk is measured by the distribution of the firm's operating income (i.e., firm's earnings before interest and tax) over time.

Financial Risk:

Financial risk is associated with the use of debt financing by firms or companies. There is a risk that the earnings of the firm may not be sufficient to meet these obligations towards the creditors. The use of debt by the firm causes variability of return for both creditors and shareholders. Financial risk is usually measured by the debt/equity ratio of the firm; the higher this ratio, the greater the variability of return and higher the financial risk

Default Risk:

Default risk arises from the failure on the part of the borrower or debtor to pay the specified amount of interest and/or to repay the principal, both at the time specified in the debt contract or covenant or indenture. The default risk has the capital risk and income risk as its components, and that it means not only the complete failure to pay but also the delay in payment

Liquidity Risk:

Liquidity risk refers to a situation wherein it may not be possible to dispose off or sell the asset, or it may be possible to do so only at great inconvenience, and cost in terms of money and time. The greater the uncertainty about time element, price concession, and transaction cost, the greater the liquidity risk. For banks and financial institutions, liquidity risk refers to their inability to meet the liabilities towards depositors when they want to withdraw their deposits.

Maturity Risk:

Maturity risk arises when the term of maturity of the security happens to be longer. Since foreseeing, forecasting and envisioning the environment, conditions and situations becomes more and more difficult as we stretch more and more into the future, the long-term investment involves risk.

Call Risk:

Call risk is associated with the corporate bonds which are issued with call-back provision or option whereby the issuer has the right of redeeming the bonds before their maturity. In case of such bonds, the bond holders face the risk of giving up higher coupon bonds, reinvesting proceeds only at lower interest rates, and incurring the cost and inconvenience of reinvestment.

Measures of Risk

The variance and standard deviation of return serve as the alternative statistical measures of the risk of the security in an absolute sense. Covariance measures the risk of the security relative to other securities in a portfolio. Value-at-risk is a statistical measure of the riskiness of financial assets or portfolios of assets. It is defined as the maximum amount expected to be lost over a given time horizon, at a pre-defined confidence level. For example, if 95% one-month VAR is Rs.5 million, there is 95% confidence that over the next month the portfolio will not lose more than Rs.5 million.

RETURN

Return is the amount or rate of produce, proceeds, gain, profit which accrues to an economic agent from an investment. It is a reward for and a motivating force behind investment. The objective of the investor is usually to maximise return.

Return on a typical investment has two components: the basic one which is the **periodic cash** or **income receipts**, either interest or dividend; and the other which is the appreciation or depreciation in the price or value of the asset, called the **capital gain** or the **capital loss**. The income component is usually but not necessarily received in cash viz., stock dividend. The capital gain (or loss) is the difference between the purchase price of the asset and the price at which it can be or is sold. The total return on an investment thus can be defined as income plus/minus price appreciation/depreciation.

Types of Return Concepts

Expected return is an anticipated, predicted, desired, ex-ante return which is subject to uncertainty.

Realised return, on the other hand, is actually earned; it is an ex- post return.

Holding period return (HPR) measures the total return from an investment during a given or designated time period in which the asset is held by the investor. $HPR = HPY + 1$

$$HPY = \frac{\text{Any cash payments received} + \text{Price change over the holding period}}{\text{Price at which the asset is purchased (beginning price)}}$$

Nominal Return, Nominal return is the return in nominal rupees (terms).

Real return is equal to the nominal return adjusted for changes in prices i.e., the rate of inflation.

The relation between nominal and real return:

$$(1 + \text{Nominal Return}) = (1 + \text{Real Return}) (1 + \text{Inflation Rate})$$

Required Rate of Return,

The RRR for a security is defined as the minimum expected rate of return needed to induce or persuade an investor to purchase the security, given its risk.

The RRR has two components. First, the risk-free rate of return and second is the risk premium.

RRR = Risk-free rate of return + Risk premium
 Risk premium = f (macroeconomic fundamentals, industry specific variables and company specific variables).

Calculation of RRR (CAPM Model)

The Capital Asset Pricing Model (CAPM) is used in finance to determine a theoretically appropriate required rate of return of an asset, if that asset is to be added to an already well-diversified portfolio, given that asset's non-diversifiable risk.

The CAPM can be represented in equation as follows:

$$E(R_i) = R_f + \beta(R_m - R_f)$$

where $E(R_i)$ = Expected return of individual security, R_f = Risk-free rate of return, β = Market risk of individual security, R_m = market return.

The model takes into account the asset's sensitivity to non-diversifiable risk (also known as systematic risk or market risk), **often represented by beta (β)**.

Testing CAPM

According to Capital Asset Pricing Model (CAPM) the market risk (β) is the sole factor which determine the expected return of the stock, which is used as the cost of equity of the company. For testing the validity of CAPM, generally we follow a two step procedure.

Step-1: Run the time series regression to estimate the market risk (β) following the equation

$$R_i = \beta(R_m)$$

Where, R_i = Individual Stock Return, R_m = Market Return

Step-2: After getting the (β) for each company/portfolio we run a cross sectional regression to examine whether (β) is statistically significant and for this, we have used the function

$\bar{R}_i = \alpha + \lambda(\beta)$. λ = premium: if the β will be statistically significant, then we can conclude that β gives the premium and the CAPM holds good.

Expected Return

The general methodology followed to take an economic event and measure its impact on the share price. The impact is measured by taking the difference between the actual return and expected return on a security. The expected return on a security is generally estimated by using the market model (or single index model) suggested by William Sharpe. The model used for estimating expected returns is the following:

$$R_i = a_i + b_i R_m + e_i$$

Where,

R_i = Return on Security i ;
 R_m = Return on Market Index;
 a_i & b_i = Constants;
 e_i = Random error.

This analysis is known as Residual analysis. The positive difference between the actual return and the expected return represents the excess return earned on a security. If the excess return is close to zero, it implies that the price reaction following the public announcement of information is immediate and the price adjusts to a new level almost immediately. Thus, the lack of excess returns would validate the semi-strong form EMH.

Expected Return of a Portfolio

As a first step in portfolio analysis, an investor needs to specify the list of securities eligible for selection or inclusion in the portfolio. Next he has to generate the risk-return expectations for these securities. These are typically expressed as the expected rate of return (mean) and the variance or standard deviation of the return. The expected return of a portfolio of assets is simply the weighted average of the return of the individual securities held in the portfolio. The weight applied to each return is the fraction of the portfolio invested in that security.

Let us consider a portfolio of two equity shares P and Q with expected returns of 15 per cent and 20 per cent respectively.

If 40 per cent of the total funds are invested in share P and the remaining 60 per cent, in share Q, then the expected portfolio return will be:

$$(0.40 \times 15) + (0.60 \times 20) = 18 \text{ per cent}$$

The formula for the calculation of expected portfolio return may be expressed as shown below:

$$r_p = \sum_{i=1}^n x_i r_i$$

Where

r_p = Expected return of the portfolio

x_i = Proportion of funds invested in security i .

r_i = Expected return of security i .

n = Number of securities in the portfolio

Risk of a Portfolio

The **variance of return and standard deviation of return** are alternative statistical measures that are used for measuring risk in investment. These statistics measure the extent to which returns are expected to vary around an average over time. The calculation of variance of a

portfolio is a little more difficult than determining its expected return. The variance or standard deviation of an individual security measures the riskiness of a security in absolute sense. For calculating the risk of a portfolio of securities, the riskiness of each security within the context of the overall portfolio has to be considered.

This depends on their interactive risk, i.e. how the returns of a security move with the returns of other securities in the portfolio and contribute to the overall risk of the portfolio.

Covariance is the statistical measure that indicates the interactive risk of a security relative to others in a portfolio of securities. In other words, the way security returns vary with each other affects the overall risk of the portfolio.

The Problems related to Expected Return (Standard deviation – Variance– Beta) will be explained separately.

Security

Security relates to a financial instrument or financial asset that can be traded in the open market, e.g., a stock, bond, options contract, or shares of a [mutual fund](#), etc. All the examples mentioned belong to a particular class or type of security.

Types of Security

There are four main types of security: debt securities, equity securities, derivative securities, and hybrid securities, which are a combination of debt and equity.



Debt Securities

Debt securities, or fixed-income securities, represent money that is borrowed and must be repaid with terms outlining the amount of the borrowed funds, interest rate, and maturity date. In other words, debt securities are debt instruments, such as bonds (e.g., a government or municipal bond) or a [certificate of deposit \(CD\)](#) that can be traded between parties.

Debt securities, such as bonds and certificates of deposit, as a rule, require the holder to make the regular interest payments, as well as repayment of the principal amount alongside any other stipulated contractual rights. Such securities are usually issued for a fixed term, and, in the end, the issuer redeems them.

A debt security's [interest rate](#) on a debt security is determined based on a borrower's credit history, track record, and solvency – the ability to repay the loan in the future. The higher the risk of the borrower's default on the loan, the higher the interest rate a lender would require to compensate for the amount of risk taken.

It is important to mention that the dollar value of the daily trading volume of debt securities is significantly larger than stocks. The reason is that debt securities are largely held by institutional investors, alongside governments and not-for-profit organizations.

Equity Securities

Equity securities represent ownership interest held by shareholders in a company. In other words, it is an investment in an organization's equity stock to become a shareholder of the organization.

The difference between holders of equity securities and holders of debt securities is that the former is not entitled to a regular payment, but they can profit from [capital gains](#) by selling the stocks. Another difference is that equity securities provide ownership rights to the holder so that he becomes one of the owners of the company, owning a stake proportionate to the number of acquired shares.

In the event a business faces bankruptcy, the equity holders can only share the residual interest that remains after all obligations have been paid out to debt security holders.

Companies regularly distribute dividends to shareholders sharing the earned profits coming from the core business operations, whereas it is not the case for the debt holders.

Derivative Securities

Derivative securities are financial instruments whose value depends on basic variables. The variables can be assets, such as stocks, bonds, currencies, interest rates, market indices, and goods. The main purpose of using derivatives is to consider and minimize risk. It is achieved by insuring against price movements, creating favorable conditions for speculations and getting access to hard-to-reach assets or markets.

Formerly, derivatives were used to ensure balanced exchange rates for goods traded internationally. International traders needed an accounting system to lock their different national currencies at a specific exchange rate.

There are four main types of derivative securities:

1. Futures

Futures, also called futures contracts, are an agreement between two parties for the purchase and delivery of an asset at an agreed-upon price at a future date. Futures are traded on an exchange, with the contracts already standardized. In a futures transaction, the parties involved must buy or sell the underlying asset.

2. Forwards

Forwards, or forward contracts, are similar to futures, but do not trade on an exchange, only retailing. When creating a forward contract, the buyer and seller must determine the terms, size, and settlement process for the derivative.

Another difference from futures is the risk for both sellers and buyers. The risks arise when one party becomes bankrupt, and the other party may not be able to protect its rights and, as a result, loses the value of its position.

3. Options

Options, or options contracts, are similar to a futures contract, as it involves the purchase or sale of an asset between two parties at a predetermined date in the future for a specific price. The key difference between the two types of contracts is that, with an option, the buyer is not required to complete the action of buying or selling.

4. Swaps

Swaps involve the exchange of one kind of cash flow with another. For example, an [interest rate swap](#) enables a trader to switch to a variable interest rate loan from a fixed interest rate loan, or vice versa.

Hybrid Securities

Hybrid security, as the name suggests, is a type of security that combines characteristics of both debt and equity securities. Many banks and organizations turn to hybrid securities to borrow money from investors.

Similar to bonds, they typically promise to pay a higher interest at a fixed or floating rate until a certain time in the future. Unlike a bond, the number and timing of interest payments are not guaranteed. They can even be converted into shares, or an investment can be terminated at any time.

Examples of hybrid securities are preferred stocks that enable the holder to receive dividends prior to the holders of common stock, convertible bonds that can be converted into a known amount of equity stocks during the life of the bond or at maturity date, depending on the terms of the contract, etc.

Hybrid securities are complex products. Even experienced investors may struggle to understand and evaluate the risks involved in trading them. Institutional investors sometimes fail at understanding the terms of the deal they enter into while buying hybrid security.

What are Shares and Who are Shareholders?

Shares are the units into which the absolute share capital of a firm is split into or divided into. Therefore, the share is a fractional portion of the share capital and comprises the ground of ownership interest in a company. The persons who contribute money through shares are called shareholders.

The amount of authorised capital, together with the number of shares in which it is split is mentioned in the Memorandum of Association but the divisions of shares in which the enterprise's capital is to be split along with their specific obligations and rights, are recommended by the Articles of Association of the company. As per The Companies Act, an enterprise can issue 2 types of shares :

Preference shares

Equity shares (also called ordinary shares)

What are Preference Shares?

Preference shares, more commonly known as preferred stock, are shares of an enterprise's stock with dividends that are paid out to the members before equity shares dividends are circulated. If the enterprise enters insolvency, the members with preferred stock are designated to be paid from company assets. Most of the preference shares have a fixed dividend, while normally do not. Preferred stock shareholders do not possess any voting rights, but equity shareholders typically do.

Features of Preference Shares :

Preference shares are a long-term source of finance

The dividend payable on preference shares (PS) is usually higher than the debenture interest
Preference shareholders (PSH) get a fixed rate of dividend regardless of the volume of profit

What are Equity Shares?

Equity shares were earlier called as ordinary shares. The shareholders of such shares are the authentic owners of the enterprise. They possess voting right in the huddles of holders of the enterprise. They have a command over the working of the enterprise. Equity shareholders are given dividend only after paying it to the preference shareholders.

Features of Equity Shares :

Equity share capital remains with the company. It is given back only when the enterprise is closed

Equity shareholders possess voting rights and select the management of the enterprise

Equity Share Meaning

An equity share, normally known as ordinary share is a part ownership where each member is a fractional owner and initiates the maximum entrepreneurial liability related to a trading concern. These types of shareholders in any organization possess the right to vote.

Related Link: [What is Equity?](#)

Features of Equity Shares Capital

Equity share capital remains with the company. It is given back only when the company is closed.

Equity Shareholders possess voting rights and select the company's management.

The dividend rate on the equity capital relies upon the obtainability of the surfeit capital. However, there is no fixed rate of dividend on the equity capital.

Types of Equity Share

Authorized Share Capital- This amount is the highest amount an organization can issue. This amount can be changed time as per the companies recommendation and with the help of few formalities.

Issued Share Capital- This is the approved capital which an organization gives to the investors.

Subscribed Share Capital- This is a portion of the issued capital which an investor accepts and agrees upon.

Paid Up Capital- This is a section of the subscribed capital, that the investors give. Paid-up capital is the money that an organization really invests in the company's operation.

Right Share- These are those type of share that an organization issue to their existing stockholders. This type of share is issued by the company to preserve the proprietary rights of old investors.

Bonus Share- When a business split the stock to its stockholders in the dividend form, we call it a bonus share.

Sweat Equity Share- This type of share is allocated only to the outstanding workers or executives of an organization for their excellent work on providing intellectual property rights to an organization.

Merits of Equity Shares Capital

ES (equity shares) does not create a sense of obligation and accountability to pay a rate of dividend that is fixed

ES can be circulated even without establishing any extra charges over the assets of an enterprise

It is a perpetual source of funding, and the enterprise has to pay back; exceptional case – under liquidation

Equity shareholders are the authentic owners of the enterprise who possess the voting rights

Demerits of Equity Shares Capital

The enterprise cannot take either the credit or an advantage if trading on equity when only equity shares are issued

There is a risk, or a liability overcapitalization as equity capital cannot be reclaimed

The management can face hindrances by the equity shareholders by guidance and systematizing themselves

When the firm earns more profits, then, higher dividends have to be paid which leads to raising in the value of the shares in the marketplace and its edges to speculation as well

Preference Share Meaning

Preference shares, also known as preferred stock, is an exclusive share option which enables shareholders to receive dividends announced by the company before the equity shareholders.

Preference shares provide the shareholders with the special right to claim dividends during the company lifetime, and also with the option to claim repayment of capital, in case of the wind up of the company.

It is considered as a hybrid security option as it represents the characteristics of both debt and equity investments.

The capital raised by issuing preference shares is known as preference share capital and preference shareholders can be regarded as owners of the company. They however do not enjoy any kind of voting rights, unlike equity shareholders.

Features of Preference Shares

The following are the features of preference shares:

Preferential dividend option for shareholders.

Preference shareholders do not have the right to vote.

Shareholders have a right to claim the assets in case of a wind up of the company.

Fixed dividend payout for shareholders, irrespective of profit earned.

Acts as a source of hybrid financing.

Types of Preference Shares

The various types of preference share are discussed below:

Cumulative preference share: Cumulative preference shares are a special type of shares that entitles the shareholders to enjoy cumulative dividend payout at times when a company is not making profits. These dividends will be counted as arrears in years when the company is not earning profit and will be paid on a cumulative basis, the next year when the business generates profits.

Non-cumulative preference shares: These types of shares do not accumulate dividends in the form of arrears. In the case of non-cumulative preference shares, the dividend payout takes place from the profits made by the company in the current year. If there is a year in which the company doesn't make any profit, then the shareholders are not paid any dividends for that year and they cannot claim for dividends in any future profit year.

Participating preference shares: These types of shares allow the shareholders to demand a part in the surplus profit of the company at the event of liquidation of the company after the dividends have been paid to the other shareholders. In other words, these shareholders enjoy fixed dividends and also share a part of the surplus profit of the company along with equity shareholders.

Non-participating preference shares: These shares do not yield the shareholders the additional option of earning dividends from the surplus profits earned by the company. In this case, the shareholders receive only the fixed dividend.

Redeemable Preference Shares: Redeemable preference shares are shares that can be repurchased or redeemed by the issuing company at a fixed rate and date. These types of shares help the company by providing a cushion during times of inflation.

Non-redeemable Preference Shares: Non-redeemable preference shares are those shares that cannot be redeemed during the entire lifetime of the company. In other words, these shares can only be redeemed at the time of winding up of the company.

Convertible Preference Shares: Convertible preference shares are a type of shares that enables the shareholders to convert their preference shares into equity shares at a fixed rate, after the expiry of a specified period as mentioned in the memorandum.

Non-convertible Preference Shares: These type of preference shares cannot be converted into equity shares. These shares will only get fixed dividend payout and also enjoy preferential dividend payout during the dissolution of a company.

Difference between Equity Shares and Preference Shares

Equity share and Preference share are the two types of share that a company issues. Equity share is an ordinary share. Preference share experience the perquisites of the dividend distribution first. The equity stockholders get the opportunity to cast their vote in major business decisions.

The company preference share receives the dividend at a fixed rate. Whenever there is an issue with the company, the preference share gets the right to return of the capital before the equity share.

Parameters	Preference Share	Equity Share
Dividend Rate	Has a fixed rate	Fluctuates
Vote Rights	No voting rights	Have voting rights
Participation in Management	Has no right to participate in management decision	Has the right to participate in management decision
Preferences	Get the first preference, before equity share	Gets second preference, after preference share

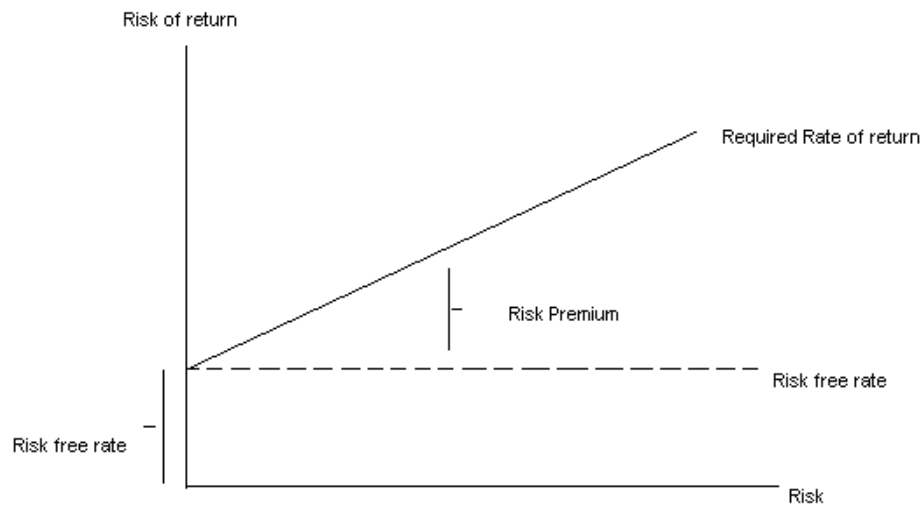
VALUATION OF SECURITIES

Investment process invariably requires the valuation of securities in which the investments are proposed. The value of a security may be compared with the price of the security to get an idea as to whether a particular security is overpriced, under-priced or correctly priced. A number of concepts of valuation have been used in the literature. Some of these are:

1. **Book Value (BV).** BV of an asset is an accounting concept based on the historical data given in the balance sheet of the firm. BV of an asset may either be given in the balance sheet or can be ascertained on the basis of figures contained in the balance sheet. For example, the BV of a debenture is the face value itself and is stated in the balance sheet. The BV of an equity share can be ascertained by dividing the net worth of the firm by the number of equity shares.
2. **Market Value (MV).** MV of an asset is defined as the price for which the asset can be sold. MV of a financial asset refers to the price prevailing at the stock exchange. In case a security is not listed, then its MV may not be available.
3. **Going Concern Value (GV).** GV refers to the value of the business as an operating, performing and running business unit. This is the value which a prospective buyer of a business may be ready to pay. GV is not necessarily the MV or BV of the entire asset taken together. GV may be less than or more than the MV/BV of the total business. Rather, GV depends upon the ability to generate sales and profit in future. If the GV is higher than the MV, then the difference between the two represents the synergies of the combined assets.
4. **Liquidation Value (LV).** LV refers to the net difference between the realizable value of all assets and the sum total of the external liabilities. This net difference belongs to the owners/shareholders and is known as LV. The LV is a factor of realizable value of an asset and therefore, is uncertain. The LV may be zero also and in such a case, the owners/shareholders do not get anything if the firm is dissolved.

5. Capitalized Value (CV). CV of a financial asset is defined as the sum of present value of cash flows from an asset discounted at the required rate of return. In order to find out the CV, the future expected benefits are discounted for time value of money. In the valuation of financial assets, the CV is most relevant concept of valuation and has been used in this text.

Required Rate of Return. In order to find out the CV, what is required is the determination of the required rate of return of the investor for the specific security being valued. This required rate of return is used as the discount rate to find out the present value. The required rate of return refers to the yield which the investor wants to earn by making investment. It is consisting of two elements – the risk free rate of return and the risk premium. These two elements have been presented in the figure below



The level of risk associated with a given cash flow can significantly affect its value. In terms of present value, greater risk is incorporated by using a higher discount rate/rate of return. Above figure shows that as the risk increases, the required rate of return also increases and the increase occurs because of the increase in risk premium. The risk-free rate, I_p remains the same for all levels of risk, and the risk premium, r_p , goes on increasing with the increase in risk. Thus, it may be said that the required rate of return is a factor of the following:

1. The risk free rate I_{pn}
2. The risk perception/attitude of the investors, and
3. The risk premium, r_p , i.e compensation required for bearing the risk.

Required rate of return, k , may be defined as

$$k = I_p + r_p \quad \dots(1)$$

BASIC VALUATION MODEL

Basically, the valuation model can be presented in terms of the cash flows, their timings and the required rate of return. The value of a security is determined by discounting the expressed cash flows to their present value at a discount rate commensurate with the risk-return prospective of the investor. So utilizing the present value technique, the value of financial asset can be expressed as follows:

$$V_0 = [cf_1/(1+k)^1] + [cf_2/(1+k)^2] + [cf_3/(1+k)^n] \quad \dots\dots(2)$$

Where

v_0 = value of the security

cf = cash flows expected at the end of year i

k = appropriate discount rate and

n = expected life of the asset

Thus the value of a security is the sum of discounted values of expected future cash inflows. For example, an investment is expected to provide an annual cash flow of Rs.5000 p.m. for the next 5 years and the appropriate discount rate for the risk associated with the investment is 15% the value of the investment may be found as follows:

$$V_0 = \sum_{i=1}^n 5000 / (1 + .15)^i$$

After going through the basic valuation model, the next step is to understand the valuation of two basic financial assets, i.e. the bonds and the shares.

BOND VALUATION

A bond or debenture is a debt security issued by a borrower and subscribed/purchased by a lender/investor. Bond is a usual form of long-term financing used by the firms, which upon issuing a bond, promise to make certain cash flows in future (in the form of interest and/or repayment) under clearly defined terms and conditions. In order to understand the valuation of bonds, the understanding of the following basic terms is required:

1. *Par value.* The par value (also called the face value or nominal value) of a bond is the principal amount of a bond and is stated on the face value of the bond is stated on the face of the bond security. The par value of a bond may be Rs.100, Rs.1000 or any amount. The issue price, however, may be less than, equal to or more than the par value.
2. *Coupon rate.* This is the rate at which interest on the par value of the bond is payable as per the payment schedule. The interest may be paid annually or even monthly. The coupon rate is usually described as % rate and is applied to the par value to find out the periodic interest amount.

3. **Maturity.** The maturity of a bond refers to the period from the date of issue, after the expiry of which the redemption repayment will be made to the investor by the borrower firm.

the value of a bond may be defined as the sum of the present values of the future interest payments plus the present value of the redemption repayment. The appropriate discount rate to find out the present value would be the required rate if the return k_d , which depends upon the prevailing risk-free interest rate and the risk premium. The valuation model may be modified to find out the value of a bond as follows:

$$B_0 = \sum_{i=1}^n I_i / (1+k_d)^i + RV / (1+k_d)^n \quad \text{.....(3)}$$

B_0 = value of bond at present

I_i = Annual interest payment starting one year from now till the end of the year n

RV = redemption repayment at the end of the year n

k_d = appropriate discount rate.

A bond of Rs.1000 bearing a coupon rate 12% is redeemable at par in 10 years. Find out the value of the bond if:

1. Required rate of return is 12% or 10% or 14%
2. Required rate of return is 14% and the maturity period is 8 years or 12 years; and
3. Required rate of return is 12% and redeemable at Rs.950 or Rs.1050 after 10 years.

Solution

The value of the bond can be ascertained by the equation 6A.3 as follows:

$$B_0 = \sum_{i=1}^n [I_i / (1+k_d)^i] + [RV / (1+k_d)^n]$$

$$\text{Or } B_0 = I (PVAF_{i,n}) + RV (PVF_{i,n})$$

Where $(PVAF_{i,n})$ = present value annuity factor at the rate of interest i , and number of years n

$(PVF_{i,n})$ = present value factor for a given rate of interest i , and number of years n

These values may be found from the table A-4 and the table A-3 respectively. These tables are given in the appendix-III.

Now the value of the bond under different situations can be ascertained as follows:

1. Basic information - Coupon rate 12%
Redeemable at par
Maturity 10 years.

If required rate of return is 12%

$$\begin{aligned} B_0 &= 120(5.650) + 1000(0.322) \\ &= 678 + 322 \\ &= \text{Rs.}1000 \end{aligned}$$

If required rate of return is 10%

$$\begin{aligned} B_0 &= 120(6.145) + 1000(0.386) \\ &= 737.4 + 386 \\ &= \text{Rs.}1123.40 \end{aligned}$$

If required rate of return is 14%

$$\begin{aligned} B_0 &= 120(5.216) + 1000(0.270) \\ &= 625.92 + 270 \\ &= \text{Rs.}895.92 \end{aligned}$$

2. Basic Information - Coupon rate 12%
Redeemable at par
Maturity 8/12 years.
Required rate of return 14%

If maturity period is 8 years

$$\begin{aligned} B_0 &= 120(4.639) + 1000(0.351) \\ &= 556.68 + 351 \\ &= 907.68 \end{aligned}$$

If required period is 12%

$$\begin{aligned}
 B_0 &= 120(5.660) + 1000(0.208) \\
 &= 679.20 + 208 \\
 &= 887.20
 \end{aligned}$$

3. Basic information - Coupon rate 12%
 Required rate of return 12%
 Maturity 10 years.

If redemption amount is Rs.950

$$\begin{aligned}
 B_0 &= 120(5.65) + 950(0.322) \\
 &= 678 + 305.90 \\
 &= \text{Rs.}983.90
 \end{aligned}$$

If redemption amount is Rs.1050

$$\begin{aligned}
 B_0 &= 120(5.650) + 1000(0.322) \\
 &= 679.2 + 338.1 \\
 &= \text{Rs.}1016.10
 \end{aligned}$$

Bond valuation Behavior: on the basis of the above calculation, certain conclusions regarding the behavior of the valuation of bond can be arrived as follows:

1. *Relating to the required rate of return:* If the required rate of return and the coupon rate are equal then the value will be equal to par value. Whenever the required rate of return differs from the coupon rate, the bond value also differs from the par value. When the required rate of return is less than the coupon rate, the bond has a premium value here as if the required rate of return is more than the coupon rate, the bond has a discounted value.
2. *Relation to maturity period:* Whenever the required rate of return is different from the coupon rate, the time to maturity also affects the value of the bond. In this respect the conclusion can be drawn with the reference to the remaining period of maturity. When the required rate of return is different from the coupon rate and assumed constant until maturity, the value of the bond will approach its par value as the remaining period approaches its maturity. Of course, when the approach rate of return is equal to the coupon rate, the bond value will remain the same at par until it matures. Further, the longer the time to maturity of bond, the greater its value changes in response to a given change in the required rate of return.

3. *Yield to maturity (YTM)*: it is already stated that the cash flows in relation to a bond are consisting of a regular interest payments and the redemption repayment. The rate of return k_d , which makes the discounted values of these cash flows equal to the bond's market value, is known as the YTM of the bond. So, a bond's YTM may be defined as the *Internal Rate of Return (IRR)* for a given level of risk. When an investor evaluates bonds in order to make a buy or not to buy decision, the evaluation is often done by finding out the IRR of the bond. The IRR of a bond is nothing but the value of k_d in equation 0:3. The YTM, i.e., the IRR of annual interest, I , the redemption value, RV and time to maturity, n . the rate of return expected from a bond if it is kept till maturity is called the YTM of the bond.

While finding out the YTM, an implied assumption is that all interest received are reinvested at a rate of return equal to bond's YTM. In order to find out the YTM of a bond, equation 0:3 is to be solved for various values of k_d until the rate causing the calculated bond value equal to its current value. The trial-and-error procedure required to find out the YTM can be explained with the help of a example as follows:

A bond of Rs.10,000 bearing coupon rate 12% and redeemable in 8 years at par is being traded at Rs.10,600. Find out the YTM of the bond.

At $k_d = 12\%$

$B_0 = 10000$ (at coupon rate = k_d)

This is less than the market price, so the k_d is reduced to 10%

$B_0 = \text{Rs.}1200(\text{PVAF}_{10\%*8\text{year}}) + 10000(\text{PAV}_{10\%.8y})$

$B_0 = 1200(5.335) + 10000(0.467)$
 $= \text{Rs. } 11072$

By interpolating between 12% and 10%

$K_d = 12\% - (600/600+472)*2$
 $= 12\% - 1.12$
 $= 10.88\%$

So, the YTM of the bond is 10.88%

A more practical alternative to this procedure to find out the YTM is the approximate yield formula as given in equation 4

$$\text{Approximate yield} = [I + (RV - B_0/n)] / (RV + B_0)^{1/2} \dots\dots 4$$

To continue with the same example, the YTM may be approximate with the help of equation 4 as follows:

YTM = $[1200 + (10000 - 10600)/8] / (10000 + 10600)/2$
= 10.92%

The approximate YTM is 10.92% and it is not significantly different from 10.88% calculated by the IRR methodology.

Valuation of convertible Debenture (CCD). In case of a CCD, the debenture holders get interest at a specified rate for a specified period after which a part or full value of the CCD is covered into specific number of equity shares. In case of partial conversion, the residential portion continues to earn interest for the remaining period after which it is redeemed. The cash flows involved in case of valuation of CCD are:

1. Periodic Interest receivable from the company.
2. Expected market price of the share received on conversion.
3. redemption amount, if any

The CCD can be valued as per the equation 5

$$B_0 (\text{CDD}) = \sum_{i=1}^n I_1 / (1+k_d)^i + mP_i / (1+k_e)^i + RV / (1+k_d)^n \dots\dots 5$$

Where

$B_0(\text{CCD})$ = value of CCD

k_e = interest amount receivable per year

m = number of shares received on conversion

P_t = share price received at the conversion time

RV = redemption value, if any
N = life of the debenture
 k_d = rate of discount

It may be noted that in case of partial convertible debentures, the annual interest before conversion and after conversion would be different. In case of fully convertible debentures, there will not be any RV.

Valuation of deep discount bonds (DDB's). In recent years, some financial institutions have issued a debt instrument known as DDB. These DDB's have an issue price and a par value or a face value which is payable to the holder of DDB. For example IDBI issued the DDB- series 1 for a price of Rs.2700. These DDB's were mature able in 25 years from the date of issue at par value of Rs.100000. No interest or any other type of Payment is available to the holder before maturity. Since there is no intermediate payment between the date of issue and the maturity date, these DDB's may also be called the zero coupon bonds.

The valuation of DDB's can be made on the same lines as the ordinary bonds are valued. As DDB generates only one future cash flow at the time of maturity, the value of the DDB may be taken as equal to the present value of this future cash flow discounted at the required rate of return of the investor for the number of years of the life of DDB's. The value of DDB may be calculated with the help of equation 6.

$$B_0(\text{DDB}) = FV / (1+r)^n \quad \text{.....6}$$

Where

$B_0(\text{DDB})$ = value of the DDB
FV = face value of DDB payable at maturity
 r = the required rate of return
 n = life of the DDB

For example, a DDB is issued for maturity period of ten years and having a par value of Rs.25000. Find out the value of the DDB given that the required rate of return is 15%

Applying the equation 6 the value of the DDB is

$$\begin{aligned} B_0(\text{DDB}) &= 25000 / (1+0.15)^{10} \\ &= 25000 * (\text{PVF}_{15\%*10 \text{ y}}) \end{aligned}$$

$$= 25000 \times 0.247$$

$$= \text{Rs.}6175$$

So the value of the bond is Rs.6175

VALUATION OF PREFERENCE SHARES

Preference share is a share which entitles the shareholder to receive (i) a dividend at a fixed rate for a given period (ii) a redemption amount at the time of preference share (in case of redeemable preference share) OR a dividend at the fixed rate perpetually till the liquidation of the company (in case of irredeemable preference share)

Assumptions. Two assumptions are relevant while ascertaining the value of preference shares are as follows:

1. the dividend on preference share are received once a year and that the first dividend is received at the end of one year from the date of acquisition / purchase
2. The company always intends to pay the preference dividend so that the stream of preference dividend is concerned to be known with certainty.

Redeemable preference share. The value of redeemable preference share may be defined as the present value of the cash flows expected from the company. The future cash flows associated with a redeemable preference share are (i) the stream of future dividends at a fixed rate of dividend (ii) the maturity payment at the time of redemption. These future cash flows are discounted at an appropriate rate to find out the value of the redeemable preference shares as follows:

$P_0 = [d_1/(1+k_p)^1] + [d_2/(1+k_p)^2] \dots\dots\dots [d_n/(1+k_p)^n] + [RV/(1+k_p)^n] \dots\dots\dots 7$
$P_0 = \sum_{i=1}^n [d_i/(1+k_p)^i] + [d_1/(1+k_p)^n]$

Where

P_0 = value of preference share

D_i = annual fixed dividend

RV = redemption value of preference share

n = life of the preference share

k_p = required rate of return of the preference shareholders

It may be noted that equation 7 (valuation of preference share) is the same as equation 3 (valuation of bond) for simple reason that both of the preference shares and the bond have the similar future cash flow associated with them.

Irredeemable preference share. The value of irredeemable preference share may be defined as the present value of the perpetuity of the fixed dividend on the preference shares. Symbolically, it may be defined as

$$P_0 = D/k_p \dots\dots\dots 8$$

Where

P_0 = value of the irredeemable preference share

D = fixed annual dividend

k_p = required rate of return of preference shareholders

VALUATION OF EQUITY SHARES

Conceptually, the valuation of the equity share is the most typical because of its residential ownership character. The equity shareholders receive the residential profit and also the residual assets in case of liquidation. From the point of view of calculation also, the valuation of equity share is difficult for (i) the rate of dividend is not given, and (ii) unlike rate of interest or rate of preference dividend which remains constant over the life of the security. The rate of dividend on equity share may be varying over the years. So the normal valuation model as applied for valuation of equity shares

Assumption. With ascertaining the value of equity share, different assumptions are made regarding the company's future profits, the amount and the timing of the dividends, the required rate of returns, etc. Different approaches have been developed for the valuation of equity shares. These different approaches, however, make the following assumptions regarding the basic characteristics of equity shares.

1. Equity share does not have any redemption rate.

2. Equity share do not have any given redemption or liquidation value. In case of liquidation of the company, their claim is residual in nature and arising in the last (after paying all external liabilities and the preference shareholders).
3. Dividends on equity shares are neither guaranteed nor compulsory. Further, neither the rate nor the timing of dividend is specified. So, the dividend can vary in any direction.

Broadly the value of equity share may be found by following either of the two approaches:

1. Valuation based on dividends
2. Valuation based on earnings

VALUATION OF EQUITY SHARES BASED ON DIVIDENDS

An investor buys or acquires an equity share in expectation of (i) a stream of future dividends from the company, and (ii) resale price of the equity share after some time when he is no longer interested in holding the share. The owner of share receives the shares as a compensation for investing the firm. So, as long as the firm is operating profitably and the investor holds the shares, he would be expecting to receive a dividend from the company. So, the dividend plays a crucial and important role in determining the value of equity share. Though there is no legal compulsion to pay dividend on equity shares, still most companies prefer to pay dividends to satisfy the expectations of their shareholders.

Assumption: Valuation of equity share based on dividends requires the following equation:

1. the dividends are paid manually
2. the first dividend is paid after one year from the date of acquisition/purchase.
3. sale of the equity share, if any, occurs only at the end of a year and at the ex-dividend terms.

The value of an equity share applying the basic valuation model (equation 2) may be defined as equal to the present value of all future benefits which the share is expected to provide in the form of dividend over the infinite period. The future capital gain/loss on sale, if any, is ignored because theoretically speaking, what is sold is the right to all future subsequent dividends. So, from valuation point of view only the infinite stream of dividends is relevant.

The value of equity share is the sum of the present values of future cash flows (in the form of dividends) discounted at the required rate of return of the investors. The valuation of equity shares may be ascertained with the help of equation 9.

$$P_0 = [d_1/(1+k_e)^1] + [d_2/(1+k_e)^2] + \dots + [d_n/(1+k_e)^n] \dots \dots 9$$

Where

P_0 = value of the equity share

D_i = expected dividend over the year

k_e = required rate of return of the equity investors

As per the equation 9, the value of a share depends on the expected stream of dividends. However, the future dividend from the company may show different patterns. The company may pay dividends at a constant rate or otherwise. This uncertainty regarding the pattern of dividend is what makes the valuation of equity shares of a typical job. Three types of dividend pattern could be assumed and valuation of equity share under all these three types of patterns can be ascertained. These three assumptions of dividend patterns are:

1. zero growth in dividend or constant dividends,
2. constant growth in dividend
3. variable growth in dividends

Zero growth in dividend or constant dividends. This is the simplest type of dividend pattern in which the dividend amount remains constant over years. The dividend stream, therefore, is a long term annuity, or almost perpetuity. Symbolically

$$D_1 = D_2 = D_3 \dots \dots \dots = D_n$$

The value of equity share under constant dividend assumption by dividing yearly dividend by the required rate of return of equity investor as follows:

$$P_0 = D/k_e \dots \dots \dots 10$$

Where

P_0 = value of equity share

D = annual constant dividend

k_e = required rate of return of equity investor

This model requires no estimation of future dividends and no forecast of future selling price and, therefore, is simple to operate. Dividend expected at the end of the year 1 will have to find out the value of equity share.

A firm pays a dividend of 20% on equity share of face value of Rs. 100/- each. Find out the value of equity share given that the dividend rate is expected to remain same and the required rate of return of the investor is 15%.

Sol.

In this situation the following information is given :

$$k_e = 15\%$$

$$D = 20(\text{i.e., } 20\% \text{ of Rs. } 100)$$

$$\text{Therefore, } P_o = 20/15 \times 100 = \text{Rs. } 133.33$$

(ii) Constant growth in dividends:- The assumption is that the dividends will grow constantly at a rate g , every year. If a firm pays a dividend of D_o at present then dividend at the end of year 1 will be D_1 , i.e., $D_o (1+g)$ and dividend at the end of year 2 will be $D_2 = D_o (1+g)^2$, and so on. Therefore, dividend payable in any future year can be ascertained with help of following:

$$D_t = D_o (1+g)^t$$

$$\text{Or, } D_t = D_{t-1}(1+g)$$

Under constant growth model, the value of a share will be found with the help of equation 11

$$P_o = D_1/k_e - g \quad \dots\dots\dots (11)$$

The Equation 11 explains the current price P_o in terms of expected dividends at the end of year 1, D_1 , the projected growth rate, g , and the expected rate of return of investors, k_e . Alternatively, the equation 11 can be used to find out an estimate of k_e from the given D_1 , P_o and g as follows:

$$k_e = (D_1/P_o) + g$$

So, k_e , which is also called the market capitalization rate is equal to the dividend yield, i.e., (D_1/P_o) plus the expected growth rate in dividends, g .

The valuation model given in equation 11 is easy to compute and apply and also recognizes the infinite stream of dividends with growth rate, g . Suppose, a share having a face value of Rs. 100/- is expected to pay a dividend of 12% at the end of year 1 and the growth rate of dividends is estimated to be 3%. If investor has a required rate of return of 16% the value of the equity share is :

$$P_0 = 12 / 16 - 0.3$$

$$= \text{Rs. } 92.30$$

The value of an equity share is positively correlated with growth rate and negatively correlated with the required rate of return. Suppose, a firm is expected to pay a dividend of Re. 1 which is expected to grow at growth rate g annually. The value of the share under different growth rates and different required rates of return have been summarized in table 1

Growth rate	Required rate of return			
	10%	12%	14%	16%
2%	12.50	10.00	8.33	7.14
4%	16.67	12.50	10.00	8.13
6%	25.00	16.67	12.50	10.00
8%	50.00	25.00	16.67	12.50

The value given in table 1 reflects the sensitivity of the growth rate and required rate of return. The higher the growth rate, higher will be the value for a given required rate of return. Further, the higher the required rate of return, lesser will be value for a given growth rate. The constant growth model is an extremely useful theoretical model to value the equity shares.

(iii) Variable growth in dividends. The zero growth rate and constant growth rate assumptions of dividend patterns are extreme assumptions. In a practical situation, the dividend from a company may show one growth rate for few years, followed by another growth rate for next few years and then yet another growth rate for next few years, and so on. For example, for five years the growth rate in dividends may be 2% then it may be 3% for next 5 years then it may stick to 4% growth rate in infinitely. This means that the dividends will grow at 2% annually for years 1 to 5 at 3% annually for years 6 to 10 and at 4% annually from

the year 11 onwards. Equation 12 takes care of such growth situations to find out the value of the equity shares.

$$P_o = \sum_{i=1}^n [d_0 (1+g_1)^i / (1+k_e)^i] + n \sum_{i=5}^5 [d_6 (1+g_2)^{i-5} / (1+k_e)^{i-5}] + \sum_{i=10}^n [d_{10} (1+g_3)^{i-10} / (1+k_e)^{i-10}]$$

Where P_o = value of equity share,

g_1, g_2 and g_3 = different growth rates for different periods, and

k_e = required rate of return of equity investors

To find out the value of equity shares under varying growth rates as per Equation 12

The following procedure may be adopted:

Step 1. Find the value of cash dividend at the end of each year during the period over which the growth rate is changing. In the above eg., the growth rate is changing over 10 years (2% growth rate for 1st five years & 3% growth rate for next 5 years).

Step2. Find out the present values of these cash dividends for different years by discounting at the required rate of return, k_e . For this purpose, the cash dividend is to be multiplied by the respective discounting factor to find out the present value. Add up all these present values.

Step 3. Find out the value of the equity share at the end of the last year of the varying growth period, i.e., the 10th year as follows:

$$P_{10} = D_{11} / k_e - g_3$$

This value P_{10} represents the present value of all expected dividends from year 10 onwards at a constant growth rate in dividends, g_3 . Find out the present value of this year by discounting to period 0.

Step 4. Sum of the figures arrived in steps no.2& 3 is the value of the equity share. If there are more breaks in the growth rates, then the similar procedure may be adopted.

A firm is paying a dividend of Rs. 1.50 per share. The rate of dividend is expected to grow at 10% for next 3 years and 5% thereafter infinitely. Find out the value of the share given that the required rate of return of the investor is 15%.

Sol.

For this situation following information is available :

$$k_e = 15\%$$

$$D_0 = \text{Rs.}1.53$$

$$g_1 = 10\%(\text{for 3 years})$$

$$g_2 = 5\%(\text{infinitely})$$

Now, the value may be calculated as follows:

End of year	Dividend Amt(Rs.)	PVF _(15%, n)	PV(Rs.)
1	1.65	.87	1.44
2	1.82	.756	1.38
3	2.00	.658	1.32
Total			4.14

Rs.4.14 is the present value of dividends expected from the company for the first 3 years.

The value of equity shares at the end of year 3 will be as follows:

$$\begin{aligned} P_3 &= D_3(1+g)/k_e-g \\ P_3 &= 2(1.05)/15-0.05 \\ &= \text{Rs.}21 \end{aligned}$$

The value of the share at the end of the 3 years will be Rs. 21. Present value of rs. 21 is

$$= \text{Rs. } 21 * (\text{PVF}_{15\%, 3y})$$

$$= \text{Rs. } 21 * (0.658)$$

$$= \text{rs. } 13.82$$

The value of the share at present is Rs. 4.14 + 13.82 i.e. Rs. 17.96

Valuation of share currently not paying dividends there may be numerous cases where the firm is not able to pay any dividend on equity shares because of insufficient profits during early years or gestation period or otherwise. Sum of the form may not like to pay early dividends because they require funds for growth purposes. The dividend models discussed above can take care of this type of situations also. For example, a firm is not expected to pay any dividend for 1st 3 years but thereafter will be paying a dividend of Rs. 2

growing at 10% p.a. forever. The value of the share, given the required rate of return can be calculated as follows:

As per the constant growth rate model, the value of the share at the end of year 3
Will be

$$\begin{aligned} P_3 &= D_4 / k_e - g \\ &= 2 / 15 - 10 \\ &= \text{Rs.}40 \end{aligned}$$

Now , this is the value of the share at the end of year 3. This value should now be discounted at 15% to find out the present value.

$$\begin{aligned} P_0 &= P_3 * (\text{PVF}_{15\% \cdot 3y}) \\ &= \text{Rs.}40 (0.658) \\ &= 26.32 \end{aligned}$$

So, the value of the share is Rs.26.32

VALUATION OF EQUITY SHARES BASED ON EARNINGS

Some firms have extensive growth opportunities and require funds to take up new projects. So these firms may retain profits (wholly or partially). This reduce the amount of dividends to the shareholders. The retained earnings are reinvested internally to generate higher profits in future. Investor are willing to forego cash dividends today in exchange for higher earnings and expectation of higher dividends in future. The value of an equity share in such a case, may be determined on the basis of the earnings of the firm. The earnings of the firm may be expressed as earnings as per share (EPS) which is ascertained from the accounting information of the firm. There are different approaches to find out the value of the equity share on the basis of the earnings of the firm. These include Gordon valuation model, Walter's Model, the P/E ratio approach and the explicit resale price model.

(a) The Gordon's Model. This valuation model presupposes that earnings of the firm are either distributed among the shareholders or are reinvested within the business. The growth in dividends in future would therefore depend upon the profits retained and the rate of return on these retained profits. The golden valuation model can be represented as follows:

$$P_0 = \text{EPS}_1 (1-b) / k_e - br \dots\dots 13$$

Where P_0 = price of a share

EPS_1 = EPS at the end of year 1

'b' = retention rate, i.e., % of earnings being retained

r = rate of return on reinvestments, i.e., ROI

k_e = required rate of return of the equity investors.

The detailed discussion on Gordon model may be found in chapter 4

(b) Walter's Model – The walter's model supports the view that the market price of a share is the sum of (i) present value of an infinite stream of dividends, and (ii) present value of an infinite stream of returns from retained earnings. The investors will evaluate the retention of earnings resulting in lesser dividends, in the light of (a) the rate of return, r, earned by the company on these retained earnings, and (b) the opportunity cost of equity investors, k_e . Depending upon the relationship between r and k_e , the investors will value the expected capital gains and will thus value the share. The Walter's Model can be presented as follows:

$$P = [D / k_e] + (k_e / r)(E - D) / k_e \dots\dots 14$$

The detailed discussion on Walter's Model may be found in chapter 4.

(c) Price earnings ratio(P/E ratio):- The P/E ratio is the most common earnings valuations Model. The P/E ratio between the price of a share & it is EPS. For eg., if a share whose EPS is Rs. 10 is having market price of Rs.250, then its P/E ratio is $250/10 = 25$. it means that the mp of the share is 25 times that of the EPS. As per P/E ratio approach the value of the share is expressed as

$$\text{Value} = \text{EPS} * \text{P/E ratio}$$

But there is a question as to how to estimate / forecast the P/E ratio? One method is to estimate the P/e ratio of the similar type of a company or the industry as a whole. Then those estimate may be further adjusted in the light of characteristics and features of the particular firm and its share. The P/E ratio before being applied to a particular case, to find out the value of the share may be analyzed for the risk involved in the firm, in the

share, growth prospects of the firm stability of earnings of the firm, etc. the higher the growth prospects of the firm and stability of a dividend, larger would be the P/e ratio. Similarly, higher the risk of firm, lower would be P/E ratio.

The P/E ratio as the basis of valuation of share has been quite common and is often used in business dailies and generals. The share quotations are often supplemented with the P/E ratios. It may be observed that some companies have very high P/E ratios while others have a low P/E ratio. The share price at any particular point of time reflects investor's expectation of future operating and investment performance of the firm. The shares of the growing firm shall act very high P/E ratio because investors are willing to pay a higher price now for expected higher returns in future.

VALUATION OF RIGHT

Some times, a company may issue right shares under sec 81 of the Company's Act 1956, to the existing share holders. Each holder owning shares as on a certain date (set at the time the issue is approved) receives an option to buy a certain number of new shares. The share holder is given a notice of this fact and is subsequently issued a form called a right which out lines the term and condition of the option. One right is issue for each share holder and total number of new share each shareholders may purchase with his right depend on the number of share he owes at the time of the right offering and the percentage increase in the total number of shares of the company represented by the new issue, i.e. each existing shareholders get an opportunity to subscribe to new shares in the same ratio in which he holds the shares.

It may be noted that the right is an option and not an obligation to buy a specific number of shares at a specific price per share over a fixed time interval. The shareholders have four option (i) to exercise the right, which means purchasing the new share s directly from the issuing company, (ii) to sell their rights, (iii) to hold the right until the expiry, (iv) to sell existing shares and simultaneously to purchase the new shares. If all the rights are exercised, the offering is fully subscribed and the company receives the target funds. However, if some rights are not exercised, then the company will be having lesser funds then required.

For example, a company requiring Rs.10,00,000 decides to offer new share at Rs.20 each (mp Rs.32 each). The number of new equity share to be issued is $\text{Rs.10,00,000} / 20 = 50,000$. if the company already has 2,50,000 or 1:5, i.e. 1 right share will be offered at Rs.20 each for every 5 existing shares held by a shareholder. Every registered share holders, on the record date, will get this opportunity. Further, that any

buyer of the share, on the stock exchange, before the record date, will also receive the right offer as he is purchasing the share on cum right basis. Investor buying the shares after record date, will not get the right offer as he is buying the share on ex-right basis. Since each share entitle the holder to get the right offer, cum right price, theoretically speaking, is equal to the ex-right plus the value of the right.

VALUATION OF THE RIGHT. The right offering are planned in such a way that it gives 'rights' a resale value or a benefit to the existing shareholders. This is accomplished by setting the opportunity it provides to purchase the share at a price less than the market price. The value of the right should be same if the share is being sold or purchase cum right. The value of right may be calculated as follows:

$$V_r = MP_{cr} - OP / N_0 + N_1$$

Where V_r = value of right

MP_{cr} = cum-right market price

OP = offer price

N_1 = existing number of shares

N_2 = number of new share offered.

To continue with the above example, the value of the right is

$$\begin{aligned} V_r &= 32 - 20/5 + 1 \\ &= \text{Rs.}2 \end{aligned}$$

If a share is traded as ex-right, i.e., the value of the right is no longer included in the market price is expected to drop by the value of the right, the market value of the share trading as ex-right may be ascertained as follows:

$$\begin{aligned} MP_{ER} &= MP_{CR} - V_R \\ &= \text{Rs.}32 - 2 = \text{Rs.}30 \end{aligned}$$

The value of right when the share is trading ex-right, i.e., V_{ER} may be ascertained as follows:

$$V_{ER} = MP_{ER} - OP / N_0$$

In the above case the value of the right based on ex-right price is:

$$\begin{aligned} V_R &= 32 - 20/6 \\ &= \text{Rs.}2 \end{aligned}$$

So, the value of the right is the same whether the equity share is being traded at cum-right basis or ex-right basis

Duration of Bond:

Duration is the single point where the cash flows for a bond, with periodical interest payments equate the single payment for the dues for the same bond.

Seven golden rules for duration of bonds

1. The duration of a zero-coupon bond equals its time to maturity.
2. Holding maturity constant, a bond's duration is higher when the coupon is lower.
3. Holding the coupon rate constant, a bond's duration generally increases with its time to maturity. Duration always increases with maturity for bonds selling at par or at premium.
4. Holding other factors constant, the duration of a coupon bond is higher when the bond's yield to maturity is lower.
5. The duration of a level perpetuity is $(1+y)/y$. here duration and maturity can differ substantially.
6. The duration for a level annuity is equal to the following :

$$(1+y)/y - T/(1+y)^T - 1$$

7. The duration of a coupon bond equals the following:

$$(1+y/y) - \{[(1+y)^T + T(c-y)]\} / [c \{(1+y)^T - 1\} + y]$$

Valuation of bonds

Q 1 A Rs. 100 par value bond bearing a coupon rate of 12 percent will mature after 5 years. Find the value of the bond if the discount rate is 15%

Q 2 the market value of Rs. 1000 par value bond having a coupon rate of 14% is maturing after 5 years for Rs. 1050. What is the YTM. What is the realised YTM if the reinvestment rate is 12%

Q 3 A Rs. 100 par value bond have a coupon rate of 14 percent and matures after 5 yaers interest is payable semiannually. Calculate the value of the bond if trhe required rate is 16%

Q 4 The firm has paid a dividend of Rs. 2 last year. The expected growth rate of the dividends is 5%. Determine the estimated price of the share if the growth rate of the share rises to 8% calculate the new share price

Q 5 find the value of the share from the following data

Last dividend paid	Rs. 2.00 per share
Growth rate for the next 5 years	15%
Growth rate beyond 5 years	10%
Required rate of return	16%

Q 6 The current dividend on the shares of X Ltd. is Rs. 2.00. it is expected to enjoy an above normal growth of 18% for next 6 years. Thereafter the growth rate will fall and stabilize at 12%. Equity investors require a return of 16% calculate the value of the shares of X Ltd.

Q 7 A company pays a dividend of Rs. 2.00 per share with the growth rate of 7%. The risk free rate is 9% and the market rate of return is 13%. The company has a beta factor of 1.50. However due to the decision of the finance manager the beta factor changes to 1.75. Find out the present as well as the likely value of share after the decision

Q 8 the following data is available for the bond

Face value	Rs. 1000
Coupon rate	16%
Years to maturity	6
Redemption value	1000
Yield to maturity	17%

Calculate the price duration and the volatility of the bond. Calculate the expected market price if the change in the required rate is by 75 basis points

UNIT IV

Fundamental and Technical Analysis - Economic Analysis , Industry Analysis ,company Analysis and Efficient market theory:

Security analysis is the analysis of tradeable financial instruments called securities. It deals with finding the proper value of individual securities.

Security analysis refers to the method of analysing the value of securities like shares and other instruments to assess the total value of business which will be useful for investors to make decisions. There are three methods to analyse the value of securities fundamental, technical, and quantitative analysis. Security analysts must act with integrity, competence, and diligence while conducting the investment profession.

The securities can broadly be classified into equity instruments (stocks), debt instruments (bonds), derivatives (options), or some hybrid (convertible bond).

Considering the nature of securities, security analysis can broadly be performed using the following three methods:-

1.Fundamental Analysis

This type of security analysis is an evaluation procedure of securities where the major goal is to calculate the intrinsic value of a stock. It studies the fundamental factors that effects stocks intrinsic value like profitability statement & position statements of a company, managerial performance and future outlook, present industrial conditions, and the overall economy.

Components of Fundamental Analysis

Fundamental analysis consists of three main parts:

- 1.Economic analysis
- 2.Industry analysis
- 3.Company analysis

Fundamental analysis is an extremely comprehensive approach that requires a deep knowledge of accounting, finance, and economics. For instance, fundamental analysis requires the ability to read financial statements, an understanding of macroeconomic factors, and knowledge of valuation techniques. It primarily relies on public data, such as a company's historical earnings and profit margins, to project future growth.

Objectives of Fundamental Analysis:

The objectives of Fundamental Analysis of Stock Market are –

- ☐To predict the future price of the share of the company
- ☐To do the valuation of the asset of the company
- ☐In order to project the performance of the business
- ☐To measure the credit risk
- ☐To evaluate the management's decisions
- ☐In order to find the intrinsic value of the asset

2. Technical Analysis

This type of security analysis is a price forecasting technique that considers only historical prices, trading volumes, and industry trends to predict the future performance of the security. It studies stock charts by applying various indicators (like MACD, Bollinger Bands, etc.), assuming every fundamental input has been factored into the price.

3 .Quantitative Analysis

This type of security analysis is a supporting methodology for both fundamental and technical analysis, which evaluates the historical performance of the stock through calculations of basic financial ratios, e.g., Earnings Per Share (EPS), Return on Investments (ROI), or complex valuations like discounted cash flows (DCF).

Need for security analysis:

The basic target of every individual is to increase their Net Worth by investing the earnings into various financial instruments, i.e., the creation of money using the money. Security analysis helps people achieve their ultimate goal, as discussed below:

1 .Returns :The primary objective of the investment is to earn returns in the form of capital appreciation as well as yield.

2 .Capital Gain :Capital Gain or appreciation is the difference between the sale price and purchase price.

3 .Yield :It is the return received in the form of interest or dividend.

$\text{Return} = \text{Capital Gain} + \text{Yield}$

4 .Risk :It is the probability of losing the principal capital invested. Security analysis avoids risks and ensures the safety of capital, also creates opportunities to outperform the market.

5 .Safety of Capital :The capital invested with proper analysis; avoids chances to lose both interest and capital. Invest in less risky debt instruments like bonds.

6. Inflation :Inflation kills ones purchasing power. Inflation over time causes you to buy a smaller percentage of good for every dollar you own. Proper investments provide you hedge against inflation.

7. Risk-Return relationship :The higher the potential return of an investment, the higher will be the risk. But the higher risk doesnt guarantee higher returns.

8 .Diversification : It means do not invest your whole capital in a single asset or asset class but allocate your capital in a variety of financial instruments and create a pool of assets called a portfolio. The goal is to reduce the risk of volatility in a particular asset.

Efficient market theory:

Efficient market theory holds that markets operate efficiently because at any given time, all publicly known information is incorporated 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.

Market efficiency refers to the degree to which market prices reflect all available, relevant information. If markets are efficient, then all information is already incorporated into prices, and so there is no way to "beat" the market because there are no undervalued or overvalued securities available.

Market efficiency refers to how well current prices reflect all available, relevant information about the actual value of the underlying assets.

A truly efficient market eliminates the possibility of beating the market, because any information available to any trader is already incorporated into the market price. As the quality and amount of information increases, the market becomes more efficient reducing opportunities for arbitrage and above market returns.

Efficient [market](#) theory hypothesis proposes that financial [markets](#) incorporate and reflect all known relevant information.

Efficient Market Assumptions

Efficient market hypothesis is based on several assumptions.

1. It assumes that all relevant [information](#) is reflected in the [stock](#) markets.
2. EMH assumes a financial [security](#) is always [priced](#) correctly.
3. It implies that [stocks](#) are never undervalued or overvalued.

4. It also implies that [investors](#) can never consistently outperform the market, by employing [investment strategies](#).

Degrees of Efficient Market Hypothesis

According to EMH, there are three forms of [market](#) efficiency namely

- Weak-form efficiency
- Semi-strong-form efficiency
- Strong-form efficiency

The different forms represent different degrees of adherence to efficient market hypothesis.

1, Weak Form Market Efficiency:

According to weak-form market efficiency, the market reflect all historic [price](#) data in a stock's current [market price](#). This implies you cannot use technical analysis to outperform the overall market. However, the investors can discover and exploit through fundamental analysis.

2.Semi Strong Efficient Market Hypothesis:

According to semi-strong-form market efficiency, the market reflect all public data (including all historical data and all current financial statement data) in a stock's current [market price](#). Furthermore, this implies that neither technical analysis nor fundamental [analysis](#) can be utilized to outperform the overall market. So [investors](#) with access to private information may be able to earn excessive returns.

3.Strong Form Market Efficiency:

According to strong-form market efficiency, reflect all data – historic and current, [public](#) and private – in a stock's current market price. Furthermore, this form of [market](#) efficiency implies that there is no way to achieve excessive returns in financial markets.

UNIT-5

PORTFOLIO MANAGEMENT

Investing is an art form. It takes knowledge about the stock market, but more importantly it requires a strategy. The top investors don't get there by hoarding, but instead know the value of a strategized approach.

While it may take some time to become an ace investor, you can start with the basics and work your way up from there. The first step to succeeding in your money-making goal is to systematically create a portfolio which works for you best.

A portfolio is essentially a record of your gains and losses. Any asset which can ultimately procure a profit, such as real estate, stocks or other investments is considered part and parcel of this compilation of your worth.

Building up a healthy investment collection is a step by step process. The art of creating a profitable portfolio lays in tailor-making it to fit the goals and limitations of the investor. Before you begin to select your investments, you must determine how tolerant you are of the risk involved. If you base your decisions on your [risk profile](#), it will guarantee you some peace of mind. Another point to consider while creating your portfolio is that diversification is your safety net. Having a good mix of investments is the key to minimizing risk while building up your profits.

PORTFOLIO MANAGEMENT

Portfolio Management is concerned with allocating assets while downsizing risk. Most importantly it is about matching goals to outcomes. This requires an analysis of the potentials and pitfalls related with the various options available to an investor. Portfolio management is a boon for investing as the selection caters to the individual's financial goals. It provides a strategy and a solution based on the need and suggests the best route that an investor should take.

PORTFOLIO MANAGER

A portfolio manager has knowledge about the stock market and uses it to further other investor's gains.

The manager must have a clear picture of the investor's expectations to find a suitable strategy and deliver the best possible returns.

Though the objective of money-making remains the same, the role of the manager sometimes differs.

TYPES OF PORTFOLIO MANAGEMENT

Active Portfolio Management

The aim of the active portfolio manager is to make better returns than what the market dictates. Those who follow this method of investing are usually contrarian in their approach. 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.

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. What this means is that if a company represented 2% of the 500 Index, then Rs. 2 would be invested into the company for every Rs.100 put into the 500 fund.

The point of opting for the lower yield is to combat the cost of management fees, while profiting through stability.

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.

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.

PORTFOLIO MANAGEMENT THEORIES

PORTFOLIO MANAGEMENT THEORIES guide portfolio management & provide set of principles based on which investments should be done so as to maximize returns while keeping risk levels to the minimum.

TRADITIONAL APPROACH THEORIES

Dow Jones Theory	It helps investors to time their investments correctly. Three different trends influence & guide its direction.
Random Walk Theory	It states that markets are fully efficient. There isn't info. lag & investors have full knowledge on any new developments.
Formula Plans	The main goal isn't to maximize profits. It assist investors to buy securities at low prices and later sell at a higher price.

TRADITIONAL APPROACH THEORIES

Harry Markowitz's Modern Theory	It suggests an investor should always go for the diversification of his portfolio. It gives a number of efficient portfolios that satisfy the requirements
Sharpe Single Index model	It is a measure of the firm's variance with regard to the entire market & one/several economic factor affecting it.
Capital Asset Pricing model	Helps the investors to understand the returns they should expect on the basis of the security's systematic risk.

Dow Theory

The Dow Theory is an approach to trading developed by [Charles H. Dow](#), who, with Edward Jones and Charles Bergstresser, founded Dow Jones & Company, Inc.

The Dow theory is a financial theory founded on a set of ideas derived from Charles H. Dow's editorials. It fundamentally states that a significant shift between bear and bull sentiment in a stock market will occur when multiple indices confirm it.

Dow believed that the stock market as a whole was a reliable measure of overall business conditions within the economy and that by analyzing the overall market, one could accurately gauge those conditions and identify the direction of significant market trends and the likely direction individual stocks would take.

The Dow theory developed from the market price action analysis, views on speculation, etc., put forth by Charles H. Dow formed a foundational step for technical analysis when the software's aided technical analysis like today didn't exist. Its evolution and usefulness in speculation are well portrayed by Robert Rhea in his book "The Dow Theory" by meticulously examining the Wall Street Journal editorials by Charles H. Dow and William Peter Hamilton in the 19th century. It was among the earliest attempts to understand the market by using fundamentals that indicated future trends.

The original version of the theory focused on comparing the closing prices of two averages: the Dow Jones Rail (or Transportation) (DJT) and the Dow Jones Industrial (DJI). The argument was that if one rose above a certain threshold, the other would follow it. To illustrate it, Dow's compared the market to the ocean. According to the economist, if you are on one side of the beach and the waves go up until a point, waves in another part of the beach will eventually reach the same point. The same happens with markets because they're also a part of a whole.

The six tenets of Dow Theory /[The Paradigms of Dow Theory](#)

To explain the theory, understanding the several rules devised by Dow is vital. These paradigms are generally known as the tenets or principles of Dow theory.

Three significant market trends: They are primary, secondary, and minor trends defined by their duration. Primary trends can be uptrend or downtrend lasting months to years, while secondary one moving opposite to the primary will last weeks or a few months. Minor trends are treated as insignificant variations lasting from a few hours to weeks, and they are not as important as the others.

Primary trends have three distinct phases: The different phases in bear markets are distribution, public participation, and panic. **Bull markets**, on the other, have accumulation, public participation, and excess phase.

Stock market discount everything: The **market indexes** react quickly to all forms of information. It can be related to the entity or **economy** as a whole. For instance, any economic shock or issues in the company management will affect stocks and move the indices upward or downward.

Volume confirms the trend: Trading volume increases during an uptrend and decrease during depressions.

Indices confirm each other: Multiple indices moving in an identical pattern reveal a trend since they give the same signal. Whereas if two indices move in the opposite direction, it is difficult to deduct a trend.

Trends continue until solid clues imply the reversal: Traders should be aware of trend reversals. It's easy to confuse them with secondary trends, so Dow cautions the investor to be careful and confirm trends with several sources before believing it's a reversal.

The Random Walk Theory

The Random Walk Theory, or the Random Walk Hypothesis, is a [mathematical model](#) of the stock market. Proponents of the theory believe that the prices of [securities](#) in the stock market evolve according to a random walk.

A “random walk” is a statistical phenomenon where a variable follows no discernible trend and moves seemingly at random. The random walk theory, as applied to trading, most clearly laid out by Burton Malkiel, an economics professor at Princeton University, posits that the price of securities moves randomly (hence the name of the theory) and that, therefore, any attempt to predict future price movement, either through fundamental or technical analysis, is futile.

The implication for traders is that it is impossible to outperform the overall market average other than by sheer chance. Those who subscribe to the random walk theory recommend using a “buy and hold” strategy, investing in a selection of stocks that represent the overall market – for example, an index mutual fund or ETF based on one of the broad stock market indexes, such as the S&P 500 Index.



Basic Assumptions of the Random Walk Theory

The Random Walk Theory assumes that the price of each security in the stock market follows a random walk.

The Random Walk Theory also assumes that the movement in the price of one security is independent of the movement in the price of another security.

Criticism of the Random Walk Theory

One of the main criticisms of the Random Walk Theory is that the stock market consists of a large number of investors, and the amount of time each investor spends in the market is different. Thus, it is possible for trends to emerge in the prices of securities in the short run, and a savvy investor can outperform the market by strategically buying stocks when the price is low and selling stocks when the price is high within a short time span.

Other critics argue that the entire basis of the Random Walk Theory is flawed and that stock prices do follow patterns or trends, even over the long run. They argue that because the price of a security is affected by an extremely large number of factors, it may be impossible to discern the pattern or trend followed by the price of that security. However, just because a pattern cannot be clearly identified, that doesn't mean that a pattern does not exist.

Formula Plans in Portfolio Management

The investor uses **formula plans** to facilitate him in making **investment decisions** for the future by exploiting the fluctuations in prices. The **formula plans** have sketched the basic rules and regulations for purchasing and selling of investments. The **formula plans** make the average investors superior to others. These **formula plans in portfolio management** are based on the fact that the investors will not have the problem of forecasting fluctuation in stock prices and will continue to act according to formula.

So, **formula plans** are a type of investment strategy that makes use of pre-determined rules for the nature and timing of change in one's investment portfolio as the market rises or falls.

Rules for Formula Plans

These plans work according to a methodology which is related for the working of each plan

These plans cannot be used for short periods of time. The longer the period of holding the investments, the easier for formula plans to work.

Generally the formula plans are strict, rigid and straight forward out they are not flexible

These plans suggest that there must be two portfolios of an investor, namely [aggressive portfolio](#) and [conservative portfolio](#). These plans do not have a selection procedure for the stocks. The methodology adopted by the **formula plans** is to find out the difference in movements of the [aggressive portfolios](#) and the [conservative portfolios](#). The formula plans disclose that when the stocks must be purchased and sold.

Types of Formula Plans in Portfolio Management

An aggressive portfolio will determine the volatile nature of the portfolio and will have large number of fluctuations; whereas the conservative portfolio will be planned to complement the aggressive portfolio and will consist of bonds. The conservative portfolio is a mechanism of defensive operations — The two portfolio when combined together will achieve the results as planned by the formula.

Following are the **three important types of formula plans** that are found useful in making **portfolio investment decisions**;

The Constant Rupee Value

The Constant Ratio

The Variable Ratio Formula Plans

Modern Portfolio Theory – Markowitz Portfolio Selection Model

Harry Markowitz developed a theory, also known as **Modern Portfolio Theory (MPT)** according to which we can balance our investment by combining different securities, illustrating how well selected shares portfolio can result in maximum profit with minimum risk. He proved that investors who take a higher risk can also achieve higher profit. The central measure of success or failure is the relative portfolio gain, i.e. gain compared to the selected benchmark.

Modern portfolio theory is based on three assumptions about the behavior of investors who: wish to maximize their utility function and who are risk averse, choose their portfolio based on the mean value and return variance, have a single-period time horizon.

Markowitz portfolio theory is based on several very important assumptions. Under these assumptions a portfolio is considered to be efficient if no other portfolio offers a higher expected return with the same or lower risk.

Investors view the mean of the distribution of potential outcomes as the expected return of an investment. Investors view the variability of potential outcomes about the mean as the risk of an investment. Variability is measured by variance or standard deviation.

Investors all have the same holding period. This eliminates time horizon risk.

Investors base all their decisions on expected return and risk. By connecting all the points of equal utility, a series of curves called the investor's indifference or utility map is created.

For a given risk level, investors prefer higher returns to lower returns, or for a given return level, investors prefer less risk to more risk.

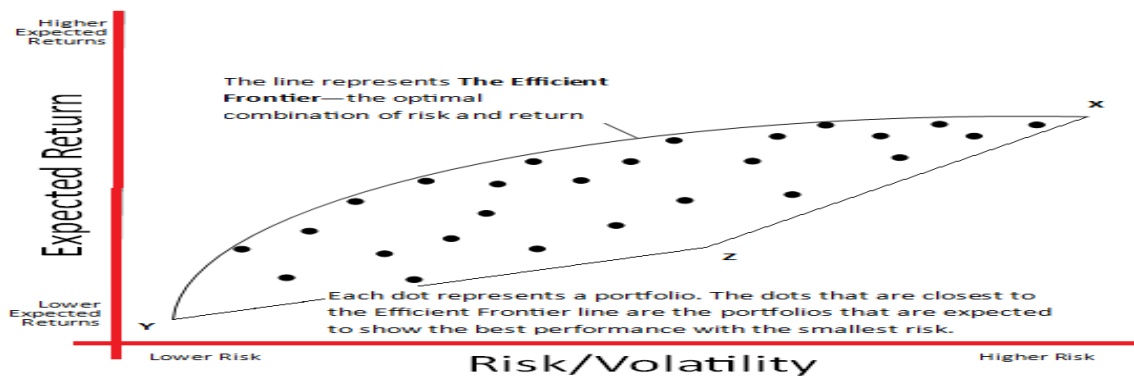
By using risk (standard deviation – σ) and the expected return (R_p) in a two-dimensional space, following figure presents portfolio combinations available to the investor. Thus, each point within the space enclosed by points XYZ, represents a certain portfolio.

By analyzing the figure the conclusion can be drawn that in a new combination of securities the portfolio can be moved:

upwards — which would imply higher returns with the same level of risk or
to the left — this implies higher returns with less risk.

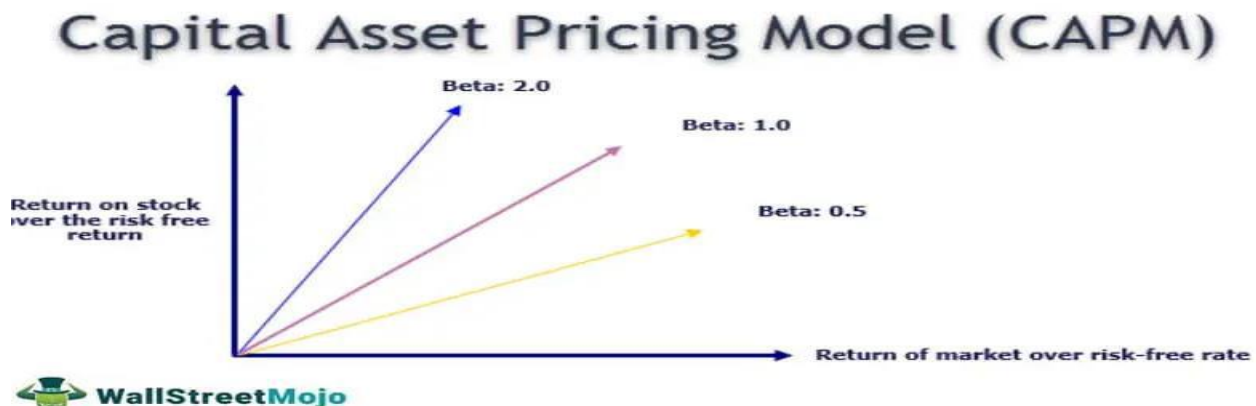
It can be noticed that the portfolios below the XY curve, unlike the portfolios on the curve, offer the investor the same return with a higher level of risk or a higher risk with less return, which is not acceptable to the investor. Investors tend to select the combination of shares that would position their portfolio on the XY curve, called the efficient frontier. If the portfolio does not belong to the frontier, the investor can improve the situation by changing the structure of the portfolio, i.e. by changing its content.

Investors will opt for the portfolio that best corresponds to their risk attitude. Those who are more risk inclined will select the portfolio on the efficient frontier, closer to point X, whereas the more risk averse will select the portfolio closer to point Y. It can be said that the Markowitz portfolio theory helps investors in the selection of the set of shares that will ensure a higher portfolio return with the desired level of risk (the tendency is to minimize risk and maximize return on investment).



The Capital Asset Pricing Model (CAPM)

The Capital Asset Pricing Model (CAPM) measures the relationship between the expected return and the risk of investing in security. This model is used to analyze securities and price them given the expected rate of return and cost of capital involved.

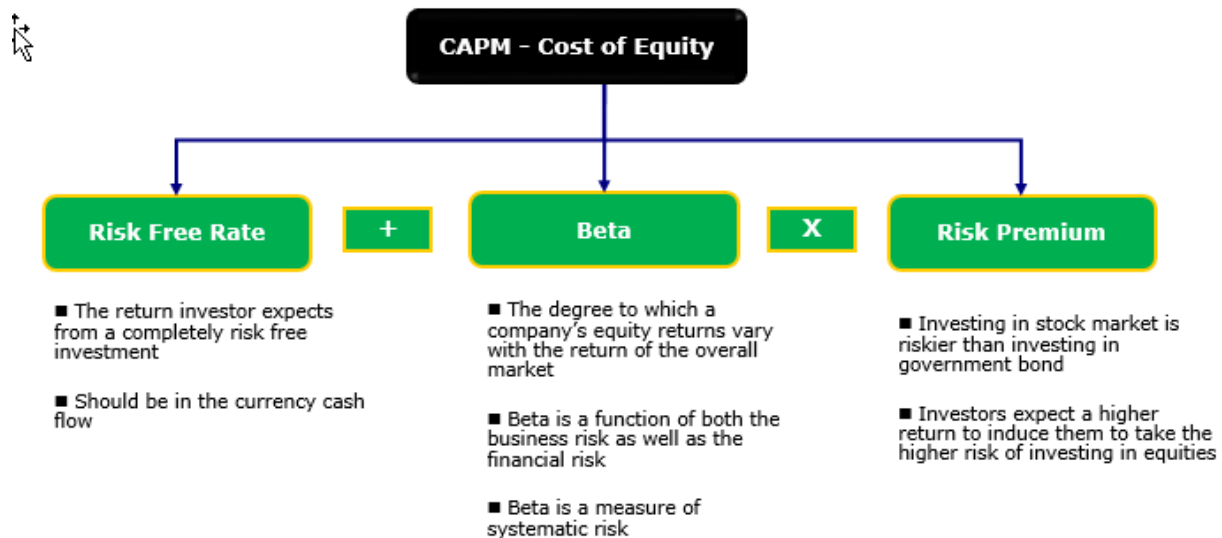


CAPM Formula

The (capital asset pricing model) CAPM formula is represented below

Expected Rate of Return = Risk-Free Premium + Beta * (Market Risk Premium)

$$R_a = R_{rf} + \beta_a * (R_m - R_{rf})$$



The CAPM calculation works on the existence of the following elements

#1 – Risk-free return (R_{rf})

Risk-Free Rate of Return is the value assigned to an investment that guarantees a return with zero risks. Generally, the value of the risk-free return is equivalent to the yield on a 10-year US government bond. Investments in US securities are considered zero risks since there is a minimal chance of the government defaulting.

#2 – Market Risk Premium ($R_m - R_{rf}$)

Market Risk Premium is the expected return an investor receives (or expects to receive in the future) from holding a risk-laden portfolio instead of risk-free assets. The premium rate allows the investor to decide if the investment in the securities should occur and, if yes, the rate he will earn beyond the risk-free return offered by government securities.

#3 – Beta (β_a)

The **Beta** is a measure of the **volatility** of a stock concerning the market in general. The fluctuations that will cause in the stock due to a change in market conditions are denoted by Beta. For Beta, which is equal to 1, the stock is in sync with the changes in the market. For example, if the stock's Beta is 1.2, it would cause a 120% change due to any change in the general market. The opposite is the case for Beta less than 1.

Thus, the investor should invest in Stock Marvel.

Advantages of CAPM

CAPM considers only the systematic or market risk or not the security's only inherent or **systemic risk**. This factor eliminates the vagueness associated with an individual security's risk, and only the general market risk, which has a degree of certainty, becomes the primary factor. The model assumes that the investor holds a diversified portfolio, and hence **the unsystematic risk** is eliminated between the stock holdings.

It is widely used in the finance industry to calculate the cost of equity and ultimately the weighted average cost of capital, which is used extensively to check the cost of financing from various sources. It is seen as a much better model to **calculate the cost of equity** than the other present models like the **Dividend growth model** (DGM)

It is a universal and easy-to-use model. Given the extensive presence of this model, this can easily be utilized for comparisons between stocks of various countries.

Disadvantages of CAPM

The capital asset pricing model is hinged on various assumptions. One of the assumptions is that a riskier asset will yield a higher return. Next, the historical data is used to calculate Beta. The model also assumes that past performance is a good measure of the future results of a stock's functioning. However, that is far from the truth.

The model also assumes that the risk-free return will remain constant throughout the stock investment. If the return on the government treasury securities rises or falls, it will change the risk-free return and potentially the calculation of the model. It is not taken into account while calculating the CAPM.

The model assumes that the investors have access to the same information and have the same decision-making process concerning the risks and returns associated with the securities. It assumes that the investors will prefer low-risk securities to high-risk securities for a given return. Investors will prefer higher returns to lower returns for a given risk. Although this is a general guideline, some of the more extravagant investors might not be in agreement with this theory.

Limitations of the Capital Asset Pricing Model

Apart from the assumptions directly related to the factors around the stock and the capital asset pricing model calculation formula, there is a list of general assumptions that the model takes, which are worth looking into.

Only the returns and risks involved in the securities are the decision-making factors for an investor. There is no accountability for the long-term growth or qualitative factors around a stock that could influence the investor to take an alternative step.

There is [perfect competition](#) in the market, and no single investor can influence a stock's prices or returns. There is no limit on the [short-selling](#) short-selling of a stock; neither is their control on the divisibility of the purchase and selling units.

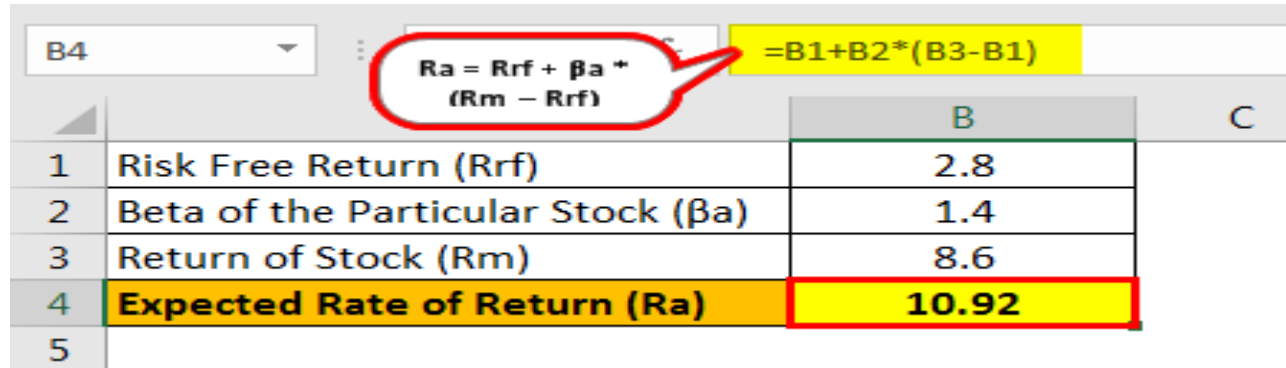
There are nil taxes regarding the returns earned or any borrowing costs concerning the amount utilized to earn interest on the investment.

Finally, the model assumes that the investor is [risk-averse](#), and he is supposed to act as a rational being and maximize his utility.

Example #1

Suppose a stock has the following information. It is listed on the London stock exchange and operates throughout Europe. The yield on a UK 10 year treasury is 2.8%. The stock in question will earn 8.6% as per historical data. The Beta for the stock is 1.4, i.e., it is 140% volatile to the changes in the general stock market.

The expected rate of return of the stock will be calculated as below.



	B	C
1	Risk Free Return (Rrf)	2.8
2	Beta of the Particular Stock (β_a)	1.4
3	Return of Stock (Rm)	8.6
4	Expected Rate of Return (Ra)	10.92
5		

CAPM Formula (Expected return) = Risk free return (2.8%) + Beta (1.4) * Market risk premium (8.6%-2.8%)

$$= 2.8 + 1.4 * (5.8)$$

$$= 2.8 + 8.12$$

Expected Rate of Return = 10.92

Example #2

Thomas has to decide to invest in either Stock Marvel or Stock DC using the CAPM model illustrated by the following screenshot from work. Thomas has to decide to invest in Stock Marvel or Stock DC with the given information available to him. Marvel – Return 9.6%, Beta 0.95. DC – Return 8.7%, Beta 1.2. As measured by the return on government stock, a risk-free return in the market is 5.6%.

The expected rate of return of the stock marvel will be calculated below.

B5		$R_a = R_{rf} + \beta_a * (R_m - R_{rf})$	$=B2+B4*(B3-B2)$
		B	C
1	Stock Marvel		
2	Risk Free Security Return (Rrf)	5.60%	
3	Return of the Stock (Rm)	9.60%	
4	Beta of Particular Stock (β_a)	95.00%	
5	Expected Rate of Return (Ra)	9.40%	
6			

Formula – Expected return = Risk free return (5.60%) + Beta (95.00) * Market risk premium (9.60%-5.60%)

Expected Rate of Return = 9.40%

The expected rate of return of the stock DC will be calculated as below.

B11		$R_a = R_{rf} + \beta_a * (R_m - R_{rf})$	$=B8+B10*(B9-B8)$
		B	C
7	Stock DC		
8	Risk Free Security Return (Rrf)	5.6%	
9	Return of the Stock (Rm)	8.7%	
10	Beta of Particular Stock (β_a)	1.2	
11	Expected Rate of Return (Ra)	9.32%	
12			

Formula – Expected return = Risk free return (5.6%) + Beta (1.2) * Market risk premium (8.7%-5.6%)

Expected Rate of Return = 9.32%

Pb-①: Calculate Expected Return on Company A and B, from the below information.

COMPANY - A		COMPANY - B	
Return	Probability	Return	Probability
3	0.15	5	0.20
4	0.20	6	0.20
5	0.30	7	0.30
6	0.20	8	0.20
7	0.15	9	0.10

Solution:

$$E(R) = \sum_{i=1}^n R_i P_i$$

Where, R_i is the return in Scenario i ,

P_i is the Probability for the return R_i in Scenario i &
 i is the Count, the number of Scenarios.

COMPANY - A			COMPANY - B		
Return (R_i)	Probability (P_i)	WAR (R_i)(P_i)	Return (R_i)	Probability (P_i)	WAR (R_i)(P_i)
3	0.15	0.45	5	0.20	1.00
4	0.20	0.80	6	0.20	1.20
5	0.30	1.50	7	0.30	2.10
6	0.20	1.20	8	0.20	1.60
7	0.15	1.05	9	0.10	0.90
$\Sigma E(R)$		5.00	$\Sigma E(R)$		6.80

$$WAR = (R_i)(P_i)$$

$$A: \Sigma E(R) = \underline{5.00} \text{ (i.e., } = 0.45 + 0.80 + 1.50 + 1.20 + 1.05 \text{)}$$

$$B: \Sigma E(R) = \underline{6.80} \text{ (i.e., } = 1.00 + 1.20 + 2.10 + 1.60 + 0.90 \text{)}$$

Problem - ④: Calculate Standard deviation and Variance from the below information.

Security Return	10	11	12	13	14
Probability	0.15	0.20	0.25	0.20	0.20

Solution:

Calculation & standard deviation				
R_i	P_i	$(R_i - E(R_i))$	$(R_i - E(R_i))^2$	Variance $\sum P_i (R_i - E(R_i))^2$
10	0.15	-2	4	0.60
11	0.20	-1	1	0.20
12	0.25	0	0	0
13	0.20	1	1	0.20
14	0.20	2	4	0.80
Variance \rightarrow				1.80

W. Notes:

i) Calculation & $(R_i - E(R_i)) = 10 - 12 = -2$; $11 - 12 = -1$;
 $12 - 12 = 0$; $13 - 12 = 1$; $14 - 12 = 2$.

ii) Calculation & $(R_i - E(R_i))^2 = (-2 \times -2 = 4)$; $(-1 \times -1 = 1)$;
 $(0 \times 0 = 0)$; $(1 \times 1 = 1)$; $(2 \times 2 = 4)$.

iii) Calculation & $P_i (R_i - E(R_i))^2 = [0.15 \times 4 = 0.60]$;
 $[0.20 \times 1 = 0.20]$; $[0.25 \times 0 = 0]$; $[0.20 \times 1 = 0.20]$; $[0.20 \times 4 = 0.80]$

iv) Calculation & Variance = Sum $P_i (R_i - E(R_i))^2$
 $0.60 + 0.20 + 0 + 0.20 + 0.80 = \underline{1.80}$

v) Calculation & standard deviation = $\sum_{i=1}^n P_i [y_i - E(y)]^2$
 \therefore standard deviation = $\sqrt{1.80}$

$$= \underline{1.34}$$

Problem : The rate of return on the security & Company Marx and market portfolio for periods are given below:

Period	1	2	3	4	5	6	7	8	9	10
Return on Security	15	17	19	21	18	16	9	11	14	13
Return on mkt Portfolio	21	20	16	17	19	14	8	12	17	10

What is the beta of security Marx?

Solution:

Period	R_x	R_y	$R_x - R_x \text{ mean}$	$R_y - R_y \text{ mean}$	$(R_x - R_x \text{ mean})(R_y - R_y \text{ mean})$	$(R_y - R_y \text{ mean})^2$
1	15	21	-0.3	5.6	-1.68	31.36
2	17	20	1.7	4.6	7.82	21.16
3	19	16	3.7	0.6	2.22	0.36
4	21	17	5.7	1.6	9.12	2.56
5	18	19	2.7	3.6	9.72	12.96
6	16	14	0.7	-1.4	-0.98	1.96
7	9	8	-6.3	-7.4	46.62	54.76
8	11	12	-4.3	-3.4	14.62	11.56
9	14	17	-1.3	1.6	-2.08	2.56
10	13	10	-2.3	-5.4	12.42	29.16
Sum	153	154			97.8	362.44 362.44
Mean	15.3	15.4				

$$\begin{aligned} \beta &= \text{Cov}_{xy} / (\text{Std}_y)^2 \\ &= 10.87 / 40.27 \\ &= 0.27 \end{aligned}$$

i) Calculation of standard deviation $= \sqrt{\sum (R_y - R_y \text{ mean})^2 / N - 1}$

$$= \sqrt{362.44 / (10 - 1)}$$

$$= \sqrt{40.27}$$

ii) Calculation of Covariance $= \frac{\sum (R_x - R_x \text{ mean})(R_y - R_y \text{ mean})}{N - 1}$

$$= 97.8 / (10 - 1)$$

iii) Calculation of beta:

$$\beta = \text{Cov}_{xy} / (\text{Std}_y)^2$$

$$= 10.87 / 40.27 = 0.27$$

Problem :

The rate of return on the Security of Company ABC and market Portfolio for 10 Periods are given below.

Period	1	2	3	4	5	6	7	8	9	10
Return on Security	10	22	-12	21	16	14	25	-18	17	15
Return on mkt P. folio	8	12	18	17	22	-11	13	17	4	-10

What is the beta of Security ABC?

Solution :

Period	R_x	R_y	$R_x - R_x$ mean	$R_y - R_y$ mean	$(R_x - R_x)$ $(R_y - R_y)$	$(R_y - R_y)^2$ mean
1	10	8	-1	-2	2	4
2	22	12	11	2	22	4
3	-12	18	-23	8	-184	64
4	21	17	10	7	70	49
5	16	22	5	12	60	144
6	14	-11	3	-21	-63	441
7	25	13	14	3	42	9
8	-18	17	-29	7	-203	49
9	17	4	6	4	24	16
10	15	-10	4	-20	-80	400
Sum	110	100			-310	1180
Mean	11	10				

i) Calculation of SD : $\sum (R_y - R_y \text{ mean})^2 / N - 1$
 $= 1180 / (10 - 1) \therefore \underline{131.11}$

ii) Calculation Covariance : $\sum (R_x - R_x \text{ mean}) (R_y - R_y \text{ mean}) / N - 1$
 $= -310 / (10 - 1) \therefore \underline{-34.44}$

iii) Calculation of Beta : $\text{Cov}_{xy} / (\text{std}_{xy})^2$
 $= -34.44 / 131.11 \therefore \underline{-0.26}$

Problem:

The return of two assets under five possible states of nature are given below:

State of Nature	Probability	Return on Asset - 1	Return on Asset - 2
1	0.20	8%	5%
2	0.15	10%	13%
3	0.18	12%	17%
4	0.23	14%	20%
5	0.24	16%	15%

- i) What is the expected return on Asset ① and Asset ②?
 ii) What is the variance and SD b/w the return on asset 1 & 2?

Solution:

* Calculation of Expected Return and Variance and SD:

Asset - 1			Asset - 2			Asset - 1			Asset - 2			Asset - 1		
R_i	P_j	$(R_i \cdot P_j)$	R_i	P_j	$(R_i \cdot P_j)$	$R_i - E_r$	$(R_i - E_r)^2$	$P_j (R_i - E_r)^2$	$R_i - E_r$	$(R_i - E_r)^2$	$P_j (R_i - E_r)^2$	$R_i - E_r$	$(R_i - E_r)^2$	$P_j (R_i - E_r)^2$
8	0.20	1.6	5	0.20	1.00	-4	16	3.20	-12	144	28.80	-12	144	28.80
10	0.15	1.5	13	0.15	1.95	-2	4	0.60	-4	16	2.4	-4	16	2.4
12	0.18	2.16	17	0.18	3.06	0	0	0	0	0	0	0	0	0
14	0.23	3.22	20	0.23	4.60	2	4	0.92	3	9	2.07	3	9	2.07
16	0.24	3.84	15	0.24	3.60	4	16	3.84	-2	4	0.96	-2	4	0.96
E_r		12.32			14.21									
V								8.56						34.23
SD								2.93						5.85

* $V: (SD)^2$

Pb-② Calculate Expected Return on below X and Y firm Securities.

COMPANY - X					
Return	6	4	8	5	7
Probability	0.17	0.18	0.26	0.20	0.19

COMPANY - Y					
Return	3	6	9	5	4
Probability	0.18	0.22	0.15	0.21	0.24

Solution: $X = \sum E(r) = 6.15$ and $Y = \sum E(r) = 5.22$

Problem - ③: Calculate standard deviation and Variance from the below information.

Security	13	15	16	19	21
Probability	0.15	0.15	0.30	0.15	0.25

Solution: Variance = 9.1 and standard deviation = 3.02

Problem : The rate of return on the security & Company ABC and market Portfolio for 10 periods are given below.

Period	1	2	3	4	5	6	7	8	9	10
Return on Security	17	18	16	26	24	19	-5	19	20	21
Return on Mkt P. folio	19	16	-7	27	23	26	30	24	22	20

Calculate Beta of Security ABC.

Solution: SD : 20.27 ; Cov : -13.67 and Beta = -0.67

Risk and return practice problems

Prepared by Pamela Peterson-Drake

Types of risk

1. Distinguish between sales risk and operating risk. Can firm have a high degree of sales risk and a low degree of operating risk? Explain.

Sales risk is the uncertainty regarding the number of units sold and the price per unit. This risk is affected by economic and market conditions. Operating risk is the uncertainty in operating earnings arising from the mix of variable and fixed operating costs. A firm can have a great deal of sales risk (e.g., a very competitive industry) and yet have low operating risk because of their operating cost structure.

2. Consider two bonds. Bond A has a face value of \$1,000 and a coupon rate of 10%. Bond B has a face value of \$1,000 and a coupon rate of 5%. Both bonds have the same maturity. Which bond has the greater interest rate risk?

Bond B because it has the lower coupon rate.

3. Consider two bonds. Bond C has a face value of \$1,000 and five years remaining to maturity. Bond D has a face value of \$1,000 and ten years remaining to maturity. Both bonds have the same coupon rate of 10%. Which bond has the greater interest rate risk?

Bond D because it has the longer maturity.

4. Consider the Gum Company. Gum sells packs of gum for \$0.50 each. It costs \$0.20 per pack to manufacture and distribute the gum. Gum has fixed operating costs of \$5,000 and fixed financing costs of \$3,000.

- a. What is Gum's degree of operating leverage at 50,000 packs produced and sold?

$$DOL = (50,000 (\$0.50 - 0.20)) / (50,000 (\$0.50 - 0.20) - 5,000) = 1.5$$

- b. What is Gum's degree of financial leverage at 50,000 packs produced and sold?

$$DFL = ((50,000 (\$0.50 - 0.20) - 5,000) / (50,000 (\$0.50 - 0.20) - 5,000 - 3,000)) = 1.42857$$

- c. What is Gum's degree of total leverage at 50,000 packs produced and sold?

$$DTL = 1.5 \times 1.42857 = 2.142857$$

Risk measurement

- For each of the following probability distributions, calculate the expected value and standard deviation:

a.

Outcome	Probability	Outcome value	px	x-E(x)	(x-E(x)) ²	p(x-E(x)) ²
Good	30%	\$40	\$12	\$16	\$256	77
Normal	50%	\$20	\$10	-\$4	\$16	8
Bad	<u>20%</u>	\$10	<u>\$2</u>	-\$14	\$196	<u>39</u>
	100%	E(x) =	\$24		variance =	<u>124</u>
					standard deviation =	\$11

b.

Outcome	Probability	Outcome value	px	x-E(x)	(x-E(x)) ²	p(x-E(x)) ²
Pessimistic	10%	\$1,000,000	\$100,000	-\$3,700,000	\$13,690,000,000,000	1,369,000,000,000
Moderate	40%	\$4,000,000	\$1,600,000	-\$700,000	\$490,000,000,000	196,000,000,000
Optimistic	<u>50%</u>	\$6,000,000	<u>\$3,000,000</u>	\$1,300,000	\$1,690,000,000,000	<u>845,000,000,000</u>
	100%	E(x) = \$4,700,000			variance =	<u>2,410,000,000,000</u>
					standard deviation =	\$1,552,417

c.

Outcome	Probability	Outcome value	px	x-E(x)	(x-E(x)) ²	p(x-E(x)) ²
One	10%	60%	0.060000	0.320000	0.102400	0.010240
Two	50%	40%	0.200000	0.120000	0.014400	0.007200
Three	30%	20%	0.060000	-0.080000	0.006400	0.001920
Four	10%	-40%	<u>-0.040000</u>	-0.680000	0.462400	<u>0.046240</u>
		E(x) = 0.280000			variance =	<u>0.065600</u>
					standard deviation =	25.61%

d.

Outcome	Probability	Outcome value	px	x-E(x)	(x-E(x)) ²	p(x-E(x)) ²
A	10%	\$1,000	\$100	-\$2,000	4,000,000	400,000
B	20%	\$2,000	\$400	-\$1,000	1,000,000	200,000
C	40%	\$3,000	\$1,200	\$0	0	0
D	20%	\$4,000	\$800	\$1,000	1,000,000	200,000
E	10%	\$5,000	<u>\$500</u>	\$2,000	4,000,000	<u>400,000</u>
		E(x) = \$3,000			variance =	1,200,000
					standard deviation =	\$1,095

- There is a 50% probability that the Plum Company's sales will be \$10 million next year, a 20% probability that they will be \$5 million, and a 30% probability that they will be \$3 million.
 - What are the expected sales of Plum Company next year?
Expected value = **\$6.9 million**
 - What is the standard deviation of Plum's next year's sales?

$$\text{Variance} = 4.8050 + 0.7220 + 4.5630 = 10.09$$

$$\text{Standard deviation} = \text{square root of } 10.09 = \mathbf{\$3.1765 \text{ million}}$$

3. You want to win the Lottery? Good Luck! The odds of winning a \$6 million lottery jackpot in Florida are 1 in 14,000,000. What is the expected value of a \$1 lottery ticket investment?

$$E(\text{Lottery ticket cash flow}) = [0.0000000714 (\$6,000,000)] + [0.9999999286 (\$0)]$$

$$= \begin{matrix} \text{winning} \\ \$0.43 \end{matrix} + \begin{matrix} \text{losing} \\ \$0 \end{matrix}$$

$$= \mathbf{\$0.43.}$$

Spending \$1 for a ticket with an expected value of 43¢ means that you expect to lose 57¢

4. Consider the following investments:

Investment	Expected return	Standard deviation
A	5%	10%
B	7%	11%
C	6%	12%
D	6%	10%

Which investment would you prefer between the following pairs?

- a. A and D? **D**
b. B and C? **B**
c. C and D? **D**

Risk, return and diversification

1. The covariance of the returns on the two securities, A and B, is -0.0005. The standard deviation of A's returns is 4% and the standard deviation of B's returns is 6%. What is the correlation between the returns of A and B?

$$\text{Correlation} = -0.0005 / ((0.04)(0.06)) = \mathbf{-0.2083}$$

2. Company X has a beta of 1.45. The expected risk-free rate of interest is 2.5% and the expected return on the market as a whole is 10%. Using the CAPM, what is ABC's expected return?

$$r = 2.5\% + 1.45(10\% - 2.5\%) = \mathbf{13.375\%}$$

3. Consider a portfolio comprised of four securities in the following proportions and with the indicated security beta.

Security	Amount invested	Beta	Expected return
A	\$1.5 million	1.0	12.0%
B	\$1.0 million	1.5	13.5%
C	\$2 million	0.8	9.0%

- a. What is the portfolio's beta?

$$\beta_p = (1.5/4.5) 1.0 + (1/4.5) 1.5 + (2/4.5) 0.8$$

$$\beta_p = 0.3333 + 0.3333 + 0.3556 = \mathbf{1.0222}$$

- b. What is the portfolio's expected return?

$$E(p) = (1.5/4.5)0.12 + (1/4.5) 0.135 + (2/4.5) 0.09$$

$$E(p) = 0.04 + 0.03 + 0.04 = \mathbf{0.11 \text{ or } 11\%}$$

4. ABC Company has a beta of 1.2. The expected risk-free rate of interest is 4% and the expected premium for the market as a whole is 5%. What is the expected return for ABC Company stock?

$$r = 4\% + 1.2(5\%) = \mathbf{10\%}$$

5. Consider Securities D and E with the following estimates:

$$E(R_D) = 8\% \quad \sigma_D = 12\% \quad E(R_E) = 13\% \quad \sigma_E = 20\%$$

Now consider the portfolios that can be formed with D and E, assuming that the investment is equal between D and E (that is, each has a weight of 50%). What is the portfolio's standard deviation if the correlation between D and E for each of the following?

- (a) $r_{ij} = 1.0$

$$\sigma_p = \sqrt{\sum_{i=1}^N X_i^2 \sigma_i^2 + \sum_{i=1}^N \sum_{j=1, j \neq i}^N X_i X_j \sigma_i \sigma_j r_{ij}}$$

$$\sigma_p = \sqrt{[(0.5^2 0.12^2) + (0.5^2 0.2^2)] + 2[(0.5)(0.5)(0.12)(0.2) 1.0]}$$

$$\sigma_p = \sqrt{0.0036 + 0.0100 + 0.012} = \sqrt{0.0256} = 0.16$$

- (b) $r_{ij} = 0.3$

$$\sigma_p = \sqrt{[(0.5^2 0.12^2) + (0.5^2 0.2^2)] + 2[(0.5)(0.5)(0.12)(0.2) 0.3]}$$

$$\sigma_p = \sqrt{0.0036 + 0.0100 + 0.0036} = \sqrt{0.0172} = 0.131149$$

- (c) $r_{ij} = 0.0$

$$\sigma_p = \sqrt{[(0.5^2 0.12^2) + (0.5^2 0.2^2)] + 2[(0.5)(0.5)(0.12)(0.2) 0.0]}$$

$$\sigma_p = \sqrt{0.0036 + 0.0100 + 0.0} = \sqrt{0.0136} = 0.116619$$

- (d) $r_{ij} = -1.0$

$$\sigma_p = \sqrt{[(0.5^2 0.12^2) + (0.5^2 0.2^2)] + 2[(0.5)(0.5)(0.12)(0.2)(-1.0)]}$$

$$\sigma_p = \sqrt{0.0036 + 0.0100 - 0.012} = \sqrt{0.0016} = 0.04$$

6. Consider Securities X and Y with the following estimates:

$$E(R_X) = 5\% \quad \sigma_X = 10\% \quad E(R_Y) = 15\% \quad \sigma_Y = 25\%$$

If the portfolio is comprised of 40% X and 60% Y and if the correlation between the returns on X and Y is -0.25, what is the portfolio's expected return and risk?

$$\text{Expected return} = 0.4(0.05) + 0.6(0.15) = 0.02 + 0.09 = \mathbf{0.11 \text{ or } 11\%}$$

$$\begin{aligned}\text{Variance} &= (0.4)(0.4)(0.10)(0.10) + (0.6)(0.6)(.25)(.25) + (2)(0.4)(0.6)(0.1)(0.25)(-0.25) \\ \text{Variance} &= 0.0016 + 0.0225 - 0.0030 = 0.0211\end{aligned}$$

$$\text{Standard deviation} = \mathbf{14.5268\%}$$