

**(17E00312) INVESTMENT AND PORTFOLIO MANAGEMENT****(Elective III)**

**Objective:** The objective of the course is to provide students an understanding of working of capital markets and management of portfolios of stocks. The pre-requisite for the course is Financial Accounting and Analysis and Financial Management.

**\* Standard discounting and statistical tables to be allowed in the examinations.**

1. **Investment:** Introduction to stock markets -objectives, Process of Investment, Investment and speculation.
2. **Fundamental Analysis & Technical Analysis:** Framework of Fundamental analysis- Economic analysis, Industry analysis-Industry Life cycle - Company analysis, Fundamental Analysis Vs Technical Analysis - Dow Theory.
3. **Measurement of Risk and Return:** Revenue Return and Capital appreciation, holding period –Calculation of expected return, Risk factors, risk classification – systematic risk – unsystematic risk – standard deviation – variance– Beta .
4. **Valuation of Securities:** Types of Securities - Approaches of valuation – Bond valuation – Preference share Valuation – Common stock Valuation.
5. **Portfolio Management:** Process of Portfolio Management, Modern Portfolio – Portfolio models – Markowitz model – Sharpe single index model, Capital Asset Pricing Models.

**Text Books:**

- Investment Management, V.K.Balla, S.Chand Company Ltd
- Security Analysis and Portfolio Management, Punithavathy Pandian, Vikas

**References:**

- Investment Analysis and portfolio management, Chandra, Tata McGraw Hill .
- Security Analysis Portfolio Management, Ranganatham&Madhumathi, Pearson Education.
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- Security analysis and portfolio management, Avadani, Himalaya publishers.
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- Investment, Bodie, McGraw Hill Book Company.
- Investment Management, Hiriappa, New Age Publications

## UNIT-1

### INVESTMENT

#### 1. INTRODUCTION TO STOCK MARKET (OR) STOCK EXCHANGE

Stock market is a place where securities are bought and sold.

**Example** – Bombay stock exchange

##### 1.1 HISTORY OF STOCK EXCHANGES

###### Stock exchange

###### A. Primary market

###### B. Secondary market

- The origin of the stock exchanges in India can be traced back to the later half of 19<sup>th</sup> century. After the American civil war 1860-61 due to the share mania of the public brokers.
- The brokers organized an informal association in Mumbai need the native stock and share brokers association in 1875.
- Increased trading activities during the first Second World War resulted in an increase in the stock trading.
- Stock exchanges were established in different centers like Chennai, Delhi, Nagpur, Kanpur, Hyderabad and Bangalore. The growth of stock exchanges suffered a setback offer the end of world war.
- Securities and contract regulation act 1956 gave powers to the central government to regulate the stock exchanges.
- The stock exchanges in Mumbai, Calcutta, Chennai, Ahmadabad, Delhi, Hyderabad, and indoor were recognized by the SCR act. The Bangalore stock exchange was recognized only ion 1963
- At present we have 211 stock exchanges with hardware and software compliant.
- Bombay stock exchange and national stock exchange being the largest stock exchange in India.

##### A. PRIMARY MARKET

- Funds may be raised through issue of fresh shared at par or premium preference shares, debentures or global depository receipts.
- Stock available for the first time one offered through new issue market.

- The issuer may be a new company or an existing company.

## B. SECONDARY MARKET

- The secondary market deals with outstanding or existing company shares or securities are traded.
- In this secondary market the inventors can sell and buy securities.
- Stock markets predominantly deal in the equity shares.
- Debt instruments like bonds and debentures and also trade in the stock market.

## 2. OBJECTIVES / FUNCTIONS OF STOCK MARKT

- 1. Maintains active trading:** Shares are traded on the stock exchanges enabling the investors to buy and sell securities. A continuous trading increase the liquidity or marketability of the shares traded on the stock exchange.
- 2. Fixation of prices:** Price is determined by the transactions that flow from investors demand and suppliers preferences.
- 3. Ensures safe and fair dealing:** The rules regulations and by-laws of the stock exchanges provide to measure of safety to the investor.
- 4. Aids in financing the industry:** A continuous market for shares provides a favorable climate for raising capital when it is easy to trade the securities; inventors are willing to subscribe to the initial public offerings. This stimulates the capital formation.
- 5. Dissemination of information:** Stock exchanges provide information through their various publications they publish the share prices traded on daily along with the volume traded. Handout handbooks and pamphlets provide information regarding the functioning of the stock exchanges.
- 6. Performance inducer:** The prices of stocks reflect the performance of the traded companies. This makes the corporate more concerned with its public image and tries to maintain good performance.
- 7. Self-regulating organization:** The stock exchanges monitor the integrity of the members brokers, listed companies and clients continues. Internal audit safeguards the investors against unfair trade practices.
- 8. Protects the investors:** Stock exchanges are responsible for investor's money. Every stock exchange activities regulated by SEBI (securities exchange board of India)

## 2.1 DEFINITION OF INVESTMENT

“An investment is the purchase of goods that are not consumed today but are used in the future to create wealth”.

“An investment is a commitment of funds made in the expectation of some positive rate of return”.

**Example** – equity shares, preference share and debentures etc.

According to oxford dictionary “investment is defined as the action or process of investment money for profit”.

According to Keynes “investment is defined as the addition of the value of the capital equipment which has resulted from the productive activity of the period”.

## 2.2 OBJECTIVES OF INVESTMENT

- 1. Return:** Investors always expect a good rate of return from their investment rate of return could be defined as the total income the investor receives during the holding period stated as a percentage of the purchasing price at the beginning of the holding period.
- 2. Safety of funds:** The selected investment avenue should be under the legal and regulatory framework. If it is not under the legal framework, it is difficult to represent the grievances if any approval of the law itself adds a flavor of safety.
- 3. Tax benefits:** The investor who invests their money in shares and securities which will reduce the investor's income tax burden.
- 4. Capital growth:** Every investor seeks maximum capital growth and implies making risky investment with considerable investment analysis and management.  
Example – equity shares and the growth shares.
- 5. Liquidity:** If a portion of the investment could be converted into cash without much loss of time. It would help the investor meet the emergencies.
- 6. Stability income:** It refers to constant return from an investment. Another major characteristic feature of the investment is the stability of income.
- 7. Diversification:** The idea is to create a portfolio that includes multiple investments in order to reduce risk.

**Example** – invest 10,000 in 10 different companies.

### 8. Marketability

- It can be transacted quickly
- The transaction cost is low
- The price change between two successive transactions
- The above are the objectives of every investor to increase their wealth.

## 3 PROCESS OF INVESTMENT

The investment process involves how an investor should make decisions about what a marketable securities to invest in how extensive the investment should be and when the investment should be made.

- Step-1. Set investment policy (investable funds and objectives and knowledge)
- Step-2 perform security analysis (market and industry company)
- Step-3 construct a portfolio (diversification and selection and allocation)
- Step-4 portfolio periodic repetition of the previous three steps revision
- Step-5 evaluate performance of portfolio (appraisal and revision)

### STEP-1. Set investment policy

Investment policy involves determining the investor's objective and the amount of his or her investable wealth. Because there is a positive relationship between risk and return for sensible investment strategies.

### STEP-2. Perform security analysis

It involves examining several that is

1. FUNDAMENTAL ANALYSIS	2. TECHNICAL ANALYSIS
Economic analysis	post process of securities
Company analysis	past volume of securities
Industry analysis	trends
	Indicators
	Oscillators

### STEP-3. Construct of portfolio

Portfolio construction involves identifying specific assets in which to invest in each one the issues how much to invest in each one the issues of selectivity's timing and diversification needs to be addressed by the investor.

- Selectivity:** It is also known as micro-forecasting refers to security analysis and focuses on forecasting price movements of individual securities.
- Timing:** It is also known as macro forecasting. Involves forecasting prices movements of common stocks in general relative to fixed-income securities such as corporate bonds and treasury bills.
- Diversification:** It involves constructing the investor's portfolio in such a manner that risk minimized subject to certain restrictions.

**STEP- 4 Portfolio revisions**

Portfolio revision is concerned with the periodic repetitions of the previous three steps over time the investor may change his or her investment objective which in turn would make the currently held portfolio less than optimal. The investor may create a new portfolio by selling certain securities and purchasing others.

**STEP 5 Evaluate performance of portfolio**

Portfolio performance evaluation involves determine periodically how the portfolio is performing in terms of the return earned and also the risk experienced by the investor.

**4. INVESTMENT V/S SPECULATION**

<b>Basis of Difference</b>	<b>Investment (Investor)</b>	<b>Speculation</b>
Meaning	Investment is the employment of funds on assets which the aim of earning income or capital appreciation	Speculation means taking up the business risk in the hope of getting short term gain.
Time horizon	Plans for a longer time horizon. His holding period may be from one year to few years	Plans for a very short period. Holding period varies from few days to months.
Risk	Assumes moderate risk	Willing to undertake high risk
Return	Likes to have moderate rate of return associated with limited risk	Like to have high returns for assuming high risk.
Decision	Considers fundamentals factors and evaluates the performance.	Considers inside information here says and market behavior
Funds	Use his own funds and avoids borrowed funds.	Use borrowed funds to supplement his personal resources.

**Unit-1 Important question**

- 1) Briefly write about Indian stock markets
- 2) Explain the Objectives, Process of Investment?
- 3) Investment and speculation

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## UNIT-2

### **FUNDAMENTAL ANALYSIS & TECHNICAL ANALYSIS**

1) **FRAMEWORK OF FUNDAMENTAL ANALYSIS** The intrinsic value of an equity share depends on a multitude of factors. The earning of the company the growth rate and the risk exposure of the company has a direct bearing on the price of share.

In this approach, investor attempts to look at fundamental factors that affect risk – returns of the securities. The objective of fundamental security analysis is to appraise the intrinsic value of a security. The intrinsic value is the through economic worth of a financial asset. Security analysis involves examination of the underlying forces that affect the wellbeing of the economy, Industry and Company. The security analysis is also called as EIC Analysis. (Economy, Industry, Company).

**1.1 ECONOMIC ANALYSIS:** The analysis of the state of the economy incorporates the performance of the economy in the past, how it is performing in the present and how it is expected to perform in future. Also relevant in this context to know how various sectors of the economy are going to grow in the future. Based on economic activities the stock market will effect. The analysis of the following factors indicates the trends in economic changes that affect the risk and return on investments.

- Gross Domestic Product (G.D.P)
- Savings and Investments
- Interest rate
- Budget
- Tax structure
- The balance of payments
- Monsoon & Agriculture
- Infrastructure Facilities
- Demographic Factors

**1) Gross Domestic Product (G.D.P): GDP indicates the rate of growth of the economy.**

- G.D.P represents aggregate value of consumption of goods and services produced in the economy. GDP consists of personal consumption expenditure ,gross private domestic investment and government expenditure on goods and services and net export of goods and services. the estimates of GDP are available on an annual basis.
- Higher GDP: - More favorable to the stock market.

- Lower GDP: - Not favorable to the stock market.

## 2) Savings and investment:

- If the savings of the individuals will increase there are more commitments from them to investment.

## 3) Inflation:

- Because of the inflation the demand for the product will effect. Because inflation effects buyers purchasing power.
- The real rate of growth is very small
- Demand for product is decreases. It affects the company profitability position.
- The profitability position is decreasing automatically share value of the company will decrease.

## 4) Interest rate:

- If the interest rate is higher, then it is very difficult to any company to raise funds. Then it leads effect the profitability position of company vice versa.
- If the interest rates are the credit availability to customers are low, the sales of the products are reduced.

## 5) Budget:

- Elaborate account of Government expenditure and revenues.
- Deficit budget: - High Inflation because of increased Cost of production.
- Surplus budget: - Deflation.
- Balanced budget: - It is favorable to the stock market.

## 6) Tax Structure:

- Every year in March the business community eagerly awaits the government announcement recording the tax policy.
- Concessions and incentives given to a certain industry encourage investment in that particular industry.
- Tax relives leads more savings, then the company's profitability position will increase.

## 7) Balance of payments:

- *The* balance of payment = “Total receipts – Total payments” (or) “Exports – Imports”

The balance of payment may be either surplus or deficit.

Exports↑      Imports↓      -      Surplus

Exports↓      Imports↑      -      Deficit

## 8) Monsoon and Agriculture:

- Agriculture is indirectly / directly linked with some industries. Ex: Sugar industries, cotton industries, textile industries, food industries depend on agriculture for raw material.

- Fertilizers and insecticides industries are supplying input to the agriculture.
- A good monsoon will leads to higher demand for inputs and results in bumper draft.
- When the monsoon is bad agriculture and hydel power sector will suffer.

#### 9) Infrastructure facilities:

- I.F is essential for the growth of industries and agriculture sector, a wide network of common system is must for development of economy.
- The regular power supply will be considered as boost to the production.
- Banking and financial sector will provide adequate financial support to the industries and agriculture.
- A good I.F is considered as favorable to the stock market.

#### 10) Demographic factors:

- Demographic data provides details about the population by age, occupation, literacy and geographic location (hot, cool). This is needed to forecast the demand for the consumer goods.
- It affects industrial growth and stock market.

#### 11) Economic Forecasting:

To estimate stock price changes and analyst has to analyze the macro-economic environment and the factors peculiar to that particular industry. The economic activities affect the corporate profits, investor's attitudes and share prices. Fall in (Government invested on goods and services) mean G.D.P or slackness in the economic growth may lead to fail in corporate profits and consequently the security prices.

➔ Analyst is familiar with forecasting techniques.

1. Key economic indicators.
2. Diffusion index.
3. Surveys.
4. Econometric model building.

➔ Economic forecasting help to decide the right time to invest and the type of security he has to purchases stocks/bonds/combo of stocks and debentures/bonds.

**12) Economic Indicators:** The economic indicators are factors that indicate the present status, Progress or slowdown of the economy. The factors are capital investment, business profits, money supply, G.N.P, interest rate and unemployment rate. The economic indicators are grouped into mainly three indicators such as

- Leading indicators
- Co-incident indicators.

- Lagging indicators.

### 13) Diffusion Index:

- The diffusion index consists of leading, co- incidental and lagging indicators.
- Diffusion index has been constructed by the **National Bureau of Economic Research** in U.S.A.
- Diffusion index is complex in nature to evaluate and the irregular movements that occurring individual indicators.
- There are main two categories of diffusion index

### 14) Surveys:

- This is a survey of expert opinions of those prominent in the Govt, business, trade, and industry.
- It incorporates expert opinion with construction activities, plant and machinery expenditure, level of inventory etc. that are important economic activities.
- Surveys can also incorporate the opinion or future plans of consumers

15) Economic Model Building: Econometrics is the field of study that applies mathematical and statistical techniques to economic Theory. It is most precise and scientific approach. In this approach the user is forced to specify in a formal mathematical manner the precise relation between the dependent and independent variables.

Forecast must quantify precisely the relationship between relationships and assumptions what is making.

The key advantage of this approach is forecasted must think clearly all the inter relationships of the economic variables.

The results are based on the quality of data input and the validity of forecasted assumptions.

Econometric model Building involves the specifications of a system of simultaneous equations containing both endogenous and exogenous variables.

**-----End of economic analysis-----**

**2. INDUSTRY ANALYSIS:** After conducting an analysis of the economy and identifying the direction it is likely to take into short interim and long term, the analyst must look into various sectors of the economy in terms various industries. Industry is a group of companies, which have similar technological structure of production and produce similar products.

#### **2.1 Importance of Industry analysis:**

- Firms in each different industry typically experience similar levels of risk and similar rates of return. As such, industry analysis can also be useful in knowing the investment- worthiness of a firm.
- Mediocre stocks in growth industry usually outperform the best stocks in a stagnant industry. These points out the need for knowing not only company prospects but also industry prospects.

## 2.2 Classification of Industries

- 1) Classification by reporting agencies
- 2) Classification by business cycle
- 3) Industry groups
- 4) Input based classification

**1) Classification by reporting agencies:** according to RBI has industries into 32 groups, stock exchange 10 group, business media have their own classification.

**2) Classification by business cycle/Industry classification:** According to business cycle based upon up swing and down swings of economy.

- **Growth industries:** These industries grow consistently and its growth and its growth may exceed the average growth of the economy.
  - High rate of earnings
  - Wider expansion of business
  - By considering technological changes
  - By considering 20<sup>th</sup> industry: - 1) Automobile industry 2) Aero plane industry
  - 1940's → Photography industry
  - 1950's → Color television industry, Computers industry
  - 1960's → Pharmaceutical industry, Communication
  - 2000's → Soft ware industry
  - Present →cellular industry, Genetic engineering and Environmental Management.
- **Cyclical Industries:** These industries mostly likely the benefit from a period of economic prosperity and most likely suffers from economic recession.
 

Ex: Fridges, Washing machines and Seasonal products.
- **Defensive Industries:** These industries specify the movement of the business cycle. Defensive industries often contain firms whose securities on investor might hold for income. Food and shelter are the basic requirements of humanity. These types of industries we can consider as defensive industries.

- Cyclical Growth Industries: These industries pass both characteristics of cyclical growth industries. Ex: Automobile industries; because these industry experiences period of stagnation, decline but they grow tremendously

### 3) Group of industries

1) *small scale units:* small scale industries are not listed and those which are listed should be of a minimum paid up capital of 30 lakhs. Those with Rs.30 lakhs and above are eligible to be listed on the OTCEL at present.

2) *Medium scale industries:* the industries units which have a paid up up capital of Rs.5 Cr and above can be listed on the regional stock exchanges like cochin, Coimbatore etc.

3) *Large scale industries:* the industries units with paid up capital of Rs.10 Cr and above can be listed on B.S.E.,N.S.E.,

<u>S.No:</u>	<u>Industry Groups</u>
1.	Food Industry
2.	Beverages, Tobacco and tobacco products
3.	Textiles
4.	Wood and wood products
5.	Leather and Leather products
6.	Rubber and plastic products
7.	Chemical and chemical products (pharmaceuticals)
8.	Non metallic minerals products (mercury)
9.	Basic metals, alloys and metal products
10.	Machinery and machine tools
11.	Transfer equipment and products
12.	Other miscellaneous manufacturing Industries.

### 4) Under U.S one S.I.C (standard Industrial classification) based on U.S Company

<u>Industrial division</u>	<u>Industry groups</u>	<u>Major groups</u>
A.	Agriculture, forest and fishing	01 – 09
B.	Mining	10 – 14
C.	Construction	15 – 17
D.	Manufacturing	20 – 39

E.	Transportation, Electric, Communication, gas and Sanitary services	40 – 49
F.	Whole sale trade, durable goods	50 – 51
G.	Retail trade	52 – 54
H.	Finance insurance and real estate	60 – 67
I.	Services	70 – 89
J.	Public Administration	91 – 97
K.	Non – Classification establishments	99

Ex: -Retail trade code (G)

57 is for home furniture, furnishing and equipment stores

This classification is again classified into 3digit industry classification under that industry group 571.

It is also consists of Industry codes 5711, 5712, 5713.....5719.

4 digit classification:

In this classification we analyze number of firms classified into each industries, number of employees, value of shipment and capital expenditure can be alternative formed and analyzed

### 2.3 Industry Life Cycle: -

1. Pioneering stage
2. Rapid growth stage
3. Maturity/stagnation stage
4. Declining stage

#### 1. Pioneering stage: -

- Product is attracted by producers(competitors)
- Product is having low demand.
- Product tries to develop brand name, differentiation of the product and for a new image.
- In this stage non price competition will be available.
- Sevier competition leads to the change of position of the firm in the terms of market share and profit.
- In this stage it is difficult to select companies per investment because the survival rate is unknown.

Ex: genetic engineering (bio informatics)

## 2. **Rapid growth stage: -**

This stage is also known as expansion stage. It starts with surviving in the pioneering Stage.

- Companies grow strongly in market share and financial performance.
- Technology of the production would be improved and low cost of production under goes quality products will be available and the companies also declare dividends to the share holders.
- It is advisable to invest in the shares at these companies.

Ex: Soft ware industry, pharmaceutical.

## 3. **Maturity/stagnation stage: -**

- The growth of the industry which had moderated in the expansion stage begins at stagnated.
- In this stage the ability of the industry to grow appears have been losses.
- Sales may be increasing at a slower rate than that experienced by other company in the industry or by the overall economy.
- The investments opportunities within the industry may be diminished.
- Symptoms of this stage include social habits high labor cost, changes in technology and stationary demand.

## 4. **Declining stages:-**

- In this stage the demand and earnings of the industry product will be declined. Ex: black and white televisions.
- Consumer prefers less to this stage.
- Specific feature of the declining stage is that even in the boom period the growth of the industry would be low and decline the higher rate during the recession.
- It is better to avoid industry in the shares of the low growth even in the boom period.
- Investments in the shares of company lead to erosion of capital.

### **2.4 Key characteristics in an industry analysis:**

#### a. **Past sales and earnings performance:**

- Historical record of industry sales
- Average levels and stability of performance
- Past variability

- Knowledge and understanding of the past behavior
  - Able to asses relative magnitude in the future
  - Cost structure of industry
- b. Permanence: It is a phenomenon related to the products and technology of the industry. In historical records must discuss with the behavioral of the numbers without regard to the factors underlying them. If the analyst feels the technology and demand of the particular industry product is vanishing in the period of time it would foolish to invest funds in that particular industry.
- c. Government attitude towards industry: For some industries the Govt will give more concessions, tax benefits, having positive attitude.
- d. Labor conditions: which type of labors are require for that particular industry, what labor actions and reactions in the industry etc., also has to know for analyzing security risk and return.
- e. Competitive conditions: In the consideration analysis of competitive conditions. Three types of general barriers are
- a) Product differentiation advantages
  - b) Absolute cost advantages and
  - c) Economies of scale
- f. Product differentiation advantages: Generally buyer's have a preference for the product of established firms or Industries such as patent rights. Because existing firms have such and advantage of a new entrant is not likely to be able to charge as high price, have to expand large sum of money on sales and promotional expenses in order to procure an acceptable sales level.
- g. Absolute cost advantages: -  
The fact is established firms or industries able to produce and distribute their products at any level of production or distribution at a lower cost than any new entrant can so established firms likely to have more profits.
- h. Economies of scale: - To attain a high level of production in order to obtain economically feasible levels of cost have to obtain significant share of the market if it expects to a competitive cost structure relating to existing firms.
- i. Research and development activities
- j. SWOT analysis: - The investor has to analyze the internal strengths and weaknesses, external opportunities and threats of the industry.
- k. Industry share price relative Industry earnings: -
- Decision to purchase is made based not only current status and future prospects but also on the current prices of securities in the industry.
  - We refer to only price consideration.

- Price is very high relatively to future earnings growth.
- Price is low relative to future prospects are din.
- Fair level of future pattern of earnings.
- Market Psychology (Based on bull and bare market)

----- End of industry analysis-----

**3. COMPANY ANALYSIS:** For earning profits investors apply a simple and common sense decision rule of maximization. That is:

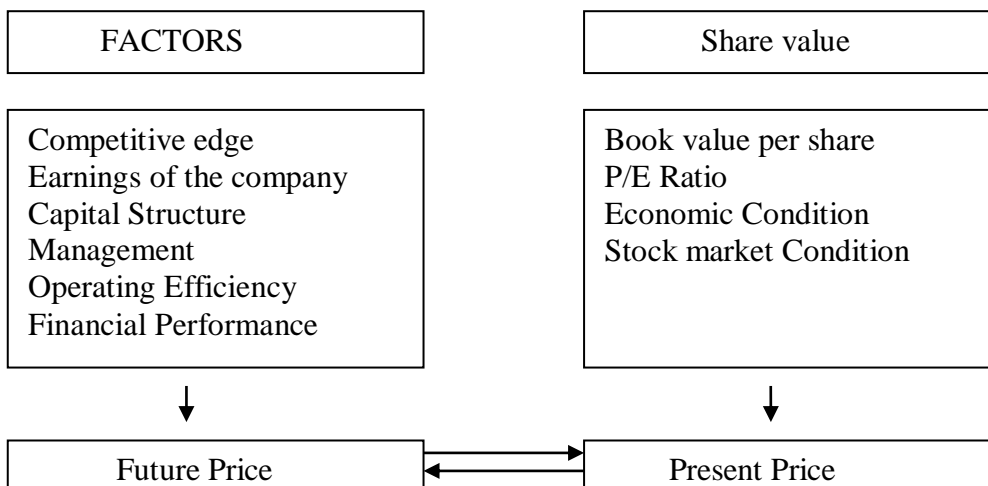
- Buy the share at a low price
- Sell the share at a high price

The above decision rule is very simple to understand, but difficult to apply in actual price. For this investor need to know

- How to find out whether the price of a company’s share is low or high?
- What is the benchmark used to compare the price of the share?

These values are depending on Economy, Industry and Company fundamentals.

Company level analysis provides a direct link to investor’s action and his investment goals in operational terms. This is because the investor buys the equivalent of a company and not that of industry and economy. This framework indeed provides the investor background, with which he buys the shares of a particular company. A careful examination of the company’s quantitative and qualitative fundamentals is very essential. The following fundamentals we have to analyze for knowing intrinsic value of the security.



- ✓ **Competitive edge:**-The first variable that influences future earnings is competitive edge. For competitive of any company we have to see marketing results of the firm in comparison to industry. This in turn is determined by the share of the company in the industry, growth of its sales and stability of sales. A company is in a strong position will provide greater earnings with more certainty than a company in a poor competitive position.
  - The rupee amount of annual sales and its share of market helps to determine a company's relative competitive position within the industry and how successful it has been in meeting competition. Here to rank the company, the companies should be comparable in like-product groups. Also size is an excellent guide to competitive position.
  - The annual growth in sales is equally if not more important than the amount of sale in determining the competitive position of company. Expanding annual sales and adequate financing firm will be in a better position to earn money whereas size of sales protects firm from economic fluctuations, growth in sales gives growth in profits.
  - Stability of sales will provide stable earning for a firm, other things being equal. Stability in sales will allow for better financial planning and plant utilization of plant. Aggressive sales of various industries vary in their degree of stability and company's sale should have same pattern as that of industry.
- ✓ **Earnings of the company:** Before we start analysis of company we should see its accounting policies. There is a risk of faulty interpretation of corporate earnings and consequent bad judgment in purchasing or selling stock. The accounting variations in reporting cost, expenses and extraordinary items could change earnings to a great extent. If rupee sales are less also the company will get earnings because of the following reasons.
  - Inventory pricing
  - Depreciation
  - Tax carryover
  - Other Non – operating incomes such as dividend income, interest etc.,
- ✓ **Capital structure:** The return on equity holder's investment can be magnified by using financial leverage, i.e. using debt financing instead of equity financing. This use of financial leverage may be measured by capitalization ratios which indicate the extent to which the firm finances its assets by use of debt or preference shares. These ratios are also referred as debt ratios.re

- **Preference shares:** the preference share capital has never been significant source of capital. It is used as source of capital in the tight money market. From shareholder's view point, use of preference shares leads to some degree of leverage in finance. The leverage impact upon equity capital is not as great as that of debt because the preference share dividends are not tax deductible. A high degree of preference shares in the capital structure tends to create instability by leading to a high degree of earnings variations in the equity shares if the earnings of the company fluctuate. The preference shares should be used only when it enhances the financial strength and earnings of the company.

- **Debt:** Debt has the advantage of low cost of capital, because interest tax deductible for the shareholders and has a good return for investors to make good market acceptability. The leverage impact of debt can be highly beneficial to the equity shareholders.

It is important to limit the debt to a reasonable level depending on the firm's earning limit and fixed assets.

- The amount of earnings is one way of determining whether debt is excessive. This is a measure of insolvency probability. The two ratios used for this are
    - a. The ratio of net income after taxes to the interest liability of the debt
    - b. The ratio of net income after taxes to the fixed and contingent expenses (dividend requirements, interests etc.,)
  - The asset limit of the debt states that there should be a reasonable limit of debt to the fixed assets of the company. For the industrial units this ratio is recommended to be below 0.5.
- ✓ **Management:** Some experts believe that the quality of a company's management may be single most important influence on its future profitability and overall success. The analysts can evaluate management by getting information on some specific questions such as listed below.
- i. What are the age and experience characteristics of management?
  - ii. How effective is the company's strategic planning?
  - iii. Has company developed and followed a sound marketing strategy?
  - iv. Does the company understand that it is part of a global environment?
  - v. Has the company effectively adapted to changes in the external business environment?
- ✓ **Operating efficiency:** The operating efficiency and the earnings of the company are directly influenced by the company's operating characteristics. A company that is constantly expanding its physical facilities and continues to operate at full capacity is more likely to produce profits and earnings in future. A company that is expanding and maintaining a high operating rate with a low break – even point will be a profitable company. A company with the stable operating rate

will have more stable revenues, income from is the result of efficient use capital assets combined with raw material, labour and management.

- ✓ **Book value per share:** It determine the amount available to share holders after paying all business liabilities , preference dividend etc.,

$$\text{Book value per share} = \frac{\text{equity share capital} + \text{reserves}}{\text{number of outstanding shares}}$$

This value is higher than the Par value; it is healthy sign to the company. At this time company issue bonus shares.

- ✓ **P/E Ratio:**

- It is the most financial parameter to know the value of security.
- It represents how many times the company's future earnings is willing to offer the shareholders.
- It is the multiplying factor that the market willing to offer to the company future earnings.

$$\frac{P}{E} \text{ Ratio} = \frac{\text{Marhet price per share}}{\text{Earnings per share}}$$

- If Current P/E Ratio > Expected P/E Ratio then the stock is overpriced. It means stock price reached peak position becZ in the future the stock price may falls down. It is suggested to investor to sell the security.
- If Current P/E Ratio < Expected P/E Ratio then the stock is underpriced. It in the future the stock will increase. It is suggested to investor to buy the security.
- If Current P/E Ratio = Expected P/E Ratio then the stock is correctly priced. It means there is no change in the future share price.
- ✓ **Financial performance:** The analyst has to analyze financial statements for knowing financial strengths and weaknesses of the company; which helpful for identifying intrinsic value of the security. The following tools are to be used for analyzing financial strengths and weaknesses of the company..i.e Ratio analysis, Comparative analysis, Common size analysis, Trend analysis, Funds flow analysis, Cash flow analysis, Break even analysis.

The above all factors will provide information to the investor for forecasting the future price of the security. The following factors will provide information to the analyst for knowing present price of the security and to confirm the future price changes.

- **Farm Work Of Company Analysis:** the two major components of company analysis are A) financial indicators B) non- financial indicators

-----End of company analysis-----

## 3.1 TECHNICAL ANALYSIS

### 3.1 INTRODUCTION:

- The methods used to analyze securities and make investment decisions fall into two very broad categories: “**Fundamental analysis**” and “**Technical analysis**”.
- Fundamental analysis involves analyzing the characteristics of a company in order to estimate its value.
- Technical analysis takes a completely different approach; it doesn't care one bit about the "value" of a company or a commodity. Technicians (sometimes called chartists) are only interested in the price movements in the market.
- Technical analysis attempts to understand the emotions in the market by studying the market itself, as opposed to its components.
- Technical analysis really just studies supply and demand in a market in an attempt to determine what direction, or trend, will continue in the future.
- Technical analysis is a method of evaluating securities by analyzing the statistics generated by market activity, such as past prices and volume.
- Technical analysts do not attempt to measure a security's intrinsic value, but instead use charts and other tools to identify patterns that can suggest future activity.

### 3.2 ASSUMPTIONS:

The field of technical analysis is based on three assumptions:

- The market value of the scrip is determined by die interaction of supply and demand.
- The market discounts everything.
- Price moves in trends.
- History tends to repeat itself.

### 3.3 THE USE OF TREND

One of the most important concepts in technical analysis is that of trend.

- A trend is really nothing more than the general direction in which a security or market is headed.
- In any given chart, you will probably notice that prices do not tend to move in a straight line in any direction, but rather in a series of highs and lows.
- In technical analysis, it is the movement of the highs and lows that constitutes a trend.
- There are three types of trend:

- Uptrend: When each successive peak and trough is higher, it's referred to as an upward trend.
- Downtrend: If the peaks and troughs are getting lower, it's a downtrend.
- Sideways/Horizontal Trend: When there is little movement up or down in the peaks and troughs, it's a sideways or horizontal trend.

Along with these three trend directions based on trend lengths

A trend of any direction can be classified:

- Long-term trend,
- Intermediate trend
- Short-term trend.

**3.4 TREND LINE:** A trend line is a simple charting technique that adds a line to a chart to represent the trend in the market or a stock. An upward trend line is drawn at the lows of an upward trend. This line represents the support the stock has every time it moves from a high to a low. This type of trend line helps traders to anticipate the point at which a stock's price will begin moving upwards again. A downward trend line is drawn at the highs of the downward trend. This line represents the resistance level that a stock faces every time the price moves from a low to a high.



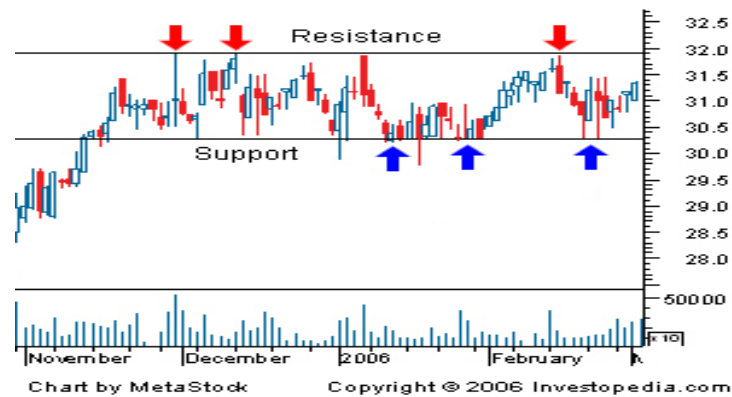
### **The Importance of Trend:**

It is important to be able to understand and identify trends so that you can trade with rather than against them.

### **Support and Resistance**

Once you understand the concept of a trend, the next major concept is that of support and resistance.

You'll often hear technical analysts talk about the ongoing battle between the bulls and the bears, or the struggle between buyers (demand) and sellers (supply). This is revealed by the prices a security seldom moves above (resistance) or below (support).



Support is the price level through which a stock or market seldom falls (illustrated by the blue arrows). Resistance, on the other hand, is the price level that a stock or market seldom surpasses (illustrated by the red arrows).

**3.5 CHARTS:** A chart is simply a graphical representation of a series of prices over a set time frame.

For example, a chart may show a stock's price movement over a one-year period, where each point on the graph represents the closing price for each day the stock is traded.



The bottom of the graph, running horizontally (x-axis), is the date or time scale.

On the right hand side, running vertically (y-axis), the price of the security is shown.

### 3.6 VOLUME:

- Volume is simply the number of shares or contracts that trade over a given period of time, usually a day.
- The higher the volume, the more active the security. To determine the movement of the volume (up or down), chartists look at the volume bars that can usually be found at the bottom of any chart.
- Volume bars illustrate how many shares have traded per period and show trends in the same way that prices do.
- Volume is an important aspect of technical analysis because it is used to confirm trends and chart patterns.

- Any price movement up or down with relatively high volume is seen as a stronger, more relevant move than a similar move with weak volume.



### 3.7 CHART TYPES

There are four main types of charts that are used by investors and traders depending on the information that they are seeking and their individual skill levels.

- Line chart**
- Bar chart**
- Candlestick chart**
- Point and Figure chart**

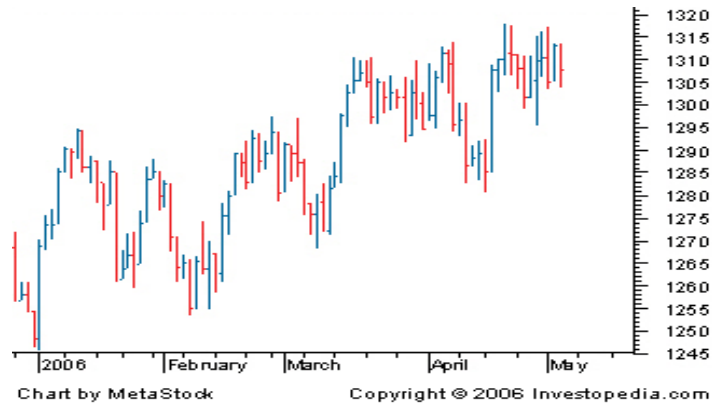
**a) Line chart:** It represents only the closing prices over a set period of time. The line is formed by connecting the closing prices over the time frame. Line charts do not provide visual information of the trading range for the individual points such as the high, low and opening prices.



**b) Bar chart:** The bar chart expands on the line chart by adding several more key pieces of information to each data point.

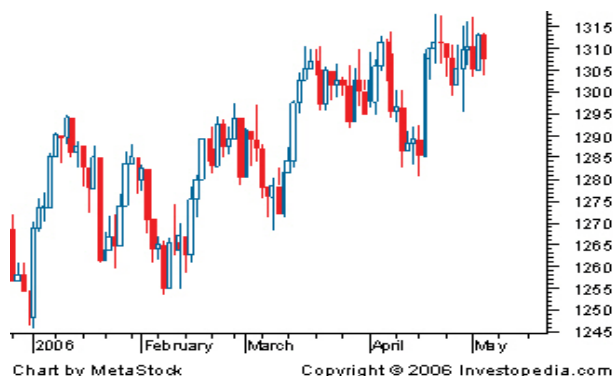
- The chart is made up of a series of vertical lines that represent each data point.
- This vertical line represents the high and low for the trading period, along with the closing price.

- The close and open are represented on the vertical line by a horizontal dash. The opening price on a bar chart is illustrated by the dash that is located on the left side of the vertical bar. Conversely, the close is represented by the dash on the right.

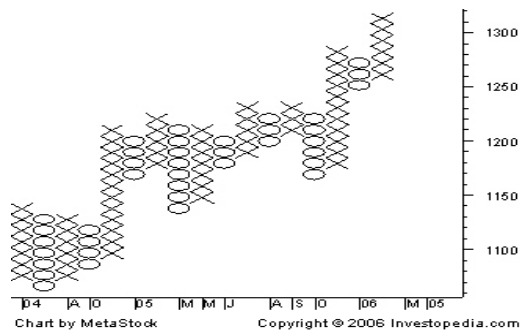


c) **Candlestick Chart:** The candlestick chart is similar to a bar chart, but it differs in the way that it is visually constructed.

- Similar to the bar chart, the candlestick also has a thin vertical line showing the period's trading range.
- There are two color constructs for days up and one for days that the price falls.
- When the price of the stock is up and closes above the opening trade, the candlestick will usually be white or clear.
- If the stock has traded down for the period, then the candlestick will usually be red or black, depending on the site.



d) **Point and Figure Chart:** The point and figure chart is not well known or used by the average investor but it has had a long history of use dating back to the first technical traders. This type of chart reflects price movements and is not as concerned about time and volume in the formulation of the points.



When first looking at a point and figure chart, you will notice a series of Xs and Os. The Xs represent upward price trends and the Os represent downward price trends. There are also numbers and letters in the chart; these represent months, and give investors an idea of the date.

Each box on the chart represents the price scale, which adjusts depending on the price of the stock: the higher the stock's price the more each box represents.

The other critical point of a point and figure chart is the reversal criteria. The reversal criteria set how much the price has to move in order for a column of Xs to become a column of Os, or vice versa. When the price trend has moved from one trend to another, it shifts to the right, signaling a trend change.

**3.8 CHART PATTERNS:** Charts are one of the most fundamental aspects of technical analysis. It is important that you clearly understand what is being shown on a chart and the information that it provides. Now that we have an idea of how charts are constructed, we can move on to the different types of chart patterns.

A chart pattern is a distinct formation on a stock chart that creates a trading signal, or a sign of future price movements. Chartists use these patterns to identify current trends and trend reversals and to trigger buy and sell signals. There are two types of patterns within this area of technical analysis, reversal and continuation.

- A reversal pattern signals that a prior trend will reverse upon completion of the pattern.
- A continuation pattern, on the other hand, signals that a trend will continue once the pattern is complete. These patterns can be found over charts of any timeframe.

We will review some of the more popular chart patterns:

- Head and Shoulders AND inverse head and shoulders
- Cup and Handle
- Double Tops and Bottoms
- Triangles
- Flag and Pennant

- Wedge
- Triple Tops and Bottoms
- Rounding Bottom

Fundamental analysis and technical analysis, the major schools of thought when it comes to approaching the markets, are at opposite ends of the spectrum. Both methods are used for researching and forecasting future trends in stock prices, and like any investment strategy or philosophy, both have their advocates and adversaries.

#### 4. TECHNICAL ANALYSIS VS FUNDAMENTAL ANALYSIS

- Fundamental analysis is a method of evaluating securities by attempting to measure the intrinsic value of a stock. Fundamental analysts study everything from the overall economy and industry conditions to the financial condition and management of companies. Earnings, expenses, assets and liabilities are all important characteristics to fundamental analysts.
- Technical analysis differs from fundamental analysis in that the stock's price and volume are the only inputs. The core assumption is that all known fundamentals are factored into price; thus, there is no need to pay close attention to them. Technical analysts do not attempt to measure a security's intrinsic value, but instead use stock charts to identify patterns and trends that suggest what a stock will do in the future.
- The most popular forms of technical analysis are simple moving averages, support and resistance, trend lines and momentum-based indicators.
- Simple moving averages are indicators that help assess the stock's trend by averaging the daily price over a fixed time period. Buy and sell signals are generated when a shorter duration moving average crosses a longer duration one.
- Support and resistance utilize price history. Support is defined as areas where buyers have stepped in before, while resistance consists of the areas where sellers have impeded price advance. Practitioners look to buy at support and sell at resistance.
- Trend lines are similar to support and resistance, as they give defined entry and exit points. However, they differ in that they are projections based on how the stock has traded in the past. They are often utilized for stocks moving to new highs or new lows where there is no price history.

- There are a number of momentum-based indicators such as Bollinger Bands, Chaikin Money Flow, stochastic and moving average convergence divergence (MACD). These each have unique formulas and give buy and sell signals based on varying criteria. Momentum indicators tend to be used in range-bound or trendless markets.

## 5. 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. and developed the Dow Jones Industrial Average (DJIA). Dow fleshed out the theory in a series of editorials in the Wall Street Journal, which he co-founded.

Before we can get into the specifics of Dow theory trend analysis, we need to understand trends. First, it's important to note that while the market tends to move in a general direction, or trend, it doesn't do so in a straight line. The market will rally up to a high (peak) and then sell off to a low (trough), but will generally move in one direction. (For related reading, see Peak-and-Trough Analysis.)

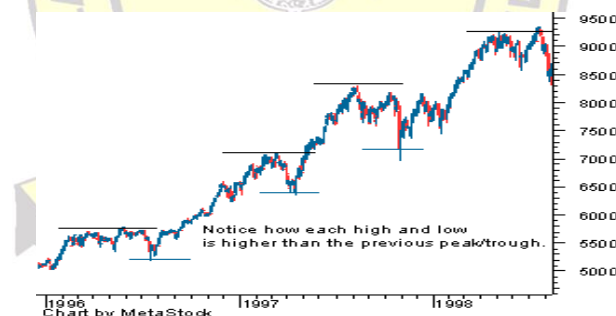


Figure 1: an uptrend

An upward trend is broken up into several rallies, where each rally has a high and a low. For a market to be considered in an uptrend, each peak in the rally must reach a higher level than the previous rally's peak, and each low in the rally must be higher than the previous rally's low.

A downward trend is broken up into several sell-offs, in which each sell-off also has a high and a low. To be considered a downtrend in Dow terms, each new low in the sell-off must be lower than the previous sell-off's low and the peak in the sell-off must be lower than the peak in the previous sell-off. (For more, see: Technical Analysis: The Use Of Trend)

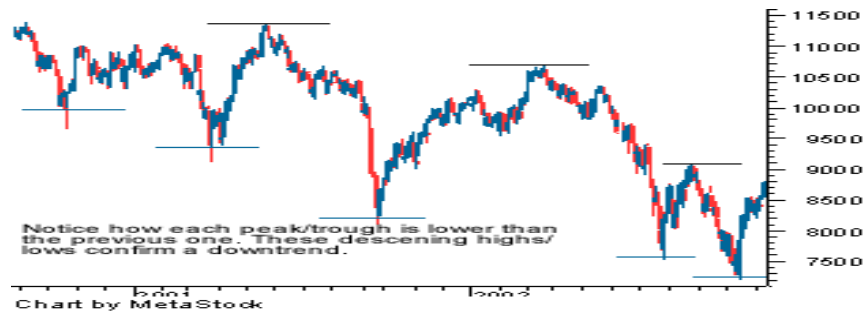


Figure 2: a downtrend

Now that we understand how Dow theory defines a trend, we can look at the finer points of trend analysis. Dow theory identifies three trends within the market: primary, secondary and minor. A primary trend is the largest trend lasting for more than a year, while a secondary trend is an intermediate trend that lasts three weeks to three months and is often associated with a movement against the primary trend. Finally, the minor trend often lasts less than three weeks and is associated with the movements in the intermediate trend.

**a) Primary Trend**

In Dow theory, the primary trend is the major trend of the market, which makes it the most important one to determine. This is because the overriding trend is the one that affects the movements in stock prices. The primary trend will also impact the secondary and minor trends within the market. (For related reading, see Short-, Intermediate- and Long-Term Trends.)

Dow determined that a primary trend will generally last between one and three years but could vary in some instances.



Figure 3: an uptrend with corrections

For example, if in an uptrend the price closes below the low of a previously established trough, it could be a sign that the market is headed lower, and not higher.

When reviewing trends, one of the most difficult things to determine is how long the price movement within a primary trend will last before it reverses. The most important aspect is to identify the direction of this trend and to trade with it, and not against it, until the weight of evidence suggests that the primary trend has reversed.

### *b) Secondary, or Intermediate, Trend*

In Dow theory, a primary trend is the main direction in which the market is moving. Conversely, a secondary trend moves in the opposite direction of the primary trend, or as a correction to the primary trend.

For example, an upward primary trend will be composed of secondary downward trends. This is the movement from a consecutively higher high to a consecutively lower high. In a primary downward trend the secondary trend will be an upward move, or a rally. This is the movement from a consecutively lower low to a consecutively higher low.

Below is an illustration of a secondary trend within a primary uptrend. Notice how the short-term highs (shown by the horizontal lines) fail to create successively higher peaks, suggesting that a short-term downtrend is present. Since the retracement does not fall below the February low, traders would use this to confirm the validity of the correction within a primary uptrend.

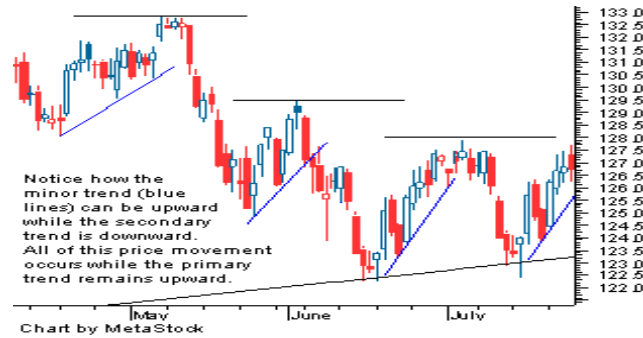


Figure 4: a secondary trend w/ a primary uptrend

In general, a secondary, or intermediate, trend typically lasts between three weeks and three months, while the retracement of the secondary trend generally ranges between one-third to two-thirds of the primary trend's movement. For example, if the primary upward trend moved the DJIA from 20,000 to 22,500 (2,500 points), the secondary trend would be expected to send the DJIA down at least 833 points (one-third of 2,500). Another important characteristic of a secondary trend is that its moves are often more volatile than those of the primary move.

### *c) Minor Trend*

The last of the three trend types in Dow theory is the minor trend, which is defined as a market movement lasting less than three weeks. The minor trend is generally the corrective moves within a secondary move, or those moves that go against the direction of the secondary trend.



Due to its short-term nature and the longer-term focus of Dow theory, the minor trend is not of major concern to Dow theory followers. But this doesn't mean it is completely irrelevant; the minor trend is watched with the large picture in mind, as these short-term price movements are a part of both the primary and secondary trends.

Most proponents of Dow theory focus their attention on the primary and secondary trends, as minor trends tend to include a considerable amount of **noise**. If too much focus is placed on minor trends, it can lead to irrational trading, as traders get distracted by short-term volatility and lose sight of the bigger picture.

Stated simply, the greater the time period a trend comprises, the more important the trend.

### **Unit-2 Important question**

- 1) Explain fundamental analysis.
- 2) Elucidate technical analysis.
- 3) Write a short note on
  - a) Industry Life cycle
  - b) Dow Theory.
- 4) Fundamental Analysis Vs Technical Analysis.

**(17E00312) INVESTMENT AND PORTFOLIO MANAGEMENT****(Elective III)**

**Objective:** The objective of the course is to provide students an understanding of working of capital markets and management of portfolios of stocks. The pre-requisite for the course is Financial Accounting and Analysis and Financial Management.

\* **Standard discounting and statistical tables to be allowed in the examinations.**

1. **Investment:** Introduction to stock markets -objectives, Process of Investment, Investment and speculation.
2. **Fundamental Analysis & Technical Analysis:** Framework of Fundamental analysis-Economic analysis, Industry analysis-Industry Life cycle - Company analysis, Fundamental Analysis Vs Technical Analysis - Dow Theory.
3. **Measurement of Risk and Return:** Revenue Return and Capital appreciation, holding period – Calculation of expected return, Risk factors, risk classification – systematic risk – unsystematic risk – standard deviation – variance– Beta .
4. **Valuation of Securities:** Types of Securities - Approaches of valuation – Bond valuation – Preference share Valuation – Common stock Valuation.
5. **Portfolio Management:** Process of Portfolio Management, Modern Portfolio – Portfolio models – Markowitz model – Sharpe single index model, Capital Asset Pricing Models.

**Text Books:**

- Investment Management, V.K.Balla, S.Chand Company Ltd
- Security Analysis and Portfolio Management, Punithavathy Pandian, Vikas

**References:**

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- Security Analysis Portfolio Management, Ranganatham&Madhumathi, Pearson Education.
- Security Analysis and Portfolio Management, Sudhindra Bhat, excel.
- Security analysis and portfolio management, Avadani, Himalaya publishers.
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- Investment Management, Preethi Singh, Himalaya Publishing House, Mumbai..
- Investment, Bodie, McGraw Hill Book Company.
- Investment Management, Hiriyappa, New Age Publications

## UNIT-3

# MEASUREMENT OF RISK AND RETURN

### 1.RETURN ON REVENUE - REVENUE RETURN

Return on revenue (ROR) (Revenue Return) is a measure of company profitability that is calculated by dividing net income by revenue. A business can increase ROR by increasing profit with a change in sales mix or by cutting expenses. ROR also has an impact on a firm's earnings per share (EPS), and analysts use ROR to make investment decisions.

Return on revenue uses net income, which is calculated as revenues minus expenses. The calculation includes both expenses paid in cash and non-cash expenses, such as depreciation. The net income calculation includes all of the business activities of the company, which includes day-to-day operations and unusual items, such as the sale of a building. Revenue, on the other hand, represents sales, and the balance is reduced by sales discounts and other deductions, such as sales returns and allowances

Examples of Sales Mix

A company can improve its ROR by increasing its net income. Changing the sales mix can increase net income. The sales mix is the proportion of each product a business sells, relative to total sales. Each product sold may deliver a different level of profit. Businesses measure the profit generated using profit margin (net income/sales). By shifting company sales to products that provide a higher profit margin, a business can increase net income and improve ROR.

**Assume, for example**, that a sporting goods store sells an \$80 baseball glove that generates a \$16 profit and a \$200 baseball bat that produces a \$20 profit. While the bat generates more revenue, the glove produces a 20% profit ( $\$16 / \$80$ ), and the bat only earns a 10% profit ( $\$20 / \$200$ ). By shifting the store's sales and marketing effort to baseball gloves, the business can earn more net income per dollar of sales, which increases ROR.

### 2. CAPITAL APPRECIATION

Capital appreciation is a rise in the value of an asset based on a rise in market price. It occurs when the asset invested commands a higher price in the market than an investor originally paid for the asset. The capital appreciation portion of the investment includes all of the market value exceeding the original investment or cost basis.

Capital appreciation is an increase in the price or value of assets. It may refer to appreciation of company stocks or bonds held by an investor, an increase in land valuation, or other upward revaluation of fixed assets.

Capital appreciation may occur passively and gradually, without the investor taking any action. It is distinguished from a capital gain which is the profit achieved by selling an asset. Capital appreciation may or may not be shown in financial statements; if it is shown, by revaluation of the asset, the increase

is said to be "recognized". Once the asset is sold, the appreciation since the date of initially buying the asset becomes a "realized" gain.

When the term is used in reference to stock valuation, capital appreciation is the goal of an investor seeking long term growth. It is growth in the principal amount invested, but not necessarily an increase in the current income from the asset.

In the context of investment in a mutual fund, capital appreciation refers to a rise in the value of the securities in a portfolio which contributes to the growth in net asset value. A capital appreciation fund is a fund for which it is its primary goal, and accordingly invests in growth stocks

Capital appreciation is one of the two main sources of investment returns, with the others being dividend or interest income. The combination of capital appreciation with dividend or interest returns is referred to as total return. Capital appreciation can occur for many different reasons in different markets and asset classes. It can also occur with financial assets such as stocks or with real assets such as real estate.

### **Example of Capital Appreciation**

An investor purchases a stock for \$10 and the stock pays an annual dividend of \$1, equating to a dividend yield of 10%. A year later, the stock is trading at \$15 per share and the investor has received the dividend of \$1. The investor has a return of \$5 from capital appreciation as the price of the stock went from the purchase price or cost basis of \$10 to a current market value of \$15; in percentage terms, the stock price increase led to a return from capital appreciation of 50%. The dividend income return is \$1, equating to a return of 10% in line with the original dividend yield. The return from capital appreciation combined with the return from the dividend leads to a total return on the stock of \$6 or 60%.

### **2.1 CAUSES OF CAPITAL APPRECIATION**

The value of assets can increase for several reasons. There can be a general trend for asset values to increase including macroeconomics factors such as strong GDP growth or Federal Reserve policy such as lowering interest rates. On a more granular level, a stock price can increase because the underlying company is growing faster than analysts expect, or the value of a house can increase because of proximity to new developments such as schools or shopping centres.

## **3. HOLDING PERIOD**

A holding period is the amount of time the investment is held by an investor or the period between the purchase and sale of a security. In a long position, the holding period refers to the time between an asset's purchase and its sale. In a short options position, the holding period is the time between when a short seller buys back the securities and when the security is delivered to the lender to close the short position.

The holding period of an investment is used to determine the taxing of capital gains or losses. A long-term holding period is one year or more with no expiration. Any investments that have a holding of less than one year will be short-term holds. The payment of dividends into an account will also have a holding period.

### 3.1 CALCULATING A HOLDING PERIOD

Starting on the day after the security's acquisition and continuing until the day of its disposal or sale, the holding period determines tax implications. For example, Sarah bought 100 shares of stock on Jan. 2, 2016. When determining her holding period, she begins counting on Jan. 3, 2016. The third day of each month after that counts as the start of a new month, regardless of how many days each month contains.

If Sarah sold her stock on December 23, 2016, she would realize a short-term capital gain or capital loss because her holding period is less than one year. If she sells her stock on Jan. 3, 2017, she would realize a long-term capital gain or loss because her holding period is more than one year.

### 3.2 DIFFERENT RULES DEFINING HOLDING PERIODS

When receiving a gift of appreciated stock or other security, the determination of the recipient's cost basis is by using the donor's basis. Also, the recipient's holding period includes the length of the donor's holding period. This continuation of holding is called "tacking on" because the recipient's holding period adds value to the donor's holding period. In cases where the recipient's basis is determined by the fair market value of the security, such as a gift of stock that decreased in value, the recipient's holding period starts on the day after receiving the gift.

When an investor receives a stock dividend, the holding period for the new shares, or portions of a new share, is the same as for the old shares. Meeting the minimum holding period is the primary requirement for dividends to be designated as qualified. For common stock, the holding must exceed 60 days throughout the 120-day period, which begins 60 days before the ex-dividend date. Preferred stock must have a holding period of at least 90 days during the 180-day period that begins 90 days before the stock's ex-dividend date.

Holding also applies when receiving new stock in a company spun off from the original company in which the investor purchased stock. For example, Paul purchased 100 shares of stock in April 2015. In June 2016, the company declared a two-for-one stock split. Paul then had 200 shares of company stock with the same holding period, starting with the date of purchase in April 2015.

## 4. CALCULATION OF EXPECTED RETURN

### 4.1 CONCEPT OF RETURN

#### 4.1.1 Return on a Single Asset:-

Return has two components

Rate of return = Dividend yield + Capital gain yield

$$R_1 = \frac{DIV_1}{P_0} + \frac{P_1 - P_0}{P_0} = \frac{DIV_1 + (P_1 - P_0)}{P_0}$$

### 4.1.2 Average Rate of Return:-

The average rate of return is the sum of the various one-period rates of return divided by the number of period.

Formula for the average rate of return is as follows:

$$\bar{R} = \frac{1}{n}[R_1 + R_2 + \dots + R_n] = \frac{1}{n} \sum_{t=1}^n R_t$$

## 5. RISK FACTORS

**A. Business Risk:** - The risk of doing business in a particular industry or environment is called business risk.

# Fluctuations in operating income

# Arise due to external & internal business factors

**B. Financial Risk:** -

# associated with the capital structure of the firm

# Variability of the income to the equity

### A. BUSINESS RISK

Business risk is that portion of the unsystematic risk caused by the operating environment of the business. Business risk arises from the inability of a firm to maintain its competitive edge and the growth or stability of the earnings. Variation that occurs in the operating environment is reflected on the operating income and expected dividends. The variation in the expected operating income indicates the business risk.

**For example** take Anu and Vinu companies. In Anu company, operating income could grow as much as 15 per cent and as low as 7 per cent. In Vinu company, the operating income can be either 12 per cent or 9 per cent. When both the companies are compared, Anu company's business risk is higher because of its high variability in operating income compared to Vinu company. Thus, business risk is concerned with the difference between revenue and earnings before interest and tax. Business risk can be divided into external business risk, and internal business risk.

#### a)Internal Business Risk

Internal business risk is associated with the operational efficiency of the firm. The operational efficiency differs from company to company. The efficiency of operation is reflected on the company's achievement of its pre-set goals: and the fulfillment of the promises to its investors.

**(1) Fluctuations in the sales** The sales level has to be maintained. It is common in business to lose customers abruptly because of competition. Loss of customers will lead to a loss in operational income.

Hence, the company has to build a wide customer base through various distribution channels. Diversified sales force may help to tide over this problem. Big corporate bodies **have long** chain of distribution channel.

Small firms often lack this diversified customer base.

(2) **Research and development (R&D)** Sometimes the product may go out of style or become obsolescent. It is the management, who has to overcome the problem of obsolescence by concentrating on the in-house research and development program.

**For example**, if Maruti Udyog has to survive the competition, it has to keep its Research and Development section active and introduce consumer oriented technological changes in the automobile sector. This is often carried out by introducing sleekness, seating comfort and break *efficiency* in their automobiles. New products have to be produced to replace the old one. Short sighted cutting of R and D budget would reduce the operational efficiency of any firm.

- (3) **Personnel management** The personnel management of the company also contributes to the operational efficiency of the firm. Frequent strikes and lock outs result in loss of production and high fixed capital cost. The labour productivity also would suffer. The risk of labour management is present in all the firms. It is up to the company to solve the problems at the table level and provide adequate incentives to encourage the increase in labour productivity. Encouragement given to the labourers at the floor level would boost morale of the labour force and leads to higher productivity and less wastage of raw materials and time.
- (4) **Fixed cost** The cost components also generate internal risk if the fixed cost is higher in the cost component. During the period of recession or low demand for product, the company cannot reduce the fixed cost. At the same time in the boom period also the fixed factor cannot vary immediately. Thus, the high fixed cost component in a firm would become a burden to the firm. The fixed cost component has to be kept always in a reasonable size, so that it may not affect the profitability of the company.
- (5) **Single product** The internal business risk is higher in the case of firm producing a single product. The fall in the demand for a single product would be fatal for the

firm. Further, some products are more vulnerable to the business cycle while some products resist and grow against the tide. Hence, the company has to diversify the products if it has to face the competition and the business cycle successfully. Take for instance, Hindustan Lever Ltd., which is producing a wide range of consumer cosmetics is thriving successfully in the business. Even in diversification, diversifying the product in the unknown path of the company may lead to an internal risk. Unwieldy diversification is as dangerous as producing a single good.

## B) EXTERNAL RISK

External risk is the result of operating conditions imposed on the firm by circumstances beyond its control. The external environments in which it operates exert some pressure on the firm. The external factors are social and regulatory factors, monetary and fiscal policies of the government, business cycle and the general economic environment within which a firm or an industry operates. A government policy that favours a particular industry could result in the rise in the stock price of the particular industry. For instance, the Indian sugar and fertilizer industry depend much on external factors.

**1. Social and regulatory factors** Harsh regulatory climate and legislation against the environmental degradation may impair the profitability of the industry. Price control, volume control, import/export control and environment control reduce the profitability of the firm. This risk is more in industries related to public utility

sectors such as telecom, banking and transportation. The governments' tariff policy of the telecom sector has a direct bearing on its earnings. Likewise, the interest rates and the directions given in the lending policies affect the profitability of the banks. CESC has not been able to increase its power tariff due to the stiff resistance by the West Bengal government. The Pollution Control Board has asked to close most of the tanneries in Tamil Nadu, which has affected the leather industry.

**2. Political risk** Political risk arises out of the change in the government policy. With a change in the ruling party, the policy also changes. When Sri. Manmohan Singh was the finance minister, liberalization policy was introduced. During the Bharathiya Janata government, even though efforts are taken to augment the foreign investment, more stress is given to Swdeshi. Political risk arises mainly in the case of foreign investment. The host government may change its rules and regulations regarding the foreign investment. From the past, an example can be cited. In 1977, the government decided that the multinationals must dilute their equity and share their growth with the Indian investors. This forced many multinationals to liquidate their holdings in the Indian companies.

**3. Business cycle** The fluctuations of the business cycle lead to fluctuations in the earnings of the company. Recession in the economy leads to a drop in the output of many industries. Steel and white consumer goods industries tend to move in tandem with the business cycle. During the boom period, there would be hectic demand for steel products and white consumer goods. But at the same time, they would be hit much during the recession period. At present, the information technology industry has resisted the business cycle and moved counter cyclically during the recession period. The effects of the business cycle vary from one company to another. Sometimes, companies with inadequate capital and consumer base may be forced to close down. In some other case, there may be a fail in the profit and the growth rate may decline. This risk factor is external to the corporate bodies and they may not be able to control it.

## B.FINANCIAL RISK

It refers to the variability of the income to the equity capital due to the debt capital. Financial risk in a company is associated with the capital structure of the company. Capital structure of the company consists of equity funds and borrowed funds. The presence of debt and preference capital results in a commitment of

paying interest or pre fixed rate of dividend. The residual income alone would be available to the equity holders. The interest payment affects the payments that are due to the equity investors. The debt financing increases the variability of the returns to the common stock holders and affects their expectations regarding the return. The use of debt with the owned funds to increase the return to the shareholders is known as financial leverage.

Debt financing enables the corporate to have funds at a low cost and financial leverage to the shareholders. As long as the earnings of a company are higher than the cost of borrowed funds, shareholders' earnings are increased. At the same time when the earnings are low, it may lead to bankruptcy to equity holders.

The above example deals with three different situations. In the year 1996, both the companies earned the same amount and the earnings per share were same. But, in the year 1997 there was 33.33 per cent

hike in the earnings of the two companies. In company A 33.33 per cent rise in operating income has resulted in a 50 per cent increase in earnings per share. In the company B, the effect of increase in operating income is more than the earnings per share has increased by cent per cent i.e. from Rs 1 to Rs 2. Because, the bond holders receive only the fixed interest whether the company fared well or not. The increase in earnings per share would cause a change in the capital appreciation in the shares of the '13' company during a good year.

In the year 1998, the economic climate has changed and there is a fall in the operating profit by 33.33 per cent for both the companies. This has caused 50 per cent fall in earnings per share for company A compared to 1996. But company "B"s earnings per share has fallen to zero and the shareholders are affected adversely in the had year. If we assume another situation of negative earnings, the situation would be worse in company B and the shareholders will be affected much. A few years of persistent negative earnings will erode the shareholders' equity. Fixed return on borrowed capital either enhances or reduces the return to shareholders.

The financial risk considers the difference between EBIT and EBT (earnings before tax). The business risk causes the variations between revenue and EBIT. The payment of interest affects the eventual earnings of the company stock. Thus, volatility in the rates of return on the stock is magnified by the borrowed money. The variations in income caused by the borrowed funds in highly levered firms are reater compared to the companies with low leverage. The financial leverage or financial risk is an avoidable risk because it is the management who has to decide. how much to be funded with the equity capital and borrowed capital.

## 6. RISK CLASSIFICATION (OR) TYPES OF RISK

The investment risk is categorized into two. They are

**6.1 SYSTEMATIC RISK:** Systematic risk arises on account of the economy-wide uncertainties and the tendency of individual securities to move together with changes in the market. This part of risk cannot be reduced through diversification. It is also known as market risk.

### Types of Systematic Risk

- 1) **Market Risk:** The variability in a security's returns resulting from fluctuations in the aggregate market is known as market risk. All securities are exposed to market risk including recessions, wars, structural changes in the economy, tax law changes and even changes in consumer preferences. Market risk is sometimes synonymously with systematic risk.
- 2) **Interest Rate Risk:** The variability in a security's returns resulting from changes in the level of interest rates is referred to as interest rate risk. Such changes generally affect securities inversely; i.e., other things being equal, security prices move inversely to interest rates. The reason for this movement is tied up with the valuation of securities. Interest rate risk affects bonds more directly than common stocks and is a major risk that all bondholders face. As interest rates change, bond prices change in the opposite direction.
- 3) **Purchasing Power Risk:** A factor affecting all securities is purchasing power risk, also known as inflation risk. This is the possibility that the purchasing power of invested dollars will decline. With uncertain inflation, the real (inflation - adjusted) return involves risk even if the nominal return is safe (e.g., a treasury bond). This risk is related to interest rate risk, since interest rates

generally rise as inflation increases, because lenders demand additional inflation premiums to compensate for the loss of purchasing power.

- 4) **Regulation Risk:** Some investments can be relatively attractive to other investments because of certain regulations or tax laws that give them an advantage of some kind. Municipal bonds, for example, pay interest that is exempt from local, state and federal taxation. As a result of that special tax exemption, municipals can price bonds to yield a lower interest rate since the net after – tax yield may still make them attractive to investors.
  - a. The risk of regulatory change that adversely affect the structure of an investment is a real danger.
- 5) **Bull - Bear Market Risk:** This risk arises from the variability in the market returns resulting from alternating bull and bear market forces. When security index rises fairly consistently from a low point, called a trough, over a period of time, this upward trend is called a bull market. The bull market ends when the market index reaches a peak and starts a down ward trend. The period during which the market declines to the next trough is called a bear market.
- 6) **International Risk:** It includes the following risks.
  - **Exchange Rate Risk:** all investors who invest internationally in today's increasingly global investment arena face the prospect of uncertainty in the returns after they convert the foreign gains back to their own currency .un like the past, when most US investors ignored international investing alternatives, invertors today must recognize and understand exchange rate risk, which can be defined as the variability in returns on securities caused by currency fluctuations exchange rate risk is sometimes called currency risk.
  - **Country Risk:** Country risk, also referred to as political risk. It arises from the exploitation of a politically weak group for the benefit of politically strong group. Now a day's the FDI's are becomes very famous because of globalization.
  - **Liquidity Risk:** it is associated with the particular secondary market in which a security trade. An investment can be bought or sold quickly and without and without significant price concession is considered liquid. The more uncertainty about the time element and the price concession, the greater the liquidity risk. A Treasury bill has little or no liquidity risk, where as a small OTC stock may have substantial liquidity risk.

### 6.1.1 FACTORS WHICH INFLUENCE SYSTEMATIC RISK:

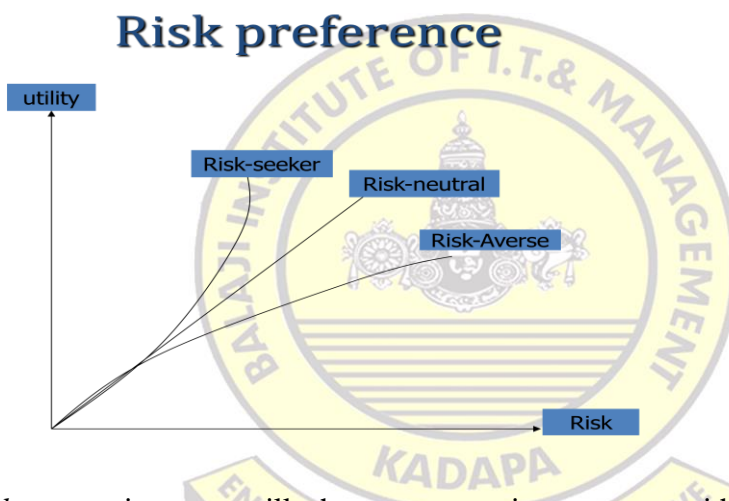
- Government Policies
- Inflation
- Interest Rates
- Foreign Exchange Fluctuations
- Political changes
- Economic Conditions

**6.2. UN – SYSTEMATIC RISK:** Unsystematic risk arises from the unique uncertainties of individual securities. It is also called unique risk. Unsystematic risk can be totally reduced through diversification.

As already mentioned, unsystematic risk is unique and peculiar to a firm or an industry. Unsystematic

risk stems from managerial inefficiency, technological change in the production process, availability of raw material, changes in the consumer preference, end labour problems. The nature and magnitude of the above mentioned factors differ from industry to industry, and company to company. They have to be analyzed separately for each industry and firm. The changes in the consumer preference affect the consumer products like television sets, washing. Machines, refrigerators, etc. more than they affect the iron and steel industry. Technological changes affect the information technology industry more than that of consumer product industry. Thus, it differs from industry to industry. Financial leverage of the companies that is debt-equity portion of the companies differs from each other. The nature and mode of raising finance and paying back the loans, involve a risk element. All these factors form the unsystematic risk and contribute a portion in the total variability of the return. Broadly, unsystematic risk can be classified into:

### Risk preference



- A *risk-averse* investor will choose among investments with the equal rates of return, the investment with lowest standard deviation. Similarly, if investments have equal risk (standard deviations), the investor would prefer the one with higher return.
- A risk-neutral investor does not consider risk, and would always prefer investments with higher returns.
- A risk-seeking investor likes investments with higher risk irrespective of the rates of return. In reality, most (if not all) investors are risk-averse.

Total Risk= Systematic+ Unsystematic

Total Risk= Market Risk+ specific Risk

Total Risk= Uncontrollable + Controllable

Total Risk= External Risk + Internal Risk

#### 6.2.1 FACTORS WHICH INFLUENCE UN SYSTEMATIC RISK

- Managerial inefficiency
- Technical Change

- Inefficiency of R&D
- Availability of R/M
- Changes in consumer preferences

#### Examples of un systematic risk

1. The company workers declare strike.
2. The R&D expert leaves the company.
3. A formidable competitor enters into market.
4. The company losses a big contract.
5. The company makes a breakthrough in process innovation.
6. The government increases custom duty on the material used by the company.
7. The company is unable to obtain adequate quantity of raw material.

## 7. STANDARD DEVIATION: -

Formulae for calculating variance and standard deviation

Standard deviation =  $\sqrt{\text{Variance}}$

$$8. \text{ VARIANCE } = \sigma^2 = \frac{1}{n-1} \sum_{t=1}^n (R_t - \bar{R})^2$$

If probabilities are given then variance: -

$$\begin{aligned} \sigma^2 &= [R_1 - E(R^2)]P_1 + [R_2 - E(R^2)]P_2 + \dots + [R_n - E(R^2)]P_n \\ &= \sum_{i=1}^n [R_i - E(R^2)]P_i \end{aligned}$$

### 8.1 RISK AND RETURN: PORTFOLIO

- A **portfolio** is a bundle or a combination of individual assets or securities.
- The **portfolio Theory** provides a normative approach to investors to make decisions to invest their wealth in assets or securities under risk.
- It is based on the assumption that investors are risk-averse.
- The second assumption of the portfolio Theory is that the returns of assets are normally distributed.
- The **return of a portfolio** is equal to the weighted average of the returns of individual assets (or securities) in the portfolio with weights being equal to the proportion of investment value in each asset

Expected return on portfolio = weight of security  $X$  × expected return on security  $X$   
+ weight of security  $Y$  × expected return on security  $Y$

### 8.2 PORTFOLIO RISK TWO-ASSET CASE: -

The portfolio variance (or) standard deviation depends on covariance or correlation.

### 8.3 COVARIANCE: -

- The portfolio variance or standard deviation depends on the co-movement of returns on two assets. Covariance of returns on two assets measures their co-movement.
- Calculation of Covariance involves following steps:
  1. Determine the expected returns on assets.
  2. Determine the deviation of possible returns from the expected return for each asset ( $R_i - \bar{R}$ ).
  3. Determine the sum of the product of each deviation of returns of two assets and respective probabilities  $(R_i - \bar{R}) P_i$ .
  4. The formula for calculating covariance of returns of the two securities X and Y is as follows:

$$COV_{xy} = \sum_{i=1}^n [R_x - E(R_x)][R_y - E(R_y)] * P_i$$

- **Positive covariance:** X's and Y's returns both either above or below the average returns at the same time. This implies positive relation between two securities.
- **Negative covariance:** X's returns could be above its average return while Y's returns could be below its average returns and vice versa. This implies negative relation between two securities.
- **Zero covariance:** returns of X and Y have no relation. Returns on X and Y have no pattern.

### 8.4 CORRELATION: -

- **Correlation** is a measure of linear relationship between two variables (say, returns of two securities, X and Y).

$$Cor_{xy} = \frac{COV_{xy}}{\sigma_x * \sigma_y}$$

- The value of correlation, called the **correlation coefficient**. The correlation coefficient always ranges between -1.0 and +1.0. A correlation coefficient of +1.0 implies a **perfectly positive correlation** while a correlation coefficient -1.0 implies a **perfectly negative correlation**. The correlation coefficient is zero if securities are not at all related to each other.
- When correlation coefficient of returns on individual securities is perfectly positive (i.e.,  $cor = 1.0$ ), then there is no advantage of diversification.
- The weighted standard deviation of returns on individual securities is equal to the standard deviation of the portfolio.
- We may therefore conclude that diversification always reduces risk provided the correlation coefficient is less than 1.
- The variance of two-security portfolio is given by the following equation:

$$\begin{aligned} \sigma_p^2 &= \sigma_x^2 w_x^2 + \sigma_y^2 w_y^2 + 2 w_x w_y Covar_{xy} \\ &= \sigma_x^2 w_x^2 + \sigma_y^2 w_y^2 + 2 w_x w_y \sigma_x \sigma_y Cor_{xy} \end{aligned}$$

### Minimum Variance Portfolio: -

Minimum variance portfolio explains” what is the best combination of two securities so that portfolio variance is minimum”.

$$w^* = \frac{\sigma_y^2 - \text{Cov}_{xy}}{\sigma_x^2 + \sigma_y^2 - 2\text{Cov}_{xy}}$$

$w^*$  is the optimum proportion of investment in security X.

Investment in Y will be:  $1 - w^*$ .

The sunrise & sunset companies have the following probability distribution of returns

Economic conditions	probability	companies	
		Sunrise	Sunset
High growth	0.1	32	30
Normal growth	0.2	20	17
slow growth	0.4	14	6
stangiation	0.2	-5	-12
Decline	0.1	-10	-16

You are required to calculate

- to determine the expected cov of returns
- calculate correlation of returns b/w the sunrise and sunset companies

Economic condition	probability	Sunrise	Sunset	$R_{SUN} \cdot P$	$R_{SET} \cdot P$
H.g	0.1	32	30	$0.1 \times 32 = 3.2$	$0.1 \times 30 = 3$
N.g	0.2	20	17	4.0	3.4
S.g	0.4	14	6	5.6	2.4
Stagnation	0.2	-5	-12	-1	-2.4
Decline	0.1	-10	-16	-1	-1.6
				$\sum R_{SUN} \times P_i = 10.8$	$\sum P_{SET} \times P_i = 4.8$

probability	$R_x$ Sunrise	$R_y$ Sunset	$[R_x - \sum(R_x)][R_y - \sum(R_y)] \times P_i$
0.1	32	30	$[32 - 10.8][30 - 4.8] \times 0.1 = 53.42$
0.2	20	17	$[20 - 10.8][17 - 4.8] \times 0.2 = 27.44$
0.4	14	6	$[14 - 10.8][6 - 4.8] \times 0.4 = 15.36$
0.2	-5	-12	$[-5 - 10.8][-12 - 4.8] \times 0.2 = 53.09$
0.1	-10	-16	$[-10 - 10.8][-16 - 4.8] \times 0.1 = 43.26$
			<u>173.76</u>

$$\sigma_x = \sqrt{\sum_{i=1}^4 [R_x - E(R_x)]^2 \cdot p_i}$$

$$= \sqrt{(32-10.8)^2 \times 0.1 + (20-10.8)^2 \times 0.2 + (14-10.8)^2 \times 0.4 + (-5-10.8)^2 \times 0.2 + (-10-10.8)^2 \times 0.1}$$

$$= \sqrt{44.94 + 16.93 + 4.09 + 49.93 + 43.26}$$

$$= \sqrt{159.16}$$

$$= 12.62$$

$$\sigma_y = \sqrt{\sum_{i=1}^4 [R_y - E(R_y)]^2 \cdot p_i}$$

$$= \sqrt{(30-4.8)^2 \times 0.1 + (17-4.8)^2 \times 0.2 + (6-4.8)^2 \times 0.4 + (-12-4.8)^2 \times 0.2 + (-16-4.8)^2 \times 0.1}$$

$$= \sqrt{63.50 + 29.76 + 0.576 + 56.44 + 43.26}$$

$$= \sqrt{193.53}$$

$$= 13.92$$

$$\text{corr } x, y = \frac{\text{cov } x, y}{\sigma_x \cdot \sigma_y} = \frac{173.76}{(12.62)(13.92)} = 0.99$$

calculate  $\beta$ , alpha, residual value and correlation

years	Returns on IBM (Y)	Returns on BSE SENSEX (X)
1	0.2	0.1
2	0.3	0.2
3	0.5	0.3
4	0.4	0.4
5	0.6	0.5

Years	Returns on IBM (Y)	Returns on BSE (X)	XY	X <sup>2</sup>	Y <sup>2</sup>
1	0.2	0.1	0.02	0.01	0.04
2	0.3	0.2	0.06	0.04	0.09
3	0.5	0.3	0.15	0.09	0.25
4	0.4	0.4	0.16	0.16	0.16
5	0.6	0.5	0.3	0.25	0.36
	$\Sigma Y = 2$	$\Sigma X = 1.5$	$\Sigma XY = 0.69$	$\Sigma X^2 = 0.55$	$\Sigma Y^2 = 0.9$

1) Beta ( $\beta$ ) = 
$$\frac{n \Sigma XY - (\Sigma X)(\Sigma Y)}{n \Sigma X^2 - (\Sigma X)^2}$$

$$= \frac{5(0.69) - (1.5)(2)}{5(0.55) - (1.5)^2}$$

$$= \frac{3.45 - 3}{2.75 - 2.25}$$

$$= \frac{0.45}{0.5}$$

$$= 0.9$$
  

2) Alpha ( $\alpha$ ) = 
$$\bar{y} - \beta \bar{x}$$

$$\bar{y} = \frac{\Sigma Y}{n} = \frac{2}{5} = 0.4$$

$$\bar{x} = \frac{\Sigma X}{n} = \frac{1.5}{5} = 0.3$$

$$\begin{aligned} \alpha &= 0.4 - 0.1848 \times 0.3 \\ &= 0.4 - 0.0554 \\ &= 0.346 \end{aligned}$$

$$\begin{aligned} 3) \text{ Residual variance } (e^2) &= \frac{\sum y^2 - \alpha \sum y - \beta \sum xy}{n} \\ &= \frac{0.9 - (0.346)(2) - (0.1848)(0.69)}{5} \\ &= \frac{0.9 - 0.692 - 0.1277}{5} = \frac{0.9 - 0.8197}{5} \\ &= \frac{0.0803}{5} = 0.01606 \end{aligned}$$

$$\begin{aligned} 4) \text{ correlation} &= \frac{n \sum xy - (\sum x)(\sum y)}{\sqrt{n \sum x^2 - (\sum x)^2} \sqrt{n \sum y^2 - (\sum y)^2}} \\ &= \frac{5(0.69) - (1.5)(2)}{\sqrt{5(0.55) - (0.55)^2} \sqrt{5(0.9) - (0.9)^2}} \\ &= \frac{3.45 - 3}{\sqrt{2.75 - 0.3025} \sqrt{4.5 - 0.81}} \\ &= \frac{0.45}{\sqrt{2.4475} \sqrt{3.69}} \\ &= \frac{0.45}{1.5644 \times 1.9209} \\ &= \frac{0.45}{3.005} \\ &= 0.1498 // \end{aligned}$$

**UNIT-3 IMPORTANT QUESTIONS**

1. Write a short note on:

- a) Revenue Return
- b) Capital appreciation,
- c) holding period,

2. Explain Risk factors

3. Elucidate risk classification (or) types of Risk

**Problems:**

Calculation of expected return ,standard deviation , variance and Beta



## (17E00312) INVESTMENT AND PORTFOLIO MANAGEMENT

### (Elective III)

**Objective:** The objective of the course is to provide students an understanding of working of capital markets and management of portfolios of stocks. The pre-requisite for the course is Financial Accounting and Analysis and Financial Management.

**\* Standard discounting and statistical tables to be allowed in the examinations.**

1. **Investment:** Introduction to stock markets -objectives, Process of Investment, Investment and speculation.
2. **Fundamental Analysis & Technical Analysis:** Framework of Fundamental analysis- Economic analysis, Industry analysis-Industry Life cycle - Company analysis, Fundamental Analysis Vs Technical Analysis - Dow Theory.
3. **Measurement of Risk and Return:** Revenue Return and Capital appreciation, holding period –Calculation of expected return, Risk factors, risk classification – systematic risk – unsystematic risk – standard deviation – variance– Beta .
4. **Valuation of Securities:** Types of Securities - Approaches of valuation – Bond valuation – Preference share Valuation – Common stock Valuation.
5. **Portfolio Management:** Process of Portfolio Management, Modern Portfolio – Portfolio models – Markowitz model – Sharpe single index model, Capital Asset Pricing Models.

#### **Text Books:**

- Investment Management, V.K.Balla, S.Chand Company Ltd
- Security Analysis and Portfolio Management ,Punithavathy Pandian, Vikas

#### **References:**

- Investment Analysis and portfolio management, Chandra, Tata McGraw Hill .
- Security Analysis Portfolio Management, Ranganatham&Madhumathi, Pearson Education.
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- Security analysis and portfolio management, Avadani, Himalaya publishers.
- Investment analysis portfolio management, Frank Reilly & Brown, Cengage.
- Investment Management, Preethi Singh, Himalaya Publishing House, Mumbai..
- Investment, Bodie, McGraw Hill Book Company.
- Investment Management ,Hiriyappa ,New Age Publications

## UNIT-4

### VALUATION OF SECURITIES

**Valuation of securities:** Valuation of Financial Securities, Instruments & Derivatives. Securities Valuation means determining the market value of equity instruments (viz. common stock and preferred stock), debt instruments (viz. ... options and futures) issued by government agencies, financial institutions and corporate organizations. The main factors driving the securities market value include liquidity, demand and supply of similar instruments, stock market rates of similar securities, present value of future cash flows etc

#### 1) TYPES OF SECURITIES

- a) **Equity shares (or) Common shares:** Represent ownership in a company and a claim (dividends) on a portion of profits. Investors get one vote per share to elect the board members, who oversee the major decisions made by management. Over the long term, common stock, by means of capital growth, yields higher returns than almost every other investment. This higher return comes at a cost since common stocks entail the most risk. If a company goes bankrupt and liquidates, the common shareholders will not receive money until the creditors, and preferred shareholders are paid.
- b) **Preferred share** represents some degree of ownership in a company but usually doesn't come with the same voting rights. (This may vary depending on the company.) With preferred shares investors are usually guaranteed a fixed dividend forever. This is different than common stock, which has variable dividends that are never guaranteed. Another advantage is that in the event of liquidation preferred shareholders are paid off before the common shareholder (but still after debt holders). Preferred stock may also be callable, meaning that the company has the option to purchase the shares from shareholders at any time for any reason (usually for a premium). Some people consider preferred stock to be more like debt than equity.
- c) **Bond** - an issued security establishing its holder's right to receive from the issuer of the bond, within the time period specified therein, its nominal value and the interest fixed therein on this value or other property equivalent. The bond may provide for other property rights of its holder, where this is not contrary to legislation.
- d) **Debentures:** A debenture is a type of debt instrument that is not secured by physical assets or collateral. Debentures are backed only by the general creditworthiness and reputation of the issuer. Both corporations and governments frequently issue this type of bond to secure capital. Like other types of bonds, debentures are documented in an indenture.

- e) **Units of mutual funds:** An investment programme funded by shareholders that trades in diversified holdings and is professionally managed. A mutual fund is a professionally managed investment fund that pools money from many investors to purchase securities. These investors may be retail or institutional in nature. Mutual funds have advantages and disadvantages compared to direct investing in individual securities.

## 2) APPROACHES OF VALUATION

- ❖ Bond valuation
- ❖ Preference share Valuation
- ❖ Common stock Valuation.

## 3) BOND VALUATION

**Bond valuation:** In finance, a bond is an instrument of indebtedness of the bond issuer to the holders. The most common types of bonds include municipal bonds and corporate bonds. The bond is a debt security, under which the issuer owes the holders a debt and (depending on the terms of the bond) is obliged to pay them interest (the coupon) or to repay the principal at a later date, termed the maturity date. Interest is usually payable at fixed intervals (semiannual, annual, sometimes monthly). Very often the bond is negotiable, that is, the ownership of the instrument can be transferred in the secondary market. This means that once the transfer agents at the bank medallion stamp the bond, it is highly liquid on the secondary market.

### 3.1 FEATURES OF BOND

- 1) **Principal:** Nominal, principal, par, or face amount is the amount on which the issuer pays interest, and which, most commonly, has to be repaid at the end of the term. Some structured bonds can have a redemption amount which is different from the face amount and can be linked to the performance of particular assets.
- 2) **Maturity:** The issuer has to repay the nominal amount on the maturity date. As long as all due payments have been made, the issuer has no further obligations to the bond holders after the maturity date. The length of time until the maturity date is often referred to as the term or tenure or maturity of a bond. The maturity can be any length of time, although debt securities with a term of less than one year are generally designated money market instruments rather than bonds. Most bonds have a term of up to 30 years. Some bonds have been issued with terms of 50 years or more, and historically there have been some issues with no maturity date (irredeemable). In the market for United States Treasury securities, there are three categories of bond maturities:
  - short term (bills): maturities between one and five years;

- medium term (notes): maturities between six and twelve years;
  - long term (bonds): maturities longer than twelve years.
- 3) **Coupon:** The coupon is the interest rate that the issuer pays to the holder. Usually this rate is fixed throughout the life of the bond. It can also vary with a money market index, such as LIBOR, or it can be even more exotic. The name "coupon" arose because in the past, paper bond certificates were issued which had coupons attached to them, one for each interest payment. On the due dates the bondholder would hand in the coupon to a bank in exchange for the interest payment. Interest can be paid at different frequencies: generally semi-annual, i.e. every 6 months, or annual. Bond issued by the Dutch East India Company in 1623
- 4) **Yield:** The yield is the rate of return received from investing in the bond. It usually refers either to The current yield, or running yield, which is simply the annual interest payment divided by the current market price of the bond (often the clean price).The yield to maturity, or redemption yield, which is a more useful measure of the return of the bond. This takes into account the current market price, and the amount and timing of all remaining coupon payments and of the repayment due on maturity. It is equivalent to the internal rate of return of a bond.
- 5) **Credit quality:** The quality of the issue refers to the probability that the bondholders will receive the amounts promised at the due dates. This will depend on a wide range of factors. High-yield bonds are bonds that are rated below investment grade by the credit rating agencies. As these bonds are riskier than investment grade bonds, investors expect to earn a higher yield. These bonds are also called *junk bonds*.
- 6) **Market price:** The market price of a tradable bond will be influenced, amongst other factors, by the amounts, currency and timing of the interest payments and capital repayment due, the quality of the bond, and the available redemption yield of other comparable bonds which can be traded in the markets. The price can be quoted as clean or dirty. "Dirty" includes the present value of all future cash flows, including accrued interest, and is most often used in Europe. "Clean" does not include accrued interest, and is most often used.

### 3.2 TYPES OF BONDS

- 1) **Government Bonds:** Government bonds can be issued by national governments as well as lower levels of government. At the national or federal level, these government bonds are known as “sovereign” debt, and are backed by the ability of a nation to tax its citizens and to print currency.
- 2) **Municipal bonds:** Municipal bonds, also known as "munis" are bonds issued by state or local governments or by government agencies. These bonds are typically riskier than national government bonds; cities don't go bankrupt that often, but it can happen (for example in Detroit and and Stockton, CA). The major advantage to munis for

investors is that the returns are free from federal tax, and furthermore, state and local governments will often consider their debt non-taxable for residents, thus making some municipal bonds completely tax free, sometimes called triple-tax free. Because of these tax savings, the yield on a muni is usually lower than that of an equivalent taxable bond. Depending on your personal situation, a muni can be a great investment on an after-tax basis.

- 3) **Corporate Bonds:** The other major issuers of bonds are corporations, and corporate bonds make up a large portion of the overall bond market. Large corporations have a great deal of flexibility as to how much debt they can issue: the limit is generally whatever the market will bear. A corporate bond is considered short-term corporate when the maturity is less than five years; intermediate is five to 12 years, and long-term is over 12 years. Corporate bonds are characterized by higher yields than government securities because there is a higher risk of a company defaulting than a government. The upside is that they can also be the most rewarding fixed-income investments because of the risk the investor must take on, where higher credit companies that are more likely to pay back their obligations will carry a relatively lower interest rate than riskier borrowers. Companies can issue bonds with fixed or variable interest rates and of varying maturity. Bonds issued by highly rated companies are referred to as investment grade while those below investment grade are junk or high-yield.
- 4) **Convertible bonds:** Convertible bonds are debt issued by corporations that give the bondholder the option to convert the bonds into shares of common stock at a later date. The rate at which investors can convert bonds into stocks, that is, the number of shares an investor gets for each bond, is determined by a metric called the conversion rate. The conversion rate may be fixed or change over time depending on the terms of the offering. A conversion rate of 30 means that for every \$1,000 of par value the convertible bondholder converts, she receives 30 shares of stock. It is not always profitable to convert bonds into equity. Investors can determine the breakeven price by dividing the selling price of the bond by the conversation rate. Typically, investors will exercise this option if the share price of the company exceeds the breakeven price. Convertible bonds typically carry lower yields due to this right given to investors.
- 5) **Callable bonds:** Callable bonds are bonds that can be redeemed by the issuer at some point prior to its maturity. If interest rates have declined since the company first issued the bond, the company is likely to want to refinance this debt at a lower rate of interest. In this case, the company calls its current bonds and reissues them at a lower rate of interest. Callable bonds typically have a higher interest rate to account for this added risk to investors. When homeowners refinance a mortgage, they are calling in their older debt for a new loan at better rates. Putable bonds allow the bondholder to force the issuer to repurchase the security at specified dates before maturity. The repurchase price is set at the time of issue, and is usually par value, and generally works to the favor of investors. Therefore, yields on these bonds tend to be lower.

- 6) **Corporate Bonds:** A company can issue bonds just as it can issue stock. Large corporations have a lot of flexibility as to how much debt they can issue: the limit is whatever the market will bear. Generally, a short-term corporate bond has a maturity of less than five years, intermediate is five to 12 years and long term is more than 12 years.
- 7) **Term Bonds:** **Term** are bonds from the same issue that share the same maturity dates. Term bonds that have a call feature can be redeemed at an earlier date than the other issued bonds. A call feature, or call provision, is an agreement that bond issuers make with buyers. This agreement is called an "indenture," which is the schedule and the price of redemptions, plus the maturity dates.
- 8) **Fixed rate bonds** have a coupon that remains constant throughout the life of the bond. A variation is stepped-coupon bonds, whose coupon increases during the life of the bond.
- 9) **Zero-coupon bonds:** Zero-coupon bonds (zeros) pay no regular interest. They are issued at a substantial discount to par value, so that the interest is effectively rolled up to maturity (and usually taxed as such). The bondholder receives the full principal amount on the redemption date. An example of zero coupon bonds is Series E savings bonds issued by the U.S. government. Zero-coupon bonds may be created from fixed rate bonds by a financial institution separating ("stripping off") the coupons from the principal. In other words, the separated coupons and the final principal payment of the bond may be traded separately. See IO (Interest Only) and PO (Principal Only).
- 10) **High-yield bonds:** High-yield bonds (junk bonds) are bonds that are rated below investment grade by the credit rating agencies. As these bonds are riskier than investment grade bonds, investors expect to earn a higher yield.
- 11) **Convertible bonds:** Convertible bonds let a bondholder exchange a bond to a number of shares of the issuer's common stock. These are known as hybrid securities, because they combine equity and debt features.
- 12) **Exchangeable bonds:** Exchangeable bonds allows for exchange to shares of a corporation other than the issuer.
- 13) **Bearer bonds:** Bearer bond is an official certificate issued without a named holder. In other words, the person who has the paper certificate can claim the value of the bond. Often they are registered by a number to prevent counterfeiting, but may be traded like cash. Bearer bonds are very risky because they can be lost or stolen.

- 14) **Registered bonds:** Registered bond is a bond whose ownership (and any subsequent purchaser) is recorded by the issuer, or by a transfer agent. It is the alternative to a Bearer bond. Interest payments and the principal upon maturity are sent to the registered owner.
- 15) **Social impact bonds:** Social impact bonds are an agreement for public sector entities to pay back private investors after meeting verified improved social outcome goals that result in public sector savings from innovative social program pilot projects.

### 3.3 METHODS OF BOND VALUATION:

tenure. Therefore, the present value of a bond can be calculated as below:

$$P = \sum_{t=1}^n \frac{C}{(1+r)^t} + \frac{M}{(1+r)^n}$$

where,

- P = Value (in rupees),  
 n = Number of years,  
 C = Annual coupon/interest payment (in rupees),  
 r = Periodic required return rate,  
 M = Maturity value/Principal repayment at the end of n years  
 t = Time period when the payment is received.

Thus, the discounted present value of future cashflow constitutes the intrinsic value of the bond. The two components of present value of a bond are the present value of principal repayment and the present value of future interest payments. For the purpose of calculating present value of interest payments, the formula applicable for the present value of a regular annuity is used. The present value of the bond may be calculated as below:

$$P = C \times PVIFA_{r,n} + M \times PVIF_{r,n}$$

where,

- PVIFA = Present value of interest annuity factor.  
 PVIF = Present value of interest factor at required rate for number of years.

**For example,** consider a 10 year, 12 percent coupon bond with a par value of ₹1,000. The required yield on this bond is 13 percent.

The cashflows for this bond are as follows:

- 1) 10 annual coupon payments of ₹120.
- 2) ₹1,000 principal repayment 10 years from now.

$$P = C \times PVIFA_{r,n} + M \times PVIF_{r,n}$$

where,

- Value of bond (P) = ?  
 Annual coupon payment (C) = ₹120 (₹1,000 of 12%)  
 Number of years (n) = 10 years  
 Principal repayment at the end of 10 years/Maturity value (M)  
 = ₹1,000

Periodic required return rate ( $r$ ) = 13%

∴ The value of the bond is:

$$P = 120 \times PVIFA_{13\%, 10\text{yrs}} + 1,000 \times PVIF_{13\%, 10\text{yrs}}$$

$$= 120 \times 5.426 + 1000 \times 0.295 = 651.1 + 295 = ₹946.1$$

**Example 1:** Calculate the value of bond from the following data:

- A bond par value is ₹1,000.
- It bears a coupon rate of 14%.
- The bond will mature after 5 years.
- The required rate of return on the bond is 13%.

**Solution:**  $P = C \times PVIFA_{r,n} + M \times PVIF_{r,n}$

where,

Value of bond ( $P$ ) = ?

Annual coupon payment ( $C$ ) = ₹140 (₹1,000 of 14%)

Number of years ( $n$ ) = 5 years

Principal repayment at the end of 5 years/Maturity value ( $M$ ) = ₹1,000

Periodic required return rate ( $r$ ) = 13%

∴ The value of bond is:

$$P = ₹140(PVIFA_{13\%, 5\text{yrs}}) + ₹1,000(PVIF_{13\%, 5\text{yrs}})$$

$$= ₹140 \times (3.517) + ₹1,000 \times (0.543) = ₹492.38 + ₹543$$

$$= ₹1,035.4$$

**Example 2:** Calculate the value of bond from the following data:

- A bond par value is ₹1,000.
- It bears a coupon rate of 12%.
- Its maturity period is 3 years.
- The required rate of return on the bond is 10%.

**Solution:**  $P = C \times PVIFA_{r,n} + M \times PVIF_{r,n}$

where,

Value of bond ( $P$ ) = ?

Annual interest/coupon payment ( $C$ ) = ₹120 (₹1,000 of 12%)

Number of years ( $n$ ) = 3 years

Principal repayment at the end of 3 years/Maturity value ( $M$ ) = ₹1,000

Periodic required return rate ( $r$ ) = 10%

∴ The value of bond is:

**Example 4:** Calculate the present value of a bond from the following data:

- A bond has a par value of ₹100 on which interest is payable semi-annually.
- It bears a coupon rate of 12 percent.
- The bond maturity period is after 8 years.
- The required rate of return on the bond is 14%.

**Solution:** 
$$P = \sum_{t=1}^{2n} \frac{C/2}{(1+r/2)^t} + \frac{M}{(1+r/2)^{2n}}$$

where,

Value of bond (P) = ?

Principal repayment at the end of 8 years/Maturity value (M) = ₹100

Semi-annually receipt of interest/coupon rate (C/2) = ₹6 (₹100 of 12%/2)

Semi-annually required rate of interest (r/2) = 7% (14%/2)

No. of periods (2n) = 16 years (8years×2)

Time period when the payment is received (t) = 16 years

∴ The value of bond is:

$$\begin{aligned} P &= \sum_{t=1}^{2n} \frac{6}{(1+0.07)^t} + \frac{100}{(1+0.07)^{16}} \\ &= ₹6 \times (\text{PVIFA}_{7\%, 16\text{yrs}}) + ₹100 \times (\text{PVIF}_{7\%, 16\text{yrs}}) \\ &= ₹6 \times (9.447) + ₹100 \times (0.339) = ₹90.6 \end{aligned}$$

**Example 5:** Calculate the value of the bond with semi-annual and annual interest from the following data:

- A bond has a par value of ₹1,000.
- It bears a coupon rate of 10 percent.
- The bond maturity period is after 8 years.
- The required rate of return on the bond is 12%.
- Payment of interest is semi-annually.

**Solution: Interest paid semi-annually:**

$$P = C(\text{PVIFA}_{r, n}) + M(\text{PVIF}_{r, n})$$

where,

Value of bond (P) = ?

Principal repayment at the end of 8 years (M) = ₹1,000

Semi-annually receipt of interest/coupon payment(C/2) = ₹50 (₹1,000 of 10%/2)

$$P = ₹120 (PVIFA_{10\%, 3 \text{ yrs}}) + ₹1,000 (PVIF_{10\%, 3 \text{ yrs}}) \\ = ₹120 \times (2.487) + 1,000 \times (0.751) = ₹298.44 + ₹751 = ₹1,049.44$$

**Example 3:** Calculate the value of bond from the following data:

- i) A bond par value is ₹100.
- ii) It bears a coupon rate of 12%.
- iii) It will mature after 8 years.
- iv) The required rate of return on the bond is 14%.

**Solution:**  $P = C \times PVIFA_{r,n} + M \times PVIF_{r,n}$

where,

Value of bond (P) = ?

Annual interest/coupon payment (C) = ₹12 (₹100 of 12%)

Number of years (n) = 8 years

Principal repayment at the end of 8 years/Maturity value (M) = ₹100

Periodic required return rate (r) = 14%

∴ The value of bond is:

$$P = ₹12(PVIFA_{14\%, 8 \text{ yrs}}) + ₹100(PVIF_{14\%, 8 \text{ yrs}}) \\ = ₹12 \times (4.639) + ₹100 \times (0.351) = ₹55.67 + ₹35.1 = ₹90.77$$

### Bond Value with Semi-Annual Interest

While most of the bonds state annual rate of interest, the payment is actually made on semi-annual basis. In such cases, following steps are taken to calculate the value of bond:

- 1) Semi-annual interest payment is calculated by dividing the annual interest payment, C, by 2.
- 2) The number of years to maturity are multiplied by 2 to get the total number of half-yearly period.
- 3) The discount rate is divided by 2 to get the appropriate discount rate of semi-annual period.

After making above modifications, the formula for valuing the bond with semi-annual interest is given as below:

$$P = \sum_{t=1}^{2n} \frac{C/2}{(1+r/2)^t} + \frac{M}{(1+r/2)^{2n}} \\ \text{or} = C/2 \times PVIFA_{r/2, 2n} + M \times PVIF_{r/2, 2n}$$

Semi-annually required rate of interest  $(r/2) = 6\%$   $(12\%/2)$

No. of periods  $(2n) = 20$  years  $(10\text{years} \times 2)$

∴ The value of bond is:

$$P = ₹50(PVIFA_{6, 20}) + 1,000(PVIF_{6, 20}) \\ = ₹50 \times 11.4699 + ₹1,000 \times 0.3118 = ₹885.3$$

**Interest paid annually:**

$$P = C(PVIFA_{r, n}) + M(PVIF_{r, n})$$

where,

Value of bond  $(P) = ?$

Principal repayment at the end of 8 years/Maturity value  $(M) = ₹1,000$

Annually receipt of interest/coupon payment  $(C) = ₹100$   $(₹1,000$  of  $10\%)$

Annually required rate of interest  $(r) = 12\%$

No. of periods  $(n) = 10$  years

$$P = ₹100(PVIFA_{12, 10}) + ₹1,000(PVIF_{12, 10}) \\ = ₹100 \times 5.6502 + ₹1,000 \times 0.3220 = ₹887.02$$

The investor would be willing to pay ₹887.02 for the bond.

#### 4.2.5. Bond Yield

Yield is one of the most important terms related to a bond. Bonds are normally compared on the basis of their yields as their price vary significantly due to differences in cashflow and other features.

Following are the four main types of yields:

- 1) **Current Yield:** The current yield is obtained by dividing annual interest by market price of the bond and thus it relates annual coupon rate to the market price.

$$\text{Current Yield} = \frac{\text{Annual Interest (I}_n\text{)}}{\text{Market Price (P}_0\text{)}} \times 100$$

This concept does not take time value of money into account. It also does not take into account the actual purchase price and hence till the expiry period it cannot be used to calculate capital gain or loss.

**Example 6:** Calculate the current yield from the following data:

- i) A bond with a par value of ₹1,000
- ii) It bears a coupon rate of 12%.
- iii) The bond maturity period is after 10 years.
- iv) Its market price for selling is ₹950.

$$\text{Solution: Current Yield} = \frac{\text{Annual Interest (I}_n\text{)}}{\text{Market Price (P}_0\text{)}} \times 100$$

Where,

Annual interest ( $I_n$ ) = ₹120 (₹1,000 of 12%)

Market price ( $P_0$ ) = ₹950

$$\text{Current Yield} = \frac{120}{950} \times 100 = 0.1263 \text{ or } 12.63 \text{ percent}$$

- 2) **Yield to Maturity:** This value equates the present value of future cashflows to the price of the bond. Thus, it is the interest rate which fulfils the following equation:

$$P = \frac{C}{(1+r)} + \frac{C}{(1+r)^2} + \dots + \frac{C}{(1+r)^n} + \frac{M}{(1+r)^n}$$

where,

- P = Price of the bond  
 C = Annual interest/coupon rate (in rupees)  
 M = Maturity value (in rupees)  
 n = Number of years left to maturity  
 r = Rate of return/interest

The yield to maturity can also be calculated by using the alternative formula:

$$\text{YTM} = \frac{C + (F - P) / n}{0.4F + 0.6P} \text{ or } P = \sum_{t=1}^n \frac{C}{(1 + \text{YTM})^t} + \frac{M}{(1 + \text{YTM})^n}$$

where,

C = Interest value/coupon rate    F = Face value of bond

**Example 7:** Calculate the bond's yield-to-maturity from the following data:

- i) Gupta purchased a bond with a ₹1,000 face value.
- ii) It bears a coupon rate of 10%.
- iii) The bond maturity period is 4 years.
- iv) Mr. Gupta paid ₹1,032.40 for the bond.

**Note:** The bond makes annual interest/coupon payments, the first to be received one year from today.

**Solution:** A bond YTM is that interest rate that equates the bond's price to the discounted value of its promised cashflows. In this case:

$$P = \frac{C}{(1+r)} + \frac{C}{(1+r)^2} + \dots + \frac{C}{(1+r)^n} + \frac{M}{(1+r)^n}$$

where,

Price of the bond (P) = ₹1,032.40

Annual interest/coupon rate (C) = 10%

Maturity value (M) = ₹1,100  
 Number of years left to maturity (n) = 4 years  
 Rate of interest (r) = ?

$$₹1,032.40 = \frac{₹100}{(1+r)} + \frac{₹100}{(1+r)^2} + \frac{₹100}{(1+r)^3} + \frac{₹1,100}{(1+r)^4}$$

Let us try a value of 9 percent for 'r'. The right hand side of the above expression becomes:

$$100(\text{PVIFA}_{9\%, 4\text{yrs}}) + 1,000(\text{PVIF}_{9\%, 4\text{yrs}})$$

$$= 100 \times (3.240) + 1,000 \times (0.708) = 324 + 708 = ₹1,032$$

The value is very close to price of the bond.

Hence, Yield to Maturity (YTM) = 9%.

**Alternatively,**

$$\text{YTM} = \frac{C + (F - P) / n}{0.4F + 0.6P}$$

where,

Yield to Maturity (YTM) = ?  
 Interest value/coupon rate (C) = ₹100  
 Face value of bond (F) = ₹1,000  
 Price of the bond (P) = ₹1,032.40  
 Number of years left to maturity (n) = 4 years

$$\text{YTM} = \frac{100 + (1,000 - 1,032.40) / 4}{0.4(1,000) + 0.6(1,032.40)} \quad \text{YTM} = 9\%$$

### **Difference between Current Yield and Yield to Maturity**

These two concepts are similar if the bond sells at par or its face value. However, if the bond trades at discount then 'yield to maturity' will be greater than the 'current yield' while in case of the bond trading at premium, the converse would be true, i.e., current yield is greater than yield to maturity.

**For example,** if the bond sells for ₹1,052, the current yield is 9.5 per cent ( $₹100 \div ₹1,052$ ) and the yield to maturity is 8 per cent. The yield to maturity is less in this case because the loss that the investor must suffer when the price of the bond declines from ₹1,052 to ₹1,000 at maturity has been included in the calculation.

The bigger the discount (or the smaller the premium), the greater are both the current yield and the yield to maturity. **For example,** when the bond sells for ₹850, the yield to maturity is 10.49 per cent, but it rises to 12.52 per cent when the price declines to ₹750.

**Example 8:** Calculate the Yield to Maturity (YTM) on the bond from the following data:

- i) The market price of a par value bond is ₹1,000.
- ii) It bears a coupon rate of 14%.
- iii) Maturity period of the bond is after 5 years.
- iv) The value of the bond is ₹1,050.

**Solution:** 
$$P = \sum_{t=1}^n \frac{C}{(1+r)^t} + \frac{M}{(1+r)^n}$$

where,

Value of bond (P) = ₹1,050

Annual interest/coupon payment (C) = ₹140 (₹1,000 of 14%)

Number of years (n) = 5 years

Time period when the payment is received (t) = 5 years

Principal repayment at the end of 5 years/Maturity value (M) = ₹1,000

Periodic required return rate (r) = ?

The YTM is the value of 'r' in the following equality:

$$1050 = \sum_{t=1}^5 \frac{140}{(1+r)^t} + \frac{1,000}{(1+r)^5} = 140(\text{PVIFA}_{r, 5\text{yrs}}) + 1,000(\text{PVIF}_{r, 5\text{yrs}})$$

Let us try a value of 13% for 'r'. The right hand side of the above expression becomes:

$$\begin{aligned} 1,050 &= 140(\text{PVIFA}_{13\%, 5\text{yrs}}) + 1,000(\text{PVIF}_{13\%, 5\text{yrs}}) \\ &= 140 \times (3.517) + 1,000 \times (0.543) = 492.4 + 543.0 = ₹1,035.4 \end{aligned}$$

Since this is less than ₹1,050, we try a lower value for 'r'. Let us try r = 12%. This makes the right-hand side equal to:

$$\begin{aligned} 1,050 &= 140(\text{PVIFA}_{12\%, 5\text{yrs}}) + 1,000(\text{PVIF}_{12\%, 5\text{yrs}}) \\ &= 140 \times (3.605) + 1,000 \times (0.567) = 504.7 + 567.0 = ₹1,071.7 \end{aligned}$$

Thus, r lies between 12% and 13%. Using a linear interpolation in this range, we find that r is equal to:

$$12\% + (13\% - 12\%) \frac{1,071.7 - 1,050.0}{1,071.7 - 1,035.4} = 12.60\%$$

- 3) **Realised Yield to Maturity:** YTM calculation assumes that cashflows are re-invested at the rate of yield to maturity. However, in real life situations, the rate of interest receivable on such reinvestments may vary. In order to account for this anomaly,

## 4) PREFERENCE SHARE VALUATION

Preference shares are one of the important sources of hybrid financing. It is a hybrid security because it has some features of equity shares as well as some features of debentures. The holders of preference shares enjoy the preferential rights with regard to receiving of dividend and getting back of capital in case the company winds-up.

### 4.1 FEATURES OF PREFERENCE SHARES:

1. Preference shares are long-term source of finance.
2. The dividend payable on preference shares is generally higher than debenture interest.
3. Preference shareholders get fixed rate of dividend irrespective of the volume of profit.
4. It is known as hybrid security because it also bears some characteristics of debentures.
5. Preference dividend is not tax deductible expenditure.
6. Preference shareholders do not have any voting rights.
7. Preference shareholders have the preferential right for repayment of capital in case of winding up of The company.
8. Preference shareholders also enjoy preferential right to receive dividend.

Advantages of Preference Shares:

### 4.2 ADVANTAGES OF PREFERENCE SHARES:

- a. The earnings per share of existing preference shareholders are not diluted if fresh preference shares are issued.
- b. Issue of preference shares increases the earnings of equity shareholders, i.e. it has a leveraging benefit.
- c. Preference shareholders do not have any voting rights and hence do not affect the decision mak-ing of the company.
- d. Preference dividend is payable only if there is profit.

#### 4.3 DISADVANTAGES OF PREFERENCE SHARES:

- a. Preference dividend is not tax deductible and hence it is costlier than a debenture.
- b. In case of cumulative preference share, arrear dividend is payable when the company earns profit, which creates a huge financial burden on the company.
- c. Redemption of preference share again creates financial burden and erodes the capital base of the company.
- d. Preference shareholders get dividend at a constant rate and it will not increase even if the company earns a huge profit, which makes this form of finance less attractive.
- e. Preference shareholders do not enjoy the voting rights and hence their fate is decided by the equity shareholders.

#### 4.4 DIFFERENT TYPES OF PREFERENCE SHARES:

Preference share may be classified under following categories:

##### **i. According to Redeem ability:**

**Redeemable Preference Shares:** Redeemable preference shares are those shares which are redeemed or repaid after the expiry of a stipulated period. As per The Companies (Amendment) Act, 1988, a company can issue redeemable preference shares which are redeemable within 10 years from the date of issue.

**Irredeemable Preference Shares:** Irredeemable preference shares are those shares which are not redeemed before a stipulated period. It does not have a specific maturity date. Such shares are redeemed at the time of liquidation of the company. As per The Companies (Amendment) Act, 1988, a company at present cannot issue irredeemable preference shares.

##### **ii. According to Right of Receiving Dividend:**

**a. Cumulative Preference Shares:** Preference dividend is payable if the company earns adequate profit. However, cumulative preference shares carry additional features which allow the preference shareholders to claim unpaid dividends of the years in which dividend could not be paid due to insufficient profit.

**b. Non-cumulative Preference Shares:** The holders of non-cumulative preference shares will get preference dividend if the company earns sufficient profit but they do not have the right to claim unpaid dividend which could not be paid due to insufficient profit.

**iii. According to Participation:**

**a. Participating Preference Shares:** Participating preference shareholders are entitled to share the surplus profit of the company in addition to preference dividend. Surplus profit is calculated by deducting preference dividend and equity dividend from the distributable profit. They are also entitled to participate in the surplus assets of the company.

**b. Non-participating Preference Shares:** Non-participating preference shareholders are not entitled to share surplus profit and surplus assets like participating preference shareholders.

**iv. According to Convertibility:**

**a. Convertible Preference Shares:** The holders of convertible preference shares are given an option to convert whole or part of their holding into equity shares after a specific period of time.

**b. Non-convertible Preference Shares:** The holders of non-convertible preference shares do not have the option to convert their holding into equity shares i.e. they remain as preference share till their redemption.

#### 4.5 METHODS PREFERENCE SHARE VALUATION

1. Value of Preference Shares
2. Yield on Preference Shares
3. Common Stock Valuation
4. Present Value Approach
5. One Year Holding Period
6. Multiple Years Holding Period
7. Constant Growth or Zero Growth Dividends
8. Growth in Dividends' Normal Growth

**1. Value of Preference Shares:** Preference shares give a fixed rate of dividend but without a maturity date. Preference shares are usually perpetuities but sometimes they do have maturity dates also.

The value of a preference share as a perpetuity is calculated thus:

V = Value of Preference Share

D = Annual Dividend per Preference Share

$i$  = Discount Rate on Preference Shares

$$V = D/i$$

A company sold its preference shares @ Rs. 50 last year. The discount rate at that time was 8%. The company pays an annual dividend of Rs. 4. The type of Preference Share is currently yielding 6%. What is the value of the company's Preference Shares?

$$V = 4/.06 = 66.67$$

**2. Yield on Preference Shares:** The yield on Preference Shares is calculated in the following manner:  $D$

$$i = D/V$$

... If current price of a preference share is Rs. 60 and annual dividend is Rs. 4, what is the yield on Preference Shares?

$$i = D/V = 4/60 = 6.67\%$$

**3. Common Stock Valuation:** The valuation of Bonds and Preference Shares showed that the rate of dividend and interest is constant and reasonably certain. Bonds represent constant income flows with a finite measurable life and preference stocks have constant return on their shares. The valuation of common stocks is comparatively more difficult.

The difficulty arises because of two factors:

- (1) The amount of dividend and timing of cash flows expected by investors are uncertain.
- (2) The earnings and dividends on common shares are generally expected to grow. Valuation of shares based on dividends and earnings.

**4. Present Value Approach:** The value of a common stock at any moment in time can be thought of as the discounted value of a series of uncertain future dividends that may grow or decline at varying rates overtime — The Basic Valuation Model.

**5. One Year Holding Period:** Common Stock Valuation is easiest to start with when the expected holding period is one year. To the investor, the rewards from a common stock consist of dividends plus any change in price during the holding period.

Example 3:

An investor buys a share at the beginning of the year for Rs. 100. He holds the stock for one year. Rs. 5/- in dividends is collected and the share is sold for Rs. 130/-. The rate of return achieved is the composite of dividend yield and change in price (capital gains yield).

$$g = \frac{D_1 - D_0}{D_0} = \frac{(1-b)E_0(1+br) - (1-b)E_0}{(1-b)E_0}$$

$$g = \frac{(1-b)E_0(1+br) - (1-b)E_0}{(1-b)E_0} = br - (1)$$

The total rate of return achieved is .05 + 3 = .35 or 35%.

**The same may be expressed in present values:**

$$P_0 = \frac{D_1}{1+K_e} + \frac{P_1}{1+K_e}$$

D<sub>1</sub> = Dividend to be received at the end of year one.

k<sub>e</sub> = Investor’s required rate of return or discount.

P<sub>1</sub> = Selling Price at the end of year one.

P<sub>0</sub> = Selling price today.

Therefore, Rs. 100 =  $\frac{5.00}{1+K_e} + \frac{130}{1+K_e}$

At what price must we be able to sell the stock at the end of one year (if the purchase price is Rs. 100 and the dividend is Rs. 5/-) in order to attain a rate of return of 40%?

$$Rs=100 = \frac{Rs.5}{1+40} + \frac{P_1}{1+40}$$

$$100=3.57+0.7 P_1$$

$$96.43=0.7 P_1$$

$$P_1 = \frac{96.43}{.7}$$

$$= 137.7(\text{selling price})$$

**6. Multiple Years Holding Period:**

Suppose the buyer who purchases the share P holds it for 3 years and then sells.

$$\frac{P_1}{(1+K_e)} + \frac{D_2}{(1+K_e)^2} + \frac{D_3}{(1+K_e)^3} + \frac{D_4}{(1+K_e)^4} + \frac{P_4}{(1+K_e)^4} \dots \dots \dots \text{Equ}$$

**The value of the share to him today will be:**

The price at the end of the fourth year and all future prices are determined in a similar manner.

**The formula for determining the value of the share at the present time can be written as follows:**

$$P_0 = \frac{D_1}{(1+Ke)^1} + \frac{D_2}{(1+Ke)^2} + \dots + \frac{P_4}{(1+Ke)^4}$$

$$= N=1 = \frac{D_1}{(1+r)^2}$$

It is obvious from the equation that the present value of the share is equal to the capitalized value of an infinite stream of dividends  $D_t$  in the equation is expected dividend. The investors estimate the dividends per share likely to be paid by the company in future periods.

These estimates are based on subjective probability distributions. Thus,  $D_t$  refers expected values or means of these distributions. Calculating the rate that will solve the equation is a tedious task requiring computation through trial and error method.

### 7. Constant Growth or Zero Growth Dividends:

**If the dividends remain constant over a period of time, the Equation will be:**

$$P_0 = D/Ke$$

**Example:** A company is paying a dividend of Rs. 6 per share every year in future. If the capitalization rate is 12%, calculate the price of share today. The constant growth model is often defended as a model which arises from the assumption that the firm will maintain a stable rate of return on new equity investments over a period of time.

The problem or posers in such a model are — How can it be used to select stocks? The method to do this is to predict the next year's dividends, the firm's long-term growth rate and the rate of return stockholders require for holding the stock.

A theoretical price of the stock could then be compared with its present price. Stocks that have theoretical prices above their actual prices would prefer to buy, those with theoretical prices below would prefer to sell.

**8. Growth in Dividends' Normal Growth:** Dividends cannot remain constant. The earnings and dividends of most companies increase over time because of their retention policies. The companies retain some portion of their earning for reinvestment in their own business. The policy would increase the common shareholder's equity as well as the firm's earnings. Therefore, the earnings per share will also increase and would produce higher dividends with the passage of time.

Assuming that a firm retains a constant proportion of its annual earnings  $b$ , every year and reinvests it at an internal rate of return  $r$ , then the firm's equity and dividends will grow at a constant rate  $br = g$ . for example, if the total assets of the firm  $A_0$  are financed by equity funds only and the firm earns a rate of return  $r$  on its assets.

The earnings of the firm in the initial year will be  $E_0 = rA_0$  if the retention ratio is  $b$ , the current dividend would be  $D_0 = (1 - b) E_0 = (1 - b) rA_0$  and the reinvested earnings would be  $bE_0 = brA_0$  (since  $E_0 = rA_0$ , the  $rA_0 - (1 - b) rA_0 = brA_0$ ).

The firm's earnings in the following year will consist of (a) the earnings on original investment  $rA_0$  plus (b) earnings on the reinvested amount  $E_0 = rbrA_0$ . Thus, the total earnings in the following year will be  $E_0 = rA_0 + rbrA_0 = rA_0 (1 + br)$  or  $E_0 (1 + br)$ , after retaining  $b$  fraction of the earnings the dividend will be  $D_1 = (1 - b) rA_0 (1 + br)$  or  $(1 - b) E_0 (1 + br)$ . The growth in dividend is:

$$g = \frac{D_1 - D_0}{D_0} = \frac{(1-b)E_0(1+br) - (1-b)E_0}{(1-b)E_0}$$

$$g = \frac{(1-b)E_0(1+br) - (1-b)E_0}{(1-b)E_0} = br \quad (1)$$

Thus, when earnings are retained the dividends grow.

To show that the growth expectations can be incorporated in the valuation model, let us assume that the dividends of a firm are expected to grow at constant rate  $g$ . If the firm pays  $D$  dividend in the first year, the dividend at the end of second year will be:

$$D_2 = D_1 (1 + g) \text{ or } D_0 (1 + g) \quad (2)$$

In the end of the third year will be:

$$D_3 = D_2 (1 + g) \text{ or } D_0 (1 + g)^2 \quad (3)$$

The present value of the share will be capitalized value of all future dividends.

$$P_0 = \frac{D_1}{(1+ke)} + \frac{D_2}{(1+ke)^2} + \frac{D_3}{(1+ke)^3} \quad (4)$$

Since,  $D_1 = D_0 (1 + g)^0$   $D_2 = D_0 (1 + g)$  we can substitute

$D_1$   $D_2$   $D_3$

$$P_0 = \frac{D_0(1-g)^0 + D_0(1+g)^1 + D_0(1+g)^2}{(1+ke)^1 + (1+ke)^2 + (1+ke)^3} \quad (5)$$

$$P_0 = \sum_{n=1}^{\infty} \frac{D_0(1+g)^{n-1}}{(1+ke)^n} \quad (6)$$

$$\text{From 4 } \therefore P_0 = \frac{D}{ke-g} \quad (7)$$

Therefore, the present value of the share is equal to initial dividend  $D_0$  divided by the difference of the capitalization rate and the growth rate and the growth rate  $r - g$ . a perpetual growth model is based on the following assumption:

- (1) The initial Dividend  $D_0$  should be greater than 0 otherwise Equation 7 will be 0.
- (2) Relation between  $r$  and  $g$  will be constant.
- (3) The capitalization rate must be greater than 0.

## 5) COMMON STOCK VALUATION

Equity shares were earlier known as ordinary shares. The holders of these shares are the real owners of the company. They have a voting right in the meetings of holders of the company. They have a control over the working of the company. Equity shareholders are paid dividend after paying it to the preference shareholders.

The rate of dividend on these shares depends upon the profits of the company. They may be paid a higher rate of dividend or they may not get anything. These shareholders take more risk as compared to preference shareholders.

Equity capital is paid after meeting all other claims including that of preference shareholders. They take risk both regarding dividend and return of capital. Equity share capital cannot be redeemed during the life time of the company.

Features of Equity Shares:

### 5.1 FEATURES OF EQUITY SHARES:

- 1) Equity share capital remains permanently with the company. It is returned only when the company is wound up.
- 2) Equity shareholders have voting rights and elect the management of the company.
- 3) The rate of dividend on equity capital depends upon the availability of surplus funds. There is no fixed rate of dividend on equity capital.

### 5.2 ADVANTAGES OF EQUITY SHARES:

- 1) Equity shares do not create any obligation to pay a fixed rate of dividend.
- 2) Equity shares can be issued without creating any charge over the assets of the company.
- 3) It is a permanent source of capital and the company has to repay it except under liquidation.

- 4) Equity shareholders are the real owners of the company who have the voting rights.
- 5) In case of profits, equity shareholders are the real gainers by way of increased dividends and appreciation in the value of shares.

### 5.3 DISADVANTAGES OF EQUITY SHARES:

1. If only equity shares are issued, the company cannot take the advantage of trading on equity.
2. As equity capital cannot be redeemed, there is a danger of over capitalization.
3. Equity shareholders can put obstacles for management by manipulation and organizing themselves.
4. During prosperous periods higher dividends have to be paid leading to increase in the value of shares in the market and it leads to speculation.
5. Investors who desire to invest in safe securities with a fixed income have no attraction for such shares.

### 5.4 METHODS OF COMMON STOCK VALUATION

#### Method # 1. Based on Balance Sheet:

**i. Book Value:** It is the net worth of a company divided by number of outstanding shares. Net worth is equal to paid-up equity capital plus reserves and surplus minus losses.

**ii. Liquidation Value:** Liquidation value is different than a book valuation. In that it uses the value of the assets at liquidation, which is often less than market and sometimes book. Liabilities are deducted from the liquidation value of the assets to determine the liquidation value of the business. Liquidation value can be used to determine the bare bottom benchmark value of a business.

$$\text{Liquidation value} = \frac{\text{value realized per share from liquidating all the assets of the firm} - \text{Amount to be paid to all the creditors and preference shareholders}}{\text{No. of outstanding shares}}$$

**iii. Replacement Cost:** Replacement costs provide an alternative way of valuing a company's assets. The replacement, or current, cost of an asset is the amount of money required to replace the asset by purchasing a similar asset with identical future service capabilities. In replacement cost, assets and liabilities are valued at their cost to replace.

#### Method # 2. Based on Dividends:

**i. One Year Holding Period:** As per this model, the investor intends to purchase now, hold it for one year and sell it off at the end of one year. Thus, the investor would receive dividend of one year as well as the share price at the end of year one.

To value a stock, we have to first find the present discounted value of the expected cash flows.

$$P_o = \frac{D_1}{(1 + ke)} + \frac{P_1}{(1 + ke)}$$

Where,

$P_o$  = the current price of the stock

$D_1$  = the dividend paid at the end of year 1

$ke$  = required return on equity investments (Discounting factor)

$P_1$  = the price at the end of period one

Let  $ke = 12\%$ ,  $Div = 0.16$  and  $P_1 = Rs.60$ .

$$P_o = \frac{0.16}{(1 + 0.12)} + \frac{60}{(1 + 0.12)}$$

$P_o = Rs. 53.71$

If the stock was selling for Rs. 53.71 or less, the share should be purchased

**ii. Multiple Year Holding Period:** As per this model, an investor may hold the shares for a number of years and sell it off at the end of it. Thus, he receives dividends for these periods as well as market price of the share after it.

$$P_o = \frac{D_1}{(1 + ke)^1} + \frac{D_2}{(1 + ke)^2} + \frac{D_3}{(1 + ke)^3} + \frac{D_n}{(1 + ke)^n} + \frac{P_n}{(1 + ke)^n}$$

Where,

$P_o$  = the current price of the stock

$D_1, D_2, D_3, \dots, D_n$  = annual dividend paid at the end of year 1, 2, 3...n

$ke$  = required return on equity investments (Discounting factor)

$P_n$  = the price at the end of period n

**For example:**

If an investor expects to get Rs.3.5, Rs.4 and Rs.4.50 as dividend from a share during the next 3 years and hopes to sell it off at Rs.75 at the end of the third year, and if required rate of return is 15%, the present value of the share will be

$$P_0 = \frac{3.5}{(1+0.15)^1} + \frac{4}{(1+0.15)^2} + \frac{4.5}{(1+0.15)^3} + \frac{75}{(1+0.15)^3}$$

### iii. Constant Growth Model (Gordon's Share Valuation Model):

As per this model, dividends will grow at the same rate (g) into the indefinite future and the discount rate (k) is greater than growth rate

$$P_0 = \frac{D_1}{k-g} \quad \text{or} \quad P_0 = \frac{D_0(1+g)}{k-g}$$

Where,

k = discount factor

g = growth rate

$D_0$  = current dividend

$D_1$  = Dividend at end of year one

**For example:** Alembic Company has declared a dividend of Rs. 2.5 per share for the current year. The company has been following a policy of enhancing its dividends by 10% every year and is expected to continue its policy in future also. The investor's required rate of return is 15%. The value of the share will be

$$P_0 = \frac{2.5(1+0.1)}{(0.15-0.10)} = \text{Rs. } 55$$

### iv. Multiple Growth Model (Also called as the Two Stage Growth Model):

The constant growth model has a very unrealistic assumption of constant growth. The growth may take place at varying rates. In the multiple growth model, the future time period is viewed as divisible into two different growth segments, the initial extraordinary growth period and the subsequent constant growth period.

$$P_0 = V_1 + V_2$$

$V_1$  = value of first stage =

$$V_1 = \frac{D_1}{(1+ke)^1} + \frac{D_2}{(1+ke)^2} + \frac{D_3}{(1+ke)^3} + \frac{D_n}{(1+ke)^n}$$

$V_2$  = value of second stage =

$$V_2 = \frac{D_n(1+g)}{(k-g)(1+ke)^n}$$

Where,

$P_0$  = the current price of the stock

$D_1, D_2, D_3, \dots, D_n$  = annual dividend paid at the end of year 1, 2, 3...n

$ke$  = required return on equity investments (Discounting factor)

$g$  = constant growth rate of dividends at the start of the second stage

**For example:** Hindalco paid a dividend of Rs.1.75 per share during the current year. It is expected to pay a dividend of Rs.2 per share during the next year. Investors forecast a dividend of Rs.3 and Rs.3.5 per share respectively during the two subsequent years. After that, it is expected that annual dividends would grow at 10% per year into an indefinite future. The investor's required rate of return is 20%.

$$V_1 = \frac{2}{(1+0.2)^1} + \frac{3}{(1+0.2)^2} + \frac{3.5}{(1+0.2)^3} = \text{Rs.}5.78$$

$$V_2 = \frac{3.5(1+0.10)}{(0.2-0.1)(1+0.2)^3} = \text{Rs.}22.28$$

$$P_0 = V_1 + V_2 = 5.78 + 22.28 = \text{Rs.} 28.06$$

### Method # 3. Other Approaches:

#### i. Price to Book Value Ratio:

$$\text{Price to book value ratio} = \frac{\text{Stockprice per share}}{\text{Shareholder's equity per share}}$$

The book value of a company is the value of the net assets expressed in the balance sheet. Net assets means total assets minus intangible assets and liabilities. This ratio gives the investor an idea of how much he is actually paying for the share.

### ii. Earnings Multiplier Approach:

Under this approach, the value of equity share is estimated as follows:

$$P_o = \text{EPS} \times \text{P/E ratio.}$$

Where,

EPS = Earning Per share

P/E ratio = Price Earning Ratio

P/E ratio = Market price per share / earnings per share

### iii. Price to Sales Ratio:

It is calculated by dividing a company's current stock price by its revenue per share for the recent twelve months. This ratio reflects what the market is willing to pay per rupee of sales.

### iv. Market Value Method:

This method is used only in case of listed companies, since they have a market value.

Market value of a company = No. of shares outstanding  $\times$  market price per share

## UNIT-4 –IMPORTANT QUESTIONS

- 1) Briefly explain Approaches of valuation
- 2) Elucidate features and types of Bond valuation
- 3) Explain types of Preference share Valuation
- 4) Elucidate features and types of Common (equity) stock Valuation

**Problems:** Bond, Preference, Common stock Valuation

**(17E00312) INVESTMENT AND PORTFOLIO MANAGEMENT**  
**(Elective III)**

**Objective:** The objective of the course is to provide students an understanding of working of capital markets and management of portfolios of stocks. The pre-requisite for the course is Financial Accounting and Analysis and Financial Management.

**\* Standard discounting and statistical tables to be allowed in the examinations.**

1. **Investment:** Introduction to stock markets -objectives, Process of Investment, Investment and speculation.
2. **Fundamental Analysis & Technical Analysis:** Framework of Fundamental analysis-Economic analysis, Industry analysis-Industry Life cycle - Company analysis, Fundamental Analysis Vs Technical Analysis - Dow Theory.
3. **Measurement of Risk and Return:** Revenue Return and Capital appreciation, holding period – Calculation of expected return, Risk factors, risk classification – systematic risk – unsystematic risk – standard deviation – variance– Beta .
4. **Valuation of Securities:** Types of Securities - Approaches of valuation – Bond valuation – Preference share Valuation – Common stock Valuation.
5. **Portfolio Management:** Process of Portfolio Management, Modern Portfolio – Portfolio models – Markowitz model – Sharpe single index model, Capital Asset Pricing Models.

**Text Books:**

- Investment Management, V.K.Balla, S.Chand Company Ltd
- Security Analysis and Portfolio Management ,Punithavathy Pandian, Vikas

**References:**

- Investment Analysis and portfolio management, Chandra, Tata McGraw Hill .
- Security Analysis Portfolio Management, Ranganatham&Madhumathi, Pearson Education.
- Security Analysis and Portfolio Management, Sudhindra Bhat, excel.
- Security analysis and portfolio management, Avadani, Himalaya publishers.
- Investment analysis portfolio management, Frank Reilly & Brown, Cengage.
- Investment Management, Preethi Singh, Himalaya Publishing House, Mumbai..
- Investment, Bodie, McGraw Hill Book Company.
- Investment Management ,Hiriyappa ,New Age Publications

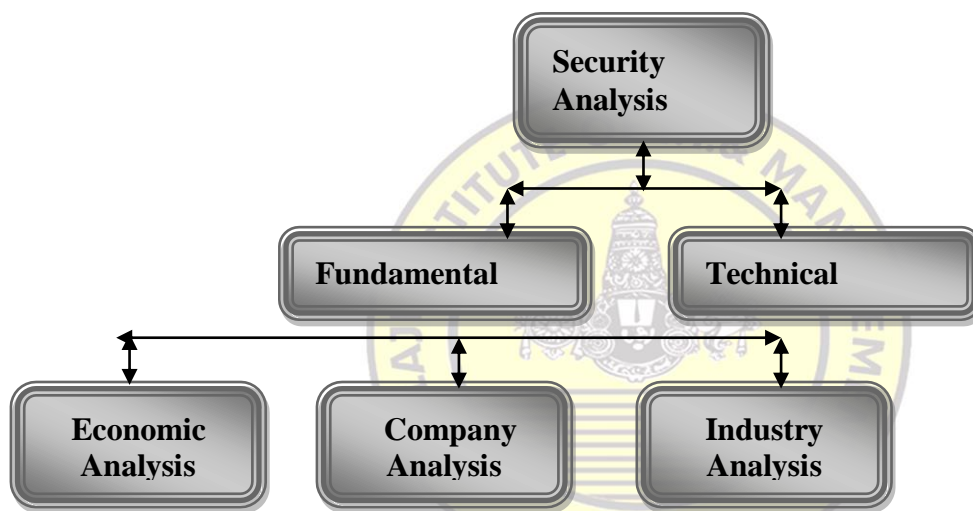
UNIT-5**PORTFOLIO MANAGEMENT****Portfolio Management**

Definition: Portfolio Management, implies tactfully managing an investment portfolio, by selecting the best investment mix in the right proportion and continuously shifting them in the portfolio, to increase the return on investment and maximize the wealth of the investor. Here, portfolio refers to a range of financial products, i.e. stocks, bonds, mutual funds, and so forth, that are held by the investors.

**1. PROCESS OF PORTFOLIO MANAGEMENT:-**Investment process describes how an investor should go about making decisions with regard to what marketable securities to investment in, how extensive the investments should be made. A five step procedure for making these decisions forms the basis of the investment process:

**PROCESS OF PORTFOLIO MANAGEMENT****Set investment Policy****Perform security analysis****Construct portfolio****Revise the portfolio****Evaluate the performance of the portfolio**

1. **Set investment policy:** It is a combination of investor's philosophy and planning. It expresses the investor's attitudes toward important of investment management issues. A comprehensive investment policy should address the following issues.
  - MISSION STATEMENT
  - RISK TOLERANCE
  - INVESTMENT OBJECTIVES
  - POLICY ASSET MIX (allocation of finds to broad asset classes such as stocks and bonds.
  - ACTIVE MANAGEMENT
2. **Security Analysis:** It involves examining several individual securities (or group of securities) within the broad categories of financial assets. It helps for the selection of securities which are give fair returns in the current and future years.



3. **Portfolio construction:-**It involves identifying those specific assets in which to invest, as well as determining the portions of the investor's wealth to put into each one. Here the issues of selectivity, timing and diversification need to be addressed by the investor. There two approaches to construct portfolio of securities.
  - **Traditional Approach**
  - **Modern Approach** :Markowitz Risk-return optimization model  
:Sharp optimum portfolio model
4. **Portfolio Revision:-**It helps for liquidating the unattractive securities and acquiring the new stars from the market. It involves periodic repetition of the previous three steps of the investment policy by setting new investment policy, security analysis afresh, and reallocation of cash for the new portfolio.
  - **Formula Plans** are to ease the problem of timing and minimize the emotions involved in investment.
    1. To minimize loss but not to increase profits.
    2. In formula plans the portfolio investment involve two types
      - ❖ Aggressive Portfolio

- ❖ Conservative Portfolio
3. Formula plans classified into four types.
- ❖ Constant Rupee Plan
  - ❖ Constant Ratio Plan
  - ❖ Variable Ratio Plan
  - ❖ Rupee Cost Averaging Plan

**5. Portfolio Performance Evaluation:-**It involves determining periodically how the portfolio performed, in terms returns earned and the risk experienced by the investor. For this the investor need to select appropriate benchmark.

The following techniques are used for measuring the performance of the portfolio.

- ❖ **Sharpe's Performance Measure**
- ❖ **Treynor's Performance Measure**
- ❖ **Jensen's Performance Measure**

## 1.2 SCOPE OF PORTFOLIO MANAGEMENT

- 1) Monitoring the performance of portfolio by incorporating the latest market conditions.
- 2) Identification of the investor's objective, constraints and preferences.
- 3) Making an evaluation of portfolio income (comparison with targets and achievement).
- 4) Making revision in the portfolio.
- 5) Implementation of the strategies in tune with investment objectives.

## 1.3 BENEFITS OF PORTFOLIO MANAGEMENT

- 1) Increased decision making transparency through a more consistent evaluation of all business units and options.
- 2) A consistent approach to risk measurement.
- 3) A systematic way of including different views of risk in decision making process.
- 4) A clear enhancement to the due diligence process.
- 5) Better understanding of value creation among new investment opportunities.
- 6) Consideration of the correlation and diversification effects of the organization's different businesses and investment options.
- 7) Guidance for strategic planning (e.g. identification of where the company needs to move to improve its risk-return position).
- 8) its risk-return position).
- 9) Consideration of qualitative and non-financial implications. These benefits can easily be recognized across most organizations, regardless of size or industry.

## 2. MODERN PORTFOLIO

MPT - Modern Portfolio Theory - represents the mathematical formulation of risk diversification in investing, that aims at selecting a group of investment assets which have collectively lower risk than any single asset on its own. This becomes possible, since various asset types frequently change in value in opposite directions. Actually investing, being a tradeoff between risk and return, presupposes that risky assets have the highest expected returns.

Thus, MPT shows how to choose a portfolio with the maximum possible expected return for the given amount of risk. It also describes how to choose a portfolio with the minimum possible risk for the given expected return. Therefore, Modern Portfolio Theory is viewed as a form of diversification which explains the way of finding the best possible diversification strategy.

### 2.1 MPT ASSUMPTIONS

Modern Portfolio Theory relies on the following assumptions and fundamentals that are the key concepts upon which it has been constructed:

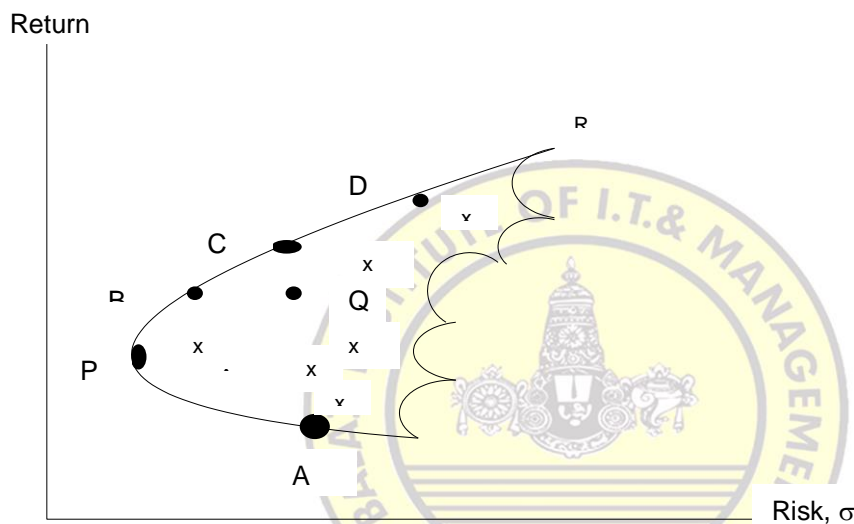
- For buying and selling securities there are no transaction costs. There is no spread between bidding and asking prices. No tax is paid, its only risk that plays a part in determining which securities an investor will buy.
- An investor has a chance to take any position of any size and in any security. The market liquidity is infinite and no one can move the market. So that nothing can stop the investor from taking positions of any size in any security.
- While making investment decisions the investor does not consider taxes and is indifferent towards receiving dividends or capital gains.
- Investors are generally rational and risk adverse. They are completely aware of all the risk contained in investment and actually take positions based on the risk determination demanding a higher return for accepting greater volatility.
- The risk-return relationships are viewed over the same time horizon. Both long term speculator and short term speculator share the same motivations, profit target and time horizon.
- Investors share identical views on risk measurement. All the investors are provided by information and their sale or purchase depends on an identical assessment of the investment and all have the same expectations from the investment. A seller will be motivated to make a sale only because another security has a level of volatility that corresponds to his desired return. A buyer will buy because this security has a level of risk that corresponds to the return he wants.
- Investors seek to control risk only by the diversification of their holdings.
- In the market all assets can be bought and sold including human capital.
- Politics and investor psychology have no influence on market.
- The risk of portfolio depends directly on the instability of returns from the given portfolio.
- An investor gives preference to the increase of utilization.
- An investor either maximizes his return for the minimum risk or maximizes his portfolio return for a given level of risk.
- Analysis is based on a single period model of investment.

## 2.2 Choosing the Best Portfolio

Two essential decisions are necessary to be made to choose the best portfolio from a number of possible portfolios, each with its risk and return opportunities:

1. Determine a set of efficient portfolios.
2. Select the best portfolio out of the efficient set.

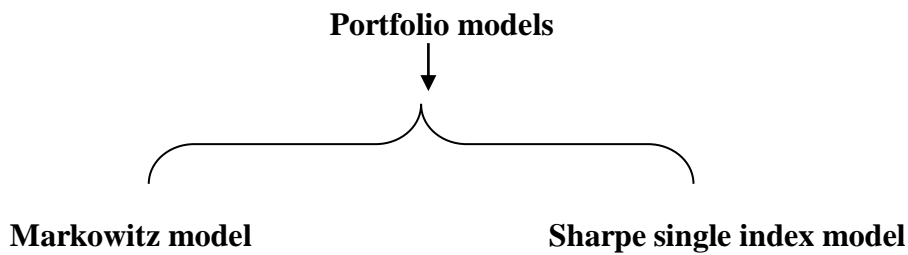
Being an important achievement in the financial sphere, the theory has found ground in other fields as well. In 1970s, it was widely applied in the area of regional sciences to derive the relationship between variability and economic growth. Similarly it has been used in the field of social psychology to form the self-concept. Currently, it is used by experts to model project portfolios of both financial and non-financial instruments.



A risk – averse investor will prefer a portfolio with the highest expected return per a given level of risk (or) prefer a portfolio with the lowest level of risk for a given level of expected returns. This is referred as “the principle of dominance.”

The portfolios which are located on the efficient frontier considered as efficient portfolios which gives highest expected rate of return at a given level of risk (or) at a low level of risk gives high expected returns. The portfolios which are not located on efficient frontier considered as inefficient portfolios.

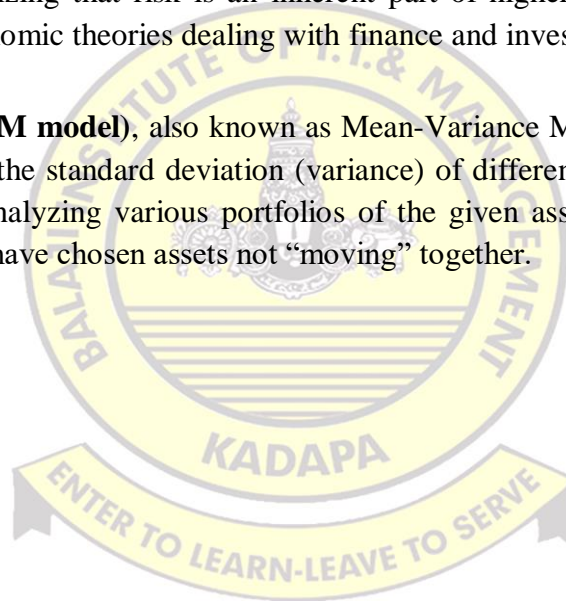
From the above chart portfolio Q has same return as portfolio B but it has higher risk. Similarly, portfolio C has higher return than portfolio Q with same amount of risk. Q is an inefficient portfolio. Portfolio B and C are efficient portfolios. Portfolio B has low risk and low return, while portfolio C has high risk and high return. B dominates C. The choice portfolio will depend on the investor’s risk – preference.



### 3. A.THE HARRY MARKOWITZ MODEL

Markowitz Portfolio Theory (MPT), a hypothesis put forth by Harry Markowitz in his paper "Portfolio Selection," (published in 1952 by the Journal of Finance) is an investment theory based on the idea that risk-averse investors can construct portfolios to optimize or maximize expected return based on a given level of market risk, emphasizing that risk is an inherent part of higher reward. It is one of the most important and influential economic theories dealing with finance and investment.

**Harry Markowitz model (HM model)**, also known as Mean-Variance Model because it is based on the expected returns (mean) and the standard deviation (variance) of different portfolios, helps to make the most efficient selection by analyzing various portfolios of the given assets. It shows investors how to reduce their risk in case they have chosen assets not “moving” together.



### Assumptions of Markowitz Model

Markowitz Theory is based on several assumptions regarding investor behavior:

- 1) Investors consider each investment alternative as being represented by a probability distribution of expected returns over some holding period.
- 2) Investors maximize one period expected utility and possess utility curve, which demonstrates diminishing marginal utility of wealth.
- 3) Individuals estimate risk on the basis of the variability of expected returns.
- 4) Investors' base decisions solely on expected return and variance (or standard deviation) or returns only.
- 5) For a given risk level, investors prefer high returns to lower returns. Similarly, for a given level of expected return, investor prefer less risk to more risk.

Under these assumptions, a single asset or portfolio of assets is considered to be "**efficient**" if no other asset or portfolio of assets offers higher expected return with the same (or lower) risk or lower risk with the same (or higher) expected return.

### Opportunity Set/Feasible Set of Portfolios

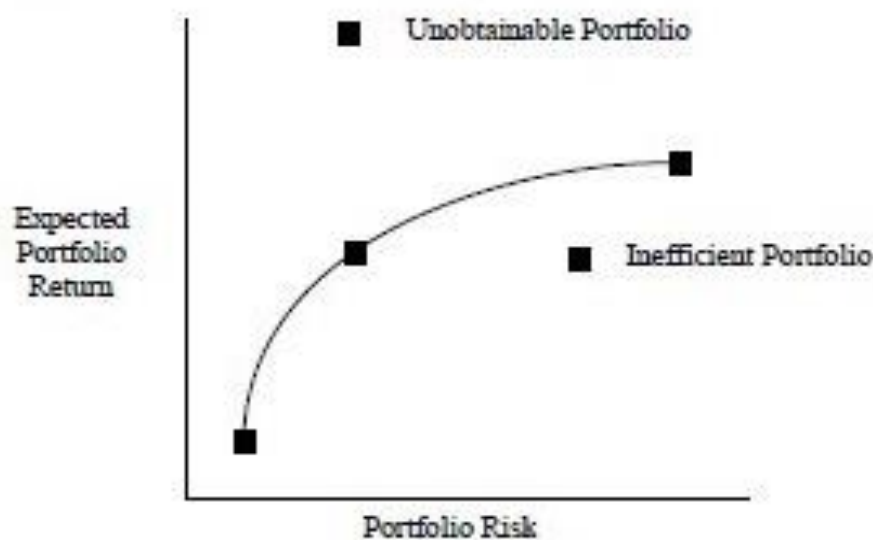
With a limited number of securities an investor can create a very large number of portfolios by combining these securities in different proportions. These constitute the portfolio opportunity set in which the investor can possibly invest. This is also known as **Feasible Set of Portfolios**. Each portfolio in the opportunity set is characterized by an expected return and a measure of risk, i.e. variance or standard deviation of returns. Not every portfolio in the portfolio opportunity set is of interest to an investor. In the opportunity set, some portfolios will obviously be dominated by others. A portfolio will dominate another if it has either a lower standard deviation and the same expected return as the other, or a higher expected return and the same standard deviation as the other. Portfolios that are dominated by other portfolios are known as inefficient portfolios. An investor would not be interested in all the portfolios in the opportunity set. He would be interested only in the efficient portfolios.

### Efficient Set of Portfolio

**Harry Markowitz** first described the goal of portfolio theory as the process of identifying an efficient set of portfolios. An efficient portfolio is a portfolio for which no greater expected return can be found

without a corresponding increase in risk. Alternatively, efficient portfolios are those for which no greater certainty of returns can be achieved without a decrease in expected return. Once this efficient set of portfolios is identified at the asset class level, the investment manager chooses an actual allocation on that frontier that best conforms to the desired risk/return targets of the investors in the fund.

The set of efficient portfolios is commonly called the **efficient frontier**. A typical set of such efficient portfolios is depicted in **figure 6.1**. This plot associates the expected return on a portfolio with a given level of risk or, conversely, the risk of a portfolio with a given expected portfolio return.



**Figure 6.1: Efficient Frontier**

The concave line depicted in the **figure 6.1** is the efficient frontier formed by tracing the boundary of all portfolios that are combinations of selected asset classes. Points inside the frontier are inefficient because less return for the risk is achieved. Points outside the line, by contrast, are more desirable, but are not obtainable (i.e., infeasible). Portfolio 1 is the minimum risk portfolio and offers the least risk of any combination of asset classes, whereas Portfolio 3 is the maximum return/maximum risk portfolio. Although Portfolio 3 corresponds to 100 per cent investment in the asset class with the greatest return, Portfolio 1, by contrast, usually will not be composed only of the least risky asset class owing to the risk-reducing effects of diversification across asset classes with different risks. For moderate return and risk, portfolios away from the endpoints, such as Portfolio 2, typically are chosen. Such portfolios

Suppose, an investor is evaluating two securities, A and B.

	<b>Security A</b>		<b>Security B</b>
Expected return	12%		20%
Standard deviation of return	20%		40%
Coefficient of correlation		-0.20	

The investor can combine securities A and B in a portfolio in a number of ways by simply changing the proportions of funds allocated to them. Some of the options available to him are shown below:

Portfolio	Proportion of A $w_A$	Proportion of B $w_B$	Expected Return $E(R_p)$	Standard Deviation $\sigma_p$
1 (A)	1.00	0.00	12.00%	20.00%
2	0.90	0.10	12.80%	17.64%
3	0.759	0.241	13.93%	16.27%
4	0.50	0.50	16.00%	20.49%
5	0.25	0.75	18.00%	29.41%
6 (B)	0.00	1.00	20.00%	40.00%

The six options described above are plotted graphically in figure 6.2. Few important points about this graph may be noted:

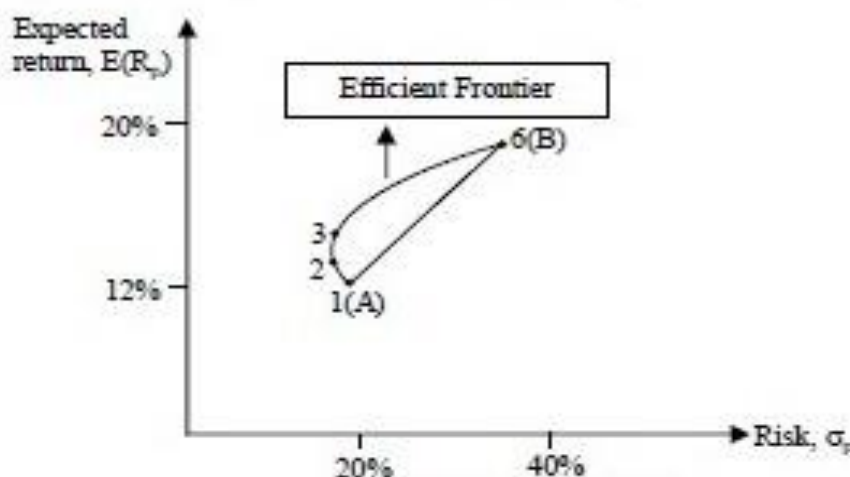


Figure 6.2: Portfolio Options

- 1) The benefit of diversification arises when the correlation between the two securities is less than 1. Because the correlation between securities A and B is  $-0.20$  (which is less than 1), the effect of diversification can be seen by comparing the curved line between points A and B with the straight line between A and B. The straight line represents the risk-return possibilities by combining A and B if

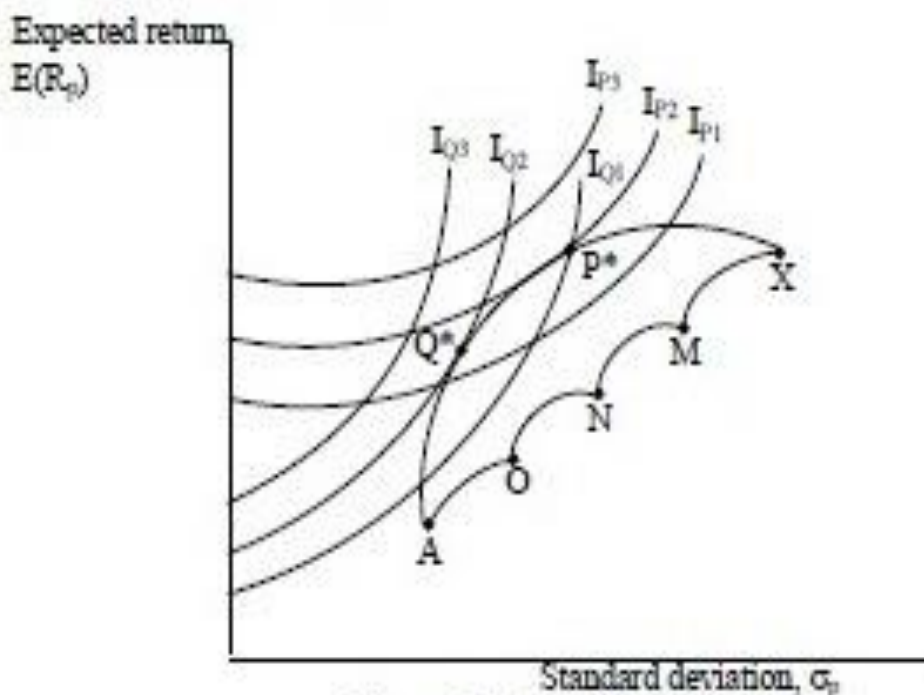


Figure 6.7: Optimal Portfolio

### 5.4.5. Sharpe Single Index Model

The Markowitz model is an elegant formulation of the portfolio problem that forms the basis of the Capital Asset Pricing Model (CAPM). From a practical point of view, however, it has two shortcomings.

- 1) The first is the problem of **computational complexity**. To see this, consider that over 2000 stocks are traded on the NSE alone. The covariance matrix of returns is a  $2000 \times 2000$  matrix, which contains 4 million numbers (though about half of these are the same). Imagine first estimating all the parameters in this matrix, and then using the matrix to calculate the efficient frontier. Now, add the thousands of other securities that are traded, and you get an idea of the practical difficulties of applying the model.
- 2) The second problem is that the model assumes that all the risk and return characteristics can be explained by the covariance of the return with that of other securities. Thus, changes in non-financial factors, such as the growth rate of the economy or the inflation rate, are not accounted for directly.

### Calculation of Return under Single Index Model

Following formula is used to calculate the return under single index model.

$$R_i = \alpha_i + \beta_i R_m + e_i$$

where,

$R_i$  = return on  $i^{\text{th}}$  security

$R_m$  = return on a market index

$\alpha$  = constant term

$\beta$  = market beta or market sensitivity of a given stock

$e_i$  = unsystematic risk

The variance of security's return  $\sigma^2 = \beta_i \sigma_m^2 + \sigma_{e_i}^2$

The covariance of returns between securities  $i$  and  $j$  is,

$$\sigma_{ij} = \beta_i \beta_j \sigma_m^2$$

The variance of the security has two components namely, systematic risk or market risk and unsystematic risk or unique risk. The variance explained by the index is referred to systematic risk. The unexplained variance is called residual variance or unsystematic risk.

Systematic risk =  $\beta_i^2 \times$  variance of market index

$$= \beta_i^2 \sigma_m^2$$

Unsystematic risk = Total variance – Systematic risk,

$$e_i^2 = \sigma_i^2 - \text{systematic risk}$$

Thus, the total risk = Systematic risk + Unsystematic risk,

$$= \beta_i^2 \sigma_m^2 + e_i^2$$

From this, the portfolio variance can be derived,

$$\sigma_p^2 = \left[ \left( \sum_{i=1}^N x_i \beta_i \right)^2 \sigma_m^2 \right] + \left[ \sum_{i=1}^N x_i^2 e_i^2 \right]$$

$\sigma^2$  = variance of portfolio

$\sigma^{2p}$  = expected variance of index

$e_i^{2n}$  = variation in security's return not related to the market index

$x_i$  = the portion of stock  $i$  in the portfolio

Likewise, expected return on the portfolio also can be estimated. For each security  $\alpha_i$  and  $\beta_i$  should be estimated.

$$R_p = \sum_{i=1}^N x_i (\alpha_i + \beta_i R_m)$$

Portfolio return is the weighted average of the estimated return for each security in the portfolio. The weights are the respective stocks proportions in the portfolio.

A portfolio's alpha value is a weighted average of the alpha values for its component securities using the proportion of the investment in a security as weight.

$$\alpha_p = \sum_{i=1}^N x_i \alpha_i$$

where,

- $\alpha_p$  = value of the alpha for the portfolio
- $x_i$  = proportion of the investment on security i
- $\alpha_i$  = value of alpha for security i
- N = number of securities in the portfolio.

Similarly, a portfolio's beta value is the weighted average of the beta values of its component stocks using relative share of them in the portfolio as weights.

$$\beta_p = \sum_{i=1}^N x_i \beta_i$$

$\beta_p$  is the portfolio beta.

**Example 1:** The following details are given for X and Y companies stocks and the Bombay Sensex for a period of one year. Calculate the systematic and unsystematic risk for the companies' stocks. If equal amount of money is allocated for the stocks what would be the portfolio risk?

	X Stock	Y Stock	Sensex
Average return	0.15	0.25	0.06
Variance of return	6.30	5.86	2.25
$\beta$	0.71	0.27	
Correlation coefficient	0.424		
Coefficient of determination ( $r^2$ )	0.18		

**Solution:** The coefficient of determination ( $r^2$ ) gives the percentage of the variation in the security's return that is explained by the variation of the market index return. In the X company stock return, 18 per cent of

variation is explained by the variation of the index and 82 per cent is not explained by the index.

Explained by the index

$$= \text{variance of security return} \times \text{coefficient of determination} \\ = 6.3 \times 0.18 = 1.134$$

Not explained by the index = variance of security return  $\times (1 - r^2)$

$$= 6.3 \times (1 - 0.18) \\ = 6.3 \times 0.82 = 5.166$$

According to Sharpe, the variance explained by the index is the systematic risk. The unexplained variance or the residual variance is the unsystematic risk.

### Company X

$$\text{Systematic risk} = \beta^2 \times \text{Variance of market index} \\ = (0.71)^2 \times 2.25 = 1.134$$

$$\text{Unsystematic risk} = \text{Total variance of security return} - \text{systematic risk} \\ = e_i^2 \\ = 6.3 - 1.134 = 5.166$$

$$\text{Total risk} = \beta_i^2 \times \sigma_m^2 + e_i^2 \\ = 1.134 + 5.166 = 6.3$$

### Company Y

$$\text{Systematic risk} = \beta_i^2 \times \sigma_m^2 \\ = (0.27)^2 \times 2.25 = 0.1640$$

$$\text{Unsystematic risk} = \text{Total variance of the security return} - \text{systematic risk} \\ = 5.86 - 0.1640 = 5.696$$

$$\sigma_p^2 = \left[ \left( \sum_{i=1}^N x_i \beta_i \right)^2 \right] + \left[ \sum_{i=1}^N x_i^2 e_i^2 \right] \\ = [(0.5 \times 0.71 + 0.5 \times 0.27)^2 \times 2.25] + [(0.5)^2 (5.166) + (0.5)^2 (5.696)] \\ = [(0.355 + 0.135)^2 \times 2.25] + [(1.292 + 1.424)] \\ = 0.540 + 2.716 = 3.256$$

**Example 2:** Consider a portfolio of four securities with the following characteristics:

Security	Weighting	$\alpha_i$	$\beta_i$	Residual Variance ( $\sigma_{ei}^2$ )
1	0.2	2.0	1.2	320
2	0.3	1.7	0.8	450

3	0.1	-0.8	1.6	270
4	0.4	1.2	1.3	180

Calculate the return and risk of the portfolio under single index model, if the return on market index is 16.4 per cent and the standard deviation of return on market index is 14 per cent.

**Solution:**

- 1) Portfolio return under single index model is calculated using the formula:

$$R_p = \alpha_p + \beta_p R_m$$

For applying this formula,  $\alpha_p$  and  $\beta_p$  have to be calculated as:

$$\begin{aligned}\alpha_p &= \sum_{i=1}^n w_i \alpha_i \\ &= (0.2)(2.0) + (0.3)(1.7) + (0.1)(-0.8) + (0.4)(1.2) \\ &= 1.31\end{aligned}$$

$$\begin{aligned}\beta_p &= \sum_{i=1}^n w_i \beta_i \\ &= (0.2)(1.2) + (0.3)(0.8) + (0.1)(1.6) + (0.4)(1.3) \\ &= 1.16\end{aligned}$$

$$\begin{aligned}R_p &= \alpha_p + \beta_p R_m \\ &= 1.31 + (1.16)(16.4) \\ &= 1.31 + 19.024 \\ &= 20.334\end{aligned}$$

- 2) Portfolio risk under single index model is calculated as:

$$\sigma_p^2 = \beta_p^2 \sigma_m^2 + \sum_{i=1}^n w_i^2 \sigma_{ei}^2$$

For applying this, portfolio residual variance needs to be calculated as:

$$\sum_{i=1}^n w_i^2 \sigma_{ei}^2$$

$$\begin{aligned}\text{Thus,} \\ &= (0.2)^2(320) + (0.3)^2(450) + (0.1)^2(270) + (0.4)^2(180) \\ &= 12.8 + 40.5 + 2.7 + 28.8 = 84.8\end{aligned}$$

Now,

$$\begin{aligned}\sigma_p^2 &= \beta_p^2 \sigma_m^2 + \sum_{i=1}^n w_i^2 \sigma_{ei}^2 \\ &= (1.16)^2(14)^2 + 84.8 \\ &= 263.74 + 84.8 = 348.54\end{aligned}$$

$$\text{Hence, } \sigma_p = \sqrt{348.54} = 18.67$$

## 4. CAPITAL ASSET PRICING MODEL

Capital Asset Pricing Model also abbreviated as CAPM was proposed by Jack Treynor, William Sharpe, John Lintner and Jan Mossin.

When an asset needs to be added to an already well diversified portfolio, Capital Asset Pricing Model is used to calculate the asset's rate of profit or rate of return (ROI). In Capital Asset Pricing Model, the asset responds only to:

- Market risks or non diversifiable risks often represented by beta
- Expected return of the market
- Expected rate of return of an asset with no risks involved

The asset return depends on the amount paid for the asset today. The price paid must ensure that the market portfolio's risk / return characteristics improve when the asset is added to it. The CAPM is a model that derives the theoretical required expected return (i.e., discount rate) for an asset in a market, given the risk-free rate available to investors and the risk of the market as a whole.

Capital Asset Pricing Model is used to determine the price of an individual security through security market line (SML) and how it is related to systematic risks.

### What is Security Market Line ?

Security Market Line is nothing but the graphical representation of capital asset pricing model to determine the rate of return of an asset sensitive to non diversifiable risk (Beta).

$$\text{SML : } E(R_i) = R_f + \beta_i[E(R_M) - R_f]$$

The CAPM is usually expressed:

$$E(R_i) = R_f + \beta_i(E(R_M) - R_f)$$

$\beta$ , Beta, is the measure of asset sensitivity to a movement in the overall market; Beta is usually found via regression on historical data. Betas exceeding one signify more than average "riskiness" in the sense of the asset's contribution to overall portfolio risk; betas below one indicate a lower than average risk contribution.

$(E(R_M) - R_f)$  is the market premium, the expected excess return of the market portfolio's expected return over the risk-free rate.

- Expected return:

$$E(R_p) = \sum_i w_i E(R_i)$$

where  $R_p$  is the return on the portfolio,  $R_i$  is the return on asset  $i$  and  $w_i$  is the weighting of component asset  $i$  (that is, the proportion of asset "i" in the portfolio).

- Portfolio return variance:

$$\sigma_p^2 = \sum_i w_i^2 \sigma_i^2 + \sum_i \sum_{j \neq i} w_i w_j \sigma_i \sigma_j \rho_{ij},$$

where  $\sigma$  is the (sample) standard deviation of the periodic returns on an asset, and  $\rho_{ij}$  is the correlation coefficient between the returns on assets  $i$  and  $j$ . Alternatively the expression can be written as:

$$\sigma_p^2 = \sum_i \sum_j w_i w_j \sigma_i \sigma_j \rho_{ij},$$

where  $\rho_{ij} = 1$  for  $i = j$ , or

$$\sigma_p^2 = \sum_i \sum_j w_i w_j \sigma_{ij},$$

where  $\sigma_{ij} = \sigma_i \sigma_j \rho_{ij}$  is the (sample) covariance of the periodic returns on the two assets, or alternatively denoted as  $\sigma(i, j)$ ,  $cov_{ij}$  or  $cov(i, j)$ .

- Portfolio return volatility (standard deviation):

$$\sigma_p = \sqrt{\sigma_p^2}$$

For a **two asset** portfolio:

- Portfolio return:  $E(R_p) = w_A E(R_A) + w_B E(R_B) = w_A E(R_A) + (1 - w_A) E(R_B)$ .
- Portfolio variance:  $\sigma_p^2 = w_A^2 \sigma_A^2 + w_B^2 \sigma_B^2 + 2w_A w_B \sigma_A \sigma_B \rho_{AB}$

For a **three asset** portfolio:

- Portfolio return:  $E(R_p) = w_A E(R_A) + w_B E(R_B) + w_C E(R_C)$
- Portfolio variance:  
$$\sigma_p^2 = w_A^2 \sigma_A^2 + w_B^2 \sigma_B^2 + w_C^2 \sigma_C^2 + 2w_A w_B \sigma_A \sigma_B \rho_{AB} + 2w_A w_C \sigma_A \sigma_C \rho_{AC} + 2w_B w_C \sigma_B \sigma_C \rho_{BC}$$

## **UNIT-5-IMPORTANT QUESTIONS**

- 1) Explain the Process of Portfolio Management,
- 2) Briefly write about Modern Portfolio (Markowitz model & Sharpe single index model)
- 3) What is CAPM? Detail note on Capital Asset Pricing Models

**Problems:** Sharpe single index model.

\* If the risk will arise due to internal factors that type of risk is called as "unsystematic risk" or controlled risk / unique risk / diversifiable risk. This can be controlled by taking preventive steps.

### Measurement of Risk

Risk can be measured by using statistical tool called standard deviation ( $\sigma$ ) or variance ( $\sigma^2$ ).

### Measurement of Returns

\* calculation of Annual Returns ( $R_i$ ) :-

Annual Returns ( $R_i$ ) = Regular dividend + Capital gain

$$R_i = \frac{D_i + (P_i - P_0)}{P_0} \times 100$$

Here;  $P_i$  = closing price;  $P_0$  = opening price

\* Average returns (or) expected returns ( $\bar{R}$  or  $E(R)$ )

$$\bar{R} \text{ (or) } E(R) = \frac{\sum_{i=1}^n R_i}{n}$$

If probabilities is given;

$$\bar{R} = \sum_{i=1}^n R_i \cdot P_i$$

calculation of variance :- ( $\sigma^2$ )

case 1 :- with out probability.

$$\sigma^2 = \frac{1}{n-1} \sum_{i=1}^n (R_i - \bar{R})^2$$

standard deviation S.D =  $\sqrt{\sigma^2}$

case 2 :- with probability.

$$\text{variance } (\sigma^2) = \sum_{i=1}^n (R_i - \bar{R})^2 \cdot P_i$$

$$S.D = \sqrt{\sigma^2}$$

1. The average market share prices and DPS dividend per share of Asian paints limited for the past 6 years are given below.

Year	2014	2013	2012	2011	2010	2009
Avg market share price	68	61	50	53	45	38
DPS (₹)	3.00	2.60	2.00	2.50	2.00	1.80

You are required to calculate a) Annual returns or avg rate of returns. b) expected returns. c) standard deviation of returns.

Sol: (A) Annual Returns ( $R_i$ ) =  $\frac{D_i + (P_1 - P_0)}{P_0} \times 100$

Year	DPS	Avg market price	$P_0$	$P_1$	$R_i$ (%)
2009	1.80	38	-	38	$R_i = -$
2010	2.00	45	38	45	$R_i = \frac{2 + (45 - 38)}{38} \times 100 = 23.68$
2011	2.50	53	45	53	$R_i = \frac{2.5 + (53 - 45)}{45} \times 100 = 23.33$
2012	2.00	50	53	50	$= \frac{2 + (50 - 53)}{53} \times 100 = -1.88$
2013	2.60	61	50	61	$= \frac{2.6 + (61 - 50)}{50} \times 100 = 27.2$
2014	3.00	68	61	68	$= \frac{3 + (61 - 68)}{50} \times 100 = 16.39$

(B) Expected returns ( $\bar{R}$ ) =  $\frac{1}{n} \sum_{i=1}^n R_i$

$$= \frac{23.68 + 23.33 - 1.88 + 27.2 + 16.39}{5}$$

$$= \frac{88.72}{5}$$

$$\boxed{\bar{R} = 17.74\%}$$

(C) Standard deviation of returns.

$$\text{Variance } (\sigma^2) = \frac{1}{n-1} \sum_{i=1}^n (R_i - \bar{R})^2$$

$$= (23.68 - 17.74)^2 + (23.33 - 17.74)^2 + (-1.88 - 17.74)^2 + (27.2 - 17.74)^2 + (18.39 - 17.74)^2$$

$$= (5.94)^2 + (5.59)^2 + (-19.62)^2 + (9.48)^2 + (-1.35)^2$$

$$= \frac{35.28 + 31.24 + 384.94 + 89.49 + 1.82}{4}$$

$$= \frac{542.77}{4}$$

$$= 135.69 \%$$

$$\text{S.D of returns } (\sigma) = \sqrt{135.69}$$

$$\boxed{\sigma = 11.65} \%$$

2. A stock costing ₹ 120/- pays no dividend. The possible prices that the stock might sell at the end of the year are as follows:  
115, 120, 125, 130, 135, 140.  
You are required to calculate a) Annual return  
b) expected returns c) standard deviation of return

Sol: a) Annual return  $R_i = \frac{D_0 + (P_1 - P_0)}{P_0} \times 100$

Year	Year end prices	P <sub>0</sub>	P <sub>1</sub>	$R_i = \frac{D_0 + (P_1 - P_0)}{P_0} \times 100$
1	115	120	115	$= \frac{(115 - 120)}{120} \times 100 = -4.16$
2	120	115	120	$\frac{120 - 115}{115} \times 100 = 4.34$
3	125	120	125	$\frac{125 - 120}{120} \times 100 = 4.16$
4	130	125	130	$\frac{130 - 125}{125} \times 100 = 4.00$
5	135	130	135	$\frac{135 - 130}{125} \times 100 = 3.84$
6	140	135	140	$\frac{140 - 135}{135} \times 100 = 3.70$
				<u>15.88</u>

$$(B) \text{ expected returns } (\bar{R}) = \frac{\sum_{i=1}^n R_i}{n}$$

$$\therefore \boxed{\bar{R} = 2.64} \quad = \frac{15.88}{6} = 2.64$$

$$(c) \text{ Variance } \sigma^2 = \frac{1}{n-1} \sum_{i=1}^n (R_i - \bar{R})^2$$

$$= \frac{(-4.16 - 2.64)^2 + (4.34 - 2.64)^2 + (4.16 - 2.64)^2 + (4.00 - 2.64)^2 + (3.84 - 2.64)^2 + (3.70 - 2.64)^2}{6-1}$$

$$= \frac{(6.8)^2 + (1.7)^2 + (1.52)^2 + (1.36)^2 + (1.2)^2 + (1.06)^2}{5}$$

$$= \frac{46.24 + 2.89 + 2.3104 + 1.8496 + 1.44 + 1.1236}{5}$$

$$= \frac{55.84}{5} = 11.168$$

$$S.D \sigma = \sqrt{11.168}$$

$$\boxed{S.D (\sigma) = 3.34}$$

returns  $\rightarrow$  percentage  
probability  $\rightarrow$  point

3. calculate expected return & the standard deviation of returns for a stock having the follg; annual returns and the probability distribution.

S.NO	1	2	3	4	5	6	7
probable re returns (%)	-24	-10	0	12	18	22	30
probability	0.05	0.15	0.15	0.20	0.20	0.15	0.10

soln expected returns  $\bar{R} = \sum_{i=1}^n R_i \cdot P_i$

S.N.O	probable returns ( $R_i$ )	probability ( $P_i$ )	$R_i * P_i = \bar{R}$
1	-24	0.05	-1.2
2	-10	0.15	-1.5
3	0	0.15	0
4	12	0.20	2.4
5	18	0.20	3.6
6	22	0.15	3.3
7	30	0.10	3
			$\bar{R} = 9.6\%$

$$(B) \text{ variance} = \sum_{i=1}^n (R_i - \bar{R})^2 \cdot P_i$$

S.N.O	$R_i$	$(R_i - \bar{R})^2$	$P_i$	$(R_i - \bar{R})^2 \cdot P_i$
1	-24	$(-24 - 9.6)^2$ 1128.96	0.05	56.448
2	-10	384.16	0.15	57.624
3	0	92.16	0.15	13.824
4	12	5.76	0.20	1.152
5	18	70.56	0.20	14.112
6	22	153.76	0.15	23.064
7	30	416.16	0.10	41.616

$$\sigma^2 = 207.84$$

$$SD(\sigma) = \sqrt{207.84}$$

$$\sigma = 14.42\%$$

4. Mrs Renuka collected the following annual returns and probability for sunrise & sunset companies.

S.NO	Annual Returns (%)		profitability
	sunrise	sunset	
1	18	-3	0.15
2	20	22	0.20
3	15	18	0.30
4	13	15	0.15
5	-5	20	0.20

she received your suggestion to choose any one of the company.

Sol: sunrise :- Expected return ( $\bar{R}$ ) =  $\sum_{i=1}^n R_i \cdot P_i$

S-NO	Returns ( $R_i$ )	probability ( $P_i$ )	$\bar{R} = \sum R_i \cdot P_i$
1	18	0.15	2.7
2	20	0.20	4.0
3	15	0.30	4.5
4	13	0.15	1.95
5	-5	0.20	1.0
			$\bar{R} = 14.15$

$$\bar{R} = 14.15\%$$

$$\text{variance } (\sigma^2) = \sum_{i=1}^n (R_i - \bar{R})^2 \cdot P_i$$

S.NO	Return ( $R_i$ )	$R_i - \bar{R}$ ( $\bar{R} = 14.15$ )	$(R_i - \bar{R})^2$	$P_i$	$(R_i - \bar{R})^2 \cdot P_i$
1	18	3.5	12.25	0.15	1.837
2	20	5.85	34.22	0.20	6.845
3	15	0.85	0.72	0.30	0.216
4	13	-1.15	1.32	0.15	0.198
5	-5	-19.15	366.72	0.20	73.34

$$\sigma^2 = 82.445$$

$$\sigma = \sqrt{82.445}$$

$$82.445$$

$$\therefore \text{S.D } (\sigma) = 9.079\%$$

Ans:- Expected returns  $(\bar{R}) = \sum_{i=1}^n R_i * P_i$

SNO	(R <sub>i</sub> )	(P <sub>i</sub> )	$\sum_{i=1}^n R_i * P_i$
1	-3	0.15	0.45
2	22	0.20	4.40
3	18	0.30	5.40
4	15	0.15	2.25
5	20	0.20	4.00
			$\bar{R} = \frac{16.5}{56} = 1.65\%$

returns  $\bar{R} = 1.65\%$

$$\therefore \bar{R} = 16.5\%$$

variance  $(\sigma^2) = \sum_{i=1}^n (R_i - \bar{R})^2 * P_i$

SNO	R <sub>i</sub>	$(\bar{R} = 16.5\%)$ R <sub>i</sub> - $\bar{R}$	$(R_i - \bar{R})^2$	R P <sub>i</sub>	$(R_i - \bar{R})^2 * P_i$
1	-3	-19.5	380.25	0.15	57.04
2	22	5.5	30.25	0.26	6.05
3	18	1.5	2.25	0.30	0.675
4	15	-1.5	2.25	0.15	0.34
5	20	3.5	12.25	0.20	2.45

$$\sigma^2 = 66.56$$

variance  $\sigma^2 = 66.56$

standard deviation (S.D)  $\sigma = \sqrt{66.56}$

$$\sigma = 8.158\%$$