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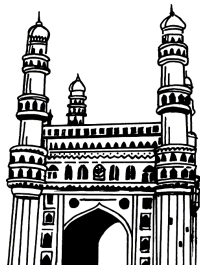

M.Com.

III Semester

(Osmania University)

LATEST EDITION
2019 - 2020

SECURITIES ANALYSIS AND PORTFOLIO MANAGEMENT

- ☞ **STUDY MANUAL**
- ☞ **SOLVED PROBLEMS**
- ☞ **SOLVED QUESTION PAPERS**

- by -

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SECURITIES ANALYSIS AND PORTFOLIO MANAGEMENT

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1.1 FUNDAMENTAL ANALYSIS

1.1.1 Meaning

Introduction

Investment decisions are a part of our economic life. Everybody makes such decisions in different contexts at different times. Some are able to reap more profits through them; while other simply lose their money. Attempts should, therefore, be made to understand and know the way sound investments decision can be made in order to improve the change of making profit through them. Thus, investment decision-making is an important area probing further.

In the fundamental approach an attempt is made to analyze various fundamental or basic factors that affect the risk-return of the securities. The effort here is to identify those securities that on perceives as mispriced in the stock market. The assumption in this case is that the 'market price' of security and the price is justified by its fundamental factors called 'intrinsic value' are different and their market place provides an opportunity for a discerning investor to detect such discrepancy. The moment such a description is identified, a decision to invest or disinvest is made.

The price prevailing in market is called "market price" (MP) and the one justified by its fundamentals is called "intrinsic value" (IV).

Criteria for Selecting an Investment

1. If IV > MP, buy the security
2. If IV < MP, sell the security
3. If IV = Mp, no action.

The fundamental factors mentioned above may relate to the economy or industry or company or all some of this. Thus Fundamental Approach includes three analysis :

1. Economic Analysis
2. Industry Analysis
3. Company Analysis

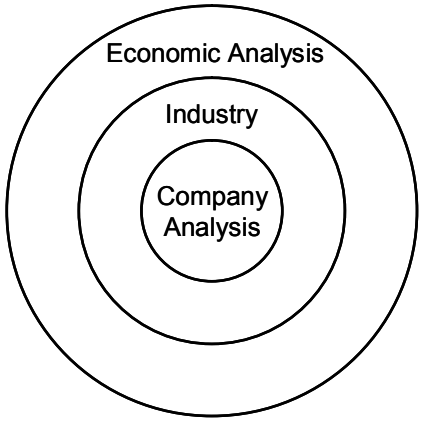


Figure: Fundamental Analysis

1.1.2 Economy Analysis

In actual practice, you must have noticed that investment decisions of individuals and the institutions made in the economy setup of a particular country. It becomes essential, therefore, to understand the star economy of that country at the macro level. The analysis of the state of the economy at the macro level 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.

Macro Economic Analysis

The analysis of the following factors indicates the trends in macro economic changes that effect the risk and return on investment:

i) **Growth Rate of Gross Domestic Product** : The gross domestic product is a measure of the total production of final goods and services in the economy during a specified period usually a year. The growth rate of GDP is the most important indicator of the performance of the economy. The higher the growth rate of GDP, other things being equal. It is more favourable it is for the stock market.

ii) **Industrial Growth Rate :** The GDP growth rate represents the average of the growth rates of the **three principal** sectors of the economy, viz. the **services sector, the industry sector, and the agricultural sector.**

Publicly listed companies play a major role in the industrial sector but only a minor role in the service sector and the agricultural sector. Hence, stock market analyst focus more on the industrial sector. They look at the overall industrial growth rate as well as the growth rates of different industries.

The higher the growth rate of the industrial sector, other things being equal, it is more favourable for the stock market.

iii) **Monsoons :** Agriculture accounts for about a quarter of the Indian economy and has important linkages, direct and indirect, with industry. Hence, the increase or decrease of agricultural production has a significant bearing in industrial production and corporate performance. Companies using agricultural raw materials as inputs or supplying inputs to agriculture are directly affected by the changes in agricultural production. Other companies also tend to be affected due to indirect linkages.

A spell of good and monsoons imparts dynamism to the industrial sector and buoyancy to the stock market. Likewise, a streak of bad monsoons casts its shadow over the industrial sector and the stock market.

iv) **Fiscal Deficit :** Government play an important role in most economies, including the Indian economy. The central budget as well as the state budgets prepared annually provides information on revenues, expenditures and deficit or surplus.

In India, governmental revenues come more from indirect taxes such as excise duty and custom duty and less from direct taxes such as income tax. The bulk of the government expenditures goes toward administration, interest payment, defence and subsidies etc.

If Government Expenditure > Government Revenues Deficit

If Government Revenues > Government Expenditure Surplus

Investment analyst examines the government budget to assess how it is likely to impact on the stock market.

v) **Interest Rate** : A rise in interest rates depresses corporate profitability and also leads to an increase in the discount rate applied by equity investors, both of which have an adverse impact on stock prices. On the other hand, a fall in interest rates improves corporate profitability and also leads to a decline in the discount rate applied by equity investors, both of which have a favourable impact on stock prices.

vi) **Inflation :** The effect of inflation on the corporate sector tends to be uneven. While certain industries benefit, others tend to suffer. Industries that enjoy a strong market for their products and which do not come under the purview of price control may benefit. On the other hand, industries have a weak and which come under the purview of price control tend to lose.

vii) **Balance of Payments, Forex Reserves, and Exchange Rates :** Balance of Payment Deficit = Balance of Trade Deficit (Imports minus exports) + Balance on 'invisible' like tourism and interest rates (payment on account of invisible minus receipts on account of invisibles) + Balance on account of capital account (Repayment on account of loans minus receipt of loans)

A balance of payments deficit depletes the forex reserves of the country and has an adverse impact on the exchange rate; on the other hand a balance of payments surplus augments the force reserves of the country and has a favourable impact on the exchange rate.

Other economic factors are :

viii) Capacity Utilisation

ix) Unemployment

x) Institutional Lending

xi) Productivity of factors of production.

xii) Industrial Wages

xiii) Status of political and economic stability

xiv) Technological innovations

xv) Infrastructural facilities

xvi) Economic and industrial policies of the government

xvii) Debt recovery and loans outstanding.

xviii) Trends in capital market

xix) Foreign Investment.

xx) Stage of the business cycle.

1.1.3 Economic Forecasting

Forecasting the future direction of the economy becomes necessary. Economic forecasting thus becomes a key activity in economy analysis.

The central theme in economic forecasting is to forecast the national income with its various components. Gross national product or GNP is a measure of the national income. It is the total value of the final output of goods and services produced in the economy. It is a measure of the total economic activities over a specified period of time and is an indicator of the level and rate of growth of economic activities. An investor would be particularly interested in forecasting the various components of the national income, especially those components that have a bearing on the particular industries and companies that he is analysing.

1.1.4 Forecasting Techniques

Economic forecasting may be carried out for short-term periods (up to three years), intermediate term periods (three to five years) and long-term periods (more than five years). An investor is more concerned about short-term economic forecasts for periods ranging from a quarter to three years. Some of the techniques of short-term economic forecasting are discussed below:

Anticipatory Surveys

Much of the activities in government, business, trade and industry are planned in advance and stated in the form of budgets. Consumers also plan for their major spending in advance. To the extent that institutions and people plan and budget for expenditure in advance, surveys of their intentions can provide valuable input to short-term economic forecasting.

Anticipatory surveys are the surveys of intentions of people in government, business, trade and industry regarding their construction activities, plant and machinery expenditures, level of inventory, etc. Such surveys may also include the future plans of consumers with regard to their spending on durables and non-durables. Based on the results of these surveys, the analyst can form his own forecast of the future state of the economy.

The greatest shortcoming of the anticipatory surveys is that there is no guarantee that the intentions surveyed will certainly materialise. The forecast based on anticipatory surveys or surveys of intentions will be valid only to the extent that the intentions are translated into action. Hence, the analyst cannot rely solely on these surveys.

Barometric or Indicator Approach

In this approach to economic forecasting, various types of indicators are studied to find out how the economy is likely to perform in the future. These indicators are time series data of certain economic variables. The indicators are classified into leading, coincidental and lagging indicators.

The leading indicators are those time series data that reach their high points (peaks) or their low points (troughs) in advance of the high points and low points of total economic activity. The coincidental indicators reach their peaks and troughs at approximately the same time as the economy, while the lagging indicators reach their turning points after the economy has already reached its own turning points.

In this method, the indicators act as barometers to indicate the future level of economic activity. However, careful examination of historical data of economic series is necessary to ascertain which economic variables have led, lagged behind or moved together with the economy.

Leading Indicators

Average weekly hours of manufacturing production workers

Average weekly initial unemployment claims

Contracts and orders for plant and machinery

Number of new building permits issued

Index of S and P 500 stock prices

Money supply (M2)

Change in sensitive materials prices

Change in manufacturers' unfilled orders (durable goods industries)

Index of consumer expectations

Coincidental Indicators

Employees on nonagricultural pay rolls, Personal income less transfer payments Index of industrial production, Manufacturing and trade sales

Lagging Indicators

Average duration of unemployment

Ratio of manufacturing and trade inventories to sales

Average prime rate

Commercial and industrial loans outstanding

Change in consumer price index for services

Of the three types of indicators, leading indicators are more useful for economic forecasting because they measure something that foreshadows a change in economic activity.

Econometric Model Building

This is the most precise and scientific of the different forecasting techniques. This technique makes use of **Econometrics**, which is a discipline that applies mathematical and statistical techniques to economic theory.

In the economic field we find complex interrelationships between the different economic variables. The precise relationships between the dependent and independent variables are specified in a formal mathematical manner in the form of equations. The system of equations is then solved to yield a forecast that is quite precise. .

Econometric models used for economic forecasting are generally complex. Vast amounts of (data are required to be collected and processed for the solution of the model. This may cause delay in making the results available. Undue delay may render the results obsolete for purpose of forecasting.

Opportunistic Model Building

This is one of the most widely used forecasting techniques. It is also known as **GNP model building or sectoral analysis.**

Initially, an analyst estimates the total demand in the economy, and based on this he estimates the total income or GNP for the forecast period. This initial estimate takes into consideration the prevailing economic environment such as the existing tax rates, interest rates, rate of inflation and other economic and fiscal policies of the government. After this initial forecast is arrived at, the analyst now begins building up

a forecast of the GNP figure by estimating the levels of various components of GNP. For this, he collects the figures of consumption expenditure, gross private domestic investment, government purchase of goods and services and net exports. He adds these figures together to arrive at the GNP forecast.

The two GNP forecasts arrived at by two different methods will be compared and necessary adjustments will be made to bring the two forecasts into line with each other.

Economic forecasting is an extremely complex and difficult process. No method is expected to give accurate results. The investor must evaluate all economic forecasts critically before making his investment decision.

1.1.5 Industry Analysis and Concept of Industry

After conducting an analysis of the economy, the analyst must - look into various sectors of the economy in terms of various industries.

An industry is a homogeneous group of companies. That is, companies with similar characteristic can be divided into one industrial group. There are man bases on which grouping of companies can be done.

Concept of Industry

An industry is generally described as a homogenous group of companies. We may define an industry "as a group of firms producing reasonably similar products which serve the same needs of a common set of buyers."

Industries are traditionally classified on the basis of products. According to this product-wise classification we have cement industry, steel industry, cotton textile industry, pharmaceutical industry, and so forth. However, industry classification becomes difficult when dealing with firms having a diversified product line. And such firms are now on the increase. Even though classification of industry poses practical difficulties, each country follows a standardised classification to facilitate data collection and reporting.

Classification of Industries

i) **Growth Industry :** This is an industry that is expected to grow consistently and its growth may exceed the average growth of the economy.

ii) **Cyclical Industry :** In this category of the industry, the firms included are those that move closely with the rate of industrial growth of the economy and fluctuate cyclically as the economy fluctuates.

iii) **Defensive Industry :** It is a grouping that includes firms, which move steadily with the economy and less than the average decline of the economy in a cyclical downturn.

Key Indicators in Analysis

The analyst is free to choose his or her own indicators for analyzing the prospectus of an industry. However, many commonly adopt the following factors.

i) **Performance Factors :** Performance factors like :

- Past Sales
- Past Earnings

ii) **Environment Factors :** Environment factors like :

- Attitude of government
- Labour conditions
- Competitive conditions
- Technological progress

iii) **Outcome factors :** Outcome factors lime :

- Industry share prices
- Strengths and weaknesses
- Opportunities and threats

Analytical Framework

We have identified various factors and questions relating to industry analysis. Now, we shall consider the frameworks within which the analysis may be carried out.

1.1.6 Industry Life Cycle

This industry life cycle theory is generally attributed to Julius Grodinsky According to the industry life cycle theory, 'the life of an industry can be segregated into the pioneering stage, the expansion stage, the stagnation stage, and the decay stage'. This kind of segregation is extremely useful to an investor because the profitability of an industry depends upon its stage of growth. In fact, each development stage is unique and exhibits different characteristics.

Technological advances in one industry can effect the growth of another industry. The jute industry began to decline when alternate and cheaper packing materials came into use. The popularity of synthetic textiles can adversely affect the demand for cotton textiles, and vice versa.

The stages can be identified as follows :

i) **Pioneering Stage :** This stage is characterized by introduction of a new product, and an up trend in business cycle that encourages new product introductions. Demand keeps on growing at an increasing rate. Competition is generated by the entry of new firms to grab the market opportunities. Weaker firms face premature death while stronger one survives to grow and expand.

ii) **Expansion Stage :** This is characterized by the hectic activity of firms surviving the pioneering stage. The market continues to grow but slowly, offering steady and slow growth in sales of the industry. It is a phase of consolidation wherein companies establish durable policies relating to dividends and investments.

iii) **Stabilization Stage :** This is the third stage in the industry life cycle. In this stage, the growth of the industry stabilises. The ability of the industry to grow appears to have been lost. Sales may be increasing but at a slower rate than that experienced by competitive industries or by the overall economy. The industry begins to stagnate. The transition of the industry from the expansion stage to the stagnation stage is often very slow. Two important reasons for this transition are change in social habits and development of improved technology.

iv) **Decay Stage :** An industry reaches this stage when it fails to detect the death signal and implement- pro-actively or reactively-appropriate strategies. Obsolescence manifests itself, effecting a decline in sales, profit, dividends and share prices.

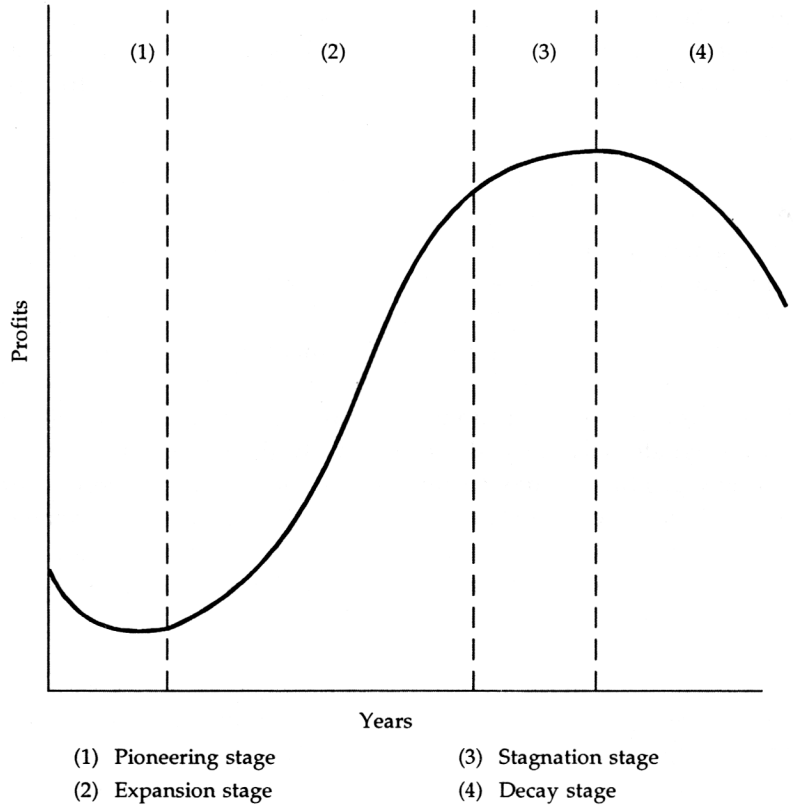


Fig.: Industry Life Cycle

1.1.7 Industry Characteristics

In an industry analysis, there are a number of key characteristics that should be considered by the analyst. These features broadly relate to the operational and structural aspects of the industry. They have a bearing on the prospects of the industry. Some of these are discussed below:

Demand Supply Gap

The demand for a product usually tends to change at a steady rate, whereas the capacity to produce the product tends to change at irregular intervals, depending upon the installation of additional production capacity. As a result, an industry is likely to experience under- supply and over-supply of capacity at different times. Excess supply reduces the profitability of the industry through a decline in the unit price realisation. On the contrary, insufficient supply tends to improve the profitability through higher

unit price realisation". Therefore, the gap between demand and supply in an industry is a fairly good indicator of its short- term or medium-term prospects. As part of industry analysis, an investor should estimate the demand supply gap in the industry.

Competitive Conditions in the Industry

Another significant factor to be considered in industry analysis is the competitive conditions in the industry. The level of competition among various companies in an industry is determined by certain competitive forces. These competitive forces are: (a) barriers to entry, (b) the threat of substitution, (c) bargaining power of the buyers, bargaining power of the suppliers and the rivalry among competitors.

Permanence

In this age of rapid technological change, the degree of permanence of an industry is an important consideration in industry analysis. Permanence is a phenomenon related to the products and the technology used by the industry. If an analyst feels that the need for a particular industry will vanish in a short period, or that the rapid technological changes would render the products obsolete within a short time, it would be foolish to invest in such an industry.

Labour Conditions

The state of labour conditions in the industry under analysis is an important consideration in an economy such as ours where the labour unions are very powerful. If the labour in a particular industry is rebellious and is inclined to resort to strikes frequently, the prospects of that industry cannot become bright.

Attitude of Government

The attitude of the government towards an industry has a significant impact on its prospects. The government may encourage the growth of certain industries and can assist such industries through favourable legislation.

Supply of Raw Materials

The availability of raw materials is an important factor determining the profitability of an industry. Some industries may have no difficulty in obtaining the major raw materials as they may be indigenously available in plenty. Other industries may have to depend on a few manufacturers within the country or on imports from outside the country for their raw material supply.

Cost Structure

Another factor to be considered in industry analysis is the cost structure of the industry, viz. the proportion of fixed costs to variable costs. The higher the fixed cost component, higher is the sales volume necessary to achieve break-even point. Conversely, the lower the proportion of fixed cost relative to variable cost, lower would be the break-even point. Lower break-even point provides higher margin of safety. An analyst would consider favourably an industry that has a lower break-even point.

1.1.8 Company Analysis

It is the final stage of fundamental analysis. The economy analysis provides the investor a broad outline of the prospects of growth in the economy. The industry analysis helps in investor to select the industry in which investment would be rewarding. Now he has to decide the company in which he should invest his money. Company analysis provides the answer to this question.

Company analysis deals with the estimates return and risk of individual shares. This calls for information regarding companies which can be broadly classified into two broad groups, internal and external sagregate. Internal information consists of data and events made public by companies concerning their operations.

The internal information sources include annual reports to shareholders, public and private statements of officers of the company, the company's financial statements, etc. External sources of information are those generated independently outside the company. These are prepared by investment services and the financial press.

In company analysis, the analyst tries to forecast the future earnings of the company because there is strong evidence that earnings have a direct and powerful effect upon share prices. The level, trend and stability of earnings of a company, however, depend upon a number of factors concerning the operation of company.

1.1.9 Financial Statements

The prosperity of a company would depend upon its profitability and financial health. The financial statements published by the company periodically help us to assess the profitability and financial health of the company. The two basic statements provided by the company are as follows,

i) **Balance Sheet:** It helps to assess the financial position of the company at a particular point of time. It shows the list of assets and liabilities of a company on a specific data.

ii) **Profit and Loss Account:** It determines the performance of the company during a particular period. It reveals the revenue earned, the cost incurred and the resulting profit or loss of the company.

1.1.10 Analysis of Financial Statements

The analysis of financial statements reveals the nature of relationship between income and expenditure, the sources and application of funds. This can be done by using the following,

i) **Comparative Financial Statements :** In the comparative statement, balance sheet figures are provided for more than one year. The comparative financial statement provides time perspective to the balance sheet figures. The annual data are compared with similar data of previous years, either in absolute terms of in percentages.

ii) **Trend Analysis :** Here percentages are calculated with a base year. This would provide insight into growth or decline of the sale or profit over the years. Here in, the investor has to look into the cost and management efficiency of the company by examining the trends prevailing.

iii) **Common Size Statement :** Common size balance sheet shows the percentage of each asset item to the total assets and each liability item to the total liabilities. Similarly, a common size income statement shows each item of expense as a percentage of net sales. With common size statements comparison can be made between two different size firms belonging to the same industry.

iv) **Funds Flow Analysis :** This statement provides an insight into the movement of funds and helps in understanding the changes in the structure of assets, liabilities and owners equity. It reveals how funds have been raised and used during an accounting period.

v) **Cash Flow Analysis :** It categorically provides an insight into the inflow and outflow of cash during an accounting period. It shows changes in cash balance between the two balance sheet dates.

vi) **Ratio Analysis :** It helps an investor to determine the strengths and weakness of a company by establishing the relationship between various elements of financial statements. Different ratios measures different aspects of a company's health. Four groups of ratios are as follows,

a) **Liquidity Ratios :** These measures the company's ability to fulfill its short-term obligations and reflects its short-term financial strength. The commonly used liquidity ratios are current ratio, quick ratio and super-quick ratio.

b) **Leverage Ratios :** These ratios are also known as capital structure ratios. They measure the company's ability to meets its long-term debt obligations. They throw light on long-term solvency of a company. The commonly used leverage ratios are debt-equity ratio, debt to total assets ratio, proprietary ratio, interest coverage ratio.

c) **Profitability Ratios :** The profitability of a company can be measured by the profitability ratios. These ratios are calculated by relating the profits either to sales, or to investment, or to the equity shares. Thus we have three groups of profitability ratios. The overall profitability is measured by the return on investment, which is a central measure of the earning power or operating efficiency of a company.

d) **Activity Ratios :** These are also known as turnover ratios. These ratios measure the efficiency in asset management. They express the relationship between sales and the different types of assets, showing the speed with which these assets generate sales.

A) Assessment of Risk

Company analysis involves not only an estimation of future returns but also an assessment of the variability in returns called risk. The variability in returns arises primarily because of variability in sales. The sensitivity of profits of changes in the level of sales is measured by a ratio called Degree of Total Leverage (DTL). This ratio is used as a measure of risk. It is calculated as follows,

$$\text{DTL} = \frac{\text{Contribution}}{\text{Profit Before Tax (PBT)}}$$

It may be noted that contribution means sales minus the variable cost. DTL may be subdivided into two components,

i) The Degree of Operating leverage (DOL) arising from the cost structure of the company and

ii) The Degree of Financial Leverage (DFL) arising from the capital structure of the company.

DOL measures the percentage change in EBIT for a 1% change in sales and is computed as,

$$DFL = \frac{EBIT}{PBIT}$$

The Degree of Total Leverage (DTL) is the product of DOL and DFL and measures the percentage change in PBT for a 1% change in sales.

B) Non-financial Parameters

The important non-financial parameters to be examined by an investor are as follows,

i) Top Management : The quality of top management team, particularly, the competence and the commitment of the chief executive officer matters a lot in shaping the destiny of the company.

ii) Product Range : Progressive companies like ITC and Hindustan Lever creates competition for their existing products by launching new product with regular frequency. Hence, investors must examine whether the company under review belongs to this group or not.

iii) Foreign Collaboration : When a company has entered into technical collaboration with a foreign company, the investor must find out more about the nature of the collaboration agreement.

iv) Research and Development Progressive companies spend substantial sum of money on R and D to upgrade their existing products, introduce new products, adapt foreign technology to suit the local conditions, achieve import substitution etc.

v) Governmental Regulations : The investor must assess the implication of governmental regulation such as MRTP act, FERA etc, for the company under review. The investment decision is ultimately a decision to invest in the shares of one or more specific companies. Company analysis deals with an analysis of various factors affecting the performance of companies so as to forecast the future earning of a company is also its variability better known as risk.

1.2 Technical Analysis

1.2.1 Meaning

Technical analysis is a method of evaluating securities b analyzing the statistics generated b 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.

Unlike fundamental analysts, technical analysts do not consider whether a stock is undervalued, or over valued, the only thing that matters is a security's past trading data and what information this data can provide about where the security might move in the future.

1.2.2 Dow Theory

The Dow Theory is one of the oldest and most famous technical tools. It was originated by Charles Dow, who founded the Dow Jones company and was the editor of The Wall Street,

According to Dow

"The market is always considered as having three movements, all going at the same time. The first is the narrow movement from day-to-day. The second is the short swing running from two weeks to a month or more, the third is the main movement covering at least four years in duration".

These movements are called

(a) Daily Fluctuations (Minor Trends): The minor trends have little analytical value, because of their short duration and variations in amplitude.

(b) Secondary Movements (trends): The secondary trend acts as a restraining force on the primary trend. It ends to correct deviations from its general boundaries.

(c) Primary Trends: The primary trends are the long range cycle that carries the entire market up or down (bull or bear markets).

1.2.3 Basic Principles of Technical Analysis

The basic principles on which technical analysis is based may be summarised as follows:

The basic technical assumptions are:

i) **The market Discounts Everything :** A major criticism of technical analysis so that it only considers price movement, ignoring the fundamental factors of the company. However, technical analysis assumes that, at an given time, a stock's price reflects everything that has or could affect the company-including fundamental factors.

ii) **Price Moves in Trends :** In technical analysis, price movements are believed to follow trends. This means that after a trend has been established, the future price movement s more likely to be in the same direction as the trend than to be against it. Most technical strategies are based on this assumption.

iii) **History Tends to Repeat Itself :** Another important postulate in technical analysis is that history tends to repeat itself, mainly in terms of price movement. The repetitive nature of price movements is attributed to market psychology; in other words, market participants tend to provide a consistent reaction to similar market stimuli over time. Technical analysis uses chart patterns to analyze market movements and understand trends.

The basic principles on which technical analysis is based may be summerised as follows.

1. The market value of a security is related to demand and supply factors operating in the market.
2. There are both rational and irrational factors which surround the supply and demand factors of a security.
3. Security prices behave in a manner that their movement is continuous in a particular direction for some length of time.
4. Trends in stock prices have been seen to change when there is a shift in the demand and supply factors.
5. The shifts in demand and supply can be detected through charts prepared specially to show market action.
6. Patterns which are projected by charts record price movements and these recorded patterns are used by analysts to make forecasts about the movement of prices in future.

1.3 TRENDS

Trend refers to the direction of movement. The share prices can either increase, fall or remain the flat. The three directions of share price movements are referred to as rising, falling and flat trends. The point to be remembered is that share prices do not rise or fall in a straight line. Every rise or fall in price is accompanied by a counter move. If a share price is increasing, the counter move will be a fall in price and vice versa. Share prices move in a zigzag manner.

Trend lines are straight lines drawn connecting either the tops or bottoms of the share price movements. The technical analyst should have at least two tops or bottoms to draw a trend line. The following figure shows trend lines.

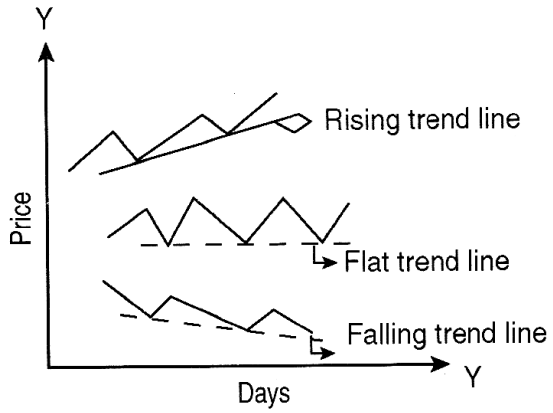


Fig.: Trend Lines

1.3.1 Primary Trend

The security price trend may be either increasing or decreasing. When the market exhibits an increasing trend, it is referred to a bull market. The bull market shows three clear-cut peaks. Each peak is higher than the previous one. The bottoms are also higher than the previous bottoms. The reactions following the peak usually halt before the previous bottoms. The phases leading to the three peaks are revival, improvement in corporate profits, and speculation. The revival period encourages more investors to buy scrips as their expectations about the future are high. In the second phase, increased corporate profits result in a further price rise. In the third phase, prices advance due to inflation and speculation.

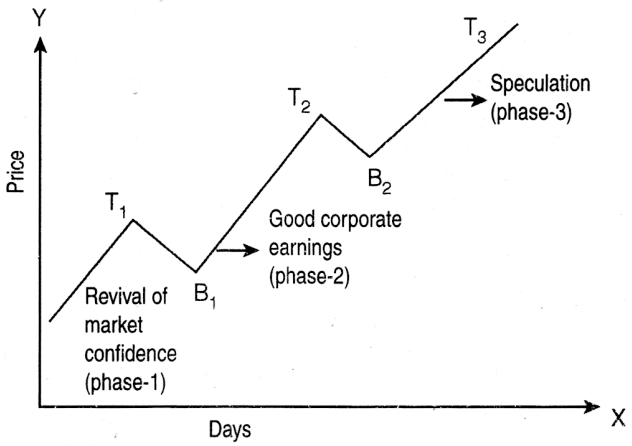


Fig.: Phases of a Bull Market

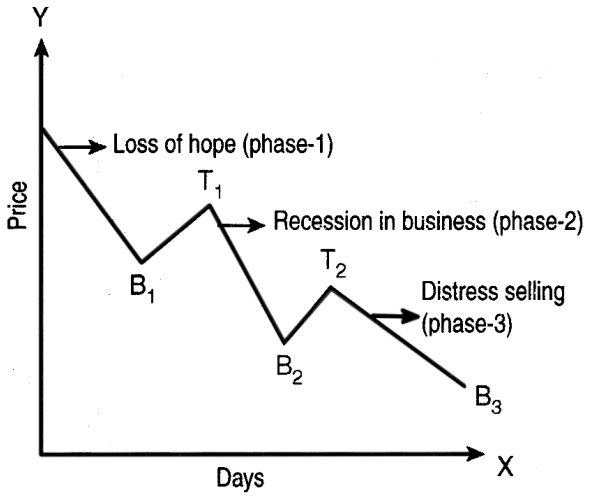


Fig.: Phases of a Bear Market

The reverse is true with the bear market. Here, the first phase of fall starts with the abandonment of hope. The chances of prices moving back to the previous high level appear to be low. This results in the sale of shares. In the second phase, companies report lower profits and dividends. This leads to selling pressure. The final phase is characterized by the distress sale of shares. During the bear phase in the Bombay Stock Exchange, more than two-thirds of the stocks were inactive. Most of the scrips were sold below their par values. Figure illustrates the three phases of a bear market. Here, the tops and bottoms are lower than the previous ones. The bull and bear phases of the Indian stock market are given in Figure.

1.3.2 Secondary Trend

The secondary or intermediate trend moves against the main trend and leads to correction. In a bull market, the secondary trend can result in the fall of about 33-66 per cent of the earlier rise. In a bear market, the secondary trend carries the price upwards and corrects the main trend. The correction would be 33-66 per cent of the earlier fall. The intermediate trend corrects the overbought and oversold positions. It provides breathing space to the market. Compared to the time taken for the primary trend, secondary trend is swift and quicker. Figure shows the secondary movement.

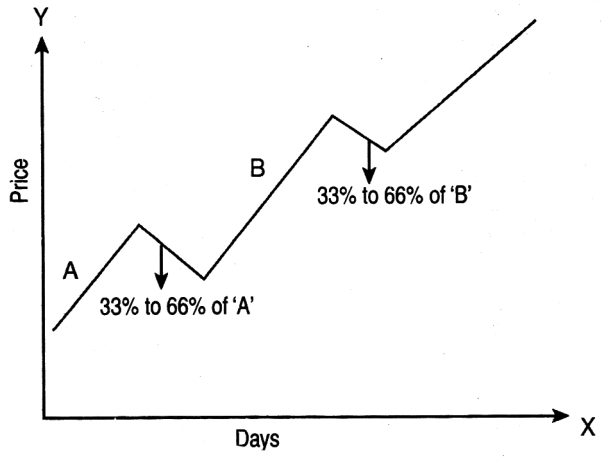


Fig.: Secondary Corrections

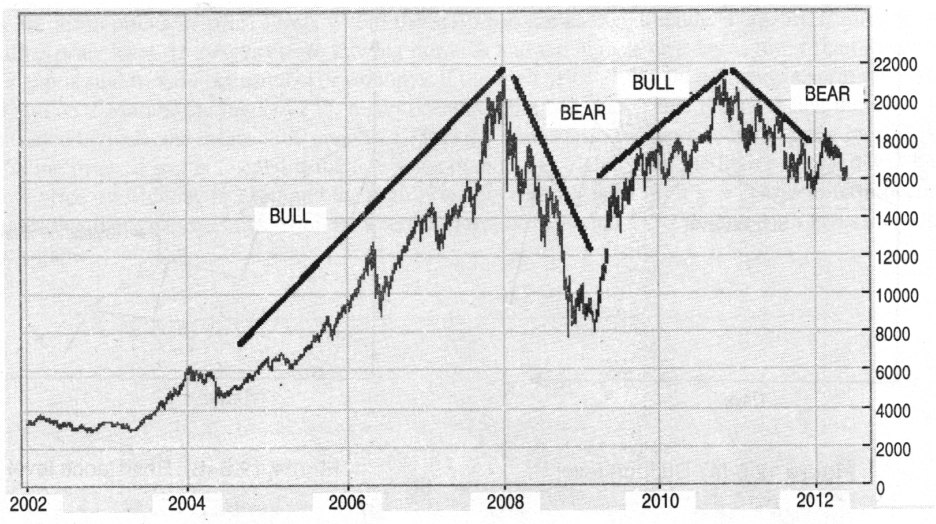


Fig.: Bull and Bear Markets - Sensex

1.3.3 Minor Trends

Minor trends or tertiary moves are the random wriggles that occur in price movements. They are simply the daily fluctuations. Minor trends try to correct the secondary trend movements. It is better for investors to concentrate on the primary or secondary trends rather than on the minor trends. The chartist plots the scrip's price or the market index each day to trace the primary and secondary trends.

1.3.4 Support and Resistance Levels

Support and resistance levels are an integral-part of technical analysis. A support level exists at a price where considerable demand for that stock is expected to prevent a further fall in the price level. The fall in the price may be halted for the time being, or it may even result in a price reversal. In the support level, demand for the scrip is expected to remain.

In the resistance level, the supply of scrip is greater than the demand and a further rise in price is prevented. The selling pressure is greater, and the increase in price is halted for the time being.

Support and resistance usually occur whenever the turnover of a large number of shares tends to be concentrated at several price levels. When the stock touches a certain level and then drops, this is called resistance, and if the stock goes down to a certain level and then rises, there exists a support. The levels constantly switch from one to the other, i.e., from support to resistance or from resistance to support. Figures (a) and (b) show the support and resistance levels.

This can be explained numerically. For example, if a scrip price hovers around ₹150 for some weeks, then it may rise and reach ₹210. At this point, the price halts and then falls back. The scrip keeps on falling back to around its original price of ₹150 and halts. Then it moves upwards. In this case, ₹150 becomes the support level. At this point, the scrip is cheap, and investors buy it. Demand makes the price move upwards. The price ₹210 becomes the resistance level, and selling pressure results in a price decline.

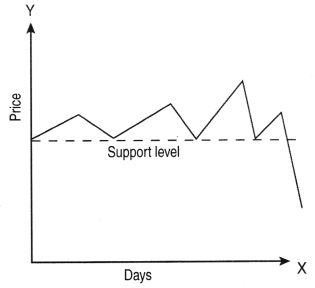


Fig.: Support Level

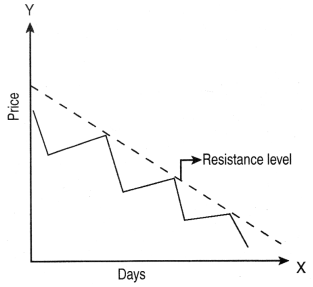


Fig.: Resistance level

If the scrip price reverses the support level and moves downward, it means that the selling pressure has overcome the potential buying pressure, signalling the possibility of a further fall in the value of the scrip. It indicates the violation of the support level and a bearish market.

If the scrip penetrates the previous top and moves above, it is a violation of the resistance level. At this point, the buying pressure would be more than the selling pressure. If the scrip moves above the double top or triple top formation, it indicates a bullish market. The support and resistance levels need not be formed only on tops or bottoms. They can be on the trend lines or gaps of the chart.

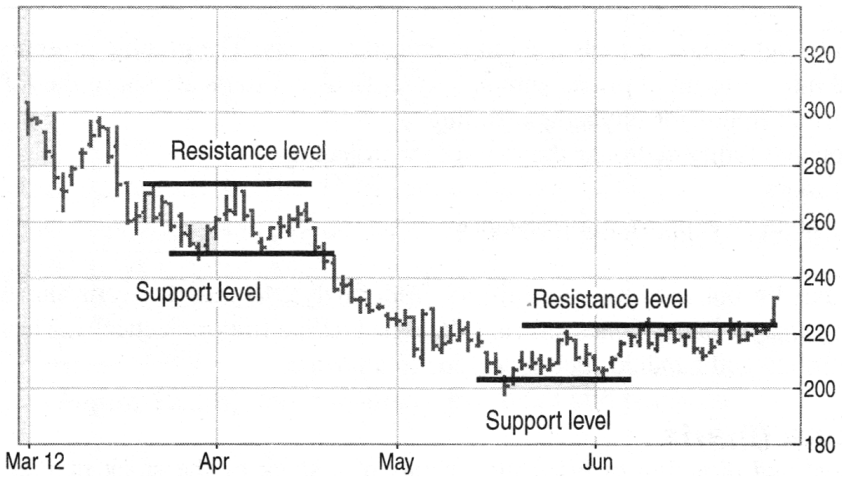


Fig.: Support and resistance levels for BHEL stock

1.3.5 GAPS

Gaps are those points or price levels where the scrip has not changed hands. They are formed in a rising or falling price level. If the prices are moving upwards and the high of any day is lower than the next day's low, a gap is said to have occurred. For example, if the high price of Instant company's scrip on 1 March is ₹200 and on 2 March, the low is ₹225, a gap occurs on the bar chart. This indicates that the stock has not been traded between the levels ₹200 and ₹225. This gap indicates a further rise in the price level. Likewise, in a falling price, a gap is formed if the low price on day 1 is higher than the high price of day 2. Suppose the low price on Monday is ₹150 and the high price on Tuesday is ₹130, a gap is said to have occurred. It indicates that there was no transaction between the level of ₹150 and ₹130. The following figure gives an illustration of such gaps.

Fig.: A bull and bear gap: Cipla Ltd

1.3.6 Trend Reversal

The rise or fall in share prices cannot go on forever. The share price movement may reverse its direction. Before the change of direction, certain patterns in price movements emerge. Violation of the trend line shows the change in the direction of the trend. Violation of the trend line means the penetration of the trend line by the scrip's price. If a scrip price cuts the rising trend line from above, it is a violation of the trend line and signals the possibility of a fall in price. Likewise, if the scrip pierces the trend line from below, it signals a rise in prices.

Trend is the direction of movement of share prices in the market. When the prices move upwards, it is a rising trend or uptrend. When the prices move downwards, we have a falling trend or downtrend. We have a flat trend when the prices move within a narrow range.

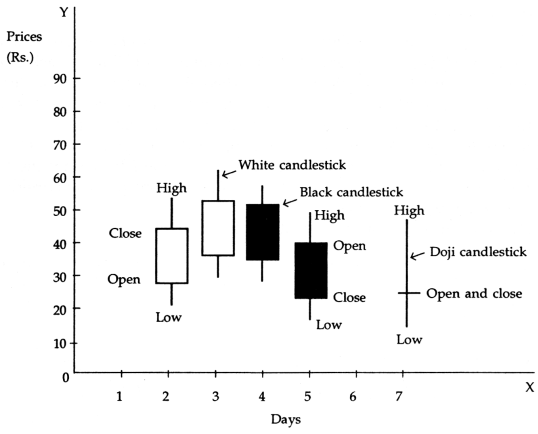


Fig.: Japanese candlesticks

Share prices seldom move in a straight line. The main trend is interrupted by short- term counter movements known as secondary reactions. The result is a zig-zag movement giving rise to alternating tops and bottoms. The formation of higher bottoms and higher tops indicates a rising trend, while the formation of lower tops and lower bottoms indicates a falling trend.

The change in the direction of trend is referred to as trend reversal. A share that exhibits a rising trend may start to move narrowly or fall after sometime. This change in the direction of movement represents a trend reversal. The reversal from a rising trend to a falling trend is marked by the formation of a lower top and a lower bottom. In the same way, the reversal from a falling trend to a rising trend is characterised by the formation of a higher bottom and a higher top.

A technical analyst tries to identify the trend reversals at an early stage so as to trade profitably in the market. When the trend reverses and begins to rise the technical analyst would recommend purchase of the share. When the trend begins to fall, sale is indicated. During a flat trend the investor should stay away from the market.

1.4 Elliot Wave Theory

There are many theories which seek to explain the behaviour of the stock market. One such theory, in technical analysis, is the Wave theory formulated by Ralph Elliot, known as the Elliot wave theory.

A wave is a movement of the market price from one change in the direction to the next change in the same direction. The waves are the result of buying and selling impulses emerging from the demand and supply pressures on the market. Depending on the demand and supply pressures, waves are generated in the prices.

According to this theory, the market moves in waves. A movement in a particular direction can be represented by five distinct waves. Of these five waves, three waves are in the direction of the movement and are termed as impulse waves. Two waves are against the direction of the movement and are termed as corrective waves or reaction waves. Waves 1, 3 and 5 are the impulse waves and waves 2 and 4 are the corrective waves. The following figure illustrates the wave theory of Elliot.

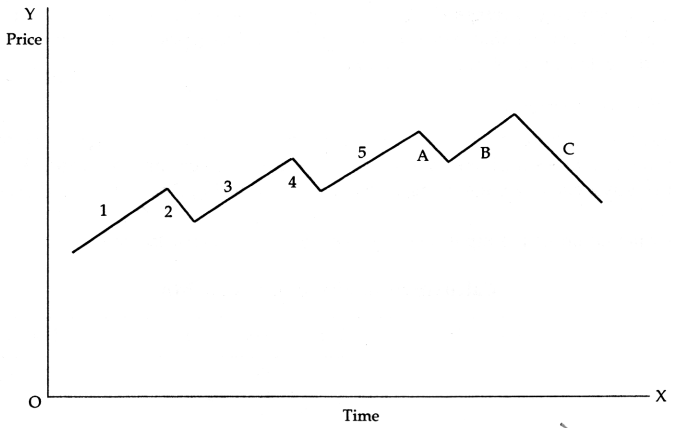


Fig.: Representation of Elliot wave theory

The wave 1 is upwards and wave 2 corrects the wave 1. Similarly, waves 3 and 5 are those with an upward impulse and wave 4 corrects wave 3.

Corrections involve correcting the earlier rise. Thus, wave 2 would correct the rise of wave 1; wave 4 would correct the rise of wave 3 and after the completion of wave 5, there would come a correction which would be labelled ABC. This correction would be in three waves in which waves A and C will be against the trend and wave B will be along the trend. This ABC correction following the fifth wave would correct the entire rise from the start of wave 1 to the end of the fifth wave. It would be greater in dimension than either the second or fourth corrective wave.

One complete cycle consists of waves made up of two distinct phases, bullish and bearish. Once the full cycle of waves is completed after the termination of the 8 wave movement, there will be a fresh cycle starting with similar impulses arising out of market trading.

The Elliot wave theory is based on the principle that action is followed by reaction. Although the wave theory is not perfect and there are many limitations in its practical use, it is accepted as one of the tools of technical analysis. The theory is used for predicting the future price changes and in deciding the timing of investment.

1.5 Mathematical Indicators

Share prices do not rise or fall in straight lines. The movements are erratic. This makes it difficult for the analyst to gauge the underlying trend. He can use the mathematical tool of moving averages to smoothen out the apparent erratic movements of share prices and highlight the underlying trend.

1.5.1 Moving Averages

Moving averages are mathematical indicators of the underlying trend of the price movement. Two types of moving averages (MA) are commonly used by analysts—the simple moving average and the exponential moving average. The closing prices of shares are generally used for the calculation of moving averages.

(a) Simple Moving Average

An average is the sum of prices of a share for a specific number of days divided by the number of days. In a simple moving average, a set of averages are calculated for a specific number of days, each average being calculated by including a new price and excluding an old price.

The calculation of a simple moving average is illustrated below:

Calculation of Five-day Simple MA

Days	Closing prices	Total of prices of 5 days	Five day MA
(1)	(2)	(3)	(4)
1	33	-	-
2	35	-	-
3	37.5	-	-
4	36	-	-
5	39	180.5	36.1
6	40	187.5	37.5
7	40.5	193.0	38.6
8	38.5	194.0	38.8
9	41	198.0	39.6
10	42	202.0	40.4
11	44	206.0	41.2
12	42.5	208.0	41.6
13	42	211.5	42.3
14	44	214.5	42.9
15	45	217.5	43.5

The first total of 180.5 in column 3 is obtained by adding the prices of the first five days, that is, (33 + 35 + 37.5 + 36 + 39). The second total of 187.5 in column 3 is obtained by adding the price of the 6th day and deleting the price of the first day from the first total, that is, (180.5 + 40 – 33). This process is continued. The moving average in column 4 is obtained by dividing the total figure in column 3 by the number of days, namely 5.

(b) Exponential Moving Average

Exponential moving average (EMA) is calculated by using the following formula:

EMA = (Current closing price – Previous EMA) × Factor + Previous EMA

where

$$\text{Factor} = \frac{2}{n+1}$$

and n = number of days for which the average is to be calculated.

The calculation of exponential moving average is illustrated below.

Calculation of Five-day EMA

Days	Closing price	EMA
1	33	33
2	35	33.66
3	37.5	34.93
4	36	35.28
5	39	36.51
6	40	37.66
7	40.5	38.60
8	38.5	38.57
9	41	39.37
10	42	40.24

Here,

$$\text{Factor} = \frac{2}{n+1} = \frac{2}{5+1} = \frac{2}{6} = 0.33$$

The EMA for the first day is taken as the closing price of that day itself. The EMA for the second day is calculated as shown below.

$$\text{EMA} = (\text{Closing price} - \text{Previous EMA}) \times \text{Factor} + \text{Previous EMA}$$

$$= (35 - 33) \times 0.33 + 33 = 33.66$$

$$\text{EMA for the third day} = (37.5 - 33.66) \times 0.33 + 33.66 = 34.93$$

If we are calculating the five day exponential moving average, the correct five day EMA will be available from the sixth day onwards.

A moving average represents the underlying trend in the share price movement. The period of the average indicates the type of trend being identified.

For example, a five day or ten day average would indicate the short-term trend; a 50 day average would indicate the medium-term trend and a 200 day average would represent the long-term trend.

The moving averages are plotted on the price charts. The curved line joining these moving averages represent the trend line. When the price of the share intersects and moves above or below this trendline, it may be taken as the first sign of trend reversal.

Sometimes, two moving averages - one short-term and the other long-term - are used in combination. In this case, trend reversal is indicated by the intersection of the two moving averages.

1.5.2 Oscillators

Oscillators are mathematical indicators calculated with the help of the closing price data. They help to identify overbought and oversold conditions and also the possibility of trend reversals. These indicators are called oscillators because they move across a reference point.

(a) Rate of Change Indicator (ROC)

It is a very popular oscillator which measures the rate of change of the current price as compared to the price a certain number of days or weeks back. To calculate a 7 day rate of change, each day's price is divided by the price which prevailed 7 days ago and then 1 is subtracted from this price ratio.

$$\text{ROC} = \frac{\text{Current price}}{\text{Price 'n' period ago}} - 1$$

The calculation of ROC is illustrated below:

Calculation of 7 Day ROC

Days	Closing price	Closing price 7 days ago	Price ratio	ROC = Ratio - 1
1	70	-	-	-
2	72	-	-	-
3	73	-	-	-
4	70	-	-	-
5	74	-	-	-
6	76	-	-	-
7	77	-	-	-
8	75	70	1.07	0.07
9	78	72	1.08	0.08
10	80	73	1.10	0.10
11	79	70	1.13	0.13
12	78	74	1.05	0.05
13	76	76	1.00	0.00
14	75	77	0.97	- 0.03
15	77	75	1.03	0.03
16	78	78	1.00	0.00
17	76	80	0.95	-0.05
18	75	79	0.95	- 0.05

The ROC values may be positive, negative or zero. An ROC chart is shown in Figure where the X axis represents the time and the Y axis represents the values of the ROC. The ROC values oscillate across the zero line. When the ROC line is above the zero line, the price is rising and when it is below the zero line, the price is falling.

Ideally, one should buy a share that is oversold and sell a share that is overbought. In the ROC chart, the overbought zone is above the zero line and the oversold zone is below the zero line. Many analysts use the zero line for identifying buying and selling opportunities. Upside crossing (from below to above the zero line) indicates a buying opportunity, while a downside crossing (from above to below the zero line) indicates a selling opportunity.

The ROC has to be used along with the price chart. The buying and selling signals indicated by the ROC should also be confirmed by the price chart.

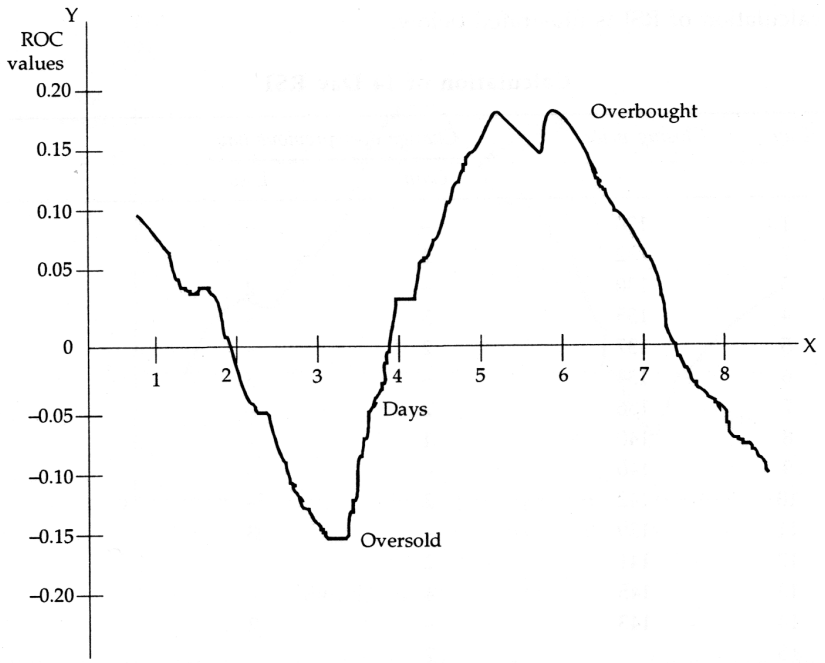


Fig.: ROC chart

(b) Relative Strength Index (RSI)

This is a powerful indicator that signals buying and selling opportunities ahead of the market. RSI for a share is calculated by using the following formula.

$$RSI = 100 - [100/(1 + RS)]$$

where

$$RS = \frac{\text{Average gain per day}}{\text{Average loss per day}}$$

The most commonly used time period for the calculation of RSI is 14 days. For the calculation a 14 day RSI, the gain per day or loss per day is arrived at by comparing the closing price of a day with that of the previous day for a period of 14 days. The gains are added up and divided by 14 to get the average gain per day. Similarly, the losses are added up and divided by 14 to get the average loss per day. The average gain per day and the average loss per day are used in the above formula for calculating the RSI for a day. In this way RSI values can be calculated for a number of days.

The calculation of RSI is illustrated below.

Calculation of 14 Day RSI

Day	Closing price	Change over previous day	
		Gain	Loss
1	130	-	-
2	132	2	-
3	130	2	-
4	135	5	-
5	137	2	-
6	134	3	-
7	136	2	-
8	140	4	-
9	140	-	-
10	142	2	-
11	139	-	3
12	141	2	-
13	145	4	-
14	143	-	2
15	145	2	-
Total		25	10
14 Day Average		$\frac{25}{14} = 1.786$	$\frac{10}{14} = 0.714$

$$RS = \frac{1.786}{0.714} = 2.50$$

$$RSI = 100 - [100/(1 + 2.50)] = 100 - (100/3.50)$$

$$= 100 - 28.58 = 71.42$$

This is the RSI for day 15. In this way the RSI values for the subsequent days can be calculated by taking the closing prices of 14 previous days. The RSI values range from 0 to 100. These values are then plotted on an XY graph as shown below in Figure.

RSI values above 70 are considered to denote overbought condition and values below 30 are considered to denote oversold condition. When the RSI has crossed the 30 line from below to above and is rising, a buying opportunity is indicated. When it has crossed the 70 line from above to below and is falling, a sell signal is indicated.

Moving Average Convergence and Divergence (MACD)

MACD is an oscillator that measures the convergence and divergence between two exponential moving averages. A short-term exponential moving average and a long-term exponential moving average are calculated with the help of the closing price data. A 12- day and 48-day exponential moving averages constitute a popular combination. The difference between the short-term EMA and the long-term EMA represents MACD.

1.6 Market Indicators

Technical analysis focuses its attention not only on individual stock price behaviour, but also on the general trend of the market. Indicators used by technical analysts to study the trend of the market as a whole are known as market indicators. Some of these indicators are discussed below.

Calculation of Breadth

Day	Advances	Declines	Daily difference	Breadth (Cumulative difference)
Monday	620	350	+ 270	+ 270
Tuesday	470	510	– 40	+ 230
Wednesday	360	610	– 250	– 20
Thursday	585	380	+ 205	+ 185
Friday	705	270	+ 435	+ 620

(a) Short Interest

A speculator often resorts to short selling which is selling a share that is not owned by the person. This is done when the speculator feels that the price of the stock will fall in future. He hopes to purchase the share at a later date (cover his short position) below the selling price and reap a profit.

The volume of short sales in the market can be used as a market indicator. As a technical indicator, short selling is called short interest. The expectation is that short sellers must eventually cover their positions. This buying activity increases the demand for stocks. Thus, short interest has significance for the market as a whole.

(b) Odd-lot Index

Small investors are presumed to buy smaller number of shares than the normal trading lot of 100 shares. These are known as odd lots and the buyers and sellers of odd lots are called odd letters. Technical analysts believe that the odd letters are inclined to do the wrong thing at critical turns in the market because of their presumed lack of sophistication.

An odd-lot index can be calculated by relating odd-lot purchases to odd-lot sales. The odd-lot index is obtained by dividing odd-lot purchases by odd-lot sales. An increase in this index suggests relatively more buying ultimates and vice versa.

(c) Mutual Fund Cash Ratio

Mutual funds represent one of the most important institutional forces in the market. Mutual fund cash as a percentage of their net assets on a daily or weekly or monthly basis has been a popular market indicator. Mutual funds keep cash to take advantage of favourable market opportunities and to provide for redemption of their units by holders. The theory is that a low cash ratio of, say about five per cent, would indicate a reasonably fully invested position leaving negligible buying power in their hands. Low cash ratios are equated with market highs indicating that the market is about to decline. At market bottoms the cash ratio would be high. This is an indication of potential purchasing power which can propel a rise in prices. Thus, high mutual fund cash ratio signals a rise in prices of shares.

1.7 Technical Analysis Vs. Fundamental Analysis

Meaning of Fundamental Analysis

In the fundamental approach an attempt is made to analyze various fundamental or basic factors that affect the risk-return of the securities. The effort here is to identify those securities that on perceives as mispriced in the stock market. The assumption in this case is that the 'market price' of security and the price is justified by its fundamental factors called 'intrinsic value' are different and their market place provides an opportunity for a discerning investor to detect such discrepancy. The moment such a description is identified, a decision to invest or disinvest is made.

Meaning of Technical Analysis

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.

Difference between Fundamental and Technical Analysis

S.No.	Basis of Difference	Fundamental Analysis	Technical Analysis
1	Nature	It perspective is long-term in nature. He is conservative in his approach. He acts on 'What should be'	It outlook is short-term oriented. He is aggressive. He acts on 'what is'
2.	Difference between current income and capital gains	It considered total gain from equity investment consists of current yield by way of dividends and long-term gains by way of capital appreciation.	It does not distinguish between current income and capital gains. He is interested in short-term profits.
3.	Base of Analysis	It forecasts stock prices on the basis of economic, industry and company statistics. The principal decision variables take the form of earnings and dividends. He makes a judgment of the stock's value with a risk-return.	It forecasts security prices by studying patterns of supply of and demand for securities. Technical analysis study of stock exchange information.
4.	Tools	It uses tools of financial analysis and statistical forecasting techniques	It uses mainly changes of financial variables besides some quantitative tools.

1.8 Efficient Market Theory

The basic assumption in technical analysis is that stock price movement is quite orderly and not random. The new theory questions this assumption. From the results of several empirical studies on stock price movements, the advocates of the new theory assert that share price movements are random. The new theory came to be known as **Random Walk** theory because of its principal contention that share price movements represent a random walk rather than an orderly movement.

1.8.1 Random Walk Theory

Stock price behaviour is explained by the theory in the following manner. A change occurs in the price of a stock only because of certain changes in the economy, industry or company. Information about these changes alters the stock prices immediately and the stock moves to a new level, either upwards or downwards, depending on the type of information. This rapid shift to a new equilibrium level whenever new information is received, is a recognition of the fact that all information which is known is fully reflected in the price of the stock. Further change in the price of the stock will occur only as a result of some other new piece of information which was not available earlier. Thus, according to this theory, changes in stock prices show independent behaviour and are dependent on the new pieces of information that are received but within themselves are independent of each other. Each price change is independent of other price changes because each change is caused by a new piece of information.

The random walk theory presupposes that the stock markets are so efficient and competitive that there is immediate price adjustment. This is the result of good communication system through which information can be spread almost anywhere in the country instantaneously. Thus, the random walk theory is based on the hypothesis that the stock markets are efficient. Hence, this theory later came to be known as the efficient market hypothesis (EMH) or the efficient market model.

1.8.2 The Efficient Market Hypothesis [EMH]

Introduction

An efficient market hypothesis is one in which security prices adjust rapidly to the arrival of new information and, therefore, the current prices of securities reflect all information about the security. You need to understand the meaning of the terms efficient capital market and efficient market hypothesis because of its importance and controversy associated with it.

This hypothesis states that the capital market is efficient in processing information. An efficient capital market is one in which security prices equal their intrinsic values at all times, and where most securities are correctly priced. The concept of an efficient capital market has been one of the dominant themes in academic literature since the 1960s.

According to Elton and Gruber, "when someone refers to efficient capital markets, they mean that security prices fully reflect all available information".

According to Eugene Fama, in an efficient market, prices fully reflect all available information.

The prices of securities observed at any time are based on correct evaluation of all information available at that time.

The efficient market model is actually concerned with the speed with which information is incorporated into security prices. The technicians believe that past price sequence contains information about the future price movements because they believe that information is slowly incorporated in security prices. This gives technicians an opportunity to earn excess returns by studying the patterns in price movements and trading accordingly.

The efficient market theory holds the view that in an efficient market, new information is processed and evaluated as it arrives and prices instantaneously adjust to new and correct levels. Consequently, an investor cannot consistently earn excess returns by undertaking fundamental analysis or technical analysis.

Why Should Capital Market be Efficient

As noted earlier, in an efficient capital market, security prices adjust rapidly to the infusion of new information, and therefore currency security prices fully reflect all available information. To be absolutely correct, this is referred to as an informationally efficient market. Although the idea of an efficient capital market is relatively straightforward, we often fail to consider why capital markets should be efficient. What set of assumptions imply an efficient capital market?

1. An initial and important premise of an efficient market requires that a large number of profit maximizing participants analyze and value securities, each independently of the others.
2. A second assumption is that new information regarding securities comes to the market in a random fashion, and timing of one announcement is generally independent of others.
3. The third assumption is especially crucial: profit maximizing investors adjust security pries rapidly to reflect the effect of new information.

1.8.3 Forms of Market Efficiency

The capital market is considered to be efficient in three different forms: the **weak form, semi-strong form** and the **strong form**. Thus, the efficient market hypothesis has been subdivided into three forms, each dealing with a different type of information. The weak form deals with the information regarding the past sequence of security price movements, the semi-strong form deals with the publicly available information, while the strong form deals with all information, both public and private (or inside).

The tests of the weak form hypothesis are essentially tests of whether all information contained in historical prices of securities is fully reflected in current prices. Semi-strong form tests of the efficient market hypothesis are tests of whether publicly available information is fully reflected in current stock prices. Finally, strong form tests of the efficient market hypothesis are tests of whether all information, both public and private (or inside), is fully reflected in security prices and whether any type of investor is able to earn excess returns.

Types of different efficient market hypothesis are as follows in briefly;

1. Weak-form EMH

The weak form EMH assumes that current stock prices full reflect all security market information, including

- Historical sequence of prices
- Rates of Return
- Trading volume data
- Other market generated informations.

This hypotheses implies that past rates of return and other historical market data should have no relationship with future rates of return (that is, rates of return should be independent).

2. Semi Strong-form EMH

The semi strong-form asserts that security prices adjust rapidly to the release of all public information, that is, current security prices full reflect all public information. The semi strong-form hypotheses encompasses the weak form hypotheses because a the market information considered by the weak form hypotheses such as stock prices, rate of return and trading volume, is public information. Public information also includes all non market information such as:

- Earnings and dividend announcements
- P/E ratio
- Dividend payout ratio
- News about the economy
- Political news.

3. The Strong-form EMH

The strong form EMH contends that stock prices full reflect all information from public and private sources. The strong form EMH extends both the weak form and the semi-strong form EMH.

1.8.4 Tests of Efficient Market Hypothesis

The weak form of the efficient market hypothesis (EMH) says that the current prices of stocks already fully reflect all the information that is contained in the historical sequence of prices. The new price movements are completely random. They are produced by new pieces of information and are not related or dependent on past price movements. Therefore, there is no benefit in studying the historical sequence of prices to gain abnormal returns from trading in securities. This implies that technical analysis, which relies on charts of price movements in the past, is not a meaningful analysis for making abnormal trading profits.

(a) Serial Correlation Test

Since the weak form EMH postulates independence between successive price changes, such independence or randomness in stock price movements can be tested by calculating the correlation between price changes in one period and changes for the same stock in another period. The correlation coefficient can take on a value ranging from -1 to 1; a positive number indicates a direct relation, a negative value implies an inverse relationship and a value close to zero implies no relationship. Thus, if correlation coefficient is close to zero, the price changes can be considered to be serially independent.

(b) Run Test

The run test is another test used to test the randomness in stock price movements. In this test, the absolute values of price changes are ignored, only the direction of change is considered. An increase in price is represented by + sign. The decrease is represented by - sign. When there is no change in prices, it is represented by '0'. A consecutive sequence of the same sign is considered as a run.

If no significant differences are found, then the security price changes are considered to be random in nature.

(c) Filter Tests

If stock price changes are random in nature, it would be extremely difficult to develop successful mechanical trading systems. Filter tests have been developed as direct tests of specific mechanical trading strategies to examine their validity and usefulness.

It is often believed that, as long as no new information enters the market, the price fluctuates randomly within two barriers - one lower, and the other higher - around the fair price. When new information comes into the market, a new equilibrium price will be determined. If the news is favourable, then the price should move up to a new equilibrium above the old price. Investors will know that this is occurring when the price breaks through the old barrier. If investors purchase at this point, they will benefit from the price increase to the new equilibrium level.

The filter rule is usually stated in the following way: Purchase the stock when it rises by *x* per cent from the previous low and sell it when it declines by *x* per cent from the subsequent high. The filters may range from 1 per cent to 50 per cent or more. The alternative to this active trading strategy is the passive buy and hold strategy.

(d) Distribution Pattern

It is a rule of statistics that the distribution of random occurrences will conform to a normal distribution. Then, if price changes are random, their distribution should also be approximately normal. Therefore, the distribution of price changes can be studied to test the randomness or otherwise of stock price movements.

1.8.4.1 Empirical Tests of Semi-strong Form Efficiency

The semi-strong form of the efficient market hypothesis says that current prices of stocks not only reflect all informational content of historical prices, but also reflect all publicly available information about the company being studied. Examples of publicly available information are-corporate annual reports, company announcements, press releases, announcements of forthcoming dividends, stock splits, etc. The semi-strong hypothesis.

The model used for estimating expected returns is the following:

$$\mathbf{R_i = a_i + b_j R_m + e_i}$$

where

R_1 = Return on security i

R_m = Return on a market index

a_i and b_i = Constants

e_i = Random error

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

Major studies on the impact of capitalisation issues such as stock splits and stock dividends have been conducted in the United States by Fama, Fisher, Jensen and Roll and Johnson, in Canada by Finn, and in the United Kingdom by Firth. All these studies found that the market adjusted share prices instantaneously and accurately for the new information. Both Pettit and Watts have investigated the market's reaction to dividend announcements. They both found that all the price adjustment was over immediately after the announcement and thus, the market had acted quickly in evaluating the information.

Other items of information whose impact on share prices have been tested include announcements of purchase and sale of large blocks of shares of a company, takeovers, annual earnings of companies, quarterly earnings, accounting procedure changes, and earnings estimates made by company officials. All these studies which made use of the Residual analysis approach, showed the market to be relatively efficient.

Ball and Brown tested the stock market's ability to absorb the informational content of reported annual earnings per share information. They found that companies with good earnings report experienced price increase in stock, while companies with bad earnings.

1.8.4.2 Tests of Strong Form Efficiency

The strong form hypothesis represents the extreme case of market efficiency. The strong form of the efficient market hypothesis maintains that the current security prices reflect all information both publicly available information as well as private or inside information. This implies that no information, whether public or inside, can be used to earn superior returns consistently.

The directors of companies and other persons occupying senior management positions within companies have access to much information that is not available to the general public. This is known as inside information. Mutual funds and other professional analysts who have large research facilities may gather much private information regarding different stocks on their own. These are private information not available to the investing public at large.

The strong form efficiency tests involve two types of tests. The first type of tests attempt to find whether those who have access to inside information have been able to utilise profitably such inside information to earn excess returns. The second type of tests examine the performance of mutual funds and the recommendations of investment analysts to see if these have succeeded in achieving superior returns with the use of private information generated by them.

The results of research on strong form EMH may be summarised as follows:

1. Inside information can be used to earn above average returns.
2. Mutual funds and investment analysts have not been able to earn superior returns by using their private information.

Short Question & Answers

1. Economy Analysis

Ans :

In actual practice, you must have noticed that investment decisions of individuals and the institutions made in the economy setup of a particular country. It becomes essential, therefore, to understand the star economy of that country at the macro level. The analysis of the state of the economy at the macro level 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.

Macro Economic Analysis

The analysis of the following factors indicates the trends in macro economic changes that effect the risk and return on investment:

(i) Growth Rate of Gross Domestic Product : The gross domestic product is a measure of the total production of final goods and services in the economy during a specified period usually a year. The growth rate of GDP is the most important indicator of the performance of the economy. The higher the growth rate of GDP, other things being equal. It is more favourable it is for the stock market.

(ii) Industrial Growth Rate : The GDP growth rate represents the average of the growth rates of the **three principal** sectors of the economy, viz. the **services sector, the industry sector, and the agricultural sector.**

Publicly listed companies play a major role in the industrial sector but only a minor role in the service sector and the agricultural sector. Hence, stock market analyst focus more on the industrial sector. They look at the overall industrial growth rate as well as the growth rates of different industries.

The higher the growth rate of the industrial sector, other things being equal, it is more favourable for the stock market.

(iii) Monsoons : Agriculture accounts for about a quarter of the Indian economy and has important linkages, direct and indirect, with industry. Hence, the increase or decrease of agricultural production has a significant bearing in

industrial production and corporate performance. Companies using agricultural raw materials as inputs or supplying inputs to agriculture are directly affected by the changes in agricultural production. Other companies also tend to be affected due to indirect linkages.

A spell of good and monsoons imparts dynamism to the industrial sector and buoyancy to the stock market. Likewise, a streak of bad monsoons casts its shadow over the industrial sector and the stock market.

2. Classification of Industries

Ans :

i) **Growth Industry :** This is an industry that is expected to grow consistently and its growth may exceed the average growth of the economy.

ii) **Cyclical Industry :** In this category of the industry, the firms included are those that move closely with the rate of industrial growth of the economy and fluctuate cyclically as the economy fluctuates.

iii) **Defensive Industry :** It is a grouping that includes firms, which move steadily with the economy and less than the average decline of the economy in a cyclical downturn.

3. Industry Life Cycle

Ans :

This industry life cycle theory is generally attributed to Julius Grodinsky According to the industry life cycle theory, 'the life of an industry can be segregated into the pioneering stage, the expansion stage, the stagnation stage, and the decay stage'. This kind of segregation is extremely useful to an investor because the profitability of an industry depends upon its stage of growth. In fact, each development stage is unique and exhibits different characteristics.

Technological advances in one industry can effect the growth of another industry. The jute industry began to decline when alternate and cheaper packing materials came into use. The popularity of synthetic textiles can adversely affect the demand for cotton textiles, and vice versa.

The stages can be identified as follows :

i) **Pioneering Stage :** This stage is characterized by introduction of a new product, and an up trend in business cycle that encourages new product introductions. Demand keeps on growing at an increasing rate. Competition is generated by the entry of new firms to grab the market opportunities. Weaker firms face premature death while stronger one survives to grow and expand.

ii) **Expansion Stage :** This is characterized by the hectic activity of firms surviving the pioneering stage. The market continues to grow but slowly, offering steady and slow growth in sales of the industry. It is a phase of consolidation wherein companies establish durable policies relating to dividends and investments.

iii) **Stabilization Stage :** This is the third stage in the industry life cycle. In this stage, the growth of the industry stabilises. The ability of the industry to grow appears to have been lost. Sales may be increasing but at a slower rate than that experienced by competitive industries or by the overall economy. The industry begins to stagnate. The transition of the industry from the expansion stage to the stagnation stage is often very slow. Two important reasons for this transition are change in social habits and development of improved technology.

iv) **Decay Stage :** An industry reaches this stage when it fails to detect the death signal and implement- pro-actively or reactively-appropriate strategies. Obsolescence manifests itself, effecting a decline in sales, profit, dividends and share prices.

4. Demand Supply Gap

Ans :

The demand for a product usually tends to change at a steady rate, whereas the capacity to produce the product tends to change at irregular intervals, depending upon the installation of additional production capacity. As a result, an industry is likely to experience under- supply and over-supply of capacity at different times. Excess supply reduces the profitability of the industry through a decline in the unit price realisation. On the contrary, insufficient supply tends to improve the profitability through higher unit price realisation". Therefore, the gap between demand and supply in an industry is a fairly good indicator of its short- term or medium-term prospects. As part of industry analysis, an investor should estimate the demand supply gap in the industry.

Competitive Conditions in the Industry

Another significant factor to be considered in industry analysis is the competitive conditions in the industry. The level of competition among various companies in an industry is determined by certain competitive forces. These competitive forces are: (a) barriers to entry, (b) the threat of substitution, (c) bargaining power of the buyers, bargaining power of the suppliers and the rivalry among competitors.

Permanence

In this age of rapid technological change, the degree of permanence of an industry is an important consideration in industry analysis. Permanence is a phenomenon related to the products and the technology used by the industry. If an analyst feels that the need for a particular industry will vanish in a short period, or that the rapid technological changes would render the products obsolete within a short time, it would be foolish to invest in such an industry.

Labour Conditions

The state of labour conditions in the industry under analysis is an important consideration in an economy such as ours where the labour unions are very powerful. If the labour in a particular industry is rebellious and is inclined to resort to strikes frequently, the prospects of that industry cannot become bright.

Attitude of Government

The attitude of the government towards an industry has a significant impact on its prospects. The government may encourage the growth of certain industries and can assist such industries through favourable legislation.

5. Company Analysis

Ans :

It is the final stage of fundamental analysis. The economy analysis provides the investor a broad outline of the prospects of growth in the economy. The industry analysis helps in investor to select the industry in which investment would be rewarding. Now he has to decide the company in which he should invest his money. Company analysis provides the answer to this question.

Company analysis deals with the estimates return and risk of individual shares. This calls for information regarding companies which can be broadly classified into two broad groups, internal and external sagregate. Internal information consists of data and events made public by companies concerning their operations.

The internal information sources include annual reports to shareholders, public and private statements of officers of the company, the company's financial statements, etc. External sources of information are those generated independently outside the company. These are prepared by investment services and the financial press.

6. Analysis of Financial Statements

Ans :

(i) Comparative Financial Statements : In the comparative statement, balance sheet figures are provided for more than one year. The comparative financial statement provides time perspective to the balance sheet figures. The annual data are compared with similar data of previous years, either in absolute terms of in percentages.

(ii) Trend Analysis : Here percentages are calculated with a base year. This would provide insight into growth or decline of the sale or profit over the years. Here in, the investor has to look into the cost and management efficiency of the company by examining the trends prevailing.

(iii) Common Size Statement : Common size balance sheet shows the percentage of each asset item to the total assets and each liability item to the total liabilities. Similarly, a common size income statement shows each item of expense as a percentage of net sales. With common size statements comparison can be made between two different size firms belonging to the same industry.

(iv) Funds Flow Analysis : This statement provides an insight into the movement of funds and helps in understanding the changes in the structure of assets, liabilities and owners equity. It reveals how funds have been raised and used during an accounting period.

(v) Cash Flow Analysis : It categorically provides an insight into the inflow and outflow of cash during an accounting period. It shows changes in cash balance between the two balance sheet dates.

7. Non-financial Parameters

Ans :

(i) Top Management : The quality of top management team, particularly, the competence and the commitment of the chief executive officer matters a lot in shaping the destiny of the company.

(ii) Product Range : Progressive companies like ITC and Hindustan Lever creates competition for their existing products by launching new product with regular frequency. Hence, investors must examine whether the company under review belongs to this group or not.

(iii) Foreign Collaboration : When a company has entered into technical collaboration with a foreign company, the investor must find out more about the nature of the collaboration agreement.

(iv) Research and Development Progressive companies spend substantial sum of money on R and D to upgrade their existing products, introduce new products, adapt foreign technology to suit the local conditions, achieve import substitution etc.

8. Dow Theory

Ans :

The Dow Theory is one of the oldest and most famous technical tools. It was originated by Charles Dow, who founded the Dow Jones company and was the editor of The Wall Street,

According to Dow

"The market is always considered as having three movements, all going at the same time. The first is the narrow movement from day-to-day. The second is the short swing running from two weeks to a month or more, the third is the main movement covering at least four years in duration".

These movements are called

(a) Daily Fluctuations (Minor Trends): The minor trends have little analytical value, because of their short duration and variations in amplitude.

(b) Secondary Movements (trends): The secondary trend acts as a restraining force on the primary trend. It ends to correct deviations from its general boundaries.

(c) Primary Trends: The primary trends are the long range cycle that carries the entire market up or down (bull or bear markets).

9. Fundamental and Technical Analysis

Ans :

S.No.	Basis of Difference	Fundamental Analysis	Technical Analysis
1	Nature	It perspective is long-term in nature. He is conservative in his approach. He acts on 'What should be'	It outlook is short-term oriented. He is aggressive. He acts on 'what is'
2.	Difference between current income and capital gains	It considered total gain from equity investment consists of current yield by way of dividends and long-term gains by way of capital appreciation.	It does not distinguish between current income and capital gains. He is interested in short-term profits.
3.	Base of Analysis	It forecasts stock prices on the basis of economic, industry and company statistics. The principal decision variables take the form of earnings and dividends. He makes a judgment of the stock's value with a risk-return.	It forecasts security prices by studying patterns of supply of and demand for securities. Technical analysis study of stock exchange information.

10. Efficient Market Theory

Ans :

The basic assumption in technical analysis is that stock price movement is quite orderly and not random. The new theory questions this assumption. From the results of several empirical studies on stock price movements, the advocates of the new theory assert that share price movements are random. The new theory came to be known as **Random Walk** theory because of its principal contention that share price movements represent a random walk rather than an orderly movement.

11. Random Walk Theory

Ans :

Stock price behaviour is explained by the theory in the following manner. A change occurs in the price of a stock only because of certain changes in the economy, industry or company. Information about these changes alters the stock prices immediately and the stock moves to a new level, either upwards or downwards, depending on the type of information. This rapid shift to a new equilibrium level whenever new information is received, is a recognition of the fact that all information which is known is fully reflected in the price of the stock. Further change in the price of the stock will occur only as a result of some other new piece of information which was not available earlier. Thus, according to this theory, changes in stock prices show independent behaviour and are dependent on the new pieces of information that are received but within themselves are independent of each other. Each price change is independent of other price changes because each change is caused by a new piece of information.

The random walk theory presupposes that the stock markets are so efficient and competitive that there is immediate price adjustment. This is the result of good communication system through which information can be spread almost anywhere in the country instantaneously. Thus, the random walk theory is based on the hypothesis that the stock markets are efficient. Hence, this theory later came to be known as the efficient market hypothesis (EMH) or the efficient market model.

12. Efficient Market Hypothesis

Ans :

This hypothesis states that the capital market is efficient in processing information. An efficient capital market is one in which security prices equal their intrinsic values at all times, and where most securities are correctly priced. The concept of an efficient capital market has been one of the dominant themes in academic literature since the 1960s.

According to Elton and Gruber, "when someone refers to efficient capital markets, they mean that security prices fully reflect all available information".

According to Eugene Fama, in an efficient market, prices fully reflect all available information.

The prices of securities observed at any time are based on correct evaluation of all information available at that time.

Choose the Correct Answer

1. If intrinsic value is greater than market price it indicates _____ [c]

   (a) no action (b) sell the security

   (c) buy the security (d) None

2. _____ is generally described as a homogenous group of companies [a]

   (a) Industry (b) company

   (c) organisation (d) production

3. After formulating the investment policy, securities are scrutinized through [d]

   a) Market analysis b) Industry analysis

   c) Company analysis d) All of the above

4. The industries which are more volatile and do well when economy prospers and during depression they suffer a setback are considered as [b]

   a) Growth b) Cyclical

   c) Defensive d) Vertical

5. Which form of EMH is also known as random walk model [a]

   a) Weak form b) Semistrong form

   c) Strong form d) Hard form

6. Anomalies of efficient market hypothesis are [d]

   a) Weekend effect b) January effect

   c) Small firm effect d) All of the above

7. _____ are the mathematical indicators of the underyling trend of the price moment [a]

   (a) moving averages (b) oscillators

   (c) both (d) none of the aboved

8. EMH is classified into _____ types [c]

(a) 2 (b) 5

(c) 3 (d) 4

9. _____ EMH contents that stock prices full reflect all information from public and private sources [a]

(a) strong form (b) semi strong form

(c) weak form (d) all of the above

10. _____ is the direction of movement of share prices in the market [a]

(a) trend (b) gaps

(c) both (d) none of the above

Fill in the blanks

1. _____ are a part of our economic life.
2. The price prevailing in market is called _____.
3. The GDP growth rate represents the average of the growth rates of the _____ sectors of the economy.
4. An _____ is generally described as a homogenous group of companies.
5. _____ deals with the estimates return and risk of individual shares.
6. _____ shows the percentage of each asset item to the total assets and each liability item to the total liabilities.
7. _____ measures the company's ability to fulfill its short-term obligations.
8. _____ is a method of evaluating securities b analyzing the statistics generated b market activity, such as past prices and volume.
9. _____ refers to the direction of movement.
10. _____ are those points or price levels where the scrip has not changed hands.
11. _____ are mathematical indicators calculated with the help of the closing price data.

ANSWERS

1. Investment decisions
2. "market price"
3. three principal
4. industry
5. Company analysis
6. Common size balance sheet
7. Liquidity Ratios
8. Technical analysis
9. Trend
10. GAPS
11. Oscillators

UNIT II

Share Valuation: Concept of Present Value – Share Valuation Model – One Year Holding Period – Multiple Year Holding Period – Constant Growth Model – Multiple Growth Model – Multiplier Approach to Share Valuation.

Bond Valuation: Bond Returns – Coupon Rate – Current Yield – Spot Interest Rate – Yield to Maturity – Yield to Call – Bond Prices – Bond Risks – Bond Duration.

2.1 SHARE VALUATION

Meaning

The market price of a share and its intrinsic value are thus the two basic inputs necessary for the investment decision. Market price of a share is available from the quotations of stock exchanges. The intrinsic value is estimated through the process of stock or share valuation.

2.1.1 Concept of Present Value

The present value concept is a fundamental concept used in the share valuation procedure. An understanding of this concept is necessary for studying the share valuation process.

Money has a 'time value'. This implies that a rupee received now is worth more than a rupee to be received after one year, because the rupee received now can be deposited in a bank at 10 per cent interest rate to receive Rs. 1.10 after one year. The time value of money suggests that earlier receipts are more desirable than later receipts, because earlier receipts can be reinvested to generate additional returns before the later receipts come in.

If an amount P is invested now for n years at r rate of interest, the future value F to be received after n years can be calculated using the compound interest formula.

$$F = P(1 + r)^n$$

Problem

An investor Rs. 1000 is invested in a bank for three years at 10 per cent interest, what was the amount to be received after the three year period?

$$F = P(1+r)^n$$

$$F = 1000(1.1)^3 = \text{Rs. } 1331$$

Where as P = Principal amount

r = rate of interest

n =

Note

The future value of a present sum can be calculated by the compounding process. Similarly, the present value of a sum to be received in future can be calculated by a reverse process known as discounting.

2.1.2 Share Valuation Model

The valuation model used to estimate the intrinsic value of a share is the present value model. The intrinsic value of a share is the present value of all future amounts to be received in respect of the ownership of that share, computed at an appropriate discount rate.

The major receipts that come from the ownership of a share are the annual dividends and the sale proceeds of the share at the end of the holding period. These are to be discounted to find their present value, using a discount rate that is the rate of return required by the investor, taking into consideration the risk involved and the investor's other investment opportunities. Thus, the intrinsic value of a share is the present value of all the future benefits expected to be received from that share.

2.1.3 One Year Holding Period

It is easy to start share valuation with one year holding period assumption. Here an investor intends to purchase a share now, hold it for one year and sell it off at the end of one year. In this case, the investor would be expected to receive an amount of dividend as well as the selling price after one year. The present value of the share may be expressed as:

$$S_0 = \frac{D_1}{(1+k)^1} + \frac{S_1}{(1+k)^1}$$

where

S_0 = Present value of the share

D_1 = Amount of dividend expected to be received at the end of one year.

S_1 = Selling price expected to be realised on sale of the share at the end of one year.

k = Rate of return required by the investor.

Problem

An investor expects to get Rs. 3.50 as dividend from a share next year and hopes to sell it off the share at Rs. 45 after holding it for one year, and if his required rate of return is 25 per cent, What is the present value?

Solution :

$$S_0 = \frac{3.50}{(1.25)^1} + \frac{45}{(1.25)^1} = \text{Rs. } 2.80 + \text{Rs. } 36 = \text{Rs. } 38.80$$

This is the intrinsic value of the share. The investor would buy this share only if its current market price is lower than this value.

2.1.4 Multiple Year Holding Period

An investor may hold a share for a certain number of years and sell it off at the end of his holding period. In this case, he would receive annual dividends each year and the sale price of the share at the end of the holding period. The present value of the share may be expressed as:

$$S_0 = \frac{D_1}{(1+k)^1} + \frac{D_2}{(1+k)^2} + \frac{D_3}{(1+k)^3} + ... + \frac{D_n + S_n}{(1+k)^n}$$

where

$D_1, D_2, D_3, ..., D_n$ = Annual dividends to be received each year.

S_n = Sale price at the end of the holding price.

k = Investor's required rate of return.

n = Holding period in years.

Problem 1

An investor expects to get Rs. 3.50, Rs. 4 and Rs. 4.50 as dividend from a share during the next three years and hopes to sell it off at Rs. 75 at the end of the third year, and if his required rate of return is 25 per cent, What is the present value of this share?

Solution :

$$S_0 = \frac{3.50}{(1.25)^1} + \frac{4.00}{(1.25)^2} + \frac{4.50}{(1.25)^3} + \frac{75}{(1.25)^3}$$

$$= 2.80 + 2.56 + 2.30 + 38.40 = \text{Rs. } 46.06$$

Different assumptions about the growth rate patterns can be made and incorporated into the valuation models. Two assumptions that are commonly used are:

1. Dividends grow at a constant rate in future, i.e. the constant growth assumption.
2. Dividends grow at varying rates in future, i.e. multiple growth assumption.

These two assumptions give rise to two modified versions of the present value model of share valuation:

(a) Constant growth model, and

(b) Multiple growth model.

2.1.5 Constant Growth Model

In this model it is assumed that dividends will grow at the same rate (g) into the indefinite future and that the discount rate (k) is greater than the dividend growth rate (g). By applying the growth rate (g) to the current dividend (D_0), the dividend expected to be received after one year (D_1) can be calculated as:

$$D_1 = D_0(1 + g)^1$$

The dividend expected to be received after two years, three years, etc. can also be calculated from the current dividend as:

$$D_2 = D_0(1 + g)^2$$

$$D_3 = D_0(1 + g)^3$$

$$D_n = D_0(1 + g)^n$$

The present value model for share valuation may now be written as :

$$S_0 = \frac{D_0(1+g)^1}{(1+k)^1} + \frac{D_0(1+g)^2}{(1+k)^2} + ... + \frac{D_0(1+g)^n}{(1+k)^n}$$

When 'n' approaches infinity, this formula can be simplified as :

$$S_0 = \frac{D_1}{k-g} \text{ or } \frac{D_0(1+g)}{k-g}$$

Thus, according to this model, the intrinsic value of a share is equal to next year's expected dividend divided by the difference between the appropriate discount rate for the stock and its expected dividend growth rate.

The constant growth model is also known as Gordon's share valuation model.

Problem 2

The company ABC's next year dividend per share is expected to be ₹3.50. The dividend in subsequent years is expected to grow at a rate of 10 per cent per year. If the required rate of return is 15 per cent per year, what should be its price. If the prevailing market price is ₹75.

Solution :

$$P_0 = \frac{D_1}{r - g}$$

$$D_1 = 3.50$$

$$r = 0.15$$

$$g = 0.10$$

$$= \frac{3.5}{0.05} = ₹70$$

The investor would be willing to pay ₹70 for the share. Since the theoretical price is less than the market price, the investor is advised not to buy.

Problem 3

Anil estimates that from investment on stock A, he would get 15 per cent dividend in the coming year. It would continue to grow by 10 per cent for the rest of the years. The selling price is ₹40. He needs a return of 20 per cent per year for his son's educational expenses. Can he invest on stock A?

Solution :

$$r = \frac{D_1}{P} + g$$

$$r = \frac{0.15}{40} + 0.10$$

$$= 0.00375 + 0.1$$

$$r = 0.10375$$

$$r = 0.10375 \times 100$$

$$r = 10.37\%$$

The rate of return from the investment on stock A would be only 10.37 per cent. Since Anil needs 20 per cent return, he should not invest in this stock. He should look for an alternative investment.

2.1.6 Multiple Growth Model

The constant growth assumption may not be realistic in many situations. The growth in dividends may be at varying rates. A typical situation for many companies may be that a period of extraordinary growth (either good or bad) will prevail for a certain number of years, after which growth will change to a level at which it is expected to continue indefinitely. This situation can be represented by a two-stage growth model.

In this 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. During the initial period growth rates will be variable from year to year, while during the subsequent period the growth rate will remain constant from year to year. The investor has to forecast the time N upto which growth rates would be variable and after which the growth rate would be constant.

The intrinsic value of the share is then the sum of the present values of two dividend flows: (a) the flow from period 1 to N which we will call V_1 and (b) the flow from period N + 1 to infinity, referred to as V_2. This means,

$$S_0 = V_1 + V_2$$

The multiple year holding period valuation model may be used for this first phase, using the dividend forecasts developed for each of the years in the first phase. Then

$$V_1 = \frac{D_1}{(1+k)^1} = \frac{D_2}{(1+k)^2} + ... + \frac{D_N}{(1+k)^N}$$

This may be summarised as:

$$V_1 = \sum_{t=1}^{N} \frac{D_t}{(1+k)^t}$$

The second phase dividends would be:

$$D_{N+1} = D_N(1+g)^1$$
$$D_{N+2} = D_N(1+g)^2$$
$$D_{N+3} = D_N(1+g)^3$$

and so on to infinity.

The present value of the second phase stream of dividends from period N + 1 to infinity can be calculated using Gordon share valuation model as:

$$\frac{D_N(1+g)}{k-g}$$

It may be noted that this value is the present value at time N of all future expected dividends from time period N + 1 to infinity. When this value has to be viewed at time 'zero', it must be discounted to provide the present value at 'zero' time for the second phase dividend stream. When so discounted the present value of the second phase dividend stream viewed at 'zero' time may be expressed as:

$$V_2 = \frac{D_N(1+g)}{(k-g)(1+k)^N}$$

The present values of the two phases, V_1 and V_2, may be added to provide the intrinsic value of the share that has two-stage growth.

The summation procedure of the two phases may be expressed as:

$$S_0 = \sum_{t=1}^{N} \frac{D_t}{(1+k)^t} + \frac{D_N(1+g)}{(k-g)(1+k)^N}$$

Problem 4

A company 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. 3.50 per share respectively during the two subsequent years. After that it is expected that annual dividends will grow at 10 per cent per year into an indefinite future.

If the investor's required rate of return is 20 per cent, what is the intrinsic value of the share?

Solution :

The dividend growth rate is variable upto the third year. From the fourth year onwards dividend growth rate is constant. V_1 would be the present value of dividends receivable during the first three years and can be calculated as :

$$V_1 = \frac{2}{(1.2)^1} + \frac{3}{(1.2)^2} + \frac{3.50}{(1.2)^3} = 1.67 + 2.08 + 2.03 = \text{Rs. } 5.78$$

$$V_2 = \frac{D_N(1+g)}{(k-g)(1+k)^n}, \qquad V_2 = \frac{3.50\,(1+0.2)}{(0.2-0.1)\,(1+0.2)^3}$$

$$V_2 = \frac{3.5(1.2)}{(0.1)(1.728)} = \frac{4.2}{0.1728} = 24.31$$

The intrinsic value of the share is the sum of the two present values V1 and V2

$$S_0 = V_1 + V_2 = 5.78 + 24.31 = \text{Rs. } 30.09$$

2.1.7 Multiplier Approach to Share Valuation

Many investors and analysts value shares by estimating an appropriate multiplier for the share. The price-earnings ratio (P/E ratio) is the most popular multiplier used for the purpose.

The price-earnings ratio is given by the expression:

$$\text{P/E ratio} = \frac{\text{Share price}}{\text{Earnings per share}}$$

The intrinsic value of a share is taken as the current earnings per share or the forecasted future earnings per share times the appropriate P/E ratio for the share.

Problem 5

Consider five annual cash flows (the first occurring one year from today)

Year:	1	2	3	4	5
Cash flow (Rs.):	5	8	12	15	16

Given a discount rate of 10 per cent, what is the present value of this stream of cash flows?

Solution :

Present value of a stream of cash flows can be calculated as follows:

$$PV = \frac{C_1}{(1+k)^1} + \frac{C_2}{(1+k)^2} + ... + \frac{C_n}{(1+k)^n} = \sum_{t=1}^{n} \frac{C_t}{(1+k)^t}$$

where,

$C_1, C_2, ..., C_n$ = Future cash flows at time periods 1, 2, ..., n.

k = Appropriate discount rate.

Here,

$$PV = \frac{5}{(1+0.1)^1} + \frac{8}{(1+0.1)^2} + \frac{12}{(1+0.1)^3} + \frac{15}{(1+0.1)^4} + \frac{16}{(1+0.1)^5}$$

$$= 4.545 + 6.612 + 9.016 + 10.245 + 9.935$$

$$= 40.353$$

Problem 6

A share is currently selling for Rs. 65. The company is expected to pay a dividend of Rs. 2.50 on the share at the end of the year. It is reliably estimated that the share will sell for Rs. 78 at the end of the year.

1. Assuming that the dividend and price forecasts are accurate, would you buy the share to hold it for one year, if your required rate of return were 12 per cent?
2. Given the current price of Rs. 65 and the expected dividend of Rs. 2.50, what would the price have to be at the end of one year to justify purchase of the share today, if your required rate of return were 15 per cent?

Solution :

1. The share valuation model for one-year holding period is:

$$S_0 = \frac{D_1}{(1+k)^1} + \frac{S_1}{(1+k)^1} = \sum_{t=1}^{n} \frac{C_t}{(1+k)^t}$$

Given

D_1 = Rs. 2.50

S_1 = Rs. 78

k = 12 per cent

Hence,

$$S_0 = \frac{2.50}{(1+0.12)^1} + \frac{78}{(1+0.12)^1}$$

$$= 2.23 + 69.64 = \text{Rs. } 71.87$$

Since the current price of the share (Rs. 65) is lower than the intrinsic value of the share (Rs. 71.87), the share is underpriced and can be bought.

2. Given

Current price = Rs. 65

D_1 = Rs. 2.50

k = 15 per cent

We have to determine the selling price at the end of the year (S1) which will give the intrinsic value of the share as Rs. 65.

Hence,

$$65 = \frac{2.50}{(1+0.15)^1} + \frac{X}{(1+0.15)^1}$$

$$65 = 2.17 + \frac{X}{(1.15)}$$

$$65 - 2.17 = \frac{X}{(1.15)}$$

Cross multiplying, $1.15\ (65 - 2.17) = X$

Therefore, $X = 1.15(62.83) = \text{Rs. } 72.25$

A selling price of Rs. 72.25 at the end of the year would justify the purchase of the share at the current price of Rs. 65.

Problem 7

Mr. X decided to buy 500 shares of an IT company with the intention of selling out at the end of five years. He estimate that the company will pay Rs. 3.50 per share as dividends for the first two years and Rs. 4.50 per share for the next three years. He further estimate that, at the end of the five year holding period, the shares can be sold for Rs. 85. What would the amount will be willing to pay today for these shares if his required rate of return is 12 per cent?

Solution :

The share valuation model for multi-year holding period is:

$$S_0 = \frac{D_1}{(1+k)^1} + \frac{D_2}{(1+k)^2} + \frac{D_3}{(1+k)^3} + ... + \frac{D_n + S_n}{(1+k)^n}$$

Given

D_1 and D_2 = Rs. 3.50

D_3, D_4 and D_5 = Rs. 4.50

S_5 = Rs. 85

k = 12 per cent

Hence,

$$S_0 = \frac{3.50}{(1+0.12)^1} + \frac{3.50}{(1+0.12)^2} + \frac{4.50}{(1+k)^n} + \frac{4.50}{(1+0.12)^4} + \frac{4.50}{(1+0.12)^5} + \frac{85}{(1+0.12)^5}$$

$$= 3.125 + 2.790 + 3.203 + 2.860 + 2.553 + 48.231 = 62.762$$

The maximum price to be paid for the shares would be Rs. 62.76 per share.

Problem 8

A company paid a cash dividend of Rs. 4 per share on its stock during the current year. The earning and dividends of the company are expected to grow at an annual rate of 8 per cent indefinitely. Investors expect a rate of return of 14 per cent on the company's shares. What is a fair price for this company's shares?

Solution :

The valuation model to be applied in this case is the constant growth model which is :

$$S_0 = \frac{D_0(1+g)}{k-g}$$

Given

D_0 = Rs. 4

g = 8 per cent

k = 14 per cent

Hence,

$$S_0 = \frac{4(1+0.08)}{(0.14-0.08)}$$

$$= \frac{4.32}{0.06}$$

= Rs. 72

The fair price for the company's shares would be Rs. 72.

Problem 9

A company paid dividends amounting to Rs. 0.75 per share during the last year. The company is expected to pay Rs. 2 per share during the next year. Investors forecast a dividend of Rs. 3 per share in the year after that. Thereafter, it is expected that dividends will grow at 10 per cent per year into an indefinite future. Would you buy/sell the share if the current price of the share is Rs. 54? Investor's required rate of return is 15 per cent.

Solution :

The valuation model to be applied in this case is the two-stage growth model.

$$S_0 = V_1 + V_2$$

$$V_1 = \frac{D_1}{(1+k)^1} + \frac{D_2}{(1+k)^2} + ... + \frac{D_N}{(1+k)^N}$$

$$V_2 = \frac{D_N(1+g)}{(k-g)(1+k)^N}$$

Given

D_1 = Rs. 2

D_2 = Rs. 3

N = 2

g = 10 per cent

k = 15 per cent

Hence,

$$V_1 = \frac{2}{(1+0.15)^1} + \frac{3}{(1+0.15)^2} = 1.74 + 2.27$$
$$= 4.01$$

$$V_2 = \frac{3(1+0.10)}{(0.15-0.10)(1+0.15)^2} = \frac{3.3}{(0.05)(1.15)^2} = 49.91$$

$$S_0 = 4.01 + 49.91 = 53.92$$

The current market price of the share (Rs. 54) is equal to the intrinsic value (Rs. 53.92). As the share is fairly price, no trading is recommended.

Problem 10

A chemical company paid a dividend of Rs. 2.75 during the current year. Forecasts suggest that earnings and dividends of the company are likely to grow at the rate of 8 per cent over the next five years and at the rate of 5 per cent thereafter. Investors have traditionally required a rate of return of 20 per cent on these shares. What is the present value of the stock?

Solution :

The valuation model to be applied in this case in the two-stage growth model given

D_0 = Rs. 2.75

N = 5

k = 20 per cent

g (for the first five years) = 8 per cent

g (after fie years) = 5 per cent

Hence,

$D_1 = D_0 (1 + g)^1 = 2.75 (1 + 0.08)^1 = 2.97$

$D_2 = D_0 (1 + g)^2 = 2.75 (1 + 0.08)^2 = 3.21$

$D_3 = D_0 (1 + g)^3 = 2.75 (1 + 0.08)^3 = 3.46$

$D_4 = D_0 (1 + g)^4 = 2.75 (1 + 0.08)^4 = 3.74$

$D_5 = D_0 (1 + g)^5 = 2.75 (1 + 0.08)^5 = 4.04$

$$V_1 = \frac{2.97}{(1+0.2)^1} + \frac{3.21}{(1+0.2)^2} + \frac{3.46}{(1+0.2)^3} + \frac{3.74}{(1+0.2)^4} + \frac{4.04}{(1+0.2)^5}$$

$= 2.48 + 2.23 + 2.00 + 1.80 + 1.62$

$= 10.13$

$$V_2 = \frac{D_N(1+g)}{(k-g)(1+k)^N} = \frac{4.04(1+0.05)}{(0.20-0.05)(1+0.20)^5}$$

$$= \frac{4.24}{(0.15)(1.2)^5} = 11.36$$

Problem 11

Cement products Ltd. currently pays a dividend of Rs. 4 per share on its equity shares.

1. If the company plans to increase its dividend at the rate of 8 per cent per year indefinitely, what will be the dividend per share in 10 years?
2. If the company's dividend per share is expected to be Rs. 7.05 per share at the end of five years, at what annual rate is the dividend expected to grow?

Solution :

1. D_0 = Rs. 4

   g = 8 per cent

   Hence,

   $D_{10} = D_0(1 + g)^{10}$

   $= 4(1 + 0.08)^{10}$

   $= 8.64$

2. D_0 = Rs. 4

   D_5 = Rs. 7.05

   We have to determine the growth rate, that is, g.

   $D_5 = D_0(1 + g)^5$

   $7.05 = 4(1 + g)5$

   $\frac{7.05}{4} = (1 + g)5$

   $1.7625 = (1 + g)5$

   $(1 + g) = 5\sqrt{1.7625}$

   $1 + g = 1.12$

   $g = 1.12 - 1$

   $= 0.12$ or 12 per cent

Hence, dividend growth rate is 12 per cent.

2.2 Debt Instruments

Debt instruments are a way for markets and participants to easily transfer the ownership of debt obligations from one party to another. Debt obligation transferability increases liquidity and gives creditors a means of trading debt obligations on the market. Without debt instruments acting as a means to facilitate trading, debt is an obligation from one party to another. When a debt instrument is used as a medium to facilitate debt trading, debt obligations can be moved from one party to another quickly and efficiently.

Debt instrument represents a contract whereby one party lends money to another on pre-determined terms with regards to rate and periodicity of interest, repayment of principal amount by the borrower to the lender. In Indian securities markets, the term 'bond' is used for debt instruments issued by the Central and State governments and public sector organizations and the term 'debenture' is used for instruments issued by private corporate sector.

Features of Debt Instruments

Each debt instrument has three features:

(a) Maturity

(b) Coupon

(c) Principal

(a) Maturity

Maturity of a bond refers to the date, on which the bond matures, which is the date on which the borrower has agreed to repay the principal. Term-to-Maturity refers to the number of years remaining for the bond to mature. The Term-to-Maturity changes everyday, from date of issue of the bond until its maturity. The term to maturity of a bond can be calculated on any date, as the distance between such a date and the date of maturity. It is also called the term or the tenure of the bond.

(b) Coupon

Coupon refers to the periodic interest payments that are made by the borrower (who is also the issuer of the bond) to the lender (the subscriber of the bond). Coupon rate is the rate at which interest is paid, and is usually represented as a percentage of the par value of a bond.

(c) Principal

Principal is the amount that has been borrowed, and is also called the par value or face value of the bond. The coupon is the product of the principal and the coupon rate. The name of the bond itself conveys the key features of a bond.

For example, a GS CG2015 11.40% bond refers to a Central Government bond maturing in the year 2015 and paying a coupon of 11.40%. Since Central Government bonds have a face value of Rs. 100 and normally pay coupon semi-annually, this bond will pay Rs. 5.70 as six- monthly coupon, until maturity.

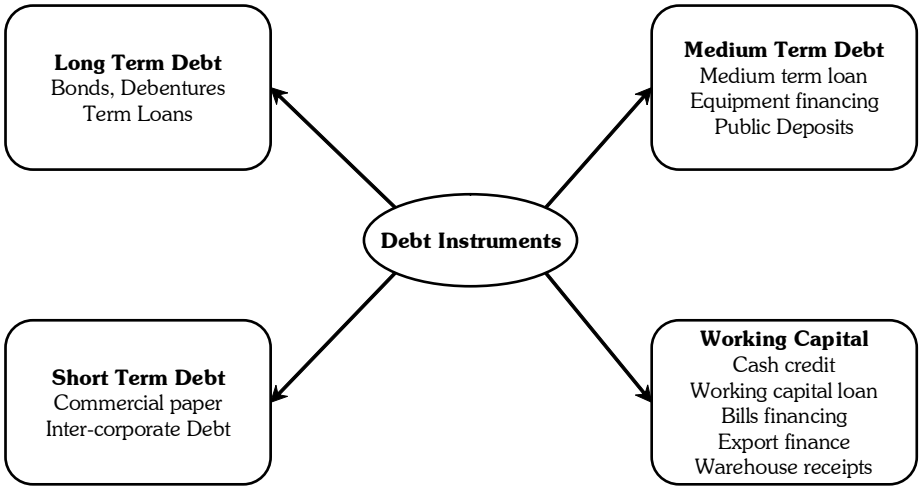
Characteristics of debt instruments

The main characteristics of a debt instrument is as follows:

- **Ease of Issue :** Any company with or without prior track record can issue debt instruments.
- **Fixed or floating rate of interest :** These instruments can be floated with fixed or floating rate of interest and for any tenure.
- **Impose fixed commitments on servicing:** While being flexible in the nature of interest and tenure at the time of issue, these instruments impose fixed commitments on the business. In other words, irrespective of the performance of the business, servicing of such instruments in the form of interest and principal repayments would have to be made. Failure to do so would be termed as default with severely adverse impact on the company's standing in the financial community.
- **Low risk, return characteristics :** Investors in such instruments being creditors of the company have priority over equity and preference shareholders in receiving return (in the form of interest) in such instruments. Carries priority claim on the assets of the firm (if secured) in the event of bankruptcy.

Types of Debt Instruments

The various instruments of debt can be classified into long term and short term debt depending on the tenure for which the amount has been raised or the period of repayment. The various instruments under each category are as follows :



Long term Debt Instruments

Bonds and Debentures : Debt instruments can be further classified into the following categories based on the different characteristics with which they are floated in the market:

- Debentures
- Bonds

Debentures : Main characteristics

- They are fixed interest debt instruments with varying period of maturity.
- Can either be placed privately or offered for subscription.
- May or may not be listed on the stock exchange.
- If listed on the stock exchanges, they should be rated prior to the listing by any of the credit rating agencies designated by SEBI.
- When offered for subscription a debenture redemption reserve has to be maintained.
- The period of maturity normally varies from 3 to 10 years and may also be more for projects with a high gestation period.

Bonds may be of many types - they may be regular income, infrastructure, tax saving or deep discount bonds. These are financial instruments with a fixed coupon rate and a definite period after which these are redeemed. The fundamental difference

between debentures and bonds is that the former is normally secured whereas the latter is not. Hence in general bonds are issued at a higher interest rate than debentures. This avenue of financing is mainly availed by highly reputed corporate concerns and financial institutions.

The three main kinds of instruments in this category are as follows:

- Fixed rate
- Floating rate
- Discount bonds

- The bonds may also be regular income with the coupons being paid at fixed intervals or cumulative in which the interest is paid on redemption.
- Unlike debentures, bonds can be floated with a fixed interest or floating interest rate. They can also be floated without interest and are called discount bonds as they are issued at a discount to the face value and an investor is paid the face value on redemption and if offered for longer terms are known as deep discount bonds.
- The main advantage with interest bearing bonds is the floating interest rate, which is stipulated based on certain mark-up over stock market index or some such index.
- From the point of view of the investor bonds are instruments carrying higher risk and higher returns as compared to debentures.
- This has to be kept in mind while floating bond issues for financing purposes. With the current buoyancy in capital markets for equity instruments the demand for corporate bonds is low.

Medium Term Loans

Medium term loans refer to loans extended for a period of between 2-5 years. The different purposes for which these loans are generally sought include:

- Short gestation projects: The short gestation projects could be for purchase of balancing equipment, for incremental expansion of capacity.
- Refinancing of loans in case of very long projects where the repayment of the term loans might occur prior to sufficient cash flows being generated by the project.

- For meeting any other medium term shortfall in funding arising out of an acquisition or bulleted repayment of a large loan, etc

The procedures for availing medium term loans, where required for short gestation projects, are largely similar to those required for project finance. In case of meeting a medium term mismatches not linked to a project or equipment, the financing decision would be on the basis of a cash flow analysis indicating the need for such medium term funding and an analysis of overall profitability and financial to the business to provide lender comfort. Other than these aspects, the procedures for availing Medium Term loans follows the requirements sought by the lenders in case of Project financing/ long term lending.

Short term debt

Short Term debt generally refers to debt raised for a period of less than a year. It can be classified into market instruments and financial assistance granted by Term Lending Institutions, Commercial Banks and Non Banking Finance Companies (NBFC) catering to the short term credit needs of the business entities.

- **Commercial Papers (CPs) :** CPs represent short term unsecured promissory notes issued by firms with a high credit rating. The maturity of these varies from 15 days to a year. They are sold at a discount to the face value and redeemed at the face value. CPs can be issued by companies, which have a minimum networth of Rs. 4 crores and needs a mandatory credit rating of minimum A2 (ICRA), P2 (Crisil), D2 (Duff & Phelps) and PR2 (Credit Analysis & Research). The rating should not be more than 2 months old. It can be issued for a minimum amount of Rs. 25 lakhs and more in multiples of Rs. 5 lakh.
- **Inter-corporate Deposits (ICDs) :** Inter-Corporate Deposits refers to unsecured short term funding raised by corporates from other corporates. This is a form of disintermediated financing, where corporates with surplus funding directly lend to those in need of funding of such funds and thereby save on the spreads that banks would have charged in borrowing from one to lend to the other.

2.3 BOND

Meaning of Bond

A bond is more or less the same as a debenture. In India, the two terms are generally interchangeable. There is no significant distinction between the two and the difference if any, is for all practical purposes negligible. While some consider a bond as an American term for a debenture others reserve the term for public debt securities belonging to the government and public sector undertakings. In India, it is common to refer to the long-term debt securities issued by the state governments, or by undertakings owned by them or by development financial institutions, as bonds.

A bond is a contract that requires the borrower to pay the interest income to the lender. It resembles the promissory note and issued by the government and corporate. The par value of the bond indicates the face value of the bond i.e., the value stated on the bond paper. Generally, the face values of bonds are Rs. 1000, 2000, 5000 and alike. Most of the bonds make fixed interest payment till the maturity period. This specific rate of interest is known as coupon rate. Coupons are paid quarterly, semiannually and annually. At the end of the maturity period, the value is repaid.

2.3.1 Types of Bonds

- **Premium Bonds**

  Premium Bonds can be simply defined as the bonds sold at the price above the par value of the same. Find in detailed about the Premium Bond.

- **Convertible Bonds**

  Convertible Bond entitles the holder of the bond to convert bonds to the share equities during a particular time span. Get more on Convertible Bond.

- **Discount Bonds**

  In a Discount Bond, the bond is sold by a customer at a price below the face value of the same bond. Get in detailed about the Discount Bond.

- **Mortgage Bonds**

  Mortgage Bonds are a special type of bond and is essentially a debt instrument. In such a case the bond is a secured one and the underlying for the same is the real estate (namely, a property which may be of the commercial or residential nature). The security that is given behind the Mortgage Bonds may not always be a property, it may be any asset like the machines.

- **Investment Bonds**

  Investment Bonds are meant solely for investment purposes where the aim of the investor is growth of capital on a long term perspective. This bond can also be purchased by the investors for getting a stream of regular income. Hence the Investment Bonds can serve the purpose of either of the two or both. The range of time for which this bond is chosen completely depends on the financial goals of the concerned person.

- **High Yield Bonds**

  High Yield Bonds are the bonds for which the rate of interest offered are higher. The risk of credit associated with this type of bond is generally higher and is rated by the grading agencies as speculative in nature. They also consider this asset type to be below the level of investment because it is not evident that in the long run or for a specified time period this locked money would appreciate.

- **Fixed Income Bonds**

  Fixed Income Bonds are the types of bonds which generate a fixed income for its investors and are dispersed to the investors at a regular period of interval. These interest payments associated with such a bond is generally low because the risk associated with is almost nil. The most popular Fixed Income Bonds in the bond market are the ones which are issued by the governments such as he Government Bonds. Another form of the Fixed Income Bonds are the GIBs (that is Guaranteed Income Bonds).

- **Junk Bonds**

  Junk Bonds are nothing but those bonds which have higher yields. These bonds are also called as High Yield Bonds. The risk of credit associated with such bonds are generally higher than the other bond types. The agencies which give credit ratings to the different types of bonds mark it with the rating of either BB or lower than that. This means that the investors who are putting their money in the same are buying a speculative proposition rather than any asset of any assured return. The traditional investors don't get into it or don't include them in their investment portfolios because the threat of depletion of their funds always looms large on the portfolio.

2.3.2 Features of Bonds

1. A Sealed Agreement

The indenture is a long, complicated legal instrument containing the restrictions, pledges and promises of the contract. Bond indenture involves three parties. The first party is the debtor corporation that borrows the money, promises to pay interest, and promises to repay the principal borrowed. The bond holders are the second party; they lend the money. They automatically accept the indenture by acquiring their bonds. The trustee is the third party with whom the bond contract is made. The trustee ensures that the corporation keeps its promises and follows the provisions contained in the indenture. In other words, the trustee does the "watchdog" job form all the bond holders.

2. Repayment of Principal

Bonds are issued in denominations of Rs.1,000 but there are also bonds of values of Rs.500 and Rs.100 and of values as high as Rs.5,000 and Rs.10,000. Financial institutions are known to buy corporate bonds bearing higher values. The value of the bond is called the 'face value, par value or maturity value.' The face value of the bond represents the promise to repay the amount to the' bondholder at the end of the specified period. This, in other words, may be called the most important feature of bond, return of the principal to the lender on a fixed date specified earlier.

3. Specified Time Period (Maturities)

Maturities vary widely. Bonds are usually grouped by their maturity classes. Short-term bonds are usually bonds maturing within 5 years. They may be secured or unsecured. These are common in industrial financing. Medium-term bonds mature in 5 to 10 years. If a bond is originally issued on a medium-term bond, it is usually secured by a real estate or equipment mortgage, or it may be backed by other security. Long-term bonds may run 20 years or more. Capital-intensive industries with long expectation of equipment life are the greatest users of this for bond financing.

4. Interest Payment

Bond interest is usually paid semi-annually, though annual payments are also popular. The method of payment depends upon whether the bond is a coupon (bearer) or registered bond.

5. Call

Bonds have an additional feature of 'call.' This is a privilege to the issuing company to repurchase bonds at a slightly higher price above the par value. For example, a bond of face value of Rs.1,000 and maturity of 20 years yields an interest of Rs.70 annually. After the first five years of issue, the market rate of interest on bonds falls considerably. The ruling rate being 5%, the company may choose to use the call feature and buy back the bond for Rs.1 ,050. This is a little higher than the face value of Rs.1,000. By calling the bonds, the company saves money. It may call back the bonds yielding interest of Rs. 70 and issue fresh bonds which will yield Rs. 50 per year. The firm has been able to save Rs. 20 per year per bond for the next 15 years till the maturity of the bond. By paying Rs. 50 higher than the face value on the bond for early redemption of the bond, the company saves a much higher amount. The bondholder is on the losing side because he gets the return of the principal amount earlier than he expected.

6. Pledge of Security

The issuing company sometimes promises to pay to the bondholder by offering some security like property. The pledge of security is a promise to the bondholders in writing and signed under seal and presented to the trustee by the company. A simple promise to pay without the proper formalities is not considered as a Pledge of security.

2.4 Bond Analysis and Valuation

Bond valuation is the process of determining the fair price of a bond. As with any security or capital investment, the fair value of a bond is the present value of the stream of cash flows it is expected to generate. Hence, the price or value of a bond is determined by discounting the bond's expected cash flows to the present using the appropriate discount rate.

The intrinsic value of bond or debenture is equal to the present value of its expected cash flows. The coupon interest payment, and the principal repayment are known and the present value is determined by discounting these future payments from the issuer at an appropriate discount rate.

Formula

The usual present value calculation are made with the help of the following equation :

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

Where PV= Present value of the security today

C = Coupon or interest payment for time period'

R= Appropriate discount rate N= number of years to maturity

Problem 12

Consider a Rs. 1000 bond issued with a maturity of five years at par to yield 10%. Interest is paid annually and the bond is newly issued. What is the present value of the bond?

Solution :

The value of the bond would be as follows :

$$PV = \frac{100}{(1+.10)^1} + \frac{100}{(1+.10)^2} + \frac{100}{(1+.10)^3} + \frac{100}{(1+.10)^4} + \frac{100}{(1+.10)^5}$$

$$= (100 \times .9091) + (100 \times .8264) + (100 \times .7513) + (100 \times .6830) + (100 \times .6209)$$

$$= 90.91 + 82.6 + 75.13 + 68.30 + 682.99$$

$$= 999.97 \text{ or approx.}$$

2.4.1 Bond Returns

Bond returns can be calculated and expressed in different ways. It is necessary to understand the meaning of each of these expressions.

2.4.2 Coupon Rate

It is the nominal rate of interest fixed and printed on the bond certificate. It is calculated on the face value of the bond. It is the rate at which interest is payable by the issuing company to the bondholder.

2.4.3 Current Yield

The current yield relates the annual coupon interest to the market price. It is expressed as :

$$\text{Current Yield} = \frac{\text{Annual interest}}{\text{Current market price}}$$

For example, the current yield of a 10 year, 12 percent coupon bond with a par value of Rs.1000 and selling for Rs. 950 is 12.63 percent.

$$\text{Current yield} = \frac{120}{950} = 0.1263 \text{ or } 12.63 \text{ percent} \Rightarrow \frac{120}{950} = 0.1263 \text{ or } 12.63\%$$

The current yield calculation reflects only the coupon interest rate. It does not consider the capital gain (or loss) that an investor will realise if the bond is purchased at a discount (or premium) and held till maturity. It also ignores the time value of money. Hence it is an incomplete and simplistic measure of Yield.

2.4.4 Spot Interest Rate

Zero coupon bond is a special type of bond which does not pay annual interests. The return on this bond is in the form of a discount on issue of the bond. For example, a two year bond of face value Rs. 1000 may be issued at a discount for Rs. 797.19. The investor who purchases this bond for Rs. 797.19 now would receive Rs. 1000 two years later. This type of bond is also called pure discount bond or deep discount bond. The return received from a zero coupon bond or a pure discount bond expressed on an annualised basis is the spot interest rate. In other words, spot interest rate is the annual rate of return on a bond that has only one cash inflow to the investor.

Spot interest rate is the discount rate that makes the present value of the single cash inflow to the investor equal to the cost of the bond. In other words, the cash inflow from the bond when discounted with the spot interest rate becomes equal to the cost of the bond.

$$519.37 = \frac{1000}{(1+k)^5}$$

$$(1 + k)^5 = \frac{1000}{519.37} = 1.9254$$

$$(1 + k) = \sqrt[5]{1.9254} = 1.14$$

$$k = 1.14 - 1 = 0.14 \text{ or } 14 \text{ per cent.}$$

The spot interest rate in this case is 14 per cent.

2.4.5 Yield to Maturity

The concept of yield-to-maturity (YTM) is one of the widely used tools in bond investment management. Arithmetically, YTM is the single discount factor that makes present value of future cashflows from a bond equal to the current price of the bond. Intuitively, YTM is the rate of return, which an investor can except to earn if the bond is held till maturity.

The yield to maturity is calculated based on certain assumptions. They are :

1. There should not be any default. Coupon and principal should be paid as per schedule.
2. The investor has to hold the bond till maturity.
3. All the coupon payments should be reinvested immediately at the same interest rate as the same yield to maturity of the bond.

Any difference in the reinvestment rate will cause a difference between the actual return and the YTM. In this sense, the YTM is only a measure of yield. It cannot be regarded as a measure of return from a coupon-paying bond.

The YTM concept has a slightly different meaning for Zero Coupon Bonds (ZCB), popularly known as Deep Discount Bonds (DDB). ZCB's do not carry any coupon but are issued at a price discounted to the face value. On maturity, these bonds are redeemed at face value. Since these bonds do not have any coupon payments during the life of the bond, the question of reinvestments of coupon payment does not arise at all. There is no reinvestment risk for ZCBs.

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

Where,

P = price of the bond $r \rightarrow$ YTM

C = annual interest (in rupees)

M = maturity value (in rupees)

n = number of years left to maturity.

Problem 13

A four-year bond with a 7 per cent coupon rate and maturity value of ₹1,000 is currently selling at ₹905. What is its yield to maturity?

Solution :

Yield to maturity can be found out by using trial-and-error method. Let us try 10 per cent as yield to maturity.

Cash flow	PV for 10%	PV of CF
70	0.9091	63.64
70	0.8264	57.85
70	0.7513	52.59
1070	0.6830	730.82
		₹904.90

The yield to maturity is 10 per cent.

The approximate YTM can also be calculated using the following formula:

$$Y = \frac{C + (P \text{ or } D / \text{years to maturity})}{(P_0 + F)/2}$$

Y = Yield to maturity

C = Coupon interest

P or D = Premium of discount

P_0 = Present value

F = Face value

In the above example,

$$= \frac{70 + (95/4)}{(905 + 1000)/2}$$

$$= \frac{93.75}{952.5} = 0.098$$

Y = 9.8%

Yield to maturity is 9.8 per cent.

Problem 14

(a) Determine the price of ₹1,000 zero coupon bond with yield to maturity (YTM) of 18 per cent and 10 years to maturity.

(b) What is YTM of this bond if its price is ₹220?

Solution :

(a) $\text{Price} = \frac{\text{Face value}}{(1+\text{YTM})^n}$

$= \frac{1000}{(1+0.18)^{10}} = \frac{1000}{5.2338}$

$= ₹191.07$

(b) $\left(\frac{\text{Face value}}{\text{Bond value}}\right)^{1/T} - 1 = \text{YTM}$

or $\left(\frac{₹1000}{₹220}\right)^{1/10} - 1 = \text{YTM}$

or $(4.55).1^{-1} = \text{YTM}$

or $1.163 - 1 = 0.163$

or $\text{YTM} = 16.3$

Problem 15

Calculate approximate YTM, if Rs. 100 per value bond carrying coupon at 12% and with maturity of 5 years is Rs. 90.

Solution :

Given,

P_n = Rs. 100

r = 12%

$\therefore$ C = 12% of Rs. 100 = Rs. 12

n = 5 years

P_0 = Rs. 90

$$\text{YTM} = \frac{C + \left[\frac{[P_n - P_0]}{n}\right]}{\frac{(P_n + P_0)}{2}} = \frac{12 + \left[\frac{[100 - 90]}{5}\right]}{\frac{(100 + 90)}{2}}$$

$$= \frac{12 + 2}{95} = \frac{14}{95} = 0.1474 \quad \text{or} \quad 14.74\%.$$

Problem 16

Face value of debenture	Rs. 1000
Annual interest rate	15%
Expected interest rate	15%
Maturity period	5 years calculate Vd.

Solution :

$$\text{Vd} = \text{I(PVAF\%(n)} + \text{F(PVCF\%, n)}$$

$$\text{Here I} = 1000 \times \frac{15}{100} = 150$$

$$\text{PVAF} = 3.352$$

$$\text{F} = 1000$$

$$\text{PVCF} = 0.497$$

$$\text{Vd} = 150\ (3.352) + 1000\ (0.497)$$

$$= 502.80 + 497$$

$$= 999.80 \text{ or Sar } 1000$$

Problem 17

Face value of debenture	Rs. 1000
Annual interest rate	15%
Expected interest rate	12%
Maturity period	5 years

Solution :

$$\text{Vd} = \text{I(PVAF \%, (n)} + \text{F(PVCF\%, n)}$$

$$\text{PVAF} = 3.605,$$

$$\text{F} = 1{,}000$$

PVIF = 0.567

= 150(3.605) + 1000 (0.567)

= 540.75 + 567

= 1107.75 or 1108

= 999.80 or Sar 1000

Problem 18

Face value of debenture	Rs. 1000
Annual interest rate	12%
Expected interest rate	15%
Maturity period	5 years

Solution :

Vd = I(PVAF %, (n) + F(PVCF%, n)

PVAF = 3.352

F = 1,000

PVIF = 0.497

= 120(3.352) + 1000 (0.497)

= 402.24+ 497

= 899.24 or 900

Problem 19

A Rs. 100/- value bond barley a coupon rate of 12% will mature after five years what is the value of the bond if the discount rate is 15% ?

Solution :

Vd = I(PVAF %, n) + F(PVCF%, n)

$I = 100 \times \frac{12}{100} = 12$

F = 100

= 12(3.352) + 100 (0.497)

= 40.224 + 49.7

= 89.92

= 90

without using table values.

$I = 12$

$n = 5$

$P_n = 100$

$i = 0.15$

$$Vd = \frac{I_1}{(1+i)^1} + \frac{I_2}{(1+i)^2} + \frac{I_3}{(1+i)^3} + \frac{I_4}{(1+i)^4} + \frac{I_5 + P_x}{(1+i)^5}$$

$$= \frac{12}{(1+0.15)^1} + \frac{12}{(1+0.15)^2} + \frac{12}{(1+0.15)^3} + \frac{12}{(1+0.15)^4} + \frac{12+100}{(1+0.15)^5}$$

$$= \frac{12}{1.15} + \frac{12}{1.3225} + \frac{12}{1.5208} + \frac{12}{1.749} + \frac{12+100}{2.0113}$$

$= 10.434 + 9.677 + 7.889 + 6.861 + 5.960$

$= 89.94$ or 89.92

Problem 20

A debenture of Rs.100/- carrying interest at 15% will become due for payment after 5 years. The required rate of return on this debenture is 10%. Calculate the current value of the debenture.

Solution :

$Vd = I(PVAF\ \%, n) + F(PVCF\%, n)$

$= 15(3.791) + 100(0621)$

$= 56.865 + 62.10$

$= 118.965$ OR 119

Problem 21

A purchased a 5 years Rs.1000/- per value bond being nominal rate of interest at 7%. What should he be willing to pay now to get a required rate of 8% to purchase the bond, if on maturity, he will receive the bond value at par ?

Solution :

$$I = 1000 \times \frac{7}{100} = 70 \quad i_n = 0.08$$

$$p_n = 1000 \quad n = 5 \text{ years}$$

$$V_d = \frac{I_1}{(1+i)^1} \frac{I_2}{(1+i)^2} + \frac{I_3}{(1+i)^3} + \frac{I_4}{(1+i)^4} + \frac{I_5 + P_n}{(1+i)^n}$$

$$V_d = \frac{70}{(1+0.08)^1} + \frac{70}{(1+0.08)^2} + \frac{70}{(1+0.08)^3} + \frac{70}{(1+0.08)^4} + \frac{70+1000}{(1+0.08)^5}$$

$$= 960.28.$$

Problem 22

Mr. X holds a debenture of Rs. 1000 carrying interest rate of 12% p.a. The interest is payable half yearly on 30th June and 31 December. The debenture is payable at premium of 10% after 5 years. The required rate of returns is 16% p.a. calculate values of debenture.

Solution :

$$Vd = I(PVAF\ \%, n) + F(PVCF\%, n)$$

$$I = 60, n = 5 \text{ years}$$

$$PVAF = 8.851$$

$$i = 16\% = 60(8.851) + 100\ (0.292) = 531.06 + 321.2 = 852.028 \text{ or } 852$$

Problem 23

The current market price of a debenture of X Ltd is Rs. 800 having a face value of Rs.1000. the debentures will be redeemed after 5 years the debentures carries an interest rate of 12% calculate yield to maturity on the debenture.

Solution :

$$YTM = \frac{C \pm [P \text{ or } D / n]}{(F + P_0 / 2)}$$

$$I = 1000 \times \frac{12}{100} = 120 = \frac{120 + \left(\frac{200}{5}\right)}{\frac{1000+800}{2}}$$

$$= \frac{120+40}{900} = \frac{160}{900} = 0.17 \text{ or } 17\%.$$

Problem 24

The market price of Rs. 1000/- per value bond carrying a coupon rate of 14% and maturing after 5 years is Rs. 1050/-. What is the yield to maturity on this bond ? What is approximate YTM ? What is the realized yield to maturity. If the investment rate is 12%.

Solution :

$$YTM = \frac{C \pm [p \text{ or } D / n]}{(F + P_0)/2}$$

$F = 1000$

$P_0 = 1050$

$n = 5$

$P = 50$

$$C = 1000 \times \frac{14}{100} = 140$$

$$YTM = \frac{140 + \left(\frac{50}{5}\right)}{\frac{1000 + 1050}{2}}$$

$$YTM = \frac{140 - 10}{1025}$$

$$YTM = \frac{130}{1025}$$

$YTM = 0.1268$ or 12.68%

ii) Calculation of realized yield to maturity.

$I = 140$

$Pn = 1000$

$i = 0.12$

$n = 5$ years.

$$Vd = \frac{140}{(1.12)} + \frac{140}{(1.12)^2} + \frac{140}{(1.12)^3} + \frac{140}{(1.12)^4} + \frac{140+1000}{(1.12)^5}$$

$$= 125 + \frac{140}{1.254} + \frac{140}{1.401} + \frac{140}{1.574} + \frac{1140}{1.762}$$

$$= 125 + 11.64 + 99.43 + 88.95 + 646.99$$

$$= 1072.51.$$

Problem 25

Find the approximate yield to maturity of the following date

	Face Value	Market Value	Period	Capitalization rate
Bond I	100	80	10	14
Bond II	150	100	8	12

Solution :

$$YTM = \frac{C \pm \left(\frac{P \text{ or } D}{n}\right)}{\left(\frac{F + P_0}{2}\right)}$$

$$C = 100 \times \frac{14}{100} = 14$$

$$F = 100$$

$$P_0 = 80 \quad n = 10$$

$$YTM = \frac{14 + \left(\frac{20}{10}\right)}{\left(\frac{100+80}{2}\right)} = \frac{14+2}{180/2}$$

$$= \frac{14+2}{90} = \frac{16}{90}$$

$$= 0.177 \quad \text{or} \quad 17.7\%$$

Bond II

$F = 15$

$P_0 = 100$

$n = 8$

$$C = \left(50 \text{ x } \frac{12}{24}\right) = 18$$

$$= \frac{18 + \left(\frac{50}{8}\right)}{\frac{150 + 100}{2}}$$

$$= \frac{18 + (50)/8}{250/2}$$

$$= \frac{18 + 6.25}{125}$$

$$= \frac{24.25}{125}$$

$= 0.194$ or 19.4%

Problem 26

X purchased a 5 years Rs. 1000/- per value bond being nominal rate of interest at 7% what should he be willing to pay now to get a required rate of 8% to purchase the bond, if an maturity. He will receive the bond value at par ?

$I = 1000 \text{ x } 7\%$

$= 70$

$Px = 1000$

$i = 0.08$

$n = 5$ years

$$Vd = \frac{I_1}{(1+i)^1} + \frac{I_2}{(1+i)^2} + \frac{I_3}{(1+i)^3} + \frac{I_4}{(1+i)^4} + \frac{I_5 + Pn}{(1+i)^n}$$

$$Vd = \frac{70}{(1+0.08)^1} + \frac{70}{(1+0.08)^2} + \frac{70}{(1+0.08)^3} + \frac{70}{(1+0.08)^4} + \frac{1070}{(1+0.08)^5}$$

$$= \frac{70}{(1.08)^1} + \frac{70}{(1.08)^2} + \frac{70}{(1.08)^3} + \frac{70}{(1.08)^4} + \frac{1070}{(1.08)^5}$$

$$= 64.81 + \frac{70}{1.167} + \frac{70}{1.259} + \frac{70}{1.36} + \frac{1070}{1.469}$$

$$= 64.81 + 59.98 + 55.59 + 51.47 + 728.38 = 960.23$$

The present value of the bond is 960.23. The investor should not be willing to pay more than Rs. 960.23 for the purchase of the bond today.

Problem 27

An Investor is Considering the purchase of the following debenture.

Maturity	Coupon	Par
3 years	11%	100%

a) If the investor requires a YTM of 13% on debentures of equivalent risk and maturity, what does he believe is a fair market price ?

b) If the debenture is selling for a price of Rs. 97.59, what is its promised YTM (present value)

a) $I = 100 \times 11\% = 11$

$n = 3$ year

$i = 13\% = 0.13$

$$Vd = \frac{I_1}{(1+i)^1} + \frac{I_2}{(1+i)^2} + \frac{I_3 + P_n}{(1+i)^n}$$

$$= \frac{11}{1.13} + \frac{11}{(1.13)^2} + \frac{11+100}{(1.13)^3}$$

$$= \frac{11}{1.13} + \frac{11}{1.27} + \frac{111}{1.44}$$

$$= 9.73 + 8.66 + 77.08 = 95.47$$

b) $C = 11$

$n = 3$

$P = 97.59$

$F = 100$

$$YTM = \frac{C \pm \left(\frac{P \text{ or } D}{n}\right)}{\frac{F + P_0}{2}} = \frac{11 + \left(\frac{2.41}{3}\right)}{\left(\frac{100 + 97.59}{2}\right)}$$

$$= \frac{11 + (2.41)/3}{(197.59)/2}$$

$$= \frac{11 + 0.803}{98.79}$$

$$= \frac{11.803}{98.79} = 0.1194 = 11.94\%$$

Problem 28

R.S Varma is considering investing in a bond currently selling for Rs. 8,785/-. The bond has 4 years to maturity Rs. 10,000 face value and 8% coupon rate. The next annual interest payment is due 1 year from today. The approximate discount factor. (i) for investments of similar risk is 10%

a) Calculate the intrinsic value of the bond based on this calculation should Varma purchase the bond

b) Calculate the YTM of the bond, based on this calculation should Varma purchase the bond ?

Solution :

$$I = 10{,}000 \times \frac{8}{100} = 800$$

$n = 4$ years

$i = 10\% = 0.1$

$Pn = 10{,}000$

$$Vd = \frac{I_1}{(1+i)^1} + \frac{I_2}{(1+i)^2} + \frac{I_3}{(1+i)^3} + \frac{I_4 + P_n}{(1+i)^4}$$

$$= \frac{800}{(1+0.1)} + \frac{800}{(1+0.1)^2} + \frac{800}{(1+0.1)^3} + \frac{800+10{,}000}{(1+0.1)^4}$$

$$= 727.27 + \frac{800}{1.21} + \frac{800}{1.33} + \frac{10800}{1.464}$$

$$= 727.27 + 661.15 + 601.50 + 7377.04$$

$$= 9366.96$$

Conclusion : The bond currently selling for Rs. 8785/- where as its intrinsic value Rs.9,366.96. Therefore it can be suggested that Varma should purchase it.

b) $C = 10{,}000 \times \frac{8}{100}$

$= 800$

$F = 10{,}000$

$p = 8785$

$n = 4$ years

$$YTM = \frac{C \pm \left(\frac{P \text{ or } D}{n}\right)}{\left(\frac{F + P_0}{2}\right)} = \frac{800 + \left(\frac{1215}{4}\right)}{\left(\frac{10000 + 8785}{2}\right)}$$

$$= \frac{800 + (1215)/4}{18785/2} = \frac{800 + 303.75}{9392.5}$$

$$= \frac{1103.75}{9392.5} = 0.1175 \quad \text{or} \quad 11.75$$

Conclusion : The Present rate of return is 10% whereas the YTM is 12% Therefore Varma should purchase it.

2.4.6 Valuation of Perpetual Debentures

Debentures which will never mature are known as perpetual debentures. Such type of debentures are rearely found in practice. The value of such a debenture can be simply find out by dividing the amount of interest with the expected rate of return from the investment. It can be determined as follows.

$$Vd = \frac{A}{i} \text{ or } \frac{\text{Annual interest}}{\text{yield rate}}$$

Where Vd = Value of debenture

A = Annual interest

i = Expected rate of interest

Problem 29

If a bond pays Rs. 80/- an interest annually on a perpetual bond. What would be the value if the current yield is 9%.

Solution : A = 80, Yield rate (i) = 9%

$$Vd = \frac{A}{i}$$

$$= \frac{80}{0.09}$$

$$= 888.89$$

Problem 30

If the coupon rate of interest on a Rs. 1000 par value perpetual bond is 7% what is its current yield if the bonds market price is Rs. 700 ?

Solution :

$$Vd = \frac{\text{Annual interest}}{\text{yieldrate}}$$

Annual interest $= 1000 \times \frac{7}{100} = 70\%$

Value of deb (V_d) = 700/-

$$= \frac{70}{700} = 0.1 \text{ or } 10\%$$

Problem 31

Mr. A is one of the debenture holder of a company is to receive an annual interest of Rs. 100 for perpetuity on his debenture of Rs. 1000. Calculate the value of the debenture if the required rate of return (i) 15%, (ii) 8% and (ii) 10% respectively.

Solution :

The value of debenture can be ascertained on the basis of the following equations.

$$Vd = \frac{A}{i}$$

Putting the values in the above equation we get the value of debentures as follows.

i) When required rate of return is 15%

$$Vd = \frac{100}{0.15}$$

$$= \text{Rs. } 667$$

ii) When the required rate of return is 8%

$$Vd = \frac{100}{0.08}$$

$$= \text{Rs. } 1250$$

iii) When the required rate of return is 10%

$$Vd = \frac{100}{0.10}$$

$$= \text{Rs. } 1000.$$

2.4.7 Yield to Call

Some bonds carry a call feature that entitles the issuer to call (buy back) the bond prior to the stated maturity date in accordance with a call schedule (which specifies a call price for each call date) For such bonds, it is a practice to calculate the yield to call (YTC) as well as the YTM.

The procedure for calculating the YTC is the same as for the YTM. Mathematically the YTC is the value of r in the following equation:

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

where M = call price (in rupees)

n = number of years until the assumed call date.

Problem 32

Bharath and company has issued 12%, Rs. 1000 face value, ten years callable bonds before two years. The bons are redeemable at par and interest payable annually. The bonds are callable after 5 years from the date of issues. The call price on the first call date is Rs. 1100 which declines by Rs. 20 per year over the next years. The current price for the bond is Rs. 950. Calculate the yield-to-call.

Solution :

Face value Rs. 1,000, Coupon rate = 12%, Coupon payment = 1000 × 12% = Rs. 120

120 (PVIFA $_{K\%}$, 3) + 1100 (PVIFA $_{K\%}$, 3) = 950

where k = YTC

Using Trial & Error Method

At k = 16%,

P_0 = 120 (2.246) + 1100 (0.641) = Rs. 974.62

At k = 18%,

P_0 = 120 (2.174) + 1100) (0.609) = Rs. 930.78

$$YTC = 16\% + \frac{24.62}{43.84} \times 2 = 17.12\%$$

∴ Yield to first call = 17.12%.

2.4.8 Holding Period Return

This return is calculated as follows:

Holding period return

$$= \frac{\text{Price gain or loss during the holding Period + Coupon interest rate, if any}}{\text{Price at the beginning of the holding period}}$$

The holding period rate of return is also called the one-period rate of return. This return can be calculated daily, monthly or annually. If the fall in the bond price is greater than the coupon payment, the holding period return will be negative.

Problem 33

(a) An investor purchases a bond at **₹900 with ₹100 as coupon payment and sells it at ₹1,000. What is his holding period return?**

(b) **If the bond is sold for ₹750 after receiving ₹100 as coupon payment, what is the holding period return?**

Solution :

(a) Holding period return $= \frac{\text{Price gain + Coupon payment}}{\text{Purchase price}}$

$$= \frac{100+100}{900} = \frac{200}{900} = 0.2222$$

Holding period return = 22.22%

(b) Holding period return $= \frac{\text{Gain or loss + Coupon payment}}{\text{Purchase price}}$

$$= \frac{-150+100}{900} = \frac{-50}{900} = -0.0555$$

Holding period return = – 5.5%

2.5 Bond Prices

All investments, including bonds and shares, derive value from the cash flow they are expected to generate. Because the cash flows will be received over future periods, there is need to discount these future cash flows to derive a present value or price for the security. In general terms, the theoretical price of any security can be established as the present value of a future stream of cash flows, as described by the following formula:

$$P_0 = \sum_{t=1}^{n} \frac{CF_t}{(1+k)^t}$$

The model indicates that the present value or, alternatively, current price P_0 of a security is the cash flows (CF) received over the time horizon V, discounted back at the rate *'k'*.

The value of a bond is equal to the present value of its expected cash flows.

These cash flows have to be discounted at an appropriate discount rate to determine their present value. The present value calculations are made with the help of the following equation:

$$P_0 = \sum_{t=1}^{n} \frac{I_t}{(1+k)^t} + \frac{MV}{(1+k)^n}$$

Where

P_0 = Present value of the bond

I_t = Annual interest payments

MV = Maturity value of the bond

n = Number of years to maturity

k = Appropriate discount rate

Problem 34

A bond of face value Rs. 1000 was issued five years ago at a coupon rate of 10 per cent. The bond had a maturity period of 10 years and as of today, therefore, five more years are left for final repayment at par. If the current market interest rate is 14 per cent, what is the present value of the bond ?

Solution :

$$P_0 = \sum_{t=1}^{5} \frac{Rs.100}{(1.14)^t} + \frac{Rs.1000}{(1.14)^5}$$

= (100 × PV factor for 5 year annuity at 14 per cent)

+ (1000 × PV factor at 14 per cent for year 5)

= (100 × 3.4331) + (1000 × 0.5194)

= 343.31 + 519.40 = Rs. 862.71

2.5.1 Bond Value Theorems

The value of the bonds depends upon three factors, namely, the coupon rate, years to maturity, and the expected yield to maturity or the required rate of return. On the basis of this, bond value theorems have evolved.

Theorem 1

If the market price of the bond increases, the yield would decline and vice versa.

Factors	Bond A	Bond B
Par value	₹1,000	₹1,000
Coupon rate	10%	10%
Maturity period	2 years	2 years
Market price	₹ 874.75	₹ 1035.66
Yield	18%	8%

Even though the bonds A and B are of the same maturity and bear the same coupon rate, the difference in the market price leads to a difference in yields. The bond with a low price has high yield because with less money more return is earned.

Theorem 2

If the bond's yield remains the same over its life, the discount or premium depends on the maturity period.

Factors	Bond A	Bond B
Par value	₹ 1,000	₹ 1,000
Coupon rate	10%	10%
Yield	15%	15%
Maturity period	2 years	3 years
Market price	₹ 918.71	₹ 885.86
Discount	₹ 81.29	₹ 114.14

This means, A bond with a short-term to maturity sells at a lower discount than B bond with a long-term to maturity.

Theorem 3

If a bond's yield remains constant over its life, the discount or premium amount will decrease at an increasing rate as its life gets shorter. Consider a bond with a face value of ,000, and maturity period of five years with 10 per cent yield to maturity. The calculated values are given below.

Years to maturity	Present value
5	620.9
4	683.0
3	751.3
2	826.4
1	909.1

The above example shows that the discount rate declines at a lower when the bond approaches maturity. The same point is illustrated in Figure.

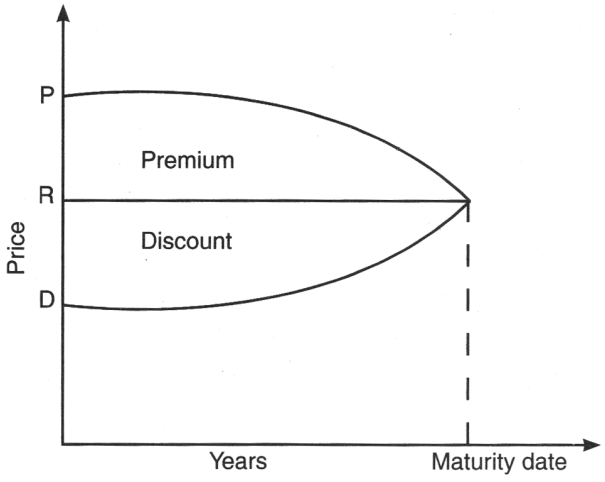


Fig.: Bond's Price Changes during its life

Theorem 4

A rise in the bond's price for a decline in the bond's yield is greater than the fall in the bond's price for a rise in the yield. Take a bond with a 10 per cent coupon rate, maturity period of five years, and a face value of ₹ 1,000. If the yield declines by 2 per cent, that is, to 8 per cent, then the bond price will be ₹ 1079.87.

= 100 (PVIFA 8%, 5 years) + 1000 (PVIF 8%, 5 years)

= 100 × 3.9927 + 1000 × 0.6806

= ₹1079.87

If the yield increases by 2 per cent, the bond price will be ₹927.88.

= 100 (PVIFA 12%, 5 years) + 1000 (PVIF 12%, 5 years)

= 100 × 3.6048 + 1000 × 0.5674

= ₹ 927.88

Now the fall in yield has resulted in a rise of ₹ 79.86 but the rise in yield caused a variation of ₹72.22 in the price.

Theorem 5

The change in the price will be less for a percentage change in the bond's yield if its coupon rate is higher. This is explained by the following example:

Factors	Bond A	Bond B
Coupon rate	10%	8%
Yield	8%	8%
Maturity period	3 years	3 years
Price	₹ 105.15	₹ 100
Face value	₹ 100	₹ 100
Yield increase	1%	1%
Price after yield increases	₹ 102.53	₹ 97.47
Percentage change in price	2.4%	2.53%

2.5.2 Bond Risks

Generally stocks are considered to be risky but bonds are not. This is not fully correct. Bond do have risk, but the nature and types of risks may be different. The risks are interest rate, default, marketability, and capability risks.

1. **Interest Rate Risk :** Variability in the return from the debt instruments to investors is caused by the changes in the market interest rate. This is known as Interest Rate Risk. Changes that occur in interest rate affect the bonds

more directly than the equity. There is a relationship between the coupon rate and market interest rate. If the market interest rate moves up, the price of the bond declines and vice versa.

2. **Default Risk :** The failure to pay the agreed value of the debt instrument by the issuer in full, on time or both are the Default Risk. Treasury bills and bonds issued by the Central Government are devoid of this risk. The same cannot be assured of bonds/debentures issued by any other corporate bodies. The default risk occurs because of macro economic factors or firm specific factors.

3. **Marketability Risk :** Variation in return caused by the difficulty in selling the bonds quickly without having to make a substantial price concession is known as Marketability Risk. This risk is different from the market risk that affects all securities in the market but, marketability risk is a specific risk. The marketability or liquidity of the particular bond depends on the corporate who issues the bond. There is a possibility of a particular company's bond becoming illiquid due to the down-grading of bond's rating by the rating agencies. The managerial inefficiencies and fall in the profits may create a fear in the minds of the investors and they may not be willing to buy such bonds in the secondary market.

4. **Callability Risk :** The uncertainty created in the investor's return by the issuer's ability to call the bond at any time is known as Callability Risk. Debt instruments used to carry call option. The call option provides the issuer the right to call back the instruments by redeeming them, This facility provides a way out for the issuer if the interest rate declines. The issuer can call the bond with high interest rate and again raise funds at a lower interest rate declines, the bond or debenture can be called at any time. There is an uncertainty regarding the maturity period.

5. **Reinvestment Risk :** When a bond pays periodic interest there is a risk that the interest payment may have to be reinvested at a lower interest rate. This is called Reinvestment Risk. The reinvestment risk is greater for bonds with longer maturity and for bonds with higher interest payments.

6. **Foreign Exchange Risk :** If a bond has payments that are denominated in a foreign currency its rupee cash flows are uncertain. The risk that the foreign currency will depreciate in relation to he Indian rupee is referred to as the Foreign Exchange Risk.

2.6 Bond Duration

Duration measures the time structure of a bond and the bond's interest rate risk. The time structure of investment in bonds is expressed in two ways. The common way to state is how many years he has to wait until the bond matures and the principal money is paid back. This is known as asset time to maturity or its years to maturity. The other way is to measure the average time until all interest coupon and the principal is recovered. This is called Macaulay's duration.

Duration is defined as the weighted average of time periods to maturity, weights being present values of the cash flow in each time period.

The formula for duration is.

$$D = \frac{\frac{C_1}{(1+r)}}{P_0} + \frac{\frac{C_2}{(1+r)^2}}{P_0} 2 + \ldots + \frac{\frac{C_1}{(1+r)^t}}{P_0} \times T$$

This can be summarised as

$$D = \sum_{t=1}^{T} \frac{P_v(C_t)}{P_0} \times t$$

D = Duration

C = Cash Flow

r = Current yield to maturity

T = Number of years

PV (C) = Present value of the Cash flow

P_0 = Sum of the present value of cash flow

Problem 35

Calculate the duration for bond A and Bond B with 7 per cent and 8 per cent coupons having maturity period of 4 years. The face value is Rs.1000. Both the bonds are currently yielding 6 per cent.

Solution :

$$D = \frac{\frac{C_1}{(1+r)}}{P_0} 1 + \frac{\frac{C_2}{(1+r)^2}}{P_0} 2 + \frac{\frac{C_3}{(1+r)^3}}{P_0} 3 + \frac{\frac{C_4}{(1+r)^4}}{P_0} 4$$

C_4 includes principal repayment

Bond 'A' with 7% Coupon rate.

Year	Cash Flow Ct	$\frac{1}{(1+r)^t}$	PV x CT	$\frac{\frac{C_t}{(1+r)^t}}{P_0}$	$\frac{\frac{C_t}{(1+r)^t} \text{ x } t}{P_0}$
1.	70	0.943	66.01	0.0638	0.0638
2.	70	0.890	62.30	0.0602	0.1204
3.	70	0.8396	58.77	0.0568	0.1704
4.	1070	0.7921	847.55	0.8191	3.2764
			P_0 =Rs. 1034.63		D=3.6310

Bond 'B' with 8% Coupon Rate

Year	Cash Flow Ct	$\frac{1}{(1+r)^t}$	PV x CT	$\frac{\frac{C_t}{(1+r)^t}}{P_0}$	$\frac{\frac{C_t}{(1+r)^t} \text{ x } t}{P_0}$
1.	80	0.943	75.44	0.0706	0.0706
2.	80	0.890	71.200	0.0666	0.1332
3.	80	0.8396	67.168	0.0628	0.1884
4.	1080	0.7921	855.1468	0.8000	3.2000
			P_0=Rs. 1069.276		D=3.5922

Example	'A' Bond'	B' Bond
Face Value	Rs. 1000,00	Rs. 1000,00
Coupon Rate	7%	8%
Years to Maturity	4.0	4.0
Macaulay's Duration	3.631 Years	3.592 Years

From the above example 10.4, it is clear that the bond with larger coupon payments has a shorter duration compared to the bond with low coupon rate.

Duration and Price Changes

The price of a bond changes according to the interest rate. A bond's price changes are commonly called bond volatility. Duration analysis helps to determine the changes in bond price as the yield to maturity changes. The relationship between the duration of a bond and its price volatility as the market interest rate changes is given by the following formula.

$$\text{Percentage change in price} = \frac{-MD[\Delta BP]}{100}$$

MD = Modified duration

BP = Basic point is 0.01 of 1 per cent (1 per cent = 100)

Δ = change in interest rate

$$\text{Modified duration MD} = \frac{D}{1+\frac{R}{P}}$$

Where,

D = Duration

R = Market yield

P = Interest payment per year (usually two)

Modified Macaulay's Duration

Modified duration is a modified version of the Macaulay model that accounts for changing interest rates. Because they affect yield, fluctuating interest rates will affect duration, so this modified formula shows how much the duration changes for each percentage change in yield. For bonds without any embedded features, bond price and interest rate move in opposite directions, so there is an inverse relationship between modified duration and an approximate 1% change in yield. Because the modified duration formula shows how a bond's duration changes in relation to interest rate movements, the formula is appropriate for investors wishing to measure the volatility of a particular bond. Modified duration is calculated as the following:

$$\text{Modified Duration} = \left[\frac{\text{Macaulay Duration}}{\left(1 + \frac{\text{yield - to - maturity}}{\text{number of coupon periods per year}}\right)}\right]$$

OR

$$\text{Modified Duration} = \left[\frac{\text{Macaulay Duration}}{\left(1 + \frac{YTM}{n}\right)}\right]$$

Problem 36

A run buys a bond with four years to maturity. The bond has a coupon rate of 9 per cent and is priced at ₹100 in the market.

(a) What is the duration of the bond?

(b) What will be the percentage change in the price of the bond, if the interest rate rises by 1 per cent?

Solution :

(a) Duration $D = \left[\sum_{t=1}^{T} \frac{P_v(C_t)}{P_0} \times t\right]$

Year	Cash (C_t)	PVIF	PVIF of cash flow	PVIF of coupon × time
1	9	0.9174	8.256	0.0826
2	9	0.8417	7.575	0.1515
3	9	0.7722	6.950	0.2085
4	109	0.7084	77.215	3.0888
			99.996	**3.5314**

Duration is 3.53 years.

(b) Change in price $= \frac{-MD[\Delta BP]}{100}$

Modified duration $= \frac{D}{\frac{1+r}{P}}$

D = Duration (Year)

r = Market yield (decimal)

P = Interest payments per year

$$\text{Modified duration} = \frac{3.531}{10/9} = \frac{3.531}{1.11} = 3.181$$

$$\text{Change in price} = \frac{-MD[\Delta BP]}{100} = \frac{-3.181[100]}{100} = -3.181\%$$

For 1 per cent rise in the interest rate the price declines by 3.181 per cent.

Bond Immunization

Bond immunization strategy is a strategy to derive a specified rate of return regardless of what happens to market interest rates over holding period.

Seeks to offset the opposite changes in bond valuation caused by price effect and reinvestment effect

- **Price Effect:** change un bond value caused by interest rate changes
- **Reinvestment Effect:** as coupon payments are received, they are reinvested at higher or lower rates that original coupon rate.

Bond immunization occurs when the average duration of the bond portfolio just equals the investment time horizon. Bond immunization minimizes risk

The financial community has witnessed a wide variation of interest rates in recent years. It is virtually impossible to invest a portfolio of fixed income securities to a certain maturity without paying the price of interest rate changes. One strategy that healthcare organizations can use to eliminate the uncertainty of interest rate changes is bond immunization.

A major problem often encountered in managing a bond portfolio is assuring a given rate of return over specified future periods. Classical immunization is defined as the process by which a fixed income portfolio is created that has an assured rate of return for a specific time horizon irrespective of interest rate changes.

Bond immunization requires a portfolio structure that balances the change in value (prices) of the portfolio at the end of the investment horizon with the return from the reinvestment of the portfolio cash flows. Immunization may be appropriate to the cash manager who seeks a high degree of assurance of compounded return over a specified investment horizon.

Immunization is especially appropriate where the time horizon is not extremely long or where the investor's tolerance for risk is low. By accepting a more modest return, the manager is more likely to realize the desired return.

Reinvestment rate risk is critical in a bond or a portfolio that is accumulating value over a period of time. The coupon reinvestment risk arises because the yield to maturity computation assumes that all coupon flows will be reinvested at the promised yield to maturity. Unfortunately, the level of interest rates is constantly changing.

Passive Strategy

A passive strategy usually involves holding a portfolio of assets for a long period of time (several years) with few changes over time, and entails little input from the fund manager. This strategy does not require the fund manager to outperform an index or to try to select undervalued assets. The theory behind passive fund management implies that two conditions are being satisfied in the securities market; efficiency and homogeneity of expectations. The assumption is that if securities markets are efficient, securities will always be priced fairly and there will be no incentive to trade actively. Also, if securities markets are characterized by investors who have homogeneous expectations of risks and returns, then again there is no incentive to trade actively. If too few securities are held in the portfolio, however, diversifiable risk may remain. Thus, a larger number of securities must be held for proper diversification.

One version of passive fund management that eliminates diversifiable risk is **index matching**, or **indexing**. Here, the fund manager attempts to match the selected index as closely as possible and to keep the fund positioned as such when money flows in and out of the fund. (Such funds are also known as tracker funds.) The passive fund management strategy has become increasingly popular as investors attempt to gain the return of the market index which is being tracked – no more and no less.

Active Bond Strategy

With an active fund management strategy, the portfolio manager constantly makes decisions and appraises the value of investments within the portfolio by collecting information, using forecasting techniques, and predicting the future performance of the various asset classes, market sectors, individual equities or assets. The goal is to obtain better performance for the portfolio. The fund manager uses personal ability and judgment to select undervalued assets to attempt to outperform the market.

Active fund managers do not believe that securities markets are always efficient. They believe that securities can be valued incorrectly by the market, thus giving rise to trading opportunities that can lead to excess returns. However, in practice, the amount of trading a fund manager will do in a fund may be limited by transaction costs. Timing the market in terms of buying and selling securities is also a part of active portfolio management.

Active managers running equity funds can adopt a number of strategies, all involving detailed analysis. Two common approaches are the 'top-down' and 'bottom-up' methods, which may be used singly or in combination to differing degrees.

The **top-down approach** involves assessing the prospects for particular market sectors or countries (depending on the index), following a detailed review of general economic, financial and political factors. To avoid underperforming the market, fund managers will often try to replicate the market sector and/or weightings. However, different sectors/countries move in and out of favour and so managers may go overweight in a sector/ country if they like the prospects or underweight if they disagree with the market consensus. Sector weightings may be changed by fund managers depending on their view of the prevailing economic cycle (known as sector rotation). If a recession is likely, shares in consumer sectors such as retailing, home builders and motor distributors will be sold and the proceeds reinvested in, say, the food manufacturing sector. A portfolio is then selected of individual shares in the favoured sectors.

The **bottom-up approach** involves the careful selection of individual shares that are assessed to be relatively undervalued and are subsequently sold once they have been re-rated. This involves detailed analysis of available information including: reports on the markets in which the company operates, its competitive position; quality of management; products and technology; customer base and sales potential, prospects for exports; capital expenditure requirements; cost structure and supplier base; and an assessment of the strength of the balance sheet, income and cash flow statements. This analysis will then be combined with judgment on its relative share price, price earnings ratio, dividend prospects and market sentiment. The process may necessitate company visits and meetings with industry analysts. Using all this information, suitable forecasts can be drawn up and the decision made whether or not to buy.

Short Question & Answers

1. Concept of Present Value

Ans :

The present value concept is a fundamental concept used in the share valuation procedure. An understanding of this concept is necessary for studying the share valuation process.

Money has a 'time value'. This implies that a rupee received now is worth more than a rupee to be received after one year, because the rupee received now can be deposited in a bank at 10 per cent interest rate to receive Rs. 1.10 after one year. The time value of money suggests that earlier receipts are more desirable than later receipts, because earlier receipts can be reinvested to generate additional returns before the later receipts come in.

If an amount P is invested now for n years at r rate of interest, the future value F to be received after n years can be calculated using the compound interest formula.

$$F = P(1 + r)^n$$

2. Multiple Year Holding Period

Ans :

An investor may hold a share for a certain number of years and sell it off at the end of his holding period. In this case, he would receive annual dividends each year and the sale price of the share at the end of the holding period. The present value of the share may be expressed as:

$$S_0 = \frac{D_1}{(1+k)^1} + \frac{D_2}{(1+k)^2} + \frac{D_3}{(1+k)^3} + ... + \frac{D_n + S_n}{(1+k)^n}$$

where

$D_1, D_2, D_3, ..., D_n$ = Annual dividends to be received each year.

S_n = Sale price at the end of the holding price.

k = Investor's required rate of return.

n = Holding period in years.

3. Multiplier Approach to Share Valuation

Ans :

Many investors and analysts value shares by estimating an appropriate multiplier for the share. The price-earnings ratio (P/E ratio) is the most popular multiplier used for the purpose.

The price-earnings ratio is given by the expression:

$$\text{P/E ratio} = \frac{\text{Share price}}{\text{Earnings per share}}$$

The intrinsic value of a share is taken as the current earnings per share or the forecasted future earnings per share times the appropriate P/E ratio for the share.

4. Features of Debt Instruments

Ans :

(a) Maturity

Maturity of a bond refers to the date, on which the bond matures, which is the date on which the borrower has agreed to repay the principal. Term-to-Maturity refers to the number of years remaining for the bond to mature. The Term-to-Maturity changes everyday, from date of issue of the bond until its maturity. The term to maturity of a bond can be calculated on any date, as the distance between such a date and the date of maturity. It is also called the term or the tenure of the bond.

(b) Coupon

Coupon refers to the periodic interest payments that are made by the borrower (who is also the issuer of the bond) to the lender (the subscriber of the bond). Coupon rate is the rate at which interest is paid, and is usually represented as a percentage of the par value of a bond.

(c) Principal

Principal is the amount that has been borrowed, and is also called the par value or face value of the bond. The coupon is the product of the principal and the coupon rate. The name of the bond itself conveys the key features of a bond.

For example, a GS CG2015 11.40% bond refers to a Central Government bond maturing in the year 2015 and paying a coupon of 11.40%. Since Central Government bonds have a face value of Rs. 100 and normally pay coupon semi-annually, this bond will pay Rs. 5.70 as six- monthly coupon, until maturity.

5. BOND

Ans :

A bond is more or less the same as a debenture. In India, the two terms are generally interchangeable. There is no significant distinction between the two and the difference if any, is for all practical purposes negligible. While some consider a bond as an American term for a debenture others reserve the term for public debt securities belonging to the government and public sector undertakings. In India, it is common to refer to the long-term debt securities issued by the state governments, or by undertakings owned by them or by development financial institutions, as bonds.

A bond is a contract that requires the borrower to pay the interest income to the lender. It resembles the promissory note and issued by the government and corporate. The par value of the bond indicates the face value of the bond i.e., the value stated on the bond paper. Generally, the face values of bonds are Rs. 1000, 2000, 5000 and alike. Most of the bonds make fixed interest payment till the maturity period. This specific rate of interest is known as coupon rate. Coupons are paid quarterly, semiannually and annually. At the end of the maturity period, the value is repaid.

6. Types of Bonds

Ans :

- **Premium Bonds**

  Premium Bonds can be simply defined as the bonds sold at the price above the par value of the same. Find in detailed about the Premium Bond.

- **Convertible Bonds**

  Convertible Bond entitles the holder of the bond to convert bonds to the share equities during a particular time span. Get more on Convertible Bond.

- **Discount Bonds**

  In a Discount Bond, the bond is sold by a customer at a price below the face value of the same bond. Get in detailed about the Discount Bond.

- **Mortgage Bonds**

  Mortgage Bonds are a special type of bond and is essentially a debt instrument. In such a case the bond is a secured one and the underlying for the same is the real estate (namely, a property which may be of the commercial or residential nature). The security that is given behind the Mortgage Bonds may not always be a property, it may be any asset like the machines.

- **Investment Bonds**

  Investment Bonds are meant solely for investment purposes where the aim of the investor is growth of capital on a long term perspective. This bond can also be purchased by the investors for getting a stream of regular income. Hence the Investment Bonds can serve the purpose of either of the two or both. The range of time for which this bond is chosen completely depends on the financial goals of the concerned person.

- **High Yield Bonds**

  High Yield Bonds are the bonds for which the rate of interest offered are higher. The risk of credit associated with this type of bond is generally higher and is rated by the grading agencies as speculative in nature. They also consider this asset type to be below the level of investment because it is not evident that in the long run or for a specified time period this locked money would appreciate.

7. Bond Analysis and Valuation

Ans :

Bond valuation is the process of determining the fair price of a bond. As with any security or capital investment, the fair value of a bond is the present value of the stream of cash flows it is expected to generate. Hence, the price or value of a bond is determined by discounting the bond's expected cash flows to the present using the appropriate discount rate.

The intrinsic value of bond or debenture is equal to the present value of its expected cash flows. The coupon interest payment, and the principal repayment are known and the present value is determined by discounting these future payments from the issuer at an appropriate discount rate.

Bond Returns : Bond returns can be calculated and expressed in different ways. It is necessary to understand the meaning of each of these expressions.

Coupon Rate : It is the nominal rate of interest fixed and printed on the bond certificate. It is calculated on the face value of the bond. It is the rate at which interest is payable by the issuing company to the bondholder.

8. Yield to Call

Ans :

Some bonds carry a call feature that entitles the issuer to call (buy back) the bond prior to the stated maturity date in accordance with a call schedule (which specifies a call price for each call date) For such bonds, it is a practice to calculate the yield to call (YTC) as well as the YTM.

The procedure for calculating the YTC is the same as for the YTM. Mathematically the YTC is the value of r in the following equation:

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

where M = call price (in rupees)

n = number of years until the assumed call date.

9. Bond Prices

Ans :

All investments, including bonds and shares, derive value from the cash flow they are expected to generate. Because the cash flows will be received over future periods, there is need to discount these future cash flows to derive a present value or price for the security. In general terms, the theoretical price of any security can be established as the present value of a future stream of cash flows, as described by the following formula:

$$P_0 = \sum_{t=1}^{n} \frac{CF_t}{(1+k)^t}$$

The model indicates that the present value or, alternatively, current price P_0 of a security is the cash flows (CF) received over the time horizon V, discounted back at the rate '*k*'.

The value of a bond is equal to the present value of its expected cash flows.

These cash flows have to be discounted at an appropriate discount rate to determine their present value. The present value calculations are made with the help of the following equation:

$$P_0 = \sum_{t=1}^{n} \frac{I_t}{(1+k)^t} + \frac{MV}{(1+k)^n}$$

Where

P_0 = Present value of the bond

I_t = Annual interest payments

MV = Maturity value of the bond

n = Number of years to maturity

k = Appropriate discount rate

10. Bond Risks

Ans :

(i) Interest Rate Risk : Variability in the return from the debt instruments to investors is caused by the changes in the market interest rate. This is known as Interest Rate Risk. Changes that occur in interest rate affect the bonds more directly than the equity. There is a relationship between the coupon rate and market interest rate. If the market interest rate moves up, the price of the bond declines and vice versa.

(ii) Default Risk : The failure to pay the agreed value of the debt instrument by the issuer in full, on time or both are the Default Risk. Treasury bills and bonds issued by the Central Government are devoid of this risk. The same cannot be assured of bonds/debentures issued by any other corporate bodies. The default risk occurs because of macro economic factors or firm specific factors.

(iii) Marketability Risk : Variation in return caused by the difficulty in selling the bonds quickly without having to make a substantial price concession is known as Marketability Risk. This risk is different from the market risk that affects all securities in the market but, marketability risk is a specific risk. The marketability or liquidity of the particular bond depends on the corporate who issues the bond. There is a possibility of a particular company's bond becoming illiquid due to the down-grading of bond's rating by the rating agencies. The managerial inefficiencies and fall in the profits may create a fear in the minds of the investors and they may not be willing to buy such bonds in the secondary market.

11. Bond Duration

Ans :

Duration measures the time structure of a bond and the bond's interest rate risk. The time structure of investment in bonds is expressed in two ways. The common way to state is how many years he has to wait until the bond matures and the principal money is paid back. This is known as asset time to maturity or its years to maturity. The other way is to measure the average time until all interest coupon and the principal is recovered. This is called Macaulay's duration.

Duration is defined as the weighted average of time periods to maturity, weights being present values of the cash flow in each time period.

The formula for duration is.

$$D = \frac{\frac{C_1}{(1+r)}}{P_0} + \frac{\frac{C_2}{(1+r)^2}}{P_0} 2 + \ldots\ldots + \frac{\frac{C_1}{(1+r)^t}}{P_0} \text{ x } T$$

This can be summarised as

$$D = \sum_{t=1}^{T} \frac{P_v(C_t)}{P_0} \text{ x } t$$

D = Duration

C = Cash Flow

r = Current yield to maturity

T = Number of years

PV (C) = Present value of the Cash flow

P_0 = Sum of the present value of cash flow

12. Modified Macaulay's Duration

Ans :

Modified duration is a modified version of the Macaulay model that accounts for changing interest rates. Because they affect yield, fluctuating interest rates will affect duration, so this modified formula shows how much the duration changes for each

percentage change in yield. For bonds without any embedded features, bond price and interest rate move in opposite directions, so there is an inverse relationship between modified duration and an approximate 1% change in yield. Because the modified duration formula shows how a bond's duration changes in relation to interest rate movements, the formula is appropriate for investors wishing to measure the volatility of a particular bond. Modified duration is calculated as the following:

$$\text{Modified Duration} = \left[\frac{\text{Macaulay Duration}}{\left(1 + \frac{\text{yield - to - maturity}}{\text{number of coupon periods per year}}\right)} \right]$$

OR

$$\text{Modified Duration} = \left[\frac{\text{Macaulay Duration}}{\left(1 + \frac{YTM}{n}\right)} \right]$$

13. Bond Immunization

Ans :

Bond immunization strategy is a strategy to derive a specified rate of return regardless of what happens to market interest rates over holding period.

Seeks to offset the opposite changes in bond valuation caused by price effect and reinvestment effect.

- **Price Effect:** change un bond value caused by interest rate changes
- **Reinvestment Effect:** as coupon payments are received, they are reinvested at higher or lower rates that original coupon rate.

Bond immunization occurs when the average duration of the bond portfolio just equals the investment time horizon. Bond immunization minimizes risk

The financial community has witnessed a wide variation of interest rates in recent years. It is virtually impossible to invest a portfolio of fixed income securities to a certain maturity without paying the price of interest rate changes. One strategy that healthcare organizations can use to eliminate the uncertainty of interest rate changes is bond immunization.

14. Passive Strategy

Ans :

A passive strategy usually involves holding a portfolio of assets for a long period of time (several years) with few changes over time, and entails little input from the fund manager. This strategy does not require the fund manager to outperform an index or to try to select undervalued assets. The theory behind passive fund management implies that two conditions are being satisfied in the securities market; efficiency and homogeneity of expectations. The assumption is that if securities markets are efficient, securities will always be priced fairly and there will be no incentive to trade actively. Also, if securities markets are characterized by investors who have homogeneous expectations of risks and returns, then again there is no incentive to trade actively. If too few securities are held in the portfolio, however, diversifiable risk may remain. Thus, a larger number of securities must be held for proper diversification.

One version of passive fund management that eliminates diversifiable risk is **index matching**, or **indexing**. Here, the fund manager attempts to match the selected index as closely as possible and to keep the fund positioned as such when money flows in and out of the fund. (Such funds are also known as tracker funds.) The passive fund management strategy has become increasingly popular as investors attempt to gain the return of the market index which is being tracked – no more and no less.

15. Active Bond Strategy

Ans :

With an active fund management strategy, the portfolio manager constantly makes decisions and appraises the value of investments within the portfolio by collecting information, using forecasting techniques, and predicting the future performance of the various asset classes, market sectors, individual equities or assets. The goal is to obtain better performance for the portfolio. The fund manager uses personal ability and judgment to select undervalued assets to attempt to outperform the market.

Active fund managers do not believe that securities markets are always efficient. They believe that securities can be valued incorrectly by the market, thus giving rise to trading opportunities that can lead to excess returns. However, in practice, the amount of trading a fund manager will do in a fund may be limited by transaction costs. Timing the market in terms of buying and selling securities is also a part of active portfolio management.

Active managers running equity funds can adopt a number of strategies, all involving detailed analysis. Two common approaches are the 'top-down' and 'bottom-up' methods, which may be used singly or in combination to differing degrees.

Choose the Correct Answer

1. _____ refers to the periodic interest payments that are made by the borrower to the lender [b]

   (a) maturity (b) coupon

   (c) principal (d) debt

2. _____ is the amount that has been borrowed, and also par value [c]

   (a) maturity (b) coupon

   (c) principal (d) debt

3. _____ can be simply defined as the bonds sold at the price above the par value of the same [b]

   (a) convertible bonds (b) premium bonds

   (c) discount bonds (d) investment bond

4. _____ bond is sold by a customer at a price below the face value of the same bond [c]

   (a) convertible bonds (b) premium bonds

   (c) discount bonds (d) investment bond

5. ZCB is also known as _____ [a]

   (a) deep discount bonds (b) discount deep bounds

   (c) derivative discount bonds (d) none of the above

6. Moving averages are classified into _____ types [c]

   (a) 4 (b) 3

   (c) 2 (d) 5

7. _____ value of a share is the present value of all future benefits. [a]

   (a) Intrinsic (b) extrinsic

   (c) both (d) none of the above

8. Constant growth model is also known as _____ [a]

(a) Gordon's share valuation model

(b) Gordon's dividend valuation model

(c) Dividend growth model

(d) None of the above

9. _____ is the most popular multiplier used to share valuation [a]

(a) EPS (b) P/E ratio

(c) Holding period (d) YTM

10. _____ relates the annual coupon interest to the market price [b]

(a) coupon yield (b) current yield

(c) YTM (d) All of the above

11. _____ is widely used tools in bond investment management [c]

(a) coupon yield (b) current yield

(c) YTM (d) All of the above

Fill in the blanks

1. P/E ratio = _____.
2. _____ are a way for markets and participants to easily transfer the ownership of debt obligations from one party to another.
3. _____ refers to the periodic interest payments that are made by the borrower (who is also the issuer of the bond) to the lender.
4. _____ loans refer to loans extended for a period of between 2-5 years.
5. _____ refers to unsecured short term funding raised by corporates from other corporates.
6. In a _____, the bond is sold by a customer at a price below the face value of the same bond.
7. _____ are nothing but those bonds which have higher yields.
8. Current Yield = _____.
9. _____ is the single discount factor that makes present value of future cashflows from a bond equal to the current price of the bond.
10. Holding period return _____.

ANSWERS

1. $\frac{\text{Share price}}{\text{Earnings per share}}$
2. Debt instruments
3. Coupon
4. Medium term
5. Inter-Corporate Deposits
6. Discount Bond
7. Junk Bonds
8. $\frac{\text{Annual interest}}{\text{Current market price}}$
9. YTM
10. $\frac{\text{Price gain or loss during the holding Period + Coupon interest rate, if any}}{\text{Price at the beginning of the holding period}}$

UNIT III

Capital Market Theory: Assumptions- Capital Asset Pricing Model – Efficient Frontier with Riskless Lending and Borrowing – Capital Market Line – Security Market Line – SML Vs. CML – Pricing of Securities with CAPM – Limitation of CAPM (Including Problems).

Arbitrage Pricing Theory: The Law of One Price – Assumptions– Arbitrage Pricing for one Risk Factor – Two Factor Arbitrage Pricing– Multiple Arbitrage Pricing – Limitations of APT (Including Problems).

3.1 CAPITAL MARKET THEORY

Capital market theory is a positive theory in that it hypothesis how investors do behave rather than, how investors should behave, as, in the case of Modern Portfolio Theory (MPT). It is reasonable "to view capital market" theory, as an extension of portfolio theory, but it is important to understand that MPT is not based on the validity, or lack thereof, of capital market theory.

The equilibrium model of interest to many investors is known as the capital asset pricing model, typically referred to as the CAPM. It allows us to measure the relevant risk of an individual security as well as to assess the relationship between relevant risk of and the returns expected from investing. The CAPM is attractive as an equilibrium model because of its simplicity and its implications. Because of serious challenges, to the model, however, alternatives have been developed. The primary alternative to the CAPM is arbitrage pricing theory, or APT, which allows for multiple sources of risk.

Assumptions

1. All investors can borrow or lend money at the risk-free rate of return.
2. All investors have identical probability distributions for future rates of return, they have homogeneous expectations with respect to the three inputs of the portfolio model i. e. expected returns, the variance of returns, and the correlation matrix.

   Therefore, given a set of security prices and a risk-free rate, all investors use the same information to generate an efficient frontier.

3. All investors have the same one-period time horizon.

4. There are no transaction costs.

5. There are no personal income taxes—investors are indifferent between capital gains and dividends.

6. There is no inflation.

7. There are many investors, and no single investor can affect the price of a stock through his or her buying and selling decisions. Investors are price takers and act as if prices are unaffected by their own trades

8. Capital markets are in equilibrium.

3.1.1 Capital Asset Pricing Model (CAPM)

The CAPM was developed to explain how risky securities are priced in market and this was attributed to experts like sharpe and Linter. Markowitz theory being more theoretical, CAPM aims at a more practical approach to stock valuation. It is no doubt based on the mean-variance approach to risk for assessment of investment as developed by Markowitz. It explains the behavioral pattern of investors in building up portfolios. It is based on economic model. It aims the investor at maximizing the utility of wealth.

The capital asset pricing model is a relationship explaining how assets should be priced in the capital markets. It reveals the relationship between the expected return, unavoidable risk and the valuation of securities. The unavoidable risk means, the risk which cannot be avoided by diversification. If a security does not provide adequate returns, then the security will not favour the investor. The CAPM is build upon the Markovitz Portfolio Model and capital market line.

An equilibrium model of asset pricing that states that the expected return on a security's sensitivity to changes in the market portfolios return. The relevant risk for an individual asset is systematic risk (or market related risk) because non-market risk can be eliminated by diversification and systematic risk is measured by beta. In other words,

all securities are expected to yield returns commensurate with their riskiness. Therefore, the relationship between an assets return and its systematic risk can be expressed by the CAPM, which is also called the security market line. The equation is as follows,

$$\bar{r}_i = r_f + \beta_i [\bar{r}_m - r_f]$$

Where,

$\bar{r}_i$ = The expected return for an asset

r_f = The risk-free rate

$\bar{r}_m$ = The expected market return (usually assumed to be BSE sensex)

β_1 = The assets beta.

The CAPM is an equilibrium model for measuring the risk-return trade-off for all assets including both efficient and efficient portfolios. A graph of the CAPM is as follows,

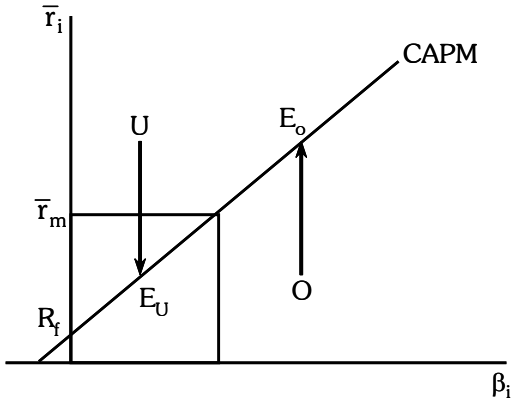


Fig.: Capital Asset Pricing Model

The above figure depicts two assets U and O, that are not in the equilibrium on the CAPM. Asset U is undervalued and therefore, a very desirable asset to own. U's price will rise in the market as more investors purchase. However, as U's price goes up, it return falls. When U's return falls to the return consistent with its beta on the SML, equilibrium is attained. With O, just the opposite takes place. Investors will attempt to sell O, since it is over value, and therefore, put downward pressure on O's price. When the return on asset O increases to the rate that is consistent with the beta risk level given by the SML, equilibrium will be achieved and downward price pressure will cease.

Assumptions of the CAPM

The capital asset pricing model is based on certain explicit assumptions regarding the behaviour of investors. The assumptions are listed below:

1. Investors make their investment decisions on the basis of risk-return assessments measured in terms of expected returns and standard deviation of returns.
2. The purchase or sale of a security can be undertaken in infinitely divisible units.
3. Purchases and sales by a single investor cannot affect prices. This means that there is perfect competition where investors in total determine prices by their actions.
4. There are no transaction costs. Given the fact that transaction costs are small, they are probably of minor importance in investment decision-making, and hence they are ignored.
5. There are no personal income taxes. Alternatively, the tax rates on dividend income and capital gains are the same, thereby making the investor indifferent to the form in which the return on the investment is received (dividends or capital gains).
6. The investor can lend or borrow any amount of funds desired at a rate of interest equal to the rate for riskless securities.
7. The investor can sell short any amount of any shares.
8. Investors share homogeneity of expectations. This implies that investors have identical expectations with regard to the decision period and decision inputs. Investors are presumed to have identical holding periods and also identical expectations regarding expected returns, variances of expected returns and covariances of all pairs of securities.

It is true that many of the above assumptions are untenable. However, they do not materially alter the real world. Moreover, the model describes the risk return relationship and the pricing of assets fairly well.

Risk Free Asset

Investment in riskfree asset is often referred to as riskfree lending. Since the Markowitz's approach involves investing for a single holding period, it means that the return of the riskfree asset is certain. If the investor purchases this asset at the beginning of the holding period, then the investor knows exactly what the value of the asset will be

at the end of the holding period. Since there is no uncertainty about the terminal value of the riskfree asset, the standard deviation of the riskfree asset is, by definition, zero. In turn, this means that the covariance between the rate of return on the riskfree asset and the rate of return on any risky asset is zero.

Since a riskfree asset has, by definition, a certain return, this type of asset must be some kind of fixed-income security with no possibility of default. Since all corporate securities have some chance of default, the riskfree asset cannot be issued by a corporation. This leaves only one type of security as a riskfree asset, i.e., Treasury security. Again, only those specific Treasury bills with a maturity that match the length of the investor's holding period.

With the introduction of a riskfree asset, the investor is now able to put part of his or her money in this asset and the remainder in any of the risky portfolios that are in Markowitz's feasible set. Adding these new opportunities expands the feasible set significantly and, more importantly, changes the location of part of Markowitz's efficient set. The nature of these changes needs to be analysed, since investors are concerned with selecting a portfolio from the efficient set. In doing so, consideration is given initially in determining the expected return and standard deviation for a portfolio that consists of combining an investment in the riskfree asset with an investment in a single risky security.

3.2 Efficient Frontier with Riskless Lending and Borrowing

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

Now it is assumed that there exists a riskless asset available for investment. A riskless asset is one whose return is certain such as a government security. Since the return is certain, the variability of return or risk is zero. The investor can invest a portion of his funds in the riskless asset which would be equivalent to lending at the risk free asset's rate of return, namely Rf. He would then be investing in a combination of risk free asset and risky assets.

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

The efficient frontier arising from a feasible set of portfolios of risky assets is concave in shape. When an investor is assumed to use riskless lending and borrowing in his investment activity the shape of the efficient frontier transforms into a straight line. Let us see how this happens.

Consider Figure The concave curve ABC represents an efficient frontier of risky portfolios. B is the optimal portfolio in the efficient frontier with R_p = 15 per cent and a_p = 8 per cent. A risk free asset with rate of return Rf = 7 per cent is available for investment. The risk or standard deviation of this asset would be zero because it is a riskless asset. Hence, it would be plotted on the Y axis. The investor may lend a part of his money at the riskless rate, i.e. invest in the risk free asset and invest the remaining portion of his funds in a risky portfolio.

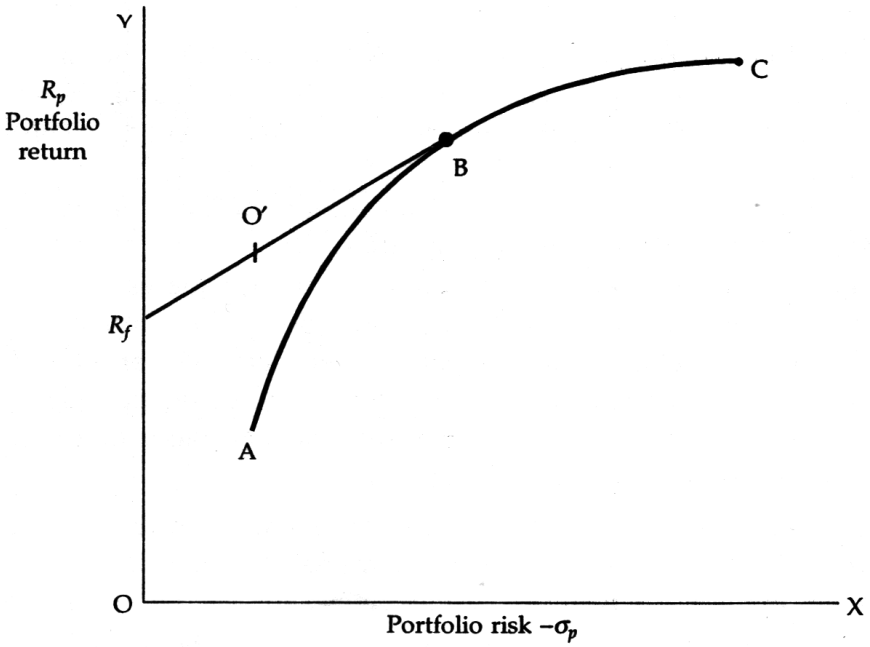


Fig.: Efficient Frontier with Introduction of Lending

If an investor places 40 per cent of his funds in the riskfree asset and the remaining 60 per cent in portfolio B, the return and risk of this combined portfolio O' may be calculated using the following formulas.

Return

$$R_c = \omega R_m + (1 - \omega)R_f$$

where

R_c = Expected return on the combined portfolio.

ω = Proportion of funds invested in risky portfolio.

$(1 - \omega)$ = Proportion of funds invested in riskless asset.

R_m = Expected return on risky portfolio.

R_f = Rate of return on riskless asset.

Risk

$$\sigma_c = \omega\sigma_m + (1 - \omega)\sigma_f$$

where

σ_c = Standard deviation of the combined portfolio.

ω = Proportion of funds invested in risky portfolio.

σ_m = Standard deviation of risky portfolio.

σ_f = Standard deviation of riskless asset.

The second term on the right hand side of the equation, $(1 - \omega)\sigma_f$ would be zero as σ_f = zero. Hence, the formula may be reduced as

$$\sigma_c = \omega\sigma_m$$

The return and risk of the combined portfolio in our illustration is worked out below:

R_c = (0.60)(15) + (0.40)(7)

= 11.8 per cent

σ_c = (0.60) (8) = 4.8 per cent

Both return and risk are lower than those of the risky portfolio B.

If we change the proportion of investment in the risky portfolio to 75 per cent, the return and risk of the combined portfolio may be calculated as shown below:

R_c = (0.75)(15) + (0.25)(7)

= 13 per cent

σ_c = (0.75)(8) = 6 per cent

Here again, both return and risk are lower than those of the risky portfolio B.

Similarly, the return and risk of all possible combinations of the riskless asset and the risky portfolio B may be worked out. All these points will lie in the straight line from Rf to B in Figure.

Now, let us consider borrowing funds by the investor for investing in the risky portfolio an amount which is larger than his own funds.

If ω is the proportion of investor's funds invested in the risky portfolio, then we can envisage three situations. If $\omega = 1$, the investor's funds are fully committed to the risky portfolio. If $\omega < 1$, only a fraction of the funds is invested in the risky portfolio and the remainder is lend at the risk free rate. If $\omega > 1$, it means the investor is borrowing at the risk free rate and investing an amount larger than his own funds in the risky portfolio.

The return and risk of such a levered portfolio can be calculated as follows:

$$R_L = \omega R_m - (\omega - 1)R_f$$

where

R_L = Return on the levered portfolio.

ω = Proportion of investor's funds invested in the risky portfolio.

R_m = Return on the risky portfolio.

R_f = The risk free borrowing rate which would be the same as the risk free lending rate, namely the return on the riskless asset.

The first term of the equation represents the gross return earned by investing the borrowed funds as well as investor's own funds in the risky portfolio. The second term of the equation represents the cost of borrowing funds which is deducted from the gross returns to obtain the net return on the levered portfolio. The risk of the levered portfolio can be calculated as:

$$\sigma_L = \omega\sigma_m$$

The return and risk of the investor in our illustration may be calculated assuming $\omega = 1.25$

$$R_L = (1.25)(15) - (0.25)(7)$$

$$= 17 \text{ per cent}$$

$$\sigma_L = (1 - 25)(8) = 10 \text{ per cent}$$

The return and risk of the levered portfolio are larger than those of the risky portfolio. The levered portfolio would give increased returns with increased risk. The return and risk of all levered portfolios would lie in a straight line to the right of the risky portfolio B. This is depicted in Figure.

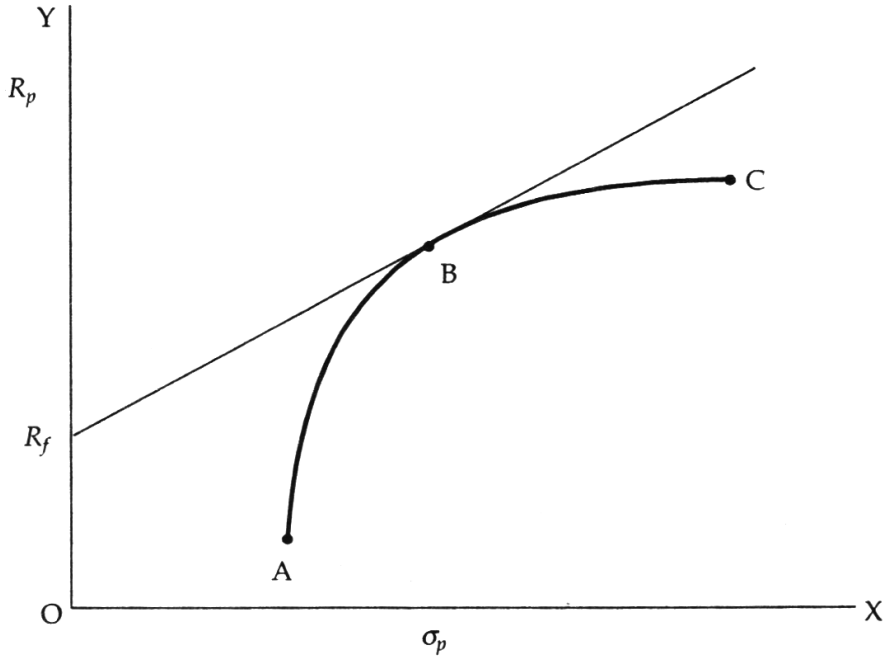


Fig.: Efficient Frontier with Borrowing and Lending

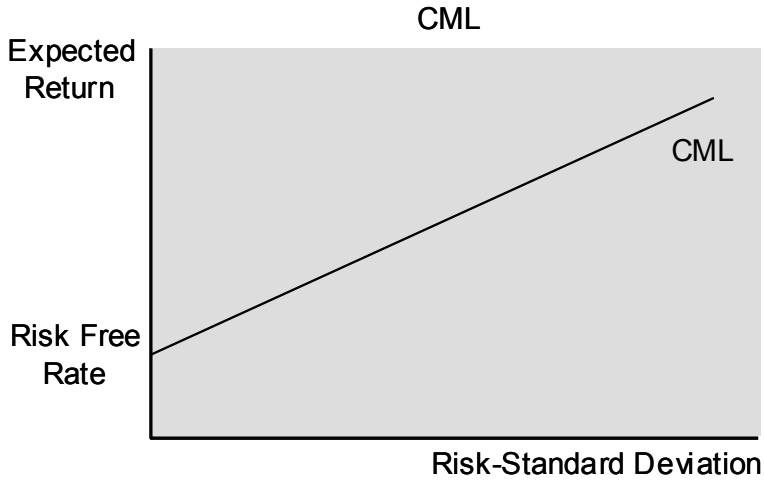
Thus, the introduction of borrowing and lending gives us an efficient frontier that is a straight line throughout. This line sets out all the alternative combinations of the risky portfolio B with risk free borrowing and lending.

The line segment from R_f to B includes all the combinations of the risky portfolio and the risk free asset. The line segment beyond point B represents all the levered portfolios (that is combinations of the risky portfolio with borrowing). Borrowing increases both the expected return and the risk, while lending (that is, combining the risky portfolio with risk free asset) reduces the expected return and risk. Thus, the investor can use borrowing or lending to attain the desired risk level. Those investors with a high risk aversion will prefer to lend and thus, hold a combination of risky assets and the risk free asset. Others with less risk aversion will borrow and invest more in the risky portfolio.

3.3 Capital Market Line

As seen previously, adjusting for the risk of an asset using the risk-free rate, an investor can easily alter his risk profile. Keeping that in mind, in the context of the capital market line (CML), the market portfolio consists of the combination of all risky assets and the risk-free asset, using market value of the assets to determine the weights. The CML line is derived by the CAPM, solving for expected return at various levels of risk.

Markowitz' idea of the efficient frontier, however, did not take into account the risk-free asset. The CML does and, as such, the frontier is extended to the risk-free rate as illustrated below:



Systematic and Unsystematic Risk

Total risk to a stock not only is a function of the risk inherent within the stock itself, but is also a function of the risk in the overall market. Systematic risk is the risk associated with the market. When analyzing the risk of an investment, the systematic risk is the risk that cannot be diversified away.

Unsystematic risk is the risk inherent to a stock. This risk is the aspect of total risk that can be diversified away when building a portfolio.

Formula : Total risk = Systematic risk + Unsystematic risk

When building a portfolio, a key concept is to gain the greatest return with the least amount of risk. However, it is important to note, that additional return is not guaranteed for an increased level of risk. With risk, reward can come, but losses can be magnified as well.

3.4 Security Market Line (SML)

The security market line (SML) is the line that reflects an investment's risk versus its return, or the return on a given investment in relation to risk. The measure of risk used for the security market line is beta.

The line begins with the risk-free rate (with zero risk) and moves upward and to the right. As the risk of an investment increases, it is expected that the return on an investment would increase. An investor with a low risk profile would choose an investment at the beginning of the security market line. An investor with a higher risk profile would thus choose an investment higher along the security market line.

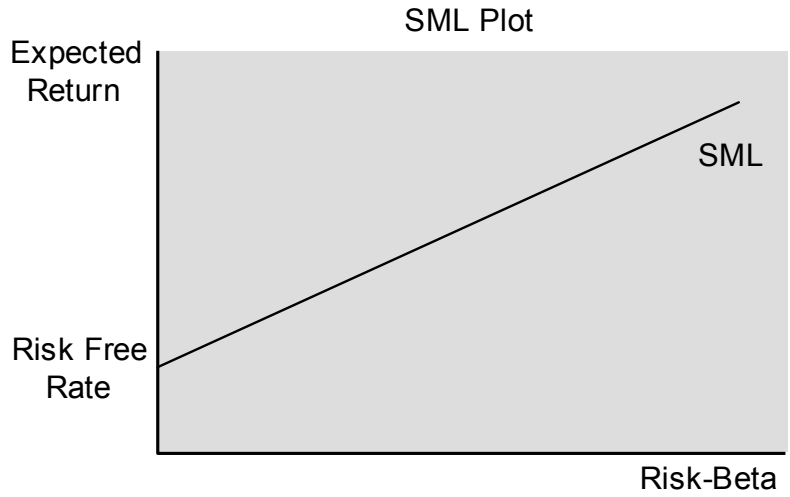


Figure: Security Market Line

Given the SML reflects the return on a given investment in relation to risk, a change in the slope of the SML could be caused by the risk premium of the investments. Recall that the risk premium of an investment is the excess return required by an investor to help ensure a required rate of return is met. If the risk premium required by investors was to change, the slope of the SML would change as well.

When a shift in the SML occurs, a change that affects all investments' risk versus return profile has occurred. A shift of the SML can occur with changes in the following:

1. Expected real growth in the economy.
2. Capital market conditions.
3. Expected inflation rate.

SML and CML

It is necessary to contrast SML with CML. Both postulate a linear (straight line) relationship between risk and return. In CML the risk is defined as total risk and is measured by standard deviation, while in SML the risk is defined as systematic risk and is measured by β. Capital market line is valid only for efficient portfolios while security market line is valid for all portfolios and all individual securities as well. CML is the basis of the capital market theory while SML is the basis of the capital asset pricing model.

3.5 Pricing of Securities with CAPM

The capital asset pricing model can also be used for evaluating the pricing of securities. The CAPM provides a framework for assessing whether a security is underpriced, overpriced or correctly priced. According to CAPM, each security is expected to provide a return commensurate with its level of risk. A security may be offering more returns than the expected return, making it more attractive. On the contrary, another security may be offering less return than the expected return, making it less attractive.

The expected return on a security can be calculated using the CAPM formula. Let us designate it as the theoretical return. The real rate of return estimated to be realised from investing in a security can be calculated by the following formula:

$$R_i = \frac{(P_1 - P_0) + D_1}{P_0}$$

where

P_0 = Current market price.

P_i = Estimated market price after one year.

D_1 = Anticipated dividend for the year.

This may be designated as the estimated return.

The CAPM framework for evaluation of pricing of securities can be illustrated with Figure.

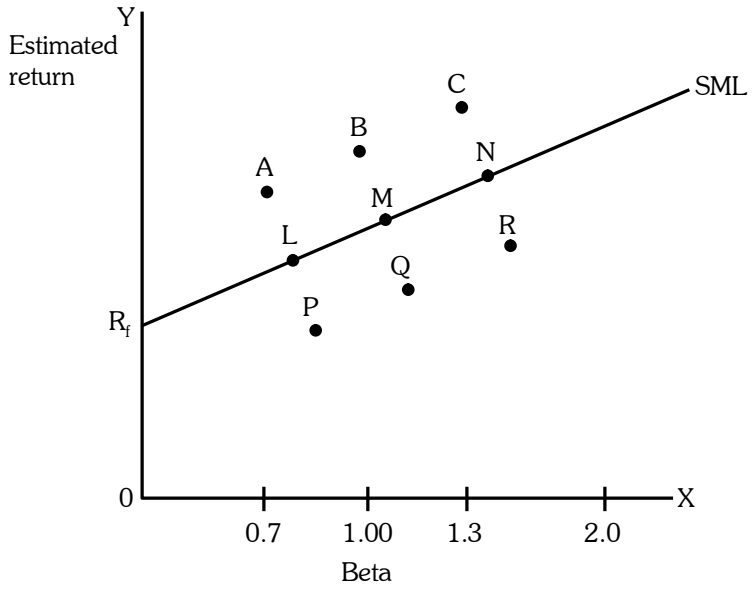


Fig.: CAPM and Security Valuation

Figure shows the security market line. Beta values are plotted on the X axis, while estimated returns are plotted on the Y axis. Nine securities are plotted on the graph according to their beta values and estimated return values.

Securities A, L and P are in the same risk class having an identical beta value of 0.7. The security market line shows the expected return for each level of risk. Security L plots on the SML indicating that the estimated return and expected return on security L is identical. Security A plots above the SML indicating that its estimated return is higher than its theoretical return. It is offering higher return than what is commensurate with its risk. Hence, it is attractive and is presumed to be underpriced. Stock P which plots below the SML has an estimated return which is lower than its theoretical or expected return. This makes it undesirable. The security may be considered to be overpriced.

Securities B, M and Q constitute a set of securities in the same risk class. Security B may be assumed to be underpriced because it offers more return than expected, while security Q may be assumed to be overpriced as it offers lower return than that expected on the basis of its risk. Security M can be considered to be correctly priced as it provides a return commensurate with its risk.

Securities C, N and R constitute another set of securities belonging to the same risk class, each having a beta value of 1.3. It can be seen that security C is underpriced, security R is overpriced and security N is correctly priced.

Calculation of CAPM Model

Under this model, the expected return of the security and return portfolio and other values can calculated as follows.

1) Expected Return on Security

$$Ri = T + \beta (Rm - T)$$

Where Ri = Expected return of the security

T = Riskless interest rate

Rm = Expected return on the market portfolio

(or) S.D. of the portfolio

bim = Beta value

2) Expected Return on Portfolio

$$E(R_p) = T + \sigma_P \left[\frac{Rm - T}{\sigma_m} \right]$$

Where $E(R_P)$ = Expected return on the portfolio

T = Riskless interest rate

σ_P = S.D of the portfolio

σ_m = SD of market portfolio

R_m = Expected return on index.

3) Construction of efficient Portfolio

$$R_p = W (R_m) + (1 - w)T$$

Where

w = Weightage or proportion of Market portfolio

3.5.1 Merits of CAPM

- **Ease-of-use**

  CAPM is a simplistic calculation that can be easily stress-tested to derive a range of possible outcomes to provide confidence around the required rates of return.

- **Diversified Portfolio**

  The assumption that investors hold a diversified portfolio, similar to the market portfolio, eliminates unsystematic (specific) risk.

- **Systematic Risk (beta)**

  CAPM takes into account systematic risk, which is left out of other return models, such as the dividend discount model (DDM). Systematic or market risk is an important variable because it is unforeseen and often cannot be completely mitigated because it is often not fully expected.

- **Business and Financial Risk Variability :** When businesses investigate opportunities, if the business mix and financing differ from the current business, then other required return calculations, like weighted average cost of capital (WACC) cannot be used.

Demerits of CAPM

- The model assumes that asset returns are (jointly) normally distributed random variables. It is however frequently observed that returns in equity and other markets are not normally distributed. As a result, large swings occur in the market more frequently than the normal distribution assumption would expect.
- The model assumes that the variance of returns is an adequate measurement of risk. This might be justified under the assumption of normally distributed returns, but for general return distributions other risk measures will likely reflect the investors' preferences more adequately.
- The model assumes that all investors have access to the same information and agree about the risk and expected return of all assets.
- The model assumes that the probability beliefs of investors match the true distribution of returns. A different possibility is that investors' expectations are biased, causing market prices to be informationally inefficient.

- The model does not appear to adequately explain the variation in stock returns. Empirical studies show that low beta stocks may offer higher returns than the model would predict.
- The model assumes that given a certain expected return investors will prefer lower risk (lower variance) to higher risk and conversely given a certain level of risk will prefer higher returns to lower ones. It does not allow for investors who will accept lower returns for higher risk. Casino gamblers clearly pay for risk, and it is possible that some stock traders will pay for risk as well.
- The model assumes that there are no taxes or transaction costs, although this assumption may be relaxed with more complicated versions of the model.
- The market portfolio consists of all assets in all markets, where each asset is weighted by its market capitalization. This assumes no preference between markets and assets for individual investors, and that investors choose assets solely as a function of their risk-return profile. It also assumes that all assets are infinitely divisible as to the amount which may be held or transacted.
- The model assumes just two dates, so that there is no opportunity to consume and rebalance portfolios repeatedly over time. The basic insights of the model are extended and generalized in the intertemporal CAPM (ICAPM) of Robert Merton, and the consumption CAPM (CCAPM) of Douglas Breeden and Mark Rubinstein.

Limitation of CAPM

a) It is based on some unrealistic assumptions such as:
   i) Existence of Risk-free assets
   ii) All assets being perfectly divisible and marketable (human capital is not divisible)
   iii) Existence of homogeneous expectations about the expected returns
   iv) Asset returns are normally distributed.

b) CAPM is a single period model - it looks at the end of the year return.

c) CAPM cannot be empirically tested because we cannot test investors expectations.

d) CAPM assumes that a security's required rate of return is based on only one factor (the stock market - beta). However, other factors such as relative sensitivity to inflation and dividend payout, may influence a security's return relative to those of other securities.

PROBLEMS

1. Mr. X considering several investments the risk free rate of return is 6.75% and the expected return for the market is 12% what should be the required rates of return for each investment using the CAPM.

Security :	A	B	C	D	E
Beta :	1.20	0.80	1.50	0.60	1.25

Solution :

T = 6.75

Rm = 12

Security A

Ri = T + bim (R_m - T)

= 6.75 + 1.20 (12 - 6.75)

= 6.75 + 1.20 (5.25)

= 6.75 + 6.30 = 13.05%

Security B

Ri = 6.75 + 0.80 (12 - 6.75)

= 6.75 + 0.80 (5.25)

= 6.75 + 4.0 = 10.95%

Security C

Ri = 6.75 + 1.50 (12 - 6.75)

= 6.75 + 1.50 (5.25)

= 6.75 + 7.87 = 14.62%

Security D

Ri = 6.75 + 0.60 (12 - 6.75)

= 6.75 + 0.60 (5.25)

= 6.75 + 3.15 = 9.9%

Security E

Ri = 6.75 + 1.25 (12 - 6.75)

= 6.75 + 1.25 (5.25)

= 6.75 + 6.6 = 13.35% .

2. If the risk free return is 10% and the expected return on BSE is 18% and risk measurement by std deviation is 5%. How do you construct an efficient portfolio to produce a 16% expected return and what would be its risk.

Solution :

R_p = W(Rm) + (1-w)T

T = 10 Rm = 18%

σ_m = 5%, Rp = 16%

16 = W(18) + (1-W)10

16 = 18W + 10-10W

-18W + 10W = 10-16

-8W = – 6

$\therefore \quad W = \frac{-6}{-8} = 0.75$

Therefore 75% of funds should be placed in market portfolio and the balance 25% should be invested in riskfree securities.

The portfolio risk can be measured as follows :

$$E(Rp) = T + \sigma_p \sigma_p \left[\frac{R_m - T}{\sigma_m}\right]$$

$$= 16 = 10 + \sigma_p \left[\frac{18-10}{5}\right]$$

$$= 16 = 10 + \sigma_p \left[\frac{8}{5}\right]$$

$$= 16 = 10 + \sigma_p (1.6)$$

$$16 = 10 + 1.6\sigma_p$$

$$-1.6\sigma_p = 10-16$$

$$-1.6\sigma_p = -6$$

$$\sigma_p = \frac{-6}{-1.6} = 3.75$$

$$\sigma_p = 3.75.$$

3. From the following information, construct the efficient portfolio when its expected return is 18% and also findout the portfolio risk. T = 8%, Rm = 20%. S.D on market index is 8%.

Solution :

Risk free return (T) = 8%

Expected return on index is 20% (Rm)

Risk measurement by S.D = 8%

Rm = 20% T = 8% Rp = 18% $\sigma_m = 8\%$

Rp = W (Rm) + (1-W)T

18 = W(20) + (1-W)8

18 = 20W + 8 - 8W

– 20W + 8W = 8 - 18

– 12W = -10

$$W = \frac{-10}{-12} = 0.83$$

Therefore 83% of funds should be placed in market portfolio and the balance 17% should be invested in the riskfree securities.

Portfolio Risk :

$$Rp = T + \sigma_p\left[\frac{R_m - T}{\sigma_m}\right]$$

$$T = 8 \quad \sigma_m = 8$$

$$R_m = 20 \quad \sigma_p = ?$$

$$R_p = 18$$

$$18 = 8 + \sigma_p \left[\frac{20-8}{8}\right]$$

$$18 = 8 + \sigma_p \left[\frac{12}{8}\right]$$

$$18 = 8 + \sigma_p (1.5)$$

$$18 = 8 + 1.5\sigma_p$$

$$-1.5\sigma_p = -10$$

$$\sigma_p = \frac{-10}{-1.5}$$

$$= 6.67.$$

4. Based on the risk and return relationship of the CAPM, find the missing data in the following table.

Security	Expected Ri return	Beta bim	Rm Exp rate on Index.
A	0.1305	1.20	-
B	-	0.80	0.12
C	0.1462	--	0.12
D	0.099	0.60	--
E	--	1.26	0.18

Consider the riskfree interest rate is 0.525 (T)

Solution :

Security A

$$Ri = T + bim\ (Rm\text{-}T)$$

$$0.1305 = 0.525 + 1.20\ (Rm - 0.525)$$

$$0.1305 = 0.525 + 1.20\ Rm - 0.63$$

$$-1.20\,Rm = 0.525 - 0.63 - 0.1305$$

$$-1.20\,Rm = -0.2355$$

$$Rm = \frac{-0.235}{-1.20}$$

$$= 0.196$$

Security B

$$Ri = T + bim\,(Rm\text{-}T)$$

$$= 0.525 + 0.80\,(0.12 - 0.525)$$

$$= 0.525 + 0.80\,(-0.405)$$

$$= 0.525 - 0.324 \Rightarrow 0.525 - 0.324$$

$$= 0.201$$

Security C

$$Ri = T + bim\,(Rm\text{-}T)$$

$$0.1462 = 0.525 + bim\,(0.12 - 0.525)$$

$$0.1462 = 0.525 + bim\,(-0.405)$$

$$0.1462 = 0.525 - 0.405\,bim$$

$$0.405bim = 0.525 - 0.1462$$

$$0.405\,bim = 0.3788$$

$$bim = \frac{0.3788}{0.405}$$

$$= 0.935$$

Security D

$$Ri = T + bim\,(Rm\text{-}T)$$

$$0.099 = 0.525 + 0.60\,(Rm - 0.525)$$

$$0.099 = 0.525 + 0.60\,(Rm\text{-}0.525)$$

$$0.099 = 0.525 - 0.315 + 0.60\,Rm$$

$$0.099 = 0.21 + 0.60\ Rm$$

$$-0.60\ Rm = 0.21 - 0.099$$

$$-0.60Rm = 0.111$$

$$= \frac{0.111}{-0.60}$$

$$= -0.185$$

Security E

$$Ri = T + bim\ (Rm-T)$$

$$= 0.525 + 1.26\ (0.18 - 0.525)$$

$$= 0.525 + 1.26\ (-0.345)$$

$$= 0.525 - 0.435$$

$$= 0.09$$

5. Assume that the risk-free rate is 10%, expected return on the market is 16% and the return on stock c is 18%.

   (a) Determine the implicit beta for stock c.

   (b) What is stock c's return if its beta is 0.75?

Solution :

(a) According to CAPM model,

$$\bar{r}_c = r_f + \beta_c [\bar{r}_m - r_f]$$

$$\Rightarrow \quad 18 = 10 + \beta_c [16 - 10]$$

$$\Rightarrow \quad 18 = 10 + 6\beta_c$$

$$\Rightarrow \quad 6\beta_c = 18 + 10$$

$$\therefore \quad \beta_c = \frac{8}{6} = 1.33$$

(b) $\bar{r}_c = 10 + 0.75\ (16 - 10)$

$\therefore\ \beta_c = 10 + 4.5 = 14.5\%$

6. The mid east investment company manages a stock fund consisting of five stocks with the following market values and betas.

Stock	Market value	Beta
A	100000	1.10
B	50000	1.20
C	75000	0.75
D	125000	0.80
E	150000	1.40
	500000	

If r_f is 7% and $\bar{r}$ is 14%, what is the portfolio's expected return?

Solution :

Calculation of weights (W_i) of each security in the portfolio,

$$W_A = \frac{100000}{500000} = 0.20$$

$$W_B = \frac{500000}{5000000} = 0.10$$

$$W_C = \frac{75000}{500000} = 0.15$$

$$W_D = \frac{125000}{500000} = 0.25$$

$$W_E = \frac{150000}{500000} = 0.30$$

Calculation of beta of the portfolio,

$$\beta_p = W_A \beta_A + W_B \beta_B + W_C \beta_C + W_D \beta_D + W_E \beta_E$$

$$= (0.2 \times 1.10) + (0.10 \times 1.20) + (0.15 \times 0.75) + (0.25 \times 0.80) + (0.30 \times 1.40)$$

$$= 0.22 + 0.12 + 0.1125 + 0.20 + 0.42$$

$$= 1.0725$$

According to CAPM model, expected return of the portfolio is as follows,

$$\bar{r}_p = r_f + \beta_p [\bar{r}_m - r_f]$$
$$= 7 + 1.0725 (14 - 7)$$
$$= 7 + 7 (1.0725)$$
$$= 7 + 7.5075$$
$$= 14.5075\%$$

7. Assume $r_f = 9\%$ and $\bar{r}_m = 15\%$. The expected returns and betas are given below for three stocks.

Stock	Expected return	Expected beta
X	14%	1.20
Y	15%	0.75
Z	20%	1.50

Which stocks (s) are under valued, over-valued?

Solution :

Determination of return for each stock that is consistent with equilibrium using the CAPM is,

$$\bar{r}_p = r_f + \beta_p [\bar{r}_m - r_f]$$

(i) $$\bar{r}_x = 9 + 1.20 (15 - 9)$$
$$= 9 + 1.20 (6)$$
$$= 9 + 7.2 = 16.2\%$$

Stock X is overvalued as its expected return is less than its equilibrium return.

(ii) $$\bar{r}_y = 9 + 0.75 (15 - 9)$$
$$= 9 + 0.75 (6) = 9 + 4.5 = 13.5\%$$

Stock Y is undervalued because its equilibrium return is less than its expected return.

(iii) $$\bar{r}_z = 9 + 1.5 (15 - 9) = 9 + 1.5 (6)$$
$$= 9 + 9 = 18\%$$

Stock Z is undervalued as its expected return is more than its equilibrium return.

8. Assume CAPM equilibrium model with unlimited borrowing and lending at a riskless rate of interest.

Security y	$\bar{r}$	s	b	σ_1^2
A	0.15	-	2.0	0.10
B	-	0.25	0.75	0.04
C	0.09	-	0.50	0.17

Compute the blanks in the above given table.

Solution :

The equation of CML is as follows,

$r_i = r_f + \beta_i r_m$

Given that,

For securities A and C, CML equation would be,

$0.15 = r_f + 2\, r_m$ (For security A)

$0.09 = r_f + 0.5\, r_m$ (For security C)

$0.06 = +\ 1.5\, rm$

$\therefore \quad r_m = \dfrac{0.06}{1.5} = 0.04$

Substituting the value of "r_m" in one of the above equation, we get,

$0.15 = r_f + 2rm$

$0.15 = r_f + 2 \times 0.04$

$\therefore \quad r_f = 0.07$

Therefore, return for security B would be,

$$\begin{aligned} r_B &= r_f + \beta_B\, r_m \\ &= 0.07 + 0.75 \times 0.04 \\ &= 0.10 \end{aligned}$$

We know that,

$$\sigma_i^2 = \text{Explained variance} + \text{Residual variance}$$

Explained variance = $\beta^2 \times$ Variance of index

$\therefore$ In case of security B,

Explained variance = Total variance – Residual variance

$= (0.25)^2 - 0.04$

$= 0.0625 - 0.04$

$= 0.0225$

And hence,

Explained variance = $\beta^2 \times$ Variance of index

$$0.0225 = (0.75)^2 \times \sigma_m^2$$

$$\sigma_m^2 = 0.04$$

Therefore,

$$\sigma_A = [\text{Explained variance} + \text{Residual variance}]^{1/2}$$

$$= \sqrt{(2^2 \times 0.04) + 0.10}$$

$$= 0.51$$

and

$$\sigma_C = \sqrt{(0.5^2 \times 0.04) + 0.17}$$

$$= 0.42$$

9. Assume the CAPM with risk free lending but not risk free borrowing. The return on the market portfolio is 10% and the return on the zero beta portfolio is 6%. The market standard deviation is 30%, complete the following table.

Security	Expected return	Standard deviation	Beta variance	Residual
X	0.14	- - -	- - -	0.0375
Y	0.10	- - -	- - -	0.0375

Solution :

The SML equation is,

$$r = \alpha + \beta(r_m)$$

Where, a = Return on the zero beta portfolio

Beta Values

X security,

$$0.15 = 0.06 + bx\ (0.10)$$

$$\beta_x(0.10) = 0.15 - 0.06$$

$$\beta_x = \frac{0.04}{0.14} = 0.4$$

Y security,

$$0.10 = 0.06 + \beta_y\ (0.10)$$

$$\beta_y(0.10) = 0.10 - 0.06$$

$$\beta_y = \frac{0.04}{0.10} = 0.4$$

Standard Deviation

We know that,

$$\sigma = \sqrt{(\beta^2 \times \text{Variance of index}) + \text{Residual variance}}$$

X security,

$$\sigma = \sqrt{(0.9^2 \times 0.3^2) + 0.0375}$$

$$= \sqrt{0.1104} = 0.332$$

Y security,

$$\sigma = \sqrt{(0.4^2 \times 0.3^2) + 0.0775}$$

$$= \sqrt{0.0919} = 0.303$$

3.6 Arbitrage Pricing Theory

Arbitrage pricing theory is one of the tools used by the investors and portfolio managers. The capital asset pricing theory explains the returns of the securities on the basis of their respective betas. According to the previous models, the investor chooses the investment on the basis of expected return and variance. The alternative model developed in asset pricing by Stephen Ross is known as Arbitrage Pricing Theory. The APT theory explains the nature of equilibrium in the asset pricing in a less complicated manner with fewer assumptions compared to CAPM.

Assumptions of APT

1. The investors have homogenous expectations
2. The investors are risk averse and utility maximisers.
3. Perfect competition prevails in the market and there is no transaction cost.

The APT theory does not assume (1) single period investment horizon, (2) no taxes (3) investors can borrow and lend at a risk free rate of interest and (4) the selection of the portfolio is based on the mean and variance analysis. This assumptions are prevent in the CAPM theory.

Arbitrage Portfolio

According to the APT theory an investor tries to find out the possibility to increase returns from his portfolio without increasing the funds in the portfolio. He also likes to keep the risk at the same level. For example, the investor holds A, B and C securities and the wants to change the proportion of the securities without any additional financial commitment. Now the change in proportion of securities can be denoted by X_A, X_B, and X_C. The increase in the investment in security A could be carried out only if he reduces the proportion of investment either in B or C because it has already stated that the investor tries to earn more income without increasing his financial commitment. Thus, the changes in different securities will add up to zero. This is the basic requirement of an arbitrage portfolio. If X indicates the change in proportion.

$$\Delta X_A + \Delta X_B + \Delta X_C = 0$$

APT Model

According to Stephen Ross, returns of the securities are influenced by a number of macro economic factors. The macro economic factors are growth rate of industrial production, rate of inflation, spread between long term and short term interest rates and spread between low-grade and high grade bonds.

The arbitrage theory is represented by the equation :

$$R_i = \lambda_0 + \lambda_1 bi_1 + \lambda_2 bi_2 ..... + \lambda_j bi_j$$

R_i = average expected return

λ_1 = sensitivity of return to bi_1

b_{i1} = the beta coefficient relevant to the particular factor

The equation is derived from the model

$$R_i = \alpha_1 + b_{i1} I_1 + b_{i2} I_2 ..... + b_{ij} I_j + e_i$$

Let us take the two factor model

$$R_i = \lambda_0 + \lambda_1 b_{i2} + b_{i2}$$

If the portfolio is a well diversified one, unsystematic risk tends to be zero and systematic risk is represented by b_{i1} and b_{i2} in the equation.

Arbitrage Pricing Equation

In a single factor model, the linear relationship between the return R_i and sensitivity b_i can be given in the following form.

$$R_i = \lambda_0 + \lambda_i b_i$$

R_i = return from stock A

λ_0 = riskless rate of return

b_i = the beta coefficient sensitivity related to the factor

λ_i = slope of the arbitrage pricing line

This model is known as single factor model since only one factor is considered.

APT and CAPM

The simplest form of APT model is consistent with the simple form of the CAPM model. When only one factor is taken into consideration, the APT can be stated as :

$$R_i = \lambda_0 + b_i \lambda_i$$

It is similar to the capital market line equation

$$R_i = R_f + \beta_i (R_m - R_f)$$

which is similar to the CAPM model.

APT is more general and less restrictive than CAPM. In APT, the investor has no need to hold the market portfolio because it does not make use of the market portfolio concept. The portfolios are constructed on the basis of the factors to eliminate arbitrage profits. APT is based on the law of one price to hold for all possible portfolio combinations.

The APT model takes into account of the impact of numerous factors on the security. The macro economic factors are taken into consideration and it is closer to reality than CAPM.

The market portfolio is well defined conceptually. In APT model, factors are not well specified. Hence the investor finds it difficult to establish equilibrium relationship. The well defined market portfolio is a significant advantage of the CAPM leading to the wide usage of the model in the stock market.

The factors that have impact on one group of securities may not affect another group of securities. There is a lack of consistency in the measurements of the APT model.

3.6.1 The Law of One Price

The formation for Arbitrage pricing theory is the law of one price. The law of one price states that two identical goods should sell at the same price. If they sold at differing prices any one could engage in arbitrage by simultaneously buying at the lower price & selling at higher price and make a riskless profit. Arbitrage also applies to financial assets. If two financial assets have the same risk, they should have the same expected return. If they do not have the same expected return, the riskless profit could be earned by simultaneously it eliminates the limitations of CAPM.

The expected return on arbitrage portfolio portfolio is calculated as follows :

1. Expected return on Security

$$E(Ri) = Rf + l_1b_1 + l_2b_2 + l_3b_3 + \text{---------}$$

Where $\sum(Ri)$ = expected return on individual security.

Rf = Risk free rate

l_1 = Market price of first factor

l_2 = Market price of second factor

l_3 = Market price of third factor

b_1 = Sensitivity factor of first stock

b_2 = Sensitivity factor of second stock

2. Expected return on arbitrage portfolio

$$\sum(R_P) = X_1 \sum R_1 + X_2 \sum R_2 + X_3 \sum R_3 - - -$$

Where $\sum(R_P)$ = Expected return on portfolio

X_1 = Weightage of 1st security.

X_2 = Weightage of 2nd security.

X_3 = Weightage of 3rd security.

$\sum R_1$ = Expectged return on 1st stock

$\sum R_2$ = Expectged return on 2nd stock

$\sum R_3$ = Expectged return on 3rd stock

Assumptions

The APT is based on the following assumptions:

1. Markets are perfectly competitive and frictionless.
2. Investors prefer more wealth to less wealth and arc risk averse.
3. There are various macroeconomic factors that a fleet the expected return on the security.
4. Total number of assets is not greater than the total number of factors affecting it.

3.6.2 Arbitrage Pricing for one Risk Factor

The one factor model is equivalent to the Capital Asset Pricing Model (CAPM), λ_0 is equal to the risk-free rate (R_f). However, the assumptions of the two models differ. Both models assume investors (1) prefer more wealth to less (2) are risk averse (3) have homogeneous expectations and (4) that capital markets are perfect. However, the APT, unlike the CAPM, does not assume (1) a one-period horizon (2) returns are normally distributed (3) a particular type of utility function (4) a market portfolio, or (5) that the investor can borrow or lend at the risk free rate. The one assumption unique to the APT is that unrestricted short selling exists. The utopian situation is available to only a few (such as investment bankers and stock exchange specialists) in today's financial markets.

The arbitrage pricing line for one risk factor can be written as,

$$\bar{r}_i = \lambda_0 + \lambda_1 \beta_i$$

Where,

$\bar{r}_i$ = the expected return on security i

λ_0 = the return for a zero beta portfolio

β_i = The sensitivity of the i^{th} asset to the risk factor

λ_1 = The factors risk premium.

A) Two Factor Arbitrage Pricing

Suppose we believe the only macroeconomic sources of risk are business cycles (GDP) and interest rates fluctuations (IR) rates of return should then respond to Unanticipated changes in both factors:

$$r_i = E(r_i) + \beta_i \, GDP + \beta_i \, IR + e_i$$

The beta coefficients are called factor

Sensitivities, factor loadings or factor betas

B) Multiple Arbitrage Pricing

Implicit to the APT as well as the CAPM is that only macroeconomic risk factors, such as unanticipated changes in interest rates or inflation, or unemployment rates that affect every firm and are the cause of systematic risk, have pricing value. Microeconomics factors, such as the death of key employees or the firm's credit rating, that cause firm-specific risk has no pricing power because such risk can be reduced to zero through diversification. Although the simplest form of the arbitrage pricing theory assumes that there is only 1 macroeconomic factor causing systematic risk, the theory can easily be extended to include any number of macroeconomic factors with associated betas for each factor:

$$E(r_i) = \lambda_0 + \lambda_1 b_{i1} + \lambda_2 b_{i2} + \ldots + \lambda_n b_{in}$$

where λ_n is the risk premium for that factor and b_{in} is the beta for that risk factor.

The general solution to solving these multi-factor equations is to solve for these factors simultaneously to see what they equal for a given set of portfolios.

3.6.3 Limitations of APT Theory

In the major limitation of APT lies in the major APT s Assumptions which are Capital markets are perfectly competitive; Investors always prefer more to less wealth and Price-generating process is a K factor model. So, the scenario is that:

1. If the assumptions did not work in a market, then APT fails to estimates the accurate expected return. Moreover in the world there are few countries who have sufficient efficiency in the market where information can be gathered easily.
2. Also the APT demands that investor perceive the risk sources, and that they can reasonably estimate factor sensitive. In fact, even professional and academician can't agree on the identity of the risk factors and the more betas investor have to estimate the more statistical noise the investor must live with.
3. Strictness in linear relationship mostly creates limitation for APT model in some parts of the world like ASE (Athens Stock Exchange).

Differences between CAPM and APT?

Like the capital assets pricing model (CAPM), Arbitrage Pricing Theory (APT) is an equilibrium model of asset pricing but assumes that the returns are generated by a factor model. Its assumption via-a-vis those of CAPM are set out first.

APT	CAPM
1. Investors do not look at expected returns and standard deviations. Based on the law of one price, if the price of an asset is different in different markets, arbitrage brings them to the same price.	Investors look at the expected returns and accompanying measured by standard deviations.
2. Investors prefer higher wealth risk-return analysis.	Investors are risk averse and returns to lower wealth.
3. APT is based on the return generated by factor models.	Investors maximise wealth for a given level of risk.

It is convenient to break up the expected return into two parts.

(i) Risk free rate of return and

(ii) The rest in the following equation, r_f is the risk free return and r_1 is the expected premium return per unit of sensitivity to the factor for portfolio.

$$rp_1 = r_f + \lambda_1$$

Similarly, the expected return on pure factor 2 portfolio,

$$rp_2 = r_f + \lambda_2$$

Thus, the investor by splitting his funds among risk free portfolios and pur factor portfolios, it is possible for him to form a portfolio with almost any sensitivity to each factor. Although theory claims that the non-factor risk can be reduced though theory claims that the non-factor risk can be reduced to zero, it is not possible in real life. Therefore, in practical investment or in portfolio operations, it is better to combine the capital asset pricing operations, it is better to combine the capital asset pricing theory and the APT model. Most investors prefer, no doubt higher levels of expected return and dislike higher levels of risk. The fact is that there is a trade off between them, which is not considered by the APT model. Synthesis of CAPM and APT is therefore more realistic.

Beta coefficients can be used to reflect the risk factors and factor sensitivities can also be taken into account to arrive at the expected returns. Thus, if the returns are generated by two factors model, the beta coefficient of a security will be related to its sensitiveness to the factor and factor. Betas can be taken to reflect the different sensitivities of different factors.

Beta coefficient for a security could be obtained by dividing $cov(r_i, r_m)$ by the variance of the market portfolio (σ_M^2).

$$\text{Thus, } \beta_i = \frac{cov\,(r_i, r_m)}{\sigma_M^2}$$

Security betas can appear in factor betas, if we ignore $\frac{cov(r_i, r_m)}{\sigma_M^2}$ then the equation is given below,

$$\beta_i = \left[\frac{cov(F_1.r_m)^1}{\sigma_M^2} \times \beta_{i1}\right] + \left[\frac{cov(F_2.r_m)^2}{\sigma_M^2} \times \beta_{i2}\right] + \frac{cov(F_3, r_m)}{\sigma_M^2}$$

If the last term becomes zero, as referred to above, then,

$$\beta F_1 = \frac{\text{cov}(F_1, r_m)}{\sigma_M^2}$$

$$\beta F_2 = \frac{\text{cov}(F_2, r_m)}{\sigma_M^2}$$

It will be seen that βF_1 and βF_2 are constants as they do not vary from one security to another, the beta coefficient of a security is a function of its sensitiveness to the pervasive factors. Thus, by taking betas of securities, the question of sensitivity of security return to a factor is taken care of.

Problem 10

The reaction coefficients for two stocks and the market prices (l) are given below :

Factor	λ	Stock	
		bA	bB
1	0.09	0.5	0.7
2	-0.03	0.4	0.8
3	0.04	1.2	0.2

using APT model and riskfree rate at 6% what is expected return, if two stocks are 50% equally weighted.

Solution :

Calculation of expected return of Stock "A"

$$\sum(R_A) = Rf + l_1b_1 + l_2b_2 + l_3b_3 + \text{---------}$$

$$= 0.06 + (0.09 \times 0.5) + (-0.03 \times 0.4) + (0.04 \times 1.2)$$

$$= 0.06 + 0.045 - 0.012 + 0.048$$

$$= 0.06 + 0.033 + 0.048$$

$$= 0.141 \text{ or } 14.1\%$$

Expected return of Stock "B"

$$\sum(R_B) = Rf + l_1b_1 + l_2b_2 + l_3b_3 + \text{---------}$$
$$= 0.06 + (0.09 \times 0.7) + (-0.03 \times 0.8) + (0.04 \times 0.2)$$
$$= 0.06 + 0.063 - 0.024 + 0.008$$
$$= 0.06 + 0.039 + 0.008$$
$$= 0.107 \text{ or } 10.7\%$$

Calculation of expected return on portfolio

$$\sum(R_P) = X_1 \sum R_A + X_2 \sum R_B$$
$$= (0.5 \times 14.1) + (0.5 \times 10.7)$$
$$= 7.05 + 5.35 = 12.4$$

Problem 11

There are two stocks X and Y and 3 factors. Given risk free rate at 8% corresponds to return on risk free asset or the risk free in general reflects the markets price of risk of or expected excess return over the risk free return

Factor	λ	Stock	
		Bx	By
1	0.06	0.5	0.8
2	0.03	0.6	0.3
3	0.09	1.3	0.7

If you are investing $\frac{1}{3}$ rd in "X" and $\frac{2}{3}$ rd in "Y" What would be the expected return using APT method

Solution :

Expected return on stock Bx.

$$\sum(R_x) = Rf + l_1b_1 + l_2b_2 + l_3b_3 + \text{---------}$$
$$= 0.08 + (0.06 \times 0.5) + (0.03 \times 0.6) + (0.09 \times 1.3)$$
$$= 0.08 + 0.03 + 0.018 + 0.117$$
$$= 0.245 \text{ or } 24.5\%$$

Expected return on stock "Y"

$$\sum(R_y) = Rf + l_1b_1 + l_2b_2 + l_3b_3 + \text{---------}$$
$$= 0.08 + (0.06 \times 0.8) + (0.03 \times 0.3) + (0.09 \times 0.7)$$
$$= 0.08 + 0.048 + 0.009 + 0.063 = 0.2 \text{ or } 20\%$$

Expected return on Arbitrage Portfolio

$$\sum(R_P) = X_1 \sum R_x + X_2 \sum R_y$$
$$= \frac{1}{3} \times 0.245 + \frac{2}{3} \times 0.2$$
$$= 0.0816 + (0.66 \times 0.2)$$
$$= 0.0816 + 0.133$$
$$= 0.2146 \text{ or } 21.46\%$$

Problem 12

Given the three portfolios in the table with expected return R_i and sensitivity factors b_{i1} and b_{i2}, what is the equation of the plane in R_i, b_{i1}, and b_{i2} space defined by these portfolios ?

Portfolio	R_i	b_{i1}	b_{i2}
A	14.0	0.8	0.8
B	10.8	0.6	0.4
C	11.2	0.4	0.6

Solution :

The information can be used to derive the equation for the risk - return plan by substituting returns and sensitivity - factor information :

$$14 = \lambda_0 + 0.8\ \lambda_1 + 0.8\ \lambda_2 \quad \text{... (1)}$$

$$10.8 = \lambda_0 + 0.6\ \lambda_1 + 0.4\ \lambda_2 \quad \text{... (2)}$$

$$11.2 = \lambda_0 + 0.4\ \lambda_1 + 0.6\ \lambda_2 \quad \text{... (3)}$$

Subtract (2) from (i) :

$$3.2 = 0.2\ \lambda_1 + 0.4\ \lambda_2 \quad \text{... (4)}$$

Subtract (2) and (3) :

$$0.4 = -0.2\,\lambda_1 + 0.2\,\lambda_2 \qquad \ldots (5)$$

From equations (4) and (5) $\lambda_2 = 6$.

From equation (5) $\lambda_1 = 4$

Finally, from equation (i), solving for λ_0 :

$$\lambda_0 = 14 - 0.8\,\lambda_1 - 0.8\,\lambda_2$$
$$= 14 - 3.2 - 4.8 = 6$$

Hence the equation of the plane describing equilibrium risk – return space can be expressed :

$$E_i = 6 + 4b_{i1} + 6b_{i2}$$

Problem 13

Using the portfolios, determine how much arbitrage profit, if any, can be made by buying or selling (short) the following portfolios (individually).

Portfolio	R_i (Percent)	b_{i1}	b_{i2}
D	14.0	0.5	0.7
E	15.2	0.8	1.0
F	9.0	0.6	0.5

Solution :

From portfolios A, B and C, the risk / return relationship is

$$r_i = 6 + 4b_{i1} + 6b_{i2}.$$

For portfolio D, an equivalent portfolio can be composed from a linear combination of A, B, and C. Given sensitivity factors $b_{i1} = 0.5$ and $b_{i2} = 0.7$, the expected return would be :

$$r_0 = 6 + 4\,(0.5) + 6(0.7)$$
$$= 12.2\%$$

Since 12.2% < 14%, portfolio D is undervalued. A riskless, costless arbitrage profit can be made by buying portfolio D and selling an equivalent amount of a portfolio composed of A, B and C.

For portfolio E, an equivalent portfolio can be constructed with yield :

$$r_{equiv} = 6 + 4\,(0.8) + 6\,(1.0)$$

$$= 15.2\%$$

This is exactly the yield of portfolio E; therefore, no arbitrage opportunities remain. For portfolio F :

$$r_{equiv} = 6 + 4\,(0.6) + 6\,(0.5)$$

$$= 11.4\%$$

Since 11.4% > 9%, the F portfolio is overpriced. Therefore, portfolio F should be sold and the equivalent portfolio should be bought.

	Initial CF	Ending CF	Risk Factors	
			bi1	bi2
Portfolio D	– Rs. 10,000,000	+ 11,40,000	0.5	0.6
Equivalent Portfolio	+ Rs. 10,000,000	– 11,22,000	–0.5	–0.7
	0 +	18,000	0	0

	Initial CF	Ending CF	Sens. Factors	
			bi1	bi2
Portfolio F	+ Rs. 1,00,00,000	– 10,90,000	–0.8	–1.0
Equivalent Portfolio	+ Rs. 1,00,00,000	+ 11,14,000	+0.8	+1.0
	0	24,000	0	0

A riskless, costless arbitrage profit of Rs. 24,000 can be made by selling Rs. 1 crore worth of portfolio F and by buying Rs. 1 crore of an equivalent portfolio made up of A, B and C.

Problem 14

K. Sundram owns a portfolio with the following characteristics :

Security	Factor 1 Sensitivity	Factor 2 Sensitivity	Proportion	Expected Return
A	1.40	2.50	.30	13%
B	0.90	1.60	.30	18%
C	1.00	0.80	.20	10
D	1.30	2.00	.20	12

Assume that returns are generated by a two-factor model and Sundram decides to create an arbitrage portfolio by increasing the holding of security B by 0.05.

(a) What must be the weights of the other three securities in Sundram's portfolio?

(b) What is the expected return on the arbitrage portfolio ?

Solution :

From the conditions required of an arbitrage portfolio, in a four-asset case it must be true that :

$$X_A + X_B + X_C + X_D = 0$$

and

$$b_{A1}X_A + b_{B1}X_B + b_{C1}X_C + b_{D1}X_D = 0$$

$$b_{A2}X_A + b_{B2}X_B + b_{C2}X_C + b_{D2}X_D = 0$$

In this case :

$$X_A + 0.5 + X_C + X_D = 0$$

$$(1.40 \times X_A) + (.90 \times .05) + (1.00 \times X_C) + (1.30 \times X_D) = 0$$

$$(2.50 \times X_A) + (1.60 \times .05) + (.80 \times X_C) + (2.0 \times X_D) = 0$$

Since :

$$X_A = -X_C - X_D - .05$$

Then :

$$[1.40 \times (-X_C - X_D - .05)] + .045 + (1.00 \times X_C) + (2.00 \times X_D) = 0$$

$$[2.50 \times (-X_C - X_D - .05)] + .08 + (.80 \times X_C) + (2.00 \times X_D) = 0$$

Setting these two equations equal to each other and solving for X_C gives :

$$X_A = - .035 - (.692 \times X_D)$$

$$X_C = - .015 - (.308 \times X_D)$$

Substituting these expressions for X_C and X_D into either factor sensitivity equation and solving for X_D gives :

$$X_D = .012$$

Therefore :

$$X_C = - .019 \text{ and } X_A = - .043$$

(b) The expected return on the arbitrage portfolio is then :

$$\widetilde{R}_{ap} = (-.043 \times 13\%) + (.05 \times 18\%) + (-.019 \times 10\%) + (.012 \times 12\%) = 0.3\%$$

Problem 15

Based on a two-factor model, consider two securities with the following characteristics :

Characteristic	Security X	Security Y
Factor 1 Sensitivity	1.2	0.15
Factor 2 Sensitivity	2.5	1.80
Nonfactor risk (σ^2_{ei})	20.0	16.0

The standard deviation of factor 1 and factor 2 are 25% and 20% respectively, and the factors have a covariance of 324. What are the standard deviations of securities X and Y ? What is their covariance ?

Solution :

Based on a two-factor model, the variance of a security is given by :

$$\sigma = b^2_{f1} \sigma^2_{f1} + b^2_{f2} \sigma^2_{f2} + 2b_{11} b_{12} \text{Cov}(F_1, F_2) + \sigma^2_{ei}$$

Therefore, for the two securities in this problem :

$$\sigma_x^2 = [(1.2)^2 \times (25)^2] + [(2.5)^2 (20)^2] + (2 \times 1.2 \times 2.5 \times 324) + 20$$

$$= [900 + 2500 + 1944 + 20]$$

$$= 5364$$

$$\sigma_x = 73.24$$

$$\sigma_y^2 = [(0.15)^2 (25)^2] + [(1.80)^2 (20)^2] + (2 \times 0.15 \times 1.80 \times 324) + 16$$

$$= [14.0625 + 1296 + 174.96 + 16] = [1501.0225]$$

$$\sigma_y = 38.74$$

The covariance between two securities in a two-factor world is :

$$\sigma_{ij} = b_{i1}b_{j1}\ \sigma_{F1}^2 + b_{i2}b_{j2}\ \sigma_{F2}^2 + (b_{i1}b_{j1} + b_{i2}b_{j2})\ \text{Cov.}\ (F_1, F_2)$$

In this case :

$$\sigma_{xy} = [(1.2 \times 0.15) \times (25)^2] + [(2.5 \times 1.80) \times (20)^2] + \{[1.2 \times 1.8) + (2.5 \times 0.15)] \times 324]$$

$$= \{[112.5) + (1800)] + [(2.16 + .375) \times 324]\}$$

$$= [\{1912.5] + [(2.535) \times 324]\}$$

$$= [(1912.5) + (821.34)]$$

$$= 2733.84$$

Problem 16

Based on a two-factor model, consider two securities with the following characteristics :

Characteristic	Security X	Security Y
Factor 1 Sensitivity	1.2	0.15
Factor 2 Sensitivity	2.5	1.80
Nonfactor risk (σ^2_{ei})	20.0	16.0

The standard deviation of factor 1 and factor 2 are 25% and 20% respectively, and the factors have a covariance of 324. What are the standard deviations of securities X and Y ? What is their covariance ?

Solution :

Based on a two-factor model, the variance of a security is given by :

$$\sigma = b_{f1}^2 \ \sigma_{f1}^2 + b_{f2}^2 \ \sigma_{f2}^2 + 2b_{11} \ b_{12} \ Cov \ (F_1, F_2) + \sigma_{ei}^2$$

Therefore, for the two securities in this problem :

$$\sigma_x^2 = [(1.2)^2 \times (25)^2] + [(2.5)^2 \ (20)^2] + (2 \times 1.2 \times 2.5 \times 324) + 20$$

$$= [900 + 2500 + 1944 + 20] = 5364$$

$$\sigma_x = 73.24$$

$$\sigma_y^2 = [(0.15)^2 \ (25)^2] + [(1.80)^2 \ (20)^2] + (2 \times 0.15 \times 1.80 \times 324) + 16$$

$$= [14.0625 + 1296 + 174.96 + 16] = [1501.0225]$$

$$\sigma_y = 38.74$$

The covariance between two securities in a two-factor world is :

$$\sigma_{ij} = b_{i1}b_{j1} \ \sigma_{F1}^2 + b_{i2}b_{j2} \ \sigma_{F2}^2 + (b_{i1}b_{j1} + b_{i2}b_{j2}) \ Cov. \ (F_1, F_2)$$

In this case :

$$\sigma_{xy} = [(1.2 \times 0.15) \times (25)^2] + [(2.5 \times 1.80) \times (20)^2] + \{[1.2 \times 1.8) + (2.5 \times 0.15)] \times 324]$$

$$= \{[112.5) + (1800)] + [(2.16 + .375) \times 324]\}$$

$$= [\{1912.5] + [(2.535) \times 324]\}$$

$$= [(1912.5) + (821.34)] = 2733.84$$

Short Question & Answers

1. Assumptions of Capital Market.

Ans :

1. All investors can borrow or lend money at the risk-free rate of return.
2. All investors have identical probability distributions for future rates of return, they have homogeneous expectations with respect to the three inputs of the portfolio model i. e. expected returns, the variance of returns, and the correlation matrix.

   Therefore, given a set of security prices and a risk-free rate, all investors use the same information to generate an efficient frontier.
3. All investors have the same one-period time horizon.
4. There are no transaction costs.
5. There are no personal income taxes—investors are indifferent between capital gains and dividends.
6. There is no inflation.
7. There are many investors, and no single investor can affect the price of a stock through his or her buying and selling decisions. Investors are price takers and act as if prices are unaffected by their own trades
8. Capital markets are in equilibrium.

2. Capital Asset Pricing Model (CAPM)

Ans :

The CAPM was developed to explain how risky securities are priced in market and this was attributed to experts like sharpe and Linter. Markowitz theory being more theoretical, CAPM aims at a more practical approach to stock valuation. It is no doubt based on the mean-variance approach to risk for assessment of investment as developed by Markowitz. It explains the behavioral pattern of investors in building up portfolios. It is based on economic model. It aims the investor at maximizing the utility of wealth.

The capital asset pricing model is a relationship explaining how assets should be priced in the capital markets. It reveals the relationship between the expected return, unavoidable risk and the valuation of securities. The unavoidable risk means, the risk

which cannot be avoided by diversification. If a security does not provide adequate returns, then the security will not favour the investor. The CAPM is build upon the Markovitz Portfolio Model and capital market line.

An equilibrium model of asset pricing that states that the expected return on a security's sensitivity to changes in the market portfolios return. The relevant risk for an individual asset is systematic risk (or market related risk) because non-market risk can be eliminated by diversification and systematic risk is measured by beta. In other words, all securities are expected to yield returns commensurate with their riskiness. Therefore, the relationship between an assets return and its systematic risk can be expressed by the CAPM, which is also called the security market line. The equation is as follows,

$$\bar{r}_i = r_f + \beta_i [\bar{r}_m - r_f]$$

Where,

$\bar{r}_i$ = The expected return for an asset

r_f = The risk-free rate

$\bar{r}_m$ = The expected market return (usually assumed to be BSE sensex)

β_1 = The assets beta.

3. Assumptions of the CAPM

Ans :

1. Investors make their investment decisions on the basis of risk-return assessments measured in terms of expected returns and standard deviation of returns.
2. The purchase or sale of a security can be undertaken in infinitely divisible units.
3. Purchases and sales by a single investor cannot affect prices. This means that there is perfect competition where investors in total determine prices by their actions.
4. There are no transaction costs. Given the fact that transaction costs are small, they are probably of minor importance in investment decision-making, and hence they are ignored.
5. There are no personal income taxes. Alternatively, the tax rates on dividend income and capital gains are the same, thereby making the investor indifferent to the form in which the return on the investment is received (dividends or capital gains).
6. The investor can lend or borrow any amount of funds desired at a rate of interest equal to the rate for riskless securities.

4. Capital Market Line

Ans :

As seen previously, adjusting for the risk of an asset using the risk-free rate, an investor can easily alter his risk profile. Keeping that in mind, in the context of the capital market line (CML), the market portfolio consists of the combination of all risky assets and the risk-free asset, using market value of the assets to determine the weights. The CML line is derived by the CAPM, solving for expected return at various levels of risk.

Markowitz' idea of the efficient frontier, however, did not take into account the risk-free asset. The CML does and, as such, the frontier is extended to the risk-free rate.

Systematic and Unsystematic Risk

Total risk to a stock not only is a function of the risk inherent within the stock itself, but is also a function of the risk in the overall market. Systematic risk is the risk associated with the market. When analyzing the risk of an investment, the systematic risk is the risk that cannot be diversified away.

Unsystematic risk is the risk inherent to a stock. This risk is the aspect of total risk that can be diversified away when building a portfolio.

Formula : Total risk = Systematic risk + Unsystematic risk

5. Security Market Line

Ans :

The security market line (SML) is the line that reflects an investment's risk versus its return, or the return on a given investment in relation to risk. The measure of risk used for the security market line is beta.

The line begins with the risk-free rate (with zero risk) and moves upward and to the right. As the risk of an investment increases, it is expected that the return on an investment would increase. An investor with a low risk profile would choose an investment at the beginning of the security market line. An investor with a higher risk profile would thus choose an investment higher along the security market line.

6. Merits of CAPM

Ans :

- **Ease-of-use**

  CAPM is a simplistic calculation that can be easily stress-tested to derive a range of possible outcomes to provide confidence around the required rates of return.

- **Diversified Portfolio**

  The assumption that investors hold a diversified portfolio, similar to the market portfolio, eliminates unsystematic (specific) risk.

- **Systematic Risk (beta)**

  CAPM takes into account systematic risk, which is left out of other return models, such as the dividend discount model (DDM). Systematic or market risk is an important variable because it is unforeseen and often cannot be completely mitigated because it is often not fully expected.

- **Business and Financial Risk Variability :** When businesses investigate opportunities, if the business mix and financing differ from the current business, then other required return calculations, like weighted average cost of capital (WACC) cannot be used.

7. Demerits of CAPM

Ans :

- The model assumes that asset returns are (jointly) normally distributed random variables. It is however frequently observed that returns in equity and other markets are not normally distributed. As a result, large swings occur in the market more frequently than the normal distribution assumption would expect.
- The model assumes that the variance of returns is an adequate measurement of risk. This might be justified under the assumption of normally distributed returns, but for general return distributions other risk measures will likely reflect the investors' preferences more adequately.
- The model assumes that all investors have access to the same information and agree about the risk and expected return of all assets.
- The model assumes that the probability beliefs of investors match the true distribution of returns. A different possibility is that investors' expectations are biased, causing market prices to be informationally inefficient.

8. Arbitrage Pricing Theory

Ans :

Arbitrage pricing theory is one of the tools used by the investors and portfolio managers. The capital asset pricing theory explains the returns of the securities on the

basis of their respective betas. According to the previous models, the investor chooses the investment on the basis of expected return and variance. The alternative model developed in asset pricing by Stephen Ross is known as Arbitrage Pricing Theory. The APT theory explains the nature of equilibrium in the asset pricing in a less complicated manner with fewer assumptions compared to CAPM.

Assumptions of APT

1. The investors have homogenous expectations
2. The investors are risk averse and utility maximisers.
3. Perfect competition prevails in the market and there is no transaction cost.

The APT theory does not assume (1) single period investment horizon, (2) no taxes (3) investors can borrow and lend at a risk free rate of interest and (4) the selection of the portfolio is based on the mean and variance analysis. This assumptions are prevent in the CAPM theory.

9. The Law of One Price

Ans :

The formation for Arbitrage pricing theory is the law of one price. The law of one price states that two identical goods should sell at the same price. If they sold at differing prices any one could engage in arbitrage by simultaneously buying at the lower price & selling at higher price and make a riskless profit. Arbitrage also applies to financial assets. If two financial assets have the same risk, they should have the same expected return. If they do not have the same expected return, the riskless profit could be earned by simultaneously it eliminates the limitations of CAPM.

The expected return on arbitrage portfolio portfolio is calculated as follows :

1. Expected return on Security

$$E(Ri) = Rf + l_1b_1 + l_2b_2 + l_3b_3 + \text{---------}$$

Where $\sum(Ri)$ = expected return on individual security.

Rf = Risk free rate

l_1 = Market price of first factor

l_2 = Market price of second factor

l_3 = Market price of third factor

b_1 = Sensitivity factor of first stock

b_2 = Sensitivity factor of second stock

2. Expected return on arbitrage portfolio

$$\sum(R_P) = X_1 \sum R_1 + X_2 \sum R_2 + X_3 \sum R_3 - - -$$

Where $\sum(R_P)$ = Expected return on portfolio

X_1 = Weightage of 1st security.

X_2 = Weightage of 2nd security.

X_3 = Weightage of 3rd security.

$\sum R_1$ = Expectged return on 1st stock

$\sum R_2$ = Expectged return on 2nd stock

$\sum R_3$ = Expectged return on 3rd stock

10. Arbitrage Pricing for one Risk Factor

Ans :

The one factor model is equivalent to the Capital Asset Pricing Model (CAPM), λ_0 is equal to the risk-free rate (R_f). However, the assumptions of the two models differ. Both models assume investors (1) prefer more wealth to less (2) are risk averse (3) have homogeneous expectations and (4) that capital markets are perfect. However, the APT, unlike the CAPM, does not assume (1) a one-period horizon (2) returns are normally distributed (3) a particular type of utility function (4) a market portfolio, or (5) that the investor can borrow or lend at the risk free rate. The one assumption unique to the APT is that unrestricted short selling exists. The utopian situation is available to only a few (such as investment bankers and stock exchange specialists) in today's financial markets.

The arbitrage pricing line for one risk factor can be written as,

$$\overline{r}_i = \lambda_0 + \lambda_1 \beta_i$$

Where,

$\overline{r}_i$ = the expected return on security i

λ_0 = the return for a zero beta portfolio

β_i = The sensitivity of the i^{th} asset to the risk factor

λ_1 = The factors risk premium.

11. Limitations of APT Theory

Ans :

In the major limitation of APT lies in the major APT s Assumptions which are Capital markets are perfectly competitive; Investors always prefer more to less wealth and Price-generating process is a K factor model. So, the scenario is that:

1. If the assumptions did not work in a market, then APT fails to estimates the accurate expected return. Moreover in the world there are few countries who have sufficient efficiency in the market where information can be gathered easily.
2. Also the APT demands that investor perceive the risk sources, and that they can reasonably estimate factor sensitive. In fact, even professional and academician can't agree on the identity of the risk factors and the more betas investor have to estimate the more statistical noise the investor must live with.
3. Strictness in linear relationship mostly creates limitation for APT model in some parts of the world like ASE (Athens Stock Exchange).

12. Differences between CAPM and APT

Ans :

APT	CAPM
1. Investors do not look at expected returns and standard deviations. Based on the law of one price, if the price of an asset is different in different markets, arbitrage brings them to the same price.	Investors look at the expected returns and accompanying measured by standard deviations.
2. Investors prefer higher wealth risk-return analysis.	Investors are risk averse and returns to lower wealth.
3. APT is based on the return generated by factor models.	Investors maximise wealth for a given level of risk.

Choose the Correct Answer

1. _____ theory is not based on the validity (or) lack there of capital market theory [a]

   (a) modern portfolio theory (b) portfolio theory

   (c) capital market (d) all of the above

2. _____ is move practical approach to stock valuation [b]

   (a) APT (b) CAPM

   (c) MPT (d) None of the above

3. _____ is the risk inherent to stock [b]

   (a) systematic risk (b) Unsystematic risk

   (c) both (d) none of the above

4. _____ line reflects the investment's risk versus its return (or) [c]
   return on a given investment in relation to risk

   (a) capital market (b) security market

   (c) both (d) none

5. CML stands for _____ [b]

   (a) capital margin line (b) capital market line

   (c) capital method line (d) cash market line

6. Some of the assumptions of CAPM are [d]

   (a) Investors are risk avers (b) Investors never satisfie

   (c) Investors have homogeneous expectation (d) All the above

7. The line connecting the intercept and the market portfolio is, [b]

   (a) Capital market line (b) Security market line

   (c) Efficient frontier (d) Portfolio line

8. Which of them are not the assumptions of APT ? [c]

(a) A one- period horizon (b) Market portfolio

(c) Both (a) and (b) (d) Risk averse

9. In reward to variability, S_p = [a]

(a) $\frac{\text{Risk premium}}{\text{Total risk}}$ (b) Risk premium + Risk

(c) Premium × Risk (d) $\frac{\text{total risk}}{\text{principal}}$

10. A process of holding a well diversified protfolio for a long term with the buy and hold approach is, [b]

(a) Active portfolio strategy (b) Passive portfolio strategy

(c) Modevate portfolio strategy (d) Normal portfolio strategy

Fill in the blanks

1. The _____ can also be used for evaluating the pricing of securities.
2. _____ is one of the tools used by the investors and portfolio managers.
3. The _____ takes into account of the impact of numerous factors on the security.
4. _____ is a theoretical framework for analysis of risk and return and their relationships.
5. _____ states that two identical goods should be sold at the same price.
6. The linear relationship between the required rates of return for efficient portfolio and their standard deviations is represented by _____
7. Stephen Ross developed an alternative model of asset pricing is known as _____
8. The relationship between an assets return and its systematic risk is expressed by _____
9. The equation of CAPM is _____
10. Total risk = _____

ANSWERS

1. capital asset pricing model
2. Arbitrage pricing theory
3. APT model
4. Markowitz model
5. Law of one price
6. Capital market line
7. Arbitrage pricing theory
8. Capital asset pricing model
9. $\overline{r}_i = r_f + \beta_i [\overline{r}_m - r_f]$
10. Systematic risk + Unsystematic risk

UNIT IV

Portfolio Performance Evaluation: Need for Evaluation – Evaluation Perspective – Meaning of Portfolio Evaluation – Measuring Portfolio Return – Risk Adjusted Returns – Sharpe Ratio – Treynor Ratio – Differential Return (Including Problems).
Security Market Indexes: Meaning – Different Averages and Indexes Exist – The Construction of Indexes – Maintenance Problems with Security Market Indexes – Stock Market Index Revision (Including Problems).

4.1 PORTFOLIO PERFORMANCE EVALUATION

Portfolio evaluation is the last step in the process of portfolio management. Portfolio analysis, selection and revision are undertaken with the objective of maximising returns and minimising risk. Portfolio evaluation is the stage where we examine to what extent the objective has been achieved. Through portfolio evaluation the investor tries to find out how well the portfolio has performed.

Need for Evaluation

Investment may be carried out by individuals on their own. The funds available with individual investors may not be large enough to create a well diversified portfolio of securities. Moreover, the time, skill and other resources at the disposal of individual investors may not be sufficient to manage the portfolio professionally. Institutional investors such as mutual funds and investment companies are better equipped to create and manage well diversified portfolios in a professional fashion. Hence, small investors may prefer to entrust their funds with mutual funds or investment companies to avail the benefits of their professional services and thereby achieve maximum return with minimum risk and effort.

Evaluation is an appraisal of performance. Whether the investment activity is carried out by individual investors themselves or through mutual funds and investment companies, different situations arise where evaluation of performance becomes imperative.

1. Self Evaluation

Where individual investors undertake the investment activity on their own, the investment decisions are taken by them. They construct and manage their own portfolio of securities.

2. Evaluation of Portfolio Managers

A mutual fund or investment company usually creates different portfolios with different objectives aimed at different sets of investors. Each such portfolio may be entrusted to different professional portfolio managers who are responsible for the investment decisions regarding the portfolio entrusted to each of them.

3. Evaluation of Mutual Funds

In India, at present, there are many mutual funds as also investment companies operating both in the public sector as well as in the private sector. These compete with each other for mobilising the investment funds with individual investors and other organisations by offering attractive returns, minimum risk, high safety and prompt liquidity.

Evaluation Perspective

A portfolio comprises several individual securities. In the building up of the portfolio several transactions of purchase and sale of securities take place. Thus, several transactions in several securities are needed to create and revise a portfolio of securities. Hence, the evaluation may be carried out from different perspectives or viewpoints such as a transactions view, security view or portfolio view.

1. Transaction View

An investor may attempt to evaluate every transaction of purchase and sale of securities. Whenever a security is bought or sold, the transaction is evaluated as regards its correctness and profitability.

2. Security View

Each security included in the portfolio has been purchased at a particular price. At the end of the holding period, the market price of the security may be higher or lower than its cost price or purchase price. Further, during the holding period, interest or dividend might have been received in respect of the security. Thus, it may be possible to evaluate the profitability of holding each security separately. This is evaluation from the security viewpoint.

3. Portfolio View

A portfolio is not a simple aggregation of a random group of securities. It is a combination of carefully selected securities, combined in a specific way so as to reduce the risk of investment to the minimum. An investor may attempt to evaluate the performance of the portfolio as a whole without examining the performance of individual securities within the portfolio. This is evaluation from the portfolio view.

4.2 Meaning of Portfolio Evaluation

Portfolio evaluation refers to the evaluation of the performance of the portfolio. It is essentially the process of comparing the return earned on a portfolio with the return earned on one or more other portfolios or on a benchmark portfolio. Portfolio evaluation essentially comprises two functions, performance measurement and performance evaluation. Performance measurement is an accounting function which measures the return earned on a portfolio during the holding period or investment period. Performance evaluation, on the other hand, addresses such issues as whether the performance was superior or inferior, whether the performance was due to skill or luck, etc.

While evaluating the performance of a portfolio, the return earned on the portfolio has to be evaluated in the context of the risk associated with that portfolio. One approach would be to group portfolios into equivalent risk classes and then compare returns of portfolios within each risk category. An alternative approach would be to specifically adjust the return for the riskiness of the portfolio by developing risk adjusted return measures and use these for evaluating portfolios across differing risk levels.

4.3 Measuring Portfolio Return

Meaning of Return

Return is the amount or rate of produce, proceeds, profits which accrues to an economic agent from an undertaking or investment. It is a reward for and a motivating force behind investment, the objective of which is usually to maximize return.

Return is the primary motivating force that drives investment. It represents the reward for undertaking investment. Since the game of investing is about returns (after allowing for is), measurement of realised (historical) returns is necessary to assess how well the investment manager has done. In addition, historical returns are often used as an important input in estimating future (prospective) returns.

Components of Return an Investment

The return of an investment consists of two components :

a) Current Return : The first component that often comes to mind when one is thinking about return is the periodic cash flow (income), such as dividend or interest, generated by the investment. Current return is measured as the periodic income in relation to the beginning price of the investment.

b) Capital Return : The second component of return is reflected in the price change called the capital return - it is simply the price appreciation (or depreciation) divided by the beginning price of the asset. For assets like equity stocks, the capital return predominates.

Thus, the total return for any security (or for that matter any asset) is defined as :

Total return = Current + Capital return

The current return can be zero or positive, whereas the capital return can be negative, zero, or positive.

4.3.1 Types of Return

1. Internal Rate of Return

The internal rate of return (IRR) is the rate of discount which makes the present value of all the revenues (cash flows) from the investment equal to the total cost of that investment. This is also known as the yield or yield rate.

2. Bond Rate

It is the interest rate received on the face value or the par value of the bond. If a company or the government issues a 10-year bond with Rs. 100 as face value and 15 per cent rate of interest, it would be described as 15 per cent bond.

3. Realised and Expected Return

Return is not as simple a concept as it appears to be because it is not guaranteed, it is mostly expected, and it may or may not be realized. Thus expected return is an anticipated, predicted, desired which is subject to uncertainty. Realised return, on the other hand, is actually earned.

4. Holding Period Return/Return

Holding period yield (HPY) measures the total return from an investment during a given time period in which the asset is held with the investor. It is to be noted that HP does not mean that the security is actually sold and the gain or loss is actually realised by the investor. The concept of HPY is applicable whether one is measuring the realized return or estimating the future return.

5. Redemption Yield or Yield to Maturity (YTM)

Redemption yield is the indicated or promised rate of return an investor will receive from a bond purchased at the current market price and held till maturity.

Annual Interest + Average annual appreciation or depreciation Redemption or face value

6. Dividend Yield

Dividend yield is the ratio of per share expected dividends, to the current market price of the share.

7. Earnings Yield

Earnings yield is the ratio of expected earnings per share of the firm to the current marker price of the share. The dividend yield and earnings yield do not differ if the firm distributes all net earnings in the form of dividends i.e. if it practices 100 per cent dividend payout ratio.

8. Nominal and Real Return

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

9. Gross and Net Yield

While gross yield refers to the yield realized by the investor before paying taxes, the net yield is what remains with him after paying the taxes. The net yield can be calculated as follows:

Net Yield = Gross Yield (1-Tax Rate).

Determinants of Return

Three major determinants of the rate of return expected by the investor are :

i) The time preference risk-free real rate.

ii) The expected rate of inflation

iii) The risk associated with the investment, which is unique to the investment.

Required Return = Risk-free real rate + Inflation premium + Risk Premium

4.3.2 Measurement of Returns

The purpose of investment is to get a return or income on the funds invested in different financial assets. The most important characteristics of financial assets are the size and variability of their future returns. Since the return on income varies, various statistical techniques are used to measure it. Over the years, many methods were adopted for quantifying returns. These are now categorized as traditional and modern techniques of measurement.

Traditional Method of Measurement

Computation of yield to measure a financial asset's return is the simplest and oldest technique of measurement. Yield can be both expected or estimated and actual for a particular period, the formula used to find yield is:

a) Estimated Yield $= \frac{\text{Expected cash income}}{\text{Current price of asset}}$

b) Actual Yield $= \frac{\text{Cash income}}{\text{Amount invested}}$

The yield that is calculated for a particular period to find out the return on the amount that is invested. For example, the annual yield on the Unit Trust certificate is the dividend income divided by the amount invested. Yields can be computed both for bonds and stocks.

Bonds

Bonds usually have a maturity period. Yield on them can be calculated either for the current period or to maturity. While it is advisable to find out yield to maturity and it is also the common practice, yet current yield on bonds can also be found out. The current yield on a bond is the annual coupon in rupees divided by the bond's purchase price.

Example 1

An investor buys a 20-year bond at Rs. 800 and it carries a Rs. 100 worth of coupons per year and its par value is Rs. 1,000, its current yield is :

$$\text{Current Yield} = \frac{\text{Annual coupon price}}{\text{Purchase price}} = \frac{100}{800}$$

$$= 0.125 \text{ or } 12.5\%$$

Example 2

Note: The investor may sometimes buy the bond at par value. Then the coupon rate and current rate are identical.

An investor buys a Rs. 100 bond of 10-year maturity with Rs. 80 worth of coupons per year. The par value of the bond is Rs. 1,000. Its current yield is :

$$\text{Current yield} = \frac{80}{100} = .08 \text{ or } 8\%$$

Yield on bonds is more commonly calculated to the date of maturity. (YTM), *i.e.*, the percentage yield that will be earned on bond from the purchase date to maturity date.

Example 3

An investor buys a bond in 2000, maturity in 2010, at Rs. 900. It has a maturity value of 10 years and par value of Rs. 1,000. It fetches Rs. 90 every year. Calculated yield.

$$\text{Current Yield} = \frac{90}{900} = 10\%$$

$$\text{Yield to Maturity} = \frac{\text{Average annual return}}{\text{Average investment}} = \frac{C + \frac{M - P}{N}}{\frac{M + P}{2}} \text{ or } \frac{C \pm \left(\frac{P \text{ or } D}{n}\right)}{\frac{f + P_0}{2}}$$

C = Annual coupon rate

Poor M = Maturity of par value of bond

For P = Purchase price or face value

N = Number of years remaining to maturity

$$\text{YTM} = \frac{90 + \frac{1000 - 900}{10}}{\frac{1000 + 900}{2}} = \frac{100}{950} = 10.5\%$$

This formula is an approximate method of calculating yield. It takes into account the values a par and the purchase price of bonds and average it. Bonds may sell either higher or lower than their par values. When bonds sell above their maturity value they are said to be at a 'Premium'. It follows then that bonds selling below their maturity value are at a 'Discount'.

Yield to maturity takes into account 'premium' or 'discount' factors arising out of the difference in purchase price and maturity value, since the yield to maturity takes several factors for finding out the returns as opposed to taking only coupon rate and purchase price to find out current yield, the yield derived from the two methods will differ. Return can also be found out for amounts invested in stocks.

Stocks

The return on stocks is measured by finding out dividend yields. Dividend yields can be estimated on expected yields as well as actual yields:

$$\text{Estimated Yield} = \frac{\text{Expected cash dividend}}{\text{Current share price}}$$

$$\text{Actual Yield} = \frac{\text{Dividend received}}{\text{Price of share in the beginning of the period}}$$

Another way of finding out returns in stock is by finding out 'earnings yield'.

Earnings Yield

Dividend yield does act consider that the earnings are retained in business for re-investment. Accordingly, earnings yield takes within its purview company growth, stock price appreciation and retained earnings. After taking these factors into consideration, the earnings yields cannot strictly be called a true measure but analysts consider earnings yield a more accurate measurement as it reflects both dividends and retained earnings.

Besides, calculating for finding out the market's attitude towards a company's growth prospects and for making comparisons among different companies on that basis, the technique of ratio analysis is applied by calculating price earnings ratios. The Price Earnings (P/E) ratio and Earnings Price (E/P) indicate how many rupees must be paid to purchase investment to earn one rupee and the E/P is earnings expected in the coming year divided by present share price.

For example

A stock that is selling for Rs. 36 and earns Rs. 3 annually has an E/'P ratio of

$$= \frac{E}{P} = \frac{\text{Earnings}}{\text{Price of share}} = \frac{3}{36} = 0.83 = 8.33\%$$

P/E ratio = 36 : 3 = 12 : 1

These ratios are useful and are sometimes also called capitalization rates. E/Ps presented in percentage and depict the gap between the earnings on shares and the price at which it is selling. The price of a share varies from one company to another depending on the industry group to which it belongs. A computer manufacturing company may sell its share at 30 times earnings, whereas public utilities shares may sell at par.

The P/E method is used when the analyst would like to estimate future price to work back to justified price. To determine current justified price, an investor would have to use his own discount rate. Valuation model to find out returns gives current justified price of stock more directly. Earnings per share is estimated and a reasonable capitalization rate must be applied to them. To find out the justified rate of the stock, it will have to be calculated with required rate of return of the investor. The analyst should try to estimate the rate at which the market will capitalize the stock's earnings. He must have a reliable capitalization rate so that he can find out the future inclination of the investor.

4.4 Measuring Returns – Improved Technique

The 'holding period yield' is one of the new techniques in measuring returns. The traditional methods did not provide a satisfactory returns measure. Some of the gaps that were identified were :

(a) That the traditional method does not distinguish between dividends and earnings portion that the company retains (Earnings Yield Method),

(b) Dividend Yield Method ignores the possibility of price appreciation on retained earnings. It is useful only for those shareholders who wish to retain shares always and are not interested in selling and anticipate that dividends are not going to change,

(c) The yield to maturity is useful only to those bond holders who will hold it to maturity. All investors may not hold bonds till maturity for obvious reasons. These methods are thus known to serve a limited purpose only.

The better method measures return through the holding period yield. This measure appears more rational and clearly defined. It serves two purposes:

(a) It measures the total return per rupee of the original investment, and

(b) Through this method comparisons can be drawn of any asset's expected return. An asset can be compared with another both historically and for future periods.

The holding period yield can be used for any asset. For example, returns from savings accounts, stocks money, real estate and bonds can be compared through this measure. The formula for the holding period yield :

$$\frac{\text{Income payments received during the year in Rs.} + \text{Capital change for the period in Rs.}}{\text{Price in rupees of original investment at the beginning of period}}$$

A look at this formula shows that HPY considers everything the investor receives over the specified period during which the asset is held relative to what was originally invested in the asset. It also considers all income payments; and positive and negative capital changes during the period. These are the measured relative to the original investment in rupees. The HPY also measures past receipts of payments as well as estimated future income. It is a technique which can measure historically as well as for an unknown future. It is useful for comparing any time period. It can be used on both Bonds and Stocks.

(a) Bond's Holding Period Yield (HPY)

The holding period yield for bonds is measured in the following way :

$$HPY = \frac{\text{Income payments during period t} + \text{Change in price during period t}}{\text{Price at the beginning}}$$

Or,

$$HPY = \frac{I_t + P}{P_I}$$

Where

t = holding period (time)

I_t = Bond's coupon interest during period t

P_t = Bond's price at the beginning of holding period

P = Change in bond price over the period.

Example

A company's bonds are bought at Rs. 1,000, retained for a holding period of one year and sold for Rs. 1,100. Find HPY.

$$HPY = \frac{90 + 100}{1000} = \frac{190}{1000} = \frac{190}{100}$$

$$= 0.19 \text{ or } 19\%$$

Or a holding period of 19 paise on each rupee invested either 19 per cent or 19 can be used to find out the Holding Period Yield. The holding period yield on bonds as seen from the formula consists of two parts — the coupon yield and the percentage change in the bond price. This may alternatively be depicted as :

$$HPY = \frac{D_t + P}{P_t}$$

(D_t = Dividends received during period t)

The formula, as in bonds can be broken into income yield and percentage price measure :

$$HPY = \frac{D_t}{P_t} + \frac{P}{P_t}$$

While current yield, dividend yield, P/E and E/P have their limited uses, HPY has the maximum usefulness as it makes comparisons for all types of assets. Estimates can also be made for a Rs. 10 common share to a Rs. 100 share and a Rs. 1,000 bond.

(b) HPY's Influence on Bonds and Stocks

The HPY makes a study of complex factors like income yield and percentage price change in a single measure. It does not discuss within its boundaries the differences between the capital gains and dividend factors. These differences are important to find out from the point of view of status of an organization.

A dividend income is different to capital gains and is treated accordingly for purpose of tax. These are also reasons for investors to alter or exercise their choice of docks and bonds. It is, however difficult to distinguish between capital gains and income aspect from the point of view of view of simplicity. It is assumed that the objective of an investor is to maximize wealth and utilize his income in such a way that his satisfaction is maximized.

The holding period technique adjusts with portfolio choice. Constant evaluation of security is made and the best choice exercised. HPY is, therefore, a flexible technique. By using this technique as the returns measure, it is not important to liquidate the portfolio at the end of each period and reinvest funds afresh. It is only a method to keep funds in the most beneficial investment opportunity.

Example 1

A share is currently selling at Rs. 50. It is expected that a dividend of Rs. 2 per share would be paid during the year and the share could be sold at Rs. 54 at the end of the year. Calculate the expected return from the share.

Solution :

$$\frac{\text{Forecasted dividend + Forecasted of the period stock price}}{\text{Initial investment}} - 1$$

$$\frac{2+54}{50} - 1 = 0.12 \quad \text{or} \quad 12 \text{ per cent}$$

Alternative, $R = \frac{D}{P_0} + \frac{P_1 - P_0}{P_0}$

where D = Dividend

p_i = End of period stock price.

p_0 = Initial stick price.

$$R = \frac{2}{50} + \frac{54 - 50}{50}$$

$$= 0.04 + 0.08$$

$$= 0.12 \text{ or } 12 \text{ per cent.}$$

Example 2

Calculate the expected return and the standard deviation of returns for a stock having the following probability distribution of returns.

Possible returns (X_i)	**Probability of (P_i)**	**$X_i \cdot P_i$**
–25	0.05	–1.25
–10	0.10	–1
0	0.10	0
15	0.15	2.25
20	0.25	5
30	0.2	6
35	0.15	5.25
		$\Sigma X_i P_i = 16.25$

Solution :

Calculation of Expected Return

$$\sum_{i-1}^{n} X_i \; p(X_i) = 16.25 \text{ per cent}$$

Calculation of Standard Deviation of Return : table

Variance, $\sigma^2 = \sum[(\bar{X}_i - \bar{X})^2 p(X_i)] = 274.69$ per cent

Standard deviation, $\sigma = \sqrt{274.69} = 16.57$ per cent

Possible return X_i	Probability $P(X_i)$	Deviation $(X_i - \bar{X})$	Deviation squared $(X_i - \bar{X})^2$	Product $(X_i - \bar{X})^2 p(X_i)$
–25	0.05	–41.25	1701.56	85.08
–10	0.10	–26.25	689.06	68.91
0	0.10	–16.25	264.06	26.41
15	0.15	–1.25	1.56	0.23
20	0.25	3.75	14.06	3.52
30	0.20	13.75	189.06	37.81
35	0.15	18.75	351.56	52.73
				$\sigma^2 = 274.69$

Example 3

A stock costing Rs. 120 pays no dividends. The possible prices that the stock might sell for at the end of the year with the respectively probabilities are :

Price (Rs.)	Probability
115	0.1
120	0.1
125	0.2
130	0.3
135	0.2
140	0.1

1. Calculate the expected return.
2. Calculate the standard deviation of returns.

Solution :

Here, the probable returns have to be calculated using the formula

$$R = \frac{D}{P_0} + \frac{P_1 - P_0}{P_0}$$

Calculation of Probable Returns (P2) : Take $P_0 = 120$

Possible price (p_1) Rs.	**$P_1 - P_0$ Rs.**	**[(P1 – P0)]/P_0 Return (per cent)**
115	–5	–4.17
120	0	0.00
125	5	4.17
130	10	8.33
135	15	12.50
140	20	16.67

Calculation of Expected Return

Probable return x_i	**Probability $P(X_i)$**	**Product $X_i\ p(x_i)$**
–4.17	0.1	–0.417
0.00	0.1	0.000
4.17	0.2	0.834
8.33	0.3	2.499
12.50	0.2	2.500
16.67	0.1	1.667
		$\bar{X} = 7.083$

Expected return $\bar{X} = 7.083$ per cent.

Possible retur X_i	Probability $P(X_i)$	Deviation $(X_i - \bar{X})$	Deviation squared $(X_i - \bar{X})^2$	Product $(X_i - \bar{X})^2 p(X_i)$
–4.17	0.1	–11.25	126.56	12.66
0.00	0.1	–7.08	50.13	5.01
4.17	0.2	–2.91	8.47	1.69
8.33	0.3	1.25	1.56	0.47
12.50	0.2	5.42	29.38	5.88
16.67	0.1	9.59	91.97	9.20
				$\sigma^2 = 34.91$

Variance, $\sigma^2 = 34.91$ per cent

Standard deviation, $\sigma^2 = 34.91 = 5.91$ per cent

4.5 Risk Adjusted Returns

One obvious method of adjusting for risk is to look at the reward per unit of risk. We know that investment in shares is risky. Risk free rate of interest is the return that an investor can earn on a riskless security, i.e. without bearing any risk. The return earned over and above the risk free rate is the risk premium that is the reward for bearing risk. If this risk premium is divided by a measure of risk, we get the risk premium per unit of risk. Thus, the reward per unit of risk for different portfolios or mutual funds may be calculated and the funds may be ranked in descending order of the ratio. A higher ratio indicates better performance.

Two methods of measuring the reward per unit of risk have been proposed by William Sharpe and Jack Treynor respectively in their pioneering work on evaluation of portfolio performance.

(i) Sharpe Ratio

The performance measure developed by William Sharpe is referred to as the Sharpe ratio or the reward to variability ratio. It is the ratio of the reward or risk premium to the variability of return or risk as measured by the standard deviation of return. The formula for calculating Sharpe ratio may be stated as:

$$\text{Sharpe ratio (SR)} = \frac{r_p - r_f}{\sigma_p}$$

where

r_p = Realised return on the portfolio.

r_f = Risk free rate of return.

σ_p = Standard deviation of portfolio return.

1. The following information is provided regarding the performance of the Blue chip fund, Leading sector fund and Contra fund for a period of six months ending December 2012. The risk free rate of interest is assumed to be 9. Rank the funds with the help of Shape Index and discuss it.

	R_p	σ_p	β
Blue chip	25.38	4	0.23
Leading sector	25.11	9.01	0.56
Contra	25.01	3.55	0.59

Solution :

$$\text{Sharpe Index} = \frac{R_p - R_f}{\sigma}$$

$$\text{Blue chip} = \frac{25.38 - 9}{4}$$

$$= 4.095 \rightarrow \text{I}$$

$$\text{Leading sector} = \frac{25.11 - 9}{9.01} = 1.788 \rightarrow \text{III}$$

$$\text{Contra} = \frac{25.01 - 9}{3.55} = 4.509 \rightarrow \text{II}$$

The blue chip fund ranks at the top among the three funds because of the higher return and low volatility in return. The leading sector fund's return is high compared with Contra's but the high volatility in return ranks it third.

(ii) Treynor Ratio

The performance measure developed by Jack Treynor is referred to as Treynor ratio or reward to volatility ratio. It is the ratio of the reward or risk premium to the volatility of return as measured by the portfolio beta. The formula for calculating Treynor ratio may be stated as:

$$\text{Treynor ratio (TR)} = \frac{r_p - r_f}{\beta_p}$$

where

r_p = Realised return on the portfolio.

r_f = Risk free rate of return

β_p = Portfolio beta.

The return and risk figures of two mutual funds and the stock market index are given in the table.

Fund	Return (per cent)	Standard deviation (per cent)	Beta
A	12	18	0.7
Z	19	25	1.3
M (Market index)	15	20	1.0

The risk free rate of return is 7 per cent.

The Sharpe ratios for the three funds are:

$$A = \frac{12-7}{18} = 0.277$$

$$Z = \frac{19-7}{25} = 0.48$$

$$M = \frac{15-7}{20} = 0.40$$

As per Sharpe's performance measure, fund Z has performed better than the benchmark market index, while fund A has performed worse than the market index.

The Treynor ratios for the three funds are:

$$A = \frac{12-7}{0.7} = 7.14$$

$$Z = \frac{19-7}{1.3} = 9.23$$

$$M = \frac{15-7}{1.0} = 8.00$$

According to Treynor's performance measure also, fund Z has performed better and fund A has performed worse than the benchmark.

5. Assuming the inputs given in problem No. 1 [Sharpe ratios] Treynor index.

$$\text{Treynor Index} = \frac{R_p - R_f}{\beta}$$

$$\text{Blue chip fund} = \frac{25.38-9}{0.23} = 71.21 \rightarrow \text{I}$$

$$\text{Leading sector fund} = \frac{25.11-9}{0.56} = 28.77 \rightarrow \text{II}$$

$$\text{Contra fund} = \frac{25.01-9}{0.59} = 27.14 \rightarrow \text{III}$$

Blue chip fund's high value is due to the high risk premium, i.e., 16.38 and the low market related risk 0.23, whereas in the Contra Fund, the premium is low and the market-related risk in high.

4.6 Differential Return

Another type of risk adjusted performance measure has been developed by Michael Jensen and is referred to as the Jensen measure or ratio. This ratio attempts to measure the differential between the actual return earned on a portfolio and the return expected from the portfolio given its level of risk.

The CAPM model is used to calculate the expected return on a portfolio. It indicates the return that a portfolio should earn for its given level of risk. The difference between the return actually earned on a portfolio and the return expected from the portfolio is a measure of the excess return or differential return that has been earned over and above what is mandated for its level of systematic risk. The differential return gives an indication of the portfolio manager's predictive ability or managerial skills.

Using the CAPM model, the expected return of the portfolio can be calculated as follows:

$$E(R_p) = R_f + \beta_p (R_m - R_f)$$

where

$E(R_p)$ = Expected portfolio return.

R_f = Risk free rate.

R_m = Return on market index.

β_p = Systematic risk of the portfolio.

The differential return is calculated as follows:

$$\alpha_p = R_p - E(R_p)$$

where

α_p = Differential return earned.

R_p = Actual return earned on the portfolio.

$E(R_p)$ = Expected return.

Thus, α_p represents the difference between actual return and expected return. If α_p has a positive value, it indicates that superior return has been earned due to superior management skills. When $\alpha_p = 0$, it indicates neutral performance. It means that the portfolio manager has done just as well as an unmanaged randomly selected portfolio with a buy and hold strategy. A negative value of oty indicates that the portfolio's performance has been worse than that of the market or a randomly selected portfolio of equivalent risk.

The alpha value in Jensen measure can be tested for its degree of significance from a value of zero by statistical methods. This means, an analyst can determine whether the differential return could have occurred by chance or whether it is significantly different from zero in a statistical sense.

Example

Funds A and Z. The actual returns realised from the two funds are 12 per cent and 19 per cent respectively with beta coefficients being 0.7 and 1.3 respectively. The market return is 15 per cent and the risk free rate is 7 per cent?

The expected return on the two funds can be calculated as shown below:

Fund A: $E(R_p) = 7 + 0.7(15 - 7) = 12.6$

Fund Z: $E(R_p) = 7 + 1.3\ (15 - 7) = 17.4$

The differential return or alpha value is shown below:

Fund A: $\alpha_p = 12 - 12.6 = -0.6$

Fund Z: $\alpha_p = 19 - 17.4 = 1.6$

The negative value of alpha for fund A indicates that its performance has been inferior. The positive value of alpha for fund Z indicates that its performance has been superior, presumably due to the superior management skills of its portfolio managers.

PROBLEMS

Problem 1

An investor owns a portfolio that over the last five years has produced 16.8 per cent annual return. During that time the portfolio produced a 1.10 beta. Further, the risk free return and the market return averaged 7.4 per cent and 15.2 per cent per year respectively. How would you evaluate the performance of the portfolio?

Solution :

The Treynor ratio can be used to evaluate the performance of the portfolio in this case.

Treynor ratio (TR) for the portfolio $= \dfrac{r_p - r_f}{\beta_p}$

$$= \frac{16.8 - 7.4}{1.10} = \frac{9.4}{1.1} = 8.55$$

Treynor ratio (TR) for market index $= \dfrac{15.2 - 7.4}{1.0} = \dfrac{7.8}{1.0} = 7.8$

The ratio for the market index can be taken as the benchmark for evaluation.

The portfolio has a reward to volatility ratio higher than that of the market index. Hence, the performance of the portfolio can be considered superior.

Problem 2

Mr. Anand is having units in a mutual fund for the past three years. He wants to evaluate its performance by comparing it to the market.

	Fund	Market
Return	70.60	41.40
Standard deviation	41.31	19.44
Risk-free rate	12	12
β	1.12	–

Find out Sharpe and Treynor indics. Comment.

Solution :

(a) Sharpe index

$$S_t = \frac{R_p - R_f}{\sigma_p}$$

$$= \frac{70.60 - 12}{41.31} = 1.419$$

$$S_t \text{ for market} = \frac{R_p - R_f}{\sigma_m}$$

$$= \frac{41.40 - 12}{19.44} = 1.512$$

Sharpe index for the fund is lower that the market and it indicates that the fund has not performed well.

(b) Treynor's Index

$$T_n = \frac{R_p - R_f}{\beta_p}$$

$$= \frac{70.60 - 12}{1.12} = 52.3\%$$

$$\text{Market index} = \frac{41.40 - 12}{1} = 29.4$$

(Market index by definition would have a beta value equal to 1).

According to Treynor index, the portfolio has performed better than the market. The two measures give different opinions. Reason is that the Sharpe's measure uses the total risk and the Treynor measure uses only the systematic risk. In a well-diversified portfolio, the unsystematic risk would become zero and both the measures would give the same result. But, here the portfolio seems to be poorly diversified and so, the results differ.

Problem 3

Pearl and Diamond are the two mutual funds. Pearl ha a mean success of 0.15 and Diamond has 0.22. The diamond has double the beta of Pearl fund's 1.5. The standard deviations of Pearl and Diamond funds are 15% and 21.43%. The mean return of market index is 12% and its standard deviation is 7. The risk-free is 8%.

(a) Compute the Jensen Index for each fund.

(b) Compute the Treynor and Sharpe indices for the funds. Interpret the results.

Solution :

(a) Jensen Index

$$R_p = \alpha_p + \beta (R_m - R_f)$$

Jensen's Index for Pearl fund

$= 8 + 1.5 (12 - 8)$

$= 14$

For Diamond fund $= 8 + 3 (12 - 8) = 20$

The difference between the actual and estimated returns.

Pearl fund $= 15 - 14 = 1$

Diamond fund $= 22 - 20 = 2$

(b) Treynor Index

$$T_n = \frac{R_p - R_f}{\beta_p}$$

Pearl fund = $\frac{15-8}{1.5} = 4.67$

Diamond fund = $\frac{22-8}{3} = 4.67$

According to Treynor Index, both the funds have same value.

Sharpe Index

$$S_t = \frac{R_p - R_f}{\sigma_p}$$

Pearl fund = $\frac{15-8}{15} = 0.46$

Diamond fund = $\frac{22-8}{21.43} = 0.65$

Market performance = $\frac{12-8}{7} = 0.57$

Treynor index and the Sharpe index results differ. Sharpe index considers the total risk but the Treynors index considers only the market risk.

Problem 4

The following three portfolios provide the particulars given below.

Portfolio	Average Annual Return	Standard Deviation	Correlation Coefficients market and Portfolio
A	18	27	0.8
B	14	18	0.6
C	15	8	0.9
Market	13	12	–

Risk-free rate of interest is 9.

(a) Rank these portfolios using Sharpe's and Treynor's methods.

(b) Compare both the indices.

Solution :

(a) Sharpe Index

$$S_t = \frac{R_p - R_f}{\sigma_p}$$

$$A = \frac{18-9}{27} = 0.333$$

$$B = \frac{14-9}{18} = 0.277$$

$$C = \frac{15-9}{8} = 0.75$$

Ranking order is C, A, B.

Trynor Index

$$T_n = \frac{R_p - R_f}{\beta_p}$$

Beta values are not given. Beta values can be estimated by using the formula

$$\beta = r\frac{\sigma_p}{\sigma_m}$$

$$A = 0.8 \times \frac{27}{12} = 1.8$$

$$B = 0.6 \times \frac{18}{12} = 0.9$$

$$C = 0.9 \times \frac{8}{12} = 0.6$$

$$T_n \text{ for } A = \frac{18-9}{1.8}$$

$$T_n \text{ for B} = \frac{14-9}{0.9} = 5.56$$

$$T_n \text{ for C} = \frac{15-9}{0.6} = 10$$

The ranking is C, B, A.

(b) The order of B and A get reversed in the Treynor's index. This may be due to their relationship with the market i.e., the systematic risk factor.

Problem 5

You are given the following historical performance information on the capital market and a mutual fund:

Year	Mutual fund beta	Mutual fund return (per cent)	Return on market index (per cent)	Return on Govt, securities (per cent)
1	0.90	–3.00	–8.50	6.50
2	0.95	1.50	4.00	6.50
3	0.95	18.00	14.00	6.00
4	1.00	22.00	18.50	6.00
5	1.00	10.00	5.70	5.75
6	0.90	7.00	1.20	5.75
7	0.80	18.00	16.00	6.00
8	0.75	24.00	18.00	5.50
9	0.75	15.00	10.00	5.50
10	0.70	–2.00	8.00	6.00

Calculate the following risk adjusted return measures for the mutual fund:

(a) Reward-to-variability ratio

(b) Reward-to-volatility ratio

Comment on the mutual fund's performance.

Solution :

As the first step in calculation, the average values of the four variables may be calculated.

The averages are as follows:

Mutual fund beta = 0.87

Mutual fund return = 11.05 per cent

Return on market index = 8.69 per cent

Return on govt, securities = 5.95 per cent

(a) Reward to variability ratio or Sharpe ratio

$$\frac{r_p - r_f}{\sigma_p}$$

For the calculation of this ratio, σ_p, or mutual fund's standard deviation of returns, is required.

Calculation of Standard deviation

Year	Mutual fund returns (X)	X^2
1	–3.00	9.00
2	1.50	2.25
3	18.00	324.00
4	22.00	484.00
5	10.00	100.00
6	7.00	49.00
7	18.00	324.00
8	24.00	576.00
9	15.00	225.00
10	–2.00	4.00
Total	110.50	2097.25

$$\sigma_p = \sqrt{\frac{N\Sigma X^2 - (\Sigma X)^2}{N^2}} = \sqrt{\frac{(10 \times 2097.25) - (110.5)^2}{10 \times 10}}$$

$$= \sqrt{\frac{20972.50 - 12210.25}{100}} = \sqrt{87.62} = 9.36 \text{ per cent}$$

$$SR = \frac{11.05 - 5.95}{9.36} = 0.545$$

(b) Reward to volatility ratio or Treynor ratio

$$TR = \frac{r_p - r_f}{\beta_p} = \frac{11.05 - 5.95}{0.87} = 5.86$$

Mutual fund performance

For evaluating the mutual fund performance we have to calculate the Sharpe and Treynor ratios for the market index to be used as the benchmark.

For calculating the Sharpe ratio for the market index, the standard deviation of returns on the market index has to be calculated.

Calculation of Standard Deviation

Year	Return on market index (X)	X^2
1	–8.50	72.25
2	4.00	16.00
3	14.00	196.00
4	18.50	342.25
5	5.70	32.49
6	1.20	1.44
7	16.00	256.00
8	18.00	324.00
9	10.00	100.00
10	8.00	64.00
Total	86.90	1404.43

$$\sigma_m = \sqrt{\frac{N\Sigma X^2 - (\Sigma X)^2}{N^2}}$$

$$= \sqrt{\frac{(10 \times 1404.43) - (86.90)^2}{10 \times 10}}$$

$$= \sqrt{\frac{14,044.30 - 7551.61}{100}}$$

$$= \sqrt{64.93}$$

$$= 8.06$$

Sharpe and Treynor ratios for the market index :

$$\text{Sharpe ratio} = \frac{r_m - r_f}{\sigma_m}$$

$$= \frac{8.69 - 5.95}{8.06}$$

$$= \frac{2.74}{8.06} = 0.34$$

$$\text{Treynor ratio} = \frac{r_m - r_f}{\beta_m}$$

$$= \frac{8.69 - 5.95}{1.00}$$

$$= \frac{2.74}{1.00} = 2.74$$

Ratios of the mutual fund and the market index may be tabulated as:

Ratio	Mutual fund	Market index
Sharpe ratio	0.545	0.34
Treynor ratio	5.86	2.74

Mutual fund has performed better than the market.

Problem 6

Information regarding two mutual funds and a market index are given below:

Fund	Return per cent	Standard deviation (per cent)	Beta
Gold	7	15	0.72
Platinum	16	35	1.33
Market index	10	24	1.0

Assuming the risk-free return as 5 per cent, calculate the differential return for the two funds.

Solution :

Differential return, as per Jensen ratio, is calculated as:

$$\alpha_p = R_p - E(R_p)$$

The expected return of the portfolio, $E(R_p)$, can be calculated using the CAPM formula.

$$E(R_p) = R_f + \beta_p (R_m - R_f)$$

Gold fund

$$E(R_p) = 5 + 0.72 (10 - 5)$$

$$= 5 + 3.6 = 8.6 \text{ per cent}$$

Platinum fund

$$E(R_p) = 5 + 1.33 (10 - 5)$$

$$= 5 + 6.65 = 11.65 \text{ per cent}$$

Differential return

Gold fund

$$\alpha_p = 7 - 8.6 = -1.6 \text{ per cent}$$

Platinum fund

$$\alpha_p = 16 - 11.65 = 4.35 \text{ per cent}$$

Problem 7

From the information given in example 3, calculate net selectivity measure for the platinum fund using Fama's framework of performance components.

Solution :

We have the following information:

R_p = 16 per cent α_p = 35 per cent

R_m = 10 per cent a_m = 24 per cent

R_f = 5 per cent β_p = 1.33

Fama's decomposition may be stated as :

$R_p = R_f + R_1 + R_2 + R_3$

R_f = 5 per cent

$R_1 = \beta_p (R_m - R_f)$

$= 1.33 (10 - 5) = 6.65$ per cent

$R_2 = [(\sigma_p / \sigma_m) - \beta_p] (R_m - R_f)$

$= [(34 / 24) - 1.33] (10 - 5)$

$= (1.46 - 1.33) (5)$

$= 0.65$ per cent

$R_3 = 16 - (5 + 6.65 + 0.65) = 16 - 12.3$

$= 3.70$ per cent

Thus,

$R_p = 5 + 6.65 + 0.65 + 3.70 = 16$ per cent

Alternatively, Fama's net selectivity can be directly calculated as follows :

Fama's net selectivity

$= R_p - [R_f + (\sigma_p / \sigma_m) (R_m - R_f)]$

$= 16 - [5 + (34 / 24) (10 - 5)]$

$= 16 - (5 + 7.3)$

$= 16 - 12.30$

$= 3.70$ per cent

4.7 Security Market Indexes

Meaning

A stock **index** or stock **market index** is a measurement of the value of a section of the stock **market**. It is computed from the prices of selected stocks (typically a weighted average). It is a tool used by investors and financial managers to describe the **market**, and to compare the return on specific investments.

Security market indexes are used to measure the performance of markets and investment managers. Understand the construction, calculation, and weaknesses of price-weighted, market capitalization-weighted and equal-weighted indexes.

Different Averages and Indexes Exist

BSE-100

The BSE Sensitive Index reflects the movement of only 30 scrips. To describe the movement of stock prices on a wider basis, the BSE constructed an index known as the BSE National Index on 3 January 1989. The fiscal year 1983-84 was chosen as the base year. This index re-designated as the BSE-100 index on 14 October 1996. It is known as the BSE-100 as it contains 100 stocks.

SSE-200

With the growth of industrialization there was a substantial increase in number of companies listed on the BSE. The number of companies listed increased from 992 in 1980 to about 3,200 by the end of March 1994. The need for a new broad-based index series reflecting market trends and newly emerged industry groups in a more effective way was felt. This led to the construction of two index series, viz., the BSE-200 and the Dollex-200 since 27 May 1994.

Dollex-200

The BSE also calculates a dollar-linked version of BSE-200 index and historical values of this index are available on the BSE website.

BSE-500

The BSE constructed a new index called BSE-500 in August 1999. As the name suggests, it consists of 500 scrips in its basket. The changing pattern of the economy and that of the market have been kept in mind while constructing this index. The index represents nearly 93 per cent of the total market capitalization on 3SE. All the 20 major industries in the economy are represented. The base year for the index is 1999. On 16 August 2005, the calculation methodology was made a free float one.

BSE Sectoral Indices

The BSE's sectoral indices are listed below:

- BSE Auto Index
- BSE BANKEX
- BSE Capital Goods Index
- BSE Consumer Durables Index
- BSE FMCG Index
- BSE Healthcare Index
- BSE IT Index
- BSE Metal Index
- BSE Oil and Gas Index
- BSE Power Index
- BSE Realty Index

BSE Mid-Cap and BSE Small Cap Indices

There was a popular belief that companies with large market capitalization alone find their way into the indices. At the same time, there was no indicator to show the performance of the mid- and small-cap companies. Hence, the BSE constructed indices to track the performance of companies with relatively small market capitalization. The base year of these indices is 2002-03 with a base value of 1000. The free float methodology was adopted to calculate the index. As per the BSE website, the features of these indices are as follows:

- Scrips that are classified as belonging to the 'Z' group, scrips that are traded under a permitted category and scrips with a trading frequency of less than 60 per cent of the days in the preceding three months are not considered for inclusion in these indices.
- The BSE Mid-Cap Index represents about 15 per cent of the free float market capitalization of the stocks listed on BSE, and Small Cap index represents 5 per cent of it.
- The number of companies in each of these indices varies. On the date of launch (11 April 2005), the BSE Mid-Cap and BSE Small-Cap indices comprised 231 and 425 constituents respectively.
- BSE Mid-Cap and BSE Small-Cap are highly correlated to the broad-based BSE-500 index.

BSE IPO Index

BSE launched the IPO index in August 2009, to follow the current primary market conditions and assess the increase in investor's wealth within two years of the listing of a company after its initial public offering.

BSE places a ceiling (cap) on the weight of the index constituents. Market capitalization weightings of index constituents is limited to 20.

NSE-S&P CNX NIFTY

This index is built by the India Index Services Product Ltd (IISL) and Credit Rating Information Services of India Ltd (CRISIL). The latter has a strategic alliance with S&P rating services. Hence, the index is named as S&P CNX Nifty. The NSE-50 index was introduced on 22 April 1996 with the following objectives:

- To reflect market movements more accurately
- To provide fund managers within instrument to measure portfolio returns vis-a-vis market returns
- To serve as a basis for introducing index-based derivatives

CNX NIFTY JUNIOR

CNX Nifty Junior comprises 50 stocks. This is an index built out of the 50 large, liquid stocks next to S&P CNX Nifty. It is a market capitalization weighted index. It is not as liquid as the S&P CNX Nifty. The CNX Nifty Junior is the second rung of growth stocks, which are not as established as those in the S&P CNX Nifty. As with the S&P CNX Nifty, stocks in the CNX Nifty Junior are filtered for liquidity, so they are the most liquid of the stocks excluded from the S&P CNX Nifty. Buying and selling the entire CNX Nifty Junior as a portfolio is possible. The maintenance of the S&P CNX Nifty and the CNX Nifty Junior are always disjointed i.e., a stock will never appear in both indices at the same time.

S&P CNX DEFTY

Defty is a dollar denominated index based on the S&P CNX Nifty. Computations are done using the S&P CNX Nifty index calculated on the NEAT trading system of NSE. If the S&P CNX Nifty rises by 3 per cent, it means that the Indian stock market rose by 3 per cent, measured in rupees. If the S&P CNX Defty rises by 3 per cent, it means that the Indian stock market rose by 3 per cent, measured in dollars.

S&P CNX 500 EQUITY INDEX

The S&P CNX 500 Equity Index comprises 500 stocks and is market capitalization is weighted. Stocks are selected based on their market capitalization, industry representation, trading interest and financial performance. The S&P CNX 500 companies are disaggregated into 72 industries. Industry weights in the index reflect the industry weights in the market. The base year for the index is the calendar year 1994 with the base index value being 1000.

CNX MID-CAP

CNX Mid-Cap is computed using the market capitalization weighted method. Selection of scrips in the index is based on the following criteria:

CNX SEGMENT INDICES

To provide investors with a better perspective of the stock market performance of the various segments of the Indian corporate sector, NSE has constructed different segment indices such as:

- CNX MNC (Multinational Corporations) Index
- CNX PSE (Public Sector Enterprises) Index
- CNX IBG (Indian Business Groups) Index
- CNX Energy Index
- CNX Pharma Index
- CNX Infrastructure Index
- CNX PSU Bank Index
- CNX Realty Index

4.7.1 The Construction of Indexes

Stock Market Indices

The general movement of the market is typically measured by indices representing the entire market or important segments thereof. Most of the stock market indices used in practice are of two types:

Equal-weighted index An index reflecting the simple arithmetic average of the price relatives of the sample shares in a certain year (or month or week or on a particular day) with reference to a base year.

Value-weighted index An index reflecting the aggregate market capitalisation of the sample shares in a certain year (or month or week or on a particular day) in relation to a base year.

To illustrate the nature of these two types of indices, consider the data for a sample of five shares for two years, the base year and year. given in Table.

Table: Data for Constructing Stock Market Indices

Share	Price in Base year (Rs.)	Price in year t(Rs.)	Price Relative	No. of outstanding Shares (in min)	Market Capitalisation in the Base Year (Rs. in ml)(1 × 4)	Market Capitalisation in Year one (Rs. in min) (2 × 4)
	1	2	3	4	5	6
A	50	70	140	10	500	700
B	40	50	125	20	800	1000
C	100	90	90	5	500	450
D	20	80	400	15	300	1200
E	15	24	160	50	750	1200
		915		2850	4550	

The index reflecting the simple arithmetic average of the price relatives of the sample shares will be 183 (915/5) and the index reflecting the aggregate market capitalisation of the sample shares will be 160 (4550/2850 multiplied by 100).

Having described how the stock market indices are constructed, let us look at the nature or the more popular stock market indices in India. The Economic Times Index of Ordinary Shares Prices, the Financial Express Equity Index, RBI Index Number of Ordinary Shares. Bombay Stock Exchange Sensitive Index, Bombay Stock Exchange National Index, and NSE-50.

Bombay Stock Exchange Sensitive Index Perhaps the most widely followed stock market index in India, the Bombay Stock Exchange Sensitive Index, popularly called the Sensex reflects the movement of 30 sensitive shares from specified and non-specified groups. The index for any trading day reflects the aggregate market value of the sample of 30 shares on that day in relation to the average aggregate market value of these shares in the base year 1978-79. This means that this is a value-weighted index.

S&P CNX Nifty Arguably the most rigorously constructed stock market index in India, the Nifty Index reflects the price movement of 50 stocks selected on the basis of market capitalisation and liquidity (impact cost). The base period selected for Nifty Index is the close of price on November 3, 1995, which marked the completion of one year of operation of NSE's Capital Market Segment. The base value of the index has been set at I (MM). It is a value* weighted index.

The Economic Times Index of Ordinary Share Prices On trading days, The Economic Times publishes the all-India index of ordinary share prices. The base year for this index is the Financial year 1984-85, the sample used for this index consists of 72 actively traded shares, and the average employed in the construction of this index is a simple arithmetic average of price relatives. This means that this is an equal-weighted index.

The Financial Express Equity Index Published by The Financial Express, this index has the calendar year 1979 as the base year, is based on UK actively traded shares, and employs a weighted arithmetic average of the price relatives of the share in the sample. This means that this is a value-weighted index.

Reserve Bank of India Index Number of Ordinary Shares is the most comprehensive index number of ordinary equity shares in India. The base year for this index is the financial year 1981-82, the sample used for this index consists of 338 equity shares, and the average employed in the construction of this index involves a combination of unweighted geometric mean and weighted arithmetic average.

Bombay Stock Exchange National Index A broad-based index in comparison to the Sensex, the Bombay Stock Exchange National Index reflects the price movement of 100 actively traded shares drawn from specified and non-specified groups of the five major stock exchanges, namely, Bombay, Calcutta, Delhi, Ahmedabad. and Madras. The base year for this index is 1983 and it is calculated in a way identical to that of the Sensex. This means that this, too, is a value-weighted index.

4.8 Maintenance Problems with Security Market Indexes

The BSE Indices Department keeps a close watch on the events that might affect the index on a regular basis and carries out daily maintenance of all BSE Indices.

1. Adjustments for Rights Issues

When a company, included in the compilation of the index, issues right shares, the free-float market capitalization of that company is increased by the number of additional shares issued based on the theoretical (ex-right) price. An offsetting or proportionate adjustment is then made to the Base Market capitalization.

2. Adjustments for Bonus Issue

When a company, included in the compilation of the index, issues bonus shares, the market capitalization of that company does not undergo any change. Therefore, there is no change in the Base Market capitalization; only the 'number of shares' in the formula is updated.

3. Other Issues

Base Market capitalization Adjustment is required when new shares are issued by way of conversion of debentures, mergers, spin-offs etc. or when equity is reduced by way of buy-back of shares, corporate restructuring etc.

4. Base Market capitalization Adjustment

The formula for adjusting the Base Market capitalization is as follows:

Stock Market Index Revision

To revise index, an index policy committee has been constituted which formulates policy and guidelines for managing CNX indices. The index is reviewed every quarter and a six weeks' notice is given to the market before making changes to the index set. The selection of the index constituent stock is based on the following four criteria.

- **Liquidity (impact cost):** For inclusion in the index, the security should have traded at an average impact cost of 0.75% or less during the last six months for 90% observations.
- **Market capitalization:** The Company should have a monthly average market capitalization of Rs. 500 crores or more during the last six months.
- **Free Float:** The Company should have at least 12% free float.
- **Others:** A company which comes out with an IPO will be eligible for inclusion in the index, if it fulfills the normal eligibility criteria for the index like impact cost, market capitalization and floating stock, for a 3-month period instead of a 6-month period.

Short Question & Answers

1. Need for Portfolio Evaluation

Ans :

Investment may be carried out by individuals on their own. The funds available with individual investors may not be large enough to create a well diversified portfolio of securities. Moreover, the time, skill and other resources at the disposal of individual investors may not be sufficient to manage the portfolio professionally. Institutional investors such as mutual funds and investment companies are better equipped to create and manage well diversified portfolios in a professional fashion. Hence, small investors may prefer to entrust their funds with mutual funds or investment companies to avail the benefits of their professional services and thereby achieve maximum return with minimum risk and effort.

Evaluation is an appraisal of performance. Whether the investment activity is carried out by individual investors themselves or through mutual funds and investment companies, different situations arise where evaluation of performance becomes imperative.

1. Self Evaluation

Where individual investors undertake the investment activity on their own, the investment decisions are taken by them. They construct and manage their own portfolio of securities.

2. Evaluation of Portfolio Managers

A mutual fund or investment company usually creates different portfolios with different objectives aimed at different sets of investors. Each such portfolio may be entrusted to different professional portfolio managers who are responsible for the investment decisions regarding the portfolio entrusted to each of them.

2. Types of Return

Ans :

1. Internal Rate of Return

The internal rate of return (IRR) is the rate of discount which makes the present value of all the revenues (cash flows) from the investment equal to the total cost of that investment. This is also known as the yield or yield rate.

2. Bond Rate

It is the interest rate received on the face value or the par value of the bond. If a company or the government issues a 10-year bond with Rs. 100 as face value and 15 per cent rate of interest, it would be described as 15 per cent bond.

3. Realised and Expected Return

Return is not as simple a concept as it appears to be because it is not guaranteed, it is mostly expected, and it may or may not be realized. Thus expected return is an anticipated, predicted, desired which is subject to uncertainty. Realised return, on the other hand, is actually earned.

4. Holding Period Return/Return

Holding period yield (HPY) measures the total return from an investment during a given time period in which the asset is held with the investor. It is to be noted that HP does not mean that the security is actually sold and the gain or loss is actually realised by the investor. The concept of HPY is applicable whether one is measuring the realized return or estimating the future return.

3. Risk Adjusted Returns

Ans :

One obvious method of adjusting for risk is to look at the reward per unit of risk. We know that investment in shares is risky. Risk free rate of interest is the return that an investor can earn on a riskless security, i.e. without bearing any risk. The return earned over and above the risk free rate is the risk premium that is the reward for bearing risk. If this risk premium is divided by a measure of risk, we get the risk premium per unit of risk. Thus, the reward per unit of risk for different portfolios or mutual funds may be calculated and the funds may be ranked in descending order of the ratio. A higher ratio indicates better performance.

Two methods of measuring the reward per unit of risk have been proposed by William Sharpe and Jack Treynor respectively in their pioneering work on evaluation of portfolio performance.

4. Sharpe Ratio

Ans :

The performance measure developed by William Sharpe is referred to as the Sharpe ratio or the reward to variability ratio. It is the ratio of the reward or risk premium to the variability of return or risk as measured by the standard deviation of return. The formula for calculating Sharpe ratio may be stated as:

$$\text{Sharpe ratio (SR)} = \frac{r_p - r_f}{\sigma_p}$$

where

r_p = Realised return on the portfolio.

r_f = Risk free rate of return.

σ_p = Standard deviation of portfolio return.

5. Differential Return

Ans :

Another type of risk adjusted performance measure has been developed by Michael Jensen and is referred to as the Jensen measure or ratio. This ratio attempts to measure the differential between the actual return earned on a portfolio and the return expected from the portfolio given its level of risk.

The CAPM model is used to calculate the expected return on a portfolio. It indicates the return that a portfolio should earn for its given level of risk. The difference between the return actually earned on a portfolio and the return expected from the portfolio is a measure of the excess return or differential return that has been earned over and above what is mandated for its level of systematic risk. The differential return gives an indication of the portfolio manager's predictive ability or managerial skills.

Using the CAPM model, the expected return of the portfolio can be calculated as follows:

$$E(R_p) = R_f + \beta_p (R_m - R_f)$$

where

$E(R_p)$ = Expected portfolio return.

R_f = Risk free rate.

R_m = Return on market index.

β_p = Systematic risk of the portfolio.

The differential return is calculated as follows:

$$\alpha_p = R_p - E(R_p)$$

where

α_p = Differential return earned.

R_p = Actual return earned on the portfolio.

$E(R_p)$ = Expected return.

6. Security Market Indexes

Ans :

A stock **index** or stock **market index** is a measurement of the value of a section of the stock **market**. It is computed from the prices of selected stocks (typically a weighted average). It is a tool used by investors and financial managers to describe the **market**, and to compare the return on specific investments.

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7. The Construction of Indexes

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8. Stock Market Index Revision

Ans :

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- **Market capitalization:** The Company should have a monthly average market capitalization of Rs. 500 crores or more during the last six months.
- **Free Float:** The Company should have at least 12% free float.
- **Others:** A company which comes out with an IPO will be eligible for inclusion in the index, if it fulfills the normal eligibility criteria for the index like impact cost, market capitalization and floating stock, for a 3-month period instead of a 6-month period.

9. Components of Return an Investment

Ans :

The return of an investment consists of two components :

a) Current Return : The first component that often comes to mind when one is thinking about return is the periodic cash flow (income), such as dividend or interest, generated by the investment. Current return is measured as the periodic income in relation to the beginning price of the investment.

b) Capital Return : The second component of return is reflected in the price change called the capital return - it is simply the price appreciation (or depreciation) divided by the beginning price of the asset. For assets like equity stocks, the capital return predominates.

Thus, the total return for any security (or for that matter any asset) is defined as :

Total return = Current + Capital return

The current return can be zero or positive, whereas the capital return can be negative, zero, or positive.

10. Determinants of Return

Ans :

Three major determinants of the rate of return expected by the investor are :

i) The time preference risk-free real rate.

ii) The expected rate of inflation

iii) The risk associated with the investment, which is unique to the investment.

Required Return = Risk-free real rate + Inflation premium + Risk Premium

Choose the Correct Answer

1. _____ is an appraisal of performance [c]

   (a) analysis (b) valuation

   (c) evaluation (d) all of the above

2. _____ is the primary motivation force that drives investment [b]

   (a) Risk (b) return

   (c) both (d) none of the above

3. _____ return is reflected in the price changes [c]

   (a) current return (b) low

   (c) capital return (d) high

4. _____ is the ratio of per share expected dividends, to the current market price of the share [b]

   (a) earning yield (b) dividend yield

   (c) gross yield (d) net yield

5. CNX nifty junior comprises of _____ stocks [a]

   (a) 50 (b) 30

   (c) 45 (d) 60

6. Reward to volatility ratio is also termed as [b]

   (a) Sharpe ratio (b) Treynor ratio

   (c) Jensen's measure (d) Jensen's ratio

7. A change in portfolio profile buying and selling shares in response to new information is [a]

   (a) Portfolio upgrading (b) Portfolio balancing

   (c) Portfolio retension (d) Portfolio revision

8. The factors to be considered for protecting the portfolio from risk and estimating the cashflows accurately are [d]

(a) Liquidity (b) Time horizon

(c) Taxes (d) All the above

9. Using the CAPM model the expected return of portfolio can be calculated [a]

as follows :

$E(R_p) = R_f + \beta_p (R_m - R_f)$ where R_m stands for

(a) Return on market index (b) Risk on market

(c) both (d) none of the above

10. _____ measures, uses only the systematic risk [a]

(a) treynor (b) sharpes

(c) Jensen's (d) All of the above

Fill in the blanks

1. _____ is the last step in the process of portfolio management.
2. _____ is the amount or rate of produce, proceeds, profits which accrues to an economic agent from an undertaking or investment.
3. Total return = _____
4. _____ measures the total return from an investment during a given time period in which the asset is held with the investor.
5. Sharpe Ratio is known as _____.
6. A _____ is a measurement of the value of a section of the stock market.
7. CRISIL stands for _____.
8. The NSE-50 index was introduced on _____.
9. _____ committee has been constituted which formulates policy and guidelines for managing CNX indices.
10. IPO stands for _____.

ANSWERS

1. Portfolio evaluation
2. Return
3. Current + Capital return
4. Holding period yield (HPY)
5. Reward to variability ratio
6. stock index
7. Credit Rating Information Services of India Ltd
8. 22 April 1996
9. Index policy
10. Initial Public Offeree

UNIT V

Portfolio Revision: Need for Revision – Meaning of Portfolio Revision – Constraints in Portfolio Revision – Portfolio Revision Strategies – Formula Plan – Constant Rupee Value Plan – Constant Ratio Plan – Dollar Cost Averaging (theory).

International Investing: Benefits and Risk of Global Investing– Factors Influencing International Investing – Foreign Exchange Risk (Theory).

5.1 Portfolio Revision

The financial markets are continually changing. In this dynamic environment, a portfolio that was optimal when constructed may not continue to be optimal with the passage of time. It may have to be revised periodically so as to ensure that it continues to be optimal.

Need for Revision

The primary factor necessitating portfolio revision is changes in the financial markets since the creation of the portfolio. The need for portfolio revision may arise because of some investor related factors also. These factors may be listed as:

1. Availability of additional funds for investment
2. Change in risk tolerance
3. Change in the investment goals
4. Need to liquidate a part of the portfolio to provide funds for some alternative use

The portfolio needs to be revised to accommodate the changes in the investor's position.

5.2 Meaning of Portfolio Revision

A portfolio is a mix of securities selected from a vast universe of securities. Two variables determine the composition of a portfolio; the first is the securities included in the portfolio and the second is the proportion of total funds invested in each security.

Portfolio revision involves changing the existing mix of securities. This may be effected either by changing the securities currently included in the portfolio or by altering the proportion of funds invested in the securities. New securities may be added to the portfolio or some of the existing securities may be removed from the portfolio.

The ultimate aim of portfolio revision is maximisation of returns and minimisation of risk.

5.2.1 Management of Portfolio

"Like other resources, portfolio also has to be efficiently managed to get high return with low risk. Portfolio management may be either passive or active.

(a) Passive Management

Passive management is a method of holding a well-diversified portfolio for a long-term with the buy-and-hold strategy. Passive management refers to the investor's endeavor to build a portfolio that resembles the overall market returns. The simplest form of passive management is holding the index fund that is designed to replicate a good and well-defined index of the common stock such as BSE-Sensex or NSE-Nifty. The fund manager buys all the stocks in the index in exact proportion of the respective stock in that index. If Reliance Industry's stock constitutes 5 per cent of the index, the fund also invests 5 per cent of its money in Reliance Industry stock. The commonly used approaches in constructing an index fund are as follows:

1. Keeping each stock in proportion to its representation in the index.
2. Holding a specified number of stocks that historically track the index in the best manner.
3. Holding a smaller set of stocks to match the index in a pre-specified set of characteristics. This can be in terms of sector, industry and the market capitalization.

Problems in the Index Portfolio

Problems in the index fund could include the following:

- **Transaction costs :** If the index fund replicates NSE-Nifty, the manager has to buy all the 50 stocks in their index proportion. Stocks with small weights also have to be bought. This involves heavy transaction cost.

- **Reinvestment of the dividends :** The income received through dividend has to be reinvested. Keeping the cash in hand idle will result in loss of return. Transaction costs have to be incurred if the dividend has to be invested in stocks. The reinvestment of the dividends may not get same of rate of return.
- **Tracking error :** The tracking error measures the deviation of the portfolio return from the respective index return. Investor's failure to replicate the index in a proper manner results in tracking error. The investor may not buy the stocks of smallest weights or some heavy weight stocks. This will result in the deviation of portfolio return from the benchmark index return. This is measured with the following formula:

$$\sigma^2 = 1/(n-1) \times S(x_i - y_i)^2$$

Where,

σ^2 is the tracking error ***n*** is the number of periods

x is the percentage return on the portfolio in period i

y is the percentage return on the benchmark

(b) Active Management

Holding securities based on future forecast is called active management. The portfolio managers who pursue an active strategy regarding the market components are called 'market timers'. Portfolio managers vary their cash position or beta of the equity portion of the portfolio based on the market forecast. Managers may indulge in group rotation. Here, group rotation means changing the investment in different industries' stocks depending on the assessment regarding their future performance.

Stocks that seem to be best bets or attractive are given more weight in the portfolio than their weight in the index. For example, information technology (IT) or fast moving consumer goods (FMCG) industry stocks may be given more weight than their respective weight in the NSE-50. At the same time, stocks that are considered to be less attractive are given lower weight compared to their weight in the index. Here, the portfolio manager may either remain passive regard to market and group components but active in the stock selection process, or he may be active in the market, group and stock selection process.

5.3 Constraints in Portfolio Revision

Portfolio revision is the process of adjusting the existing portfolio in accordance with the changes in financial markets and the investor's position so as to ensure maximum return from the portfolio with the minimum of risk. Portfolio revision or adjustment necessitates purchase and sale of securities. Purchase and sale of securities gives rise to certain problems which act as constraints in portfolio revision. Some of these are discussed below:

1. Transaction Cost

Buying and selling of securities involve transaction costs such as commission and brokerage. Frequent buying and selling of securities for portfolio revision may push up transaction costs thereby reducing the gains from portfolio revision. Hence, the transaction costs involved in portfolio revision may act as a constraint to timely revision of portfolio.

Frequent sales of securities in the course of periodic portfolio revision or adjustment will result in short-term capital gains which would be taxed at a higher rate compared to long-term capital gains. The higher tax on short-term capital gains may act as a constraint to frequent portfolio revisions.

2. Statutory Stipulations

The largest portfolios in every country are managed by investment companies and mutual funds. These institutional investors are normally governed by certain statutory stipulations regarding their investment activity. These stipulations often act as constraints in timely portfolio revision.

3. Intrinsic Difficulty

Portfolio revision is a difficult and time consuming exercise. The methodology to be followed for portfolio revision is also not clearly established. Different approaches may be adopted for the purpose. The difficulty of carrying out portfolio revision itself may act as a constraint to portfolio revision.

5.4 Portfolio Revision Strategies

Two different strategies may be adopted for portfolio revision, namely an active revision strategy and a passive revision strategy. The choice of the strategy would depend on the investor's objectives, skill, resources and time.

Active revision strategy involves frequent and sometimes substantial adjustments to the portfolio. Investors who undertake active revision strategy believe that security markets are not continuously efficient.

The practitioners of active revision strategy are confident of developing better estimates of the true risk and return of securities than the rest of the market. They hope to use their better estimates to generate excess returns.

Active portfolio revision is essentially carrying out portfolio analysis and portfolio selection all over again. It is based on an analysis of the fundamental factors affecting the economy, industry and company as also the technical factors like demand and supply.

Passive revision strategy, in contrast, involves only minor and infrequent adjustment to the portfolio over time. They find little incentive for actively trading and revising portfolios periodically.

Under passive revision strategy, adjustment to the portfolio is carried out according to certain predetermined rules and procedures designated as formula plans. These formula plans help the investor to adjust his portfolio according to changes in the securities market.

5.4.1 Rebalancing the Portfolio

Constant rupee strategy and constant ratio strategy are the common rebalancing techniques adopted. The portfolio is divided into two parts, namely, aggressive and defensive or conservative portfolios. The portfolio mix facilitates the automatic selling and buying of bonds and stocks. Here, the amount to be spent on the different types of securities is fixed. The amount can be fixed either constant in value or ratio. This depends on the investor's attitude towards risk and return. The strategies help to divide the fund to be invested between the aggressive and conservative portfolios.

The aggressive portfolio consists more of common stocks that yield superior returns with high risk. The aggressive portfolio's return is volatile because the share prices generally fluctuate. The conservative portfolio consists of more bonds that have fixed rate of returns. It is called conservative portfolio because the return is certain and the risk is less. Bond portion serves as a cushion for the volatility of the aggressive portfolio. The capital appreciation in the conservative portfolio is quite slow, and the fall in the price of the bond or debenture is also alike.

The strategies provide the basic rules and regulations for the purchase and sale of securities. The amount to be spent on the different types of securities is fixed. The amount may be fixed either in a constant or variable ratio. This depends on the investor's attitude towards risk and return. The commonly used strategies are rupee cost averaging, the constant rupee value, the constant ratio and the variable ratio strategies. The strategies help to divide the investible fund between the aggressive and conservative portfolios.

Assumptions

1. Certain percentage of the investor's fund is allocated between fixed-income securities and common stocks. The proportion of money invested in each component depends on the prevailing market condition. If the stock market is in the boom condition, fewer funds are allotted to stocks. Perhaps it may be a ratio of 80 per cent of bonds and 20 per cent of stocks in the portfolio. If the market is low, the proportion may reverse. In a balanced fund, 50 per cent of the fund is invested in stocks and 50 per cent in bonds.
2. If the market moves higher, proportion of stocks in the portfolio may either reduce or remain constant. The portfolio is more aggressive in the depressed market and defensive when the market is on the rise.
3. The stocks are bought and sold whenever a significant change in the price occurs. The changes in the level of the market could be measured with the help of indices such as BSE- Sensitive Index and NSE-Nifty.
4. The investor should strictly follow the strategy once he chooses it. He should not abandon the strategy but continue to act on the strategy.
5. The investors should select good stocks that move along with the market. They should reflect the risk and return features of the market. The stock price movement should be closely correlated with the market movement, and the beta value should be around 1.0. The stocks of the fundamentally strong companies have to be included in the portfolio.

Advantages

- Basic rules and regulations for the purchase and sale of securities are provided.
- The rules and regulations are rigid and help to overcome human emotion.
- The investor may earn higher profits by adopting the strategies.
- A course of action is formulated according to the investor's objectives.
- It controls the buying and selling of securities by the investor.
- It is useful for taking decisions on the timing of investments.

Disadvantages

- Strategies do not support the selection of the security. The selection of the security has to be based either on the fundamental, technical analysis or both.
- It is rigorous and not amenable with the inherent problem of adjustment.
- The strategy should be applied for long periods; otherwise, the transaction fee may be high.
- Even if the investor adopts various strategies, he needs forecasting. Market forecasting helps him to identify the best stocks.

5.4.2 Formula Plan

In the market, the prices of securities fluctuate. Ideally, investors should buy when prices are low and sell when prices are high. If portfolio revision is done according to this principle, investors would be able to benefit from the price fluctuations in the securities market. But investors are hesitant to buy when prices are low either expecting that prices will fall further lower or fearing that prices would not move upwards again. Similarly, when prices are high, investors hesitate to sell because they feel that prices may rise further and they may be able to realise larger profits.

Investors would not be acting in the way required to benefit from price fluctuations. Hence, certain mechanical revision techniques or procedures have been developed to enable the investors to benefit from price fluctuations in the market by buying stocks when prices are low and selling them when prices are high. These techniques are referred to as formula plans.

Formula plans represent an attempt to exploit the price fluctuations in the market and make them a source of profit to the investor. They make the decisions on timings of buying and selling securities automatic and eliminate the emotions surrounding the timing decisions. Formula plans consist of predetermined rules regarding when to buy or sell and how much to buy or sell.

The use of formula plans demands that the investor divide his investment funds into two portfolios, one aggressive and the other conservative or defensive. The aggressive portfolio usually consists of equity shares while the defensive portfolio consists of bonds and debentures.

The formula plans specify predetermined rules for the transfer of funds from the aggressive portfolio to the defensive portfolio and vice versa.

There are different formula plans for implementing passive portfolio revision. Let us discuss some of the important ones.

5.4.3 Constant Rupee Value Plan

This is one of the most popular or commonly used formula plans. In this plan, the investor constructs two portfolios, one aggressive, consisting of equity shares and the other, defensive, consisting of bonds and debentures. The purpose of this plan is to keep the value of the aggressive portfolio constant, i.e. at the original amount invested in the aggressive portfolio.

To keep the total value of the aggressive portfolio at its original level, the investor has to buy some shares from the market to be included in his portfolio. For this purpose, a part of the defensive portfolio will be liquidated to raise the money needed to buy additional shares.

Under this plan, the investor is effectively transferring funds from the aggressive portfolio to the defensive portfolio and thereby booking profit when share prices are increasing. Funds are transferred from the defensive portfolio to the aggressive portfolio when share prices are low.

Table: Constant rupee strategy

Period	Market Price (₹)	Number of Shares	Value of Stock Portfolio (₹)	Value of Defensive Portfolio (₹)	Total (₹)
1.	50	200	10,000	10,000	20,000
2.	44	200	8,800	10,000	18,800
3.	40	200	8,0OO	10,000	18,000
4.	40	250	10,000 Bought 50 Shares	8,000	18,000
5.	44	250	11,000	8,000	19,000
6.	50	250	12,500	8,000	20,500
7.	50	200	10,000 Sold 50 Shares	10,500	20,500

According to the Table the investor has ₹20, 000 to invest and divides it equally between stocks and bonds 50:50 that is 10,000:10,000. He makes quarterly adjustments if the stock price falls or rises by 20 per cent. In the third quarter, the stock prices fell by 20 per cent initiating the action. He shifted ₹2000 from the bonds' portion and bought 50 shares. This lifted the value of stock portion again to ₹10,000.

In the sixth quarter, the stock price has increased from ₹40 to ₹50, a 20 per cent increase. In this action point the investor disposes the shares and shifts the money to the bond portion. By this the stock amount of the portfolio has remained constant however; the total portfolio value has increased. The investor stands to gain by the value appreciation.

The major advantage of this strategy is that purchase and sales are determined automatically. This facilitates the investor to earn a capital gain by selling the stocks when the price increases and buying it at a somewhat lower. At the starting point, stocks should not be purchased either at high prices or very low prices to make the strategy operate effectively. If the investor starts the purchase at the extreme price level. The stock fund may be either very small or large.

5.4.4 Constant Ratio Plan

This is a variation of the constant rupee value plan. Here again the investor would construct two portfolios, one aggressive and the other defensive with his investment funds. The ratio between the investments in the aggressive portfolio and the defensive portfolio would be predetermined such as 1:1 or 1.5:1 etc. The purpose of this plan is to keep this ratio constant by readjusting the two portfolios when share prices fluctuate from time to time. For this purpose, a revision point will also have to be predetermined. The revision points may be fixed as ± 0.10 for example. This means that when the ratio between the values of the aggressive portfolio and the defensive portfolio moves up by 0.10 points or moves down by 0.10 points, the portfolios would be adjusted by transfer of funds from one to the other.

Let us assume that an investor starts with Rs. 20,000, investing Rs. 10,000 each in the aggressive portfolio and the defensive portfolio. The initial ratio is then 1:1. He has predetermined the revision points as ± 0.20. As share price increases the value of the aggressive portfolio would rise. When the value of the aggressive portfolio rises to Rs. 12,000, the ratio becomes 1.2:1 (i.e. Rs. 12,000 : Rs. 10,000). Shares worth Rs. 1,000 will be sold and the amount transferred to the defensive portfolio by buying bonds. Now, the value of both the portfolios would be Rs. 11,000 and the ratio would become 1:1.

Table: Constant ratio strategy

Market price	Number of shares in stock portion	Value of stock (₹)	Value of defensive portfolio (₹)	Total portfolio value (₹)	Ratio of stock portion to defensive portion
50	100	5000	5000	10,000	1.00
48	100	4800	5000	9,800	0.96
45	100	4500	5000	9,500	0.90
	₹ 248 transferred from bond portion and 5.5 shares purchased				
45	105.5	4748	4752	9,500	1.00
40.5	105.5	4273	4752	9,025	0.90
	Bought 5.9 shares by transferring ?239 from bond portion				
40.5	111.4	4512	4511	9,023	1.00
44.5	111.4	4957	4511	9,468	1.10
5 shares are sold and invested in bonds to make the ratio equal 1:1					

The advantage of constant ratio strategy is the automatism, and it forces the manager to counter adjust his portfolio cyclically. However, this approach does not eliminate the necessity of selecting individual security.

The limitation of the strategy is that the money is shifted from the stock portion to bond portion. Bond is also a capital market instrument and responds to market pressures. Bond and share prices may both rise and fall at the same time. In the down trend, both prices may decline and then gain.

5.4.5 Dollar Cost Averaging (theory)

All formula plans assume that stock prices fluctuate up and down in cycles. Dollar cost averaging utilises this cyclic movement in share prices to construct a portfolio at low cost.

The plan stipulates that the investor invest a constant sum, such as Rs. 5,000, Rs. 10,000, etc. in a specified share or portfolio of shares regularly at periodical intervals, such as a month, two months, a quarter, etc. regardless of the price of the shares at the time of investment. This periodic investment is to be continued over a fairly long period to cover a complete cycle of share price movements.

If the plan is implemented over a complete cycle of stock prices, the investor will obtain his shares at a lower average cost per share than the average price prevailing in the market over the period. This occurs because more shares would be purchased at lower prices than at higher prices.

The dollar cost averaging is really a technique of building up a portfolio over a period of time. The plan does not envisage withdrawal of funds from the portfolio in between.

The dollar cost averaging is specially suited to investors who have periodic sums to invest.

5.4.6 Rupee Cost Averaging Strategy

"The simplest and most effective strategy is the rupee cost averaging. First, stocks with good fundamentals and long-term growth prospects should be selected. Such stocks' prices tend to be volatile in the market and provide the maximum benefits from rupee cost averaging. Secondly, the investor should make a commitment of buying shares at regular intervals. Once he makes a commitment, he should purchase the shares regardless of the stock's price, the company's short-term performance and the economic factors affecting the stock market.

In the rupee cost averaging strategy, the investor buys varying number of shares at various points of the stock market cycle. In a way, it can be called time diversification. Let us assume that an investor decides to buy ₹1000 worth of a particular stock for four quarters in a year, ignoring the transaction costs. Table 22.4 gives the details.

Table: Rupee cost averaging

Quarter	Market Price	Shares Purchased	Cumulative Investment	Market Value (In ₹)	Unrealised Profit or Loss	Average Cost per share	Average Market price per share
1.	100	10	1,000	1,000	0	100	100
2.	90	11	1,990	1,890	(100)	94.76	95
3.	100	10	2,990	3,100	110	96.45	96.67
4.	110	9	3,980	4,400	420	99.50	100

In the above example, the stock price fell in the second quarter but recovered in the third quarter. The investor is able buy more stocks in the second quarter than in the first quarter. The benefits of this strategy can be viewed by comparing the last two columns. In the second quarter, the average cost per share is lower than the average market price per share. This is the benefit derived from rupee cost averaging.

Advantages

The advantages of the rupee cost averaging are as follows:

- It reduces the average cost per share and improves the possibility of gain over a long period.
- It removes the pressure of timing the stock purchase from investors.
- It makes the investors to plan the investment programme thoroughly on the periodical commitment of funds.
- Applicable to both falling and rising markets, although it works best if stocks are acquired in a declining market.
- In a nutshell, the investor must decide in advance the sum and periodic intervals at which he has to invest. Once it is decided, the implementation is mechanical.

Limitations

- Extra transaction costs are involved with small and frequent purchase of shares.
- The strategy does not indicate when to sell. It is strictly a strategy for buying.
- It does not eliminate the necessity for selecting the individual stocks that are to be purchased.
- There is no indication of the appropriate interval between purchases.
- The averaging advantage does not yield a profit if the stock price is in a downward trend.
- The strategy seems to work better when stock prices have cyclical patterns.

The rupee cost averaging strategy yields better results when applied to no-load-mutual funds. The problems of high transaction costs and stock selection are eliminated. The broad-based index fund experiences profit if the price is volatile, allowing the averaging effect to result in cost reduction. The investor has to decide only on the size of the fund and the length of the interval between the purchase.

5.5 INTERNATIONAL INVESTING

The strategy of selecting globally-based investment instruments as part of an investment portfolio. International investing includes such investment vehicles as mutual funds, American Depository Receipts, exchange-traded funds (ETFs) or direct investments in foreign markets. People often invest internationally for diversification, to spread the investment risk among foreign companies and markets; and for growth, to take advantage of emerging markets.

Foreign direct investment (FDI) is an investment in a business by an investor from another country for which the foreign investor has control over the company purchased. The Organization of Economic Cooperation and Development (OECD) defines control as owning 10% or more of the business. Businesses that make foreign direct investments are often called multinational corporations (MNCs) or multinational enterprises (MNEs).

A MNE may make a direct investment by creating a new foreign enterprise, which is called a green field investment, or by the acquisition of a foreign firm, either called an acquisition or brown field investment.

Advantages of FDI

An FDI may provide some great advantages for the MNE but not for the foreign country where the investment is made. On the other hand, sometimes the deal can work out better for the foreign country depending upon how the investment pans out. Ideally, there should be numerous advantages for both the MNE and the foreign country, which is often a developing country. We'll examine the advantages and disadvantages from both perspectives, starting with the advantages for multinational enterprises (MNES).

- **Access to markets**: FDI can be an effective way for you to enter into a foreign market. Some countries may extremely limit foreign company access to their domestic markets. Acquiring or starting a business in the market is a means for you to gain access.
- **Access to resources**: FDI is also an effective way for you to acquire important natural resources, such as precious metals and fossil fuels. Oil companies, for example, often make tremendous FDIs to develop oil fields.

- **Reduces cost of production**: FDI is a means for you to reduce your cost of production if the labor market is cheaper and the regulations are less restrictive in the target foreign market. For example, it's a well-known fact that the shoe and clothing industries have been able to drastically reduce their costs of production by moving operations to developing countries.

FDI also offers some advantages for foreign countries. For starters, FDI offers a source of external capital and increased revenue. It can be a tremendous source of external capital for a developing country, which can lead to economic development.

Another advantage is the development of new industries. Remember that a MNE doesn't necessary own all of the foreign entity. Sometimes a local firm can develop a strategic alliance with a foreign investor to help develop a new industry in the developing country. The developing country gets to establish a new industry and market, and the MNE gets access to a new market through its partnership with the local firm.

Additionally, tax revenue is generated from the products and activities of the factory, taxes imposed on factory employee income and purchases, and taxes on the income and purchases now possible because of the added economic activity created by the factory. Developing governments can use this capital infusion and revenue from economic growth to create and improve its physical and economic infrastructure such as building roads, communication systems, educational institutions, and subsidizing the creation of new domestic industries.

Disadvantages of FDI

International investments can be included in an investment portfolio to provide diversification and growth opportunities. All types of investments involve risk, and international investing may present special risks, including:

- Fluctuations in currency exchange rates
- Changes in market value
- Significant political, economic and social events
- Low liquidity
- Less access to important information
- Foreign legal remedies
- Varying market operations and procedures

Enhanced Return Potential

By investing overseas, you have the opportunity to invest in dynamic international companies that may be growing faster than their U.S. counterparts.

International stocks and bonds allow you to invest in some of the best-performing markets in the world.

Despite posting solid long-term gains, the U.S. is rarely the leading individual market in any given year. Even during the bull markets of the late 1990s, the U.S. was out-performed by markets in other countries. Investing in foreign stocks and bonds lets you benefit from bullish markets overseas.

Lower Volatility

While international funds generally are more volatile than similar domestic funds, including them in your portfolio can provide greater diversification, potentially lowering the overall volatility of your portfolio.

A note on international versus global funds: International funds invest exclusively in foreign companies. Global funds invest in both foreign and U.S. companies and generally are less volatile than strictly international funds.

The Risks of Foreign Investing

While international diversification may help to reduce overall portfolio risk over time, there are important differences between U.S. and foreign investing that can affect the day-to-day volatility of international holdings:

- Political or economic instability in foreign countries could negatively affect foreign investments, especially in emerging markets.
- Fluctuating foreign exchange rates can increase or decrease the dollar value of an investment even if the security's price remains unchanged.
- Financial information about specific companies in emerging markets can be difficult to obtain.

5.5.1 Types of Foreign Investment

1. Foreign Direct Investment (FDI): which involves
   (a) Wholly owned subsidiary
   (b) Joint venture
   (c) Acquisition
2. Foreign Portfolio Investment (FPI)
   (a) Investment by FIIs
   (b) Investment in GDRs, FDRs, FCCBs etc.

5.5.2 Factors Affecting Foreign investment Decision

1. Stable, predictable macroeconomic policy.
2. An effective and honest government.
3. A large and growing market.
4. Freedom of activity in the market.
5. Minimal government regulation.
6. Property rights and protection.
7. Reliable 'infrastructure:
8. Availability of high-quality factors of production.
9. A strong local currency.
10. The ability to remit profits, dividends and interest.
11. A favorable tax climate.
12. Freedom to operate between markets

5.5.3 Factors Influencing Foreign Investment Decisions

Now that you understand the basic economic reasons why companies choose to invest in foreign markets, and what forms that investment may take, it is important to understand the other factors that influence where and why companies decide to invest overseas. These other factors relate not only to the overall economic outlook for a country, but also to economic policy decisions taken by foreign governments—aspects that can be very political and controversial.

The policy frameworks relating to FDI and FPI are relatively similar, although there are a few differences. Direct investors tend to look at a number of factors relating to how they will be able to operate in a foreign country:

- The rules and regulations pertaining to the entry and operations of foreign investors
- Standards of treatment of foreign affiliates, compared to "nationals" of the host country
- The functioning and efficiency of local markets
- Trade policy and privatization policy
- Business facilitation measures, such as investment promotion, incentives, improvements in amenities and other measures to reduce the cost of doing

business. For example, some countries set up special export processing zones, which may be free of customs or duties, or offer special tax breaks for new investors

- Restrictions, if any, on bringing home ("re-patriating") earnings or profits in the form of dividends, royalties, interest or other payments

The determinants of FPI are somewhat more complex, however. Because portfolio investment earnings are more likely to be tied to the broader macroeconomic indicators of a country, such as overall market capitalization of an economy, they can be more sensitive to factors such as:

- High national economic growth rates
- Exchange rate stability
- General macroeconomic stability
- Levels of foreign exchange reserves held by the central bank
- general health of the foreign banking system
- liquidity of the stock and bond market
- interest rates

In addition to these general economic indicators, portfolio investors also look at the economic policy environment as well, and especially at factors such as:

- The ease of repatriating dividends and capital
- Taxes on capital gains
- Regulation of the stock and bond markets
- The quality of domestic accounting and disclosure systems
- The speed and reliability of dispute settlement systems
- The degree of protection of investor's rights

5.6 International Portfolio Investment

International portfolio investment refers to the addition of foreign stocks, bonds, mutual funds and other securities in the portfolio. The proportion of international securities depends on the investor's attitude towards risk and return. The process of globalization and liberatlization of the financial markets around the world have linked nations more closely. It has stimulated the demand and supply of cross-border capital flows. The developments in the field of information technology have increased the speed of funds transfer. The factors contributing to the markets' integration are as follows:

- Growth of global and multinational companies and organizations
- Innovations in the field of information technology
- Deregulation of the financial systems in developed nations
- Massive increase in international capital flows
- Reduction in foreign exchange controls.

5.7 Benefits of International Portfolio Investment

Listed below are the main benefits of such investment:

Scope for widening investment Emerging markets provide an opportunity for adding good performers to the portfolio. In markets such as Brazil, India or Taiwan, an investor can find companies with attractive returns that have not yet been fully valued by the market. This provides significant upside potential.

Inclusion of markets with different return profiles If the portfolio consists of only domestic securities, it operates in the same macroeconomic, political and legal environment. These factors affect the return more or less uniformly. If there are international securities, these factors differ, and the return profile is also different. Further, business cycles may differ among nations.

Table: Summary statistics of daily returns of select international indices and the Sensex (1997-98 to 2008-09)

Indices	Mean	Minimum	Maximum	Standard deviation
DJIA	0005	-8.201	10.508	1.294
NASDAQ	0007	-10.168	13.255	1.887
NIKKEI	-0.027	-12.111	13.235	1.636
KLSE	-0.011	-24.153	20.817	1.639
HANG SENG	0003	-14.735	17.247	1.898
FTSE	-0.003	-9.265	9.384	1.315
PAX	0006	-7.433	10.797	1.669
ALL ORDINARIES	0.0124	-8.554	6.067	0.989
STI	-0.007	-9.216	12.874	1.502
CAC	0002	-9.472	10.595	1.562
SENSEX	0036	-11.809	8.592	1.766

Reduces volatility in the portfolio Spreading the investments among different asset classes in international markets such as stocks, bonds and money market securities helps to reduce the overall volatility in a portfolio. The 'mix within the mix' in the equity allocation of a portfolio and the adding of an international fund alongside a group of domestic funds reduces volatility in return. The unfavourable performance in one market is counterbalanced by favourable performance in another market.

Low degree of correlation among markets Securities' returns are less correlated across countries than within countries because political, institutional and economic factors vary across countries. Gains from international portfolio diversification depend on the degree of correlation ($-1 < p < +1$) between the home country and a foreign country. Table shows the low degree of correlation among the markets. Further, All Ordinaries of Australia was negatively correlated with several countries.

Table: Correlation coefficients of daily returns of Sensex and international indices (1997-98 to 2008-09)

Indices	Sensex	DJIA	NASDAQ	NIKKEI	KLSE	HANG SENG	FTSE	DAX	ALL ORDINARIES	STI
Sensex	1									
DJIA	0.046*	1								
NASDAQ	0.027	0.759*	1							
NIKKEI	0.013	–0.004	0.018	1						
KLSE	0.036*	0.018	0.016	0.035	1					
HANG SENG	0.010	0.009	0.025	0.045*	0.052*	1				
FTSE	0.007	0.071*	0.045*	0.004	0.033	0.006	1			
DAX	–0.029	–0.009	0.029	–0.003	0.037	–0.015	0.102	1		
ALL ORDINARIES	–0.013	0.002	–0.002	–0.012	–0.021	0.020	–0.005	–0.007	1	
STI	0.027	0.074*	0.064*	0.007	–0.023	–0.010	0.041*	0.044*	–0.012	1

Investing Overseas

Once an investor decides to look at international markets; he must take several investment decisions, such as whether he should look at a broad international portfolio, a more limited portfolio focused on either emerging markets or developed markets, a region, such as Euro zone or Asia, or specific countries.

Selection of markets Diversification is the fundamental consideration in any investment and becomes particularly important when investing internationally. Investing the total portfolio in a single country is not wise as it increases the portfolio risk. Investments should be allocated among developed, emerging and, perhaps, frontier markets in a diversified international portfolio. Investments have to be spread over many countries to maximize returns and minimize risks.

Selection of instruments An investor must determine the investment vehicles he or she wants to invest in as a number of investment options are open to him. These include government securities, stocks or bonds of private corporations in the chosen country, stocks or bonds of a company that gets a substantial portion of its revenues from the country selected, or an internationally focused exchange traded fund or mutual fund. The choice of investment instrument depends on each investor's risk and return profile, as well as his knowledge and experience in the international market.

Evaluation and revision In addition to carefully analyzing all possible investments, an international investor must monitor his or her portfolio and enhance it according to the international investment climate. As economic conditions in the Euro zone and the US are constantly changing, the investor must be extra careful in designing his international portfolio. International markets that were once known as promising markets may lose their prominence, and countries that once seemed to less promising might now be a suitable investment avenue. Portfolio evaluation and revision is, thus, an ongoing process.

5.8 Market Categories

Markets can be categorized as developed, emerging and frontier markets.

Developed markets

These belong to the industrialized economies with well developed economic systems. They are characterized by political stability and appropriate governance. Developed markets are the proper destination for investment. Recent studies show that their economic growth is lagging behind that of the emerging markets. The US, Canada, France, Japan and Australia are some examples of developed markets.

Emerging markets

These markets show strong economic growth and rapid industrialization. The economic fundamentals of the market are strong. The returns on investments are high compared to those in other markets. The political uncertainty and speculations in the financial markets pose a threat to the investor. Booms and busts are common in this market. The investor must assess the political climate of these markets before investing in them. China, India and Brazil are some of the emerging markets.

Frontier markets

These markets represent 'the next wave' of investment destinations. Frontier markets are smaller than the emerging markets. They are in countries where there are legal restrictions on international investment. Frontier markets are highly uncertain and lack liquidity of investment. The returns in these markets are above average. Frontier markets have a low degree of correlation with other markets and offer the advantage of diversification. Nigeria, Botswana and Kuwait are examples of frontier markets.

5.9 Foreign Exchange Risk

The risk that the return on an investment may be reduced or eliminated because of a change in the exchange rate of two currencies.

For example, if an American has a CD in the United Kingdom worth 1 million British pounds and the exchange rate is 2USD: 1 G BP, then the American effectively has $2 million in the CD. How ever, if the exchange rate changes significantly to, say, 1US D:1 GBP, then the American only has $1 million in the CD, even though he/she still has 1 million pounds. Foreign exchange risk is also called exchange rate risk.

Management of Foreign Exchange Risk

Foreign exchange risk is the exposure of an institution to the potential impact of movements in foreign exchange rates. Foreign exchange risk is linked to unexpected fluctuations in the value of currencies. A strong currency can very well be risky, while a weak currency may not be risky. The risk level depends on whether the fluctuations can be predicted. Short and long-term fluctuations have a direct impact on the profitability and competitiveness of business.

A very important dimension of international finance is exposure management and their has been an increased interest by MNCs in recent times in developing techniques and strategies for foreign exchange exposure management.

MNCs face three kinds of risk- Translation, Transaction and Economic exposure. The foreign exchange market consists of the spot market and the forward or futures market. The spot market deals with foreign exchange delivered within 2 business days or less. Transactions in the spot market quote rates of exchange prevalent at the time the transactional took place.

Typically, a bank will quote a rate at which it is willing to buy the currency (bid rate) and a rate at which it will sell a currency (offer rate) for delivery of the particular currency. The forward market is for foreign exchange to be delivered in 3 days or more. In quoting the forward rate of currency, a bank will quote a bid and offer rate for delivery typically one, two, three or six months after the transaction date.

Exchange rates are considered by MNCs as a crucially important factor affecting their profitability. This is because exchange rate fluctuations directly impact the sales revenue of firms exporting goods and services. Future payments in a foreign currency carry the risk that the foreign currency will depreciate in value before the foreign currency payment is received and is exchanged into Indian rupees.

Thus, exchange risk is the effect that unexpected exchange rate changes have on the value of the firm. Foreign exchange risks therefore pose one of the greatest challenges to MNCs.

Exchange Rate Exposure

The exchange rate depends on several factors such as imports, exports, domestic and international economic conditions. The exchange rate fluctuates depending on the above mentioned factors. If the foreign currency of an international investment and the rupee value changes, it can either increase or reduce return on international investment. This is because the foreign companies' stocks are traded in their currencies and dividends are paid in the domestic currency. When an investor receives dividends or sells his international investment, he has to convert the foreign currency into Indian rupees. If the foreign currency appreciates compared to the Indian rupee, the investment return will increase because the foreign currency earnings translate into more rupees. At the same time, if the value of the foreign currency weakens or depreciates compared to the Indian rupee, the investment return will fall because the earnings translate into fewer rupees.

An investor placed an order to buy 100 shares of Big Brother company trading on the NYSE. Assume that he acquires the shares at $11. The exchange rate was ₹48 to the dollar at the time of purchase. This means the investment cost was $100 \times 11 \times 48 = ₹52,800$. The share price may appreciate to $12.5.

$$\text{The holding period return} = \frac{12.5 - 11}{11} \times 100 = 13.64$$

Over the same period, the value of the dollar fell to ₹ 47. Now, there is a change in the return perspective. If the investor sells the stock, he will receive $12.5 \times 100 \times 47$ = ₹ 58,750.

$$\text{The holding period return} = ₹\frac{58,750 - 52,800}{52,800} \times 100 = 11.27\%$$

The actual return is only 11.27 per cent to the investor. The foreign exchange rate fluctuation hurts the investor. The appreciation of the rupee value works negatively.

Instead of rupee appreciation if there is a decline in the rupee value, the return profile is different. Let us assume the exchange rate is \$1 = ₹50. The investor receives $100 \times 12.5 \times 50$ = ₹62,500.

$$\text{The holding period return } ₹\ \frac{62,500 - 52,900}{52,800} \times 100 = 18.37\%$$

The component of return is,

= 13.64+4.73 = 18.37 (percent) i.e.,

= Gain due to stock price appreciation + Gain due to depreciation of rupee value.)

5.9.1 Types of Risk

There are mainly three types of foreign exchange risk. They are :

- Translation exposure
- Transaction exposure
- Operating Risk
- Strategic Risk

1. Translation Exposure

Translation risk is the degree to which a firm's foreign currency denominated financial statements is affected by exchange rate changes. All financial statements of a foreign subsidiary have to be translated into the home currency for the purpose of finalizing the accounts for any given period.

If a firm has subsidiaries in many countries, the fluctuations in exchange rate will make the assets valuation different in different periods. The changes in asset

valuation due to fluctuations in exchange rate will affect the group's asset, capital structure ratios, profitability ratios, solvency ratios, etc. FASB 52 specifies that US firms with foreign operations should provide information disclosing effects of foreign exchange rate changes on the enterprise consolidated financial statements and equity.

The following procedure has been followed :

- Assets and liabilities are to be translated at the current rate that is the rate prevailing at the time of preparation of consolidated statements.
- All revenues and expenses are to be translated at the actual exchange rates prevailing on the date of transactions. For items occurring numerous times weighted averages for exchange rates can he used.
- Translation adjustments (gains or losses) are not to be charged to the net income of the reporting company. Instead these adjustments are accumulated and reported in a separate account shown in the shareholders equity section of the balance sheet, where they remain until the equity is disposed off.

Translation Exposure Steps

The various steps involved in measuring translation exposure are :

- **First**, Determine functional currency.
- **Second,** Translate using temporal method recording gains/ losses in the income: statement as realized.
- **Third,** Translate using current method recording gains/losses in the balance sheet as realized.
- **Finally,** consolidate into parent company financial statements.

2. Transaction Exposure

Transaction exposure refers to the extent to which the future value of firm's domestic cash flow is affected by exchange rate fluctuations. It arises from the possibility of incurring foreign exchange gains or losses on transaction already entered into and denominated in a foreign currency.

The degree of transaction exposure depends on the extent to which a firm's transactions are in foreign currency. For example, the transaction in exposure will be more if the firm has more transactions in foreign currency.

According to FASB 52, all transaction gains and losses should be accounted for and included' in the equity's net income for the reporting period. Unlike translation gains and loses which require only a bookkeeping adjustment, transaction gains and losses are realized as soon as exchange rate changes.

The exposure could be interpreted either from the standpoint of the affiliate or the parent company. An entity cannot have an exposure in the currency in which its transactions are measured.

Distinction between Transaction and Translation Exposure

The addition of the word 'risk' after 'transaction' or 'translation' tends to convey that transaction risk and translation risk are two different risks, i.e., different external threats. Indeed, they may be more appropriately viewed as different ways of looking at and managing the same (or at least largely overlapping) external threats.

- An accounting model of receipts and payments is implicit when reference is made to translation risk, and a cash flow model of receipts and payments is implicit when reference is made to transaction risk.
- Translation risks are commonly restricted by experts to contractually committed receipts and payments. Uncommitted ones may never appear on financial statements at all.
- Clearly, this category of contractually committed receipts and payments overlaps with a considerable proportion of those included in transaction risks.
- In fact, some writers would treat transaction and translation risks as co-terminus, whereas others would wish to extend transaction risk to include a number of uncommitted future transactions.
- What is common to all of them, however, is that the distinction is not between different external threats, i.e., different mismatches.
- Transaction and translation mismatches arise largely from the same transactions: both threats are from the effect of adverse movements in the same nominal exchange rates on the outcomes of largely the same transactions.
- The distinction is effectively between two models of the business used by managers, the accounting model and the future cash flows model.

- The contrast concerns the values (current market or balance sheet values) and the time horizon which the currency manager has in mind when managing the risks.
- The distinction is subjective in that it turns on manager's perceptions: if he is concerned with accounting values and with losses or gains arising in financial reporting periods, then he is managing the translation or accounting risk; if he is concerned with the amount of the future cash receipt or payment on its expected date, then he is managing transaction risk.
- The distinction between translation and transaction risk is, therefore, between management perceptions, not between external threats or risks. This is, however, important to recognise and provide for.
- Translation (position) risk can be measured either aggressively for gain or defensively to avoid loss.
- Some companies prefer the objective of leaving the impact of currency movements unchanged between successive reporting periods. They prefer to smooth rather than optimize or minimize the effect of currency movements.
- Defensive management approach involves adjustment of each position to zero. Aggressive management of freely floating currencies is for those who either have reason to know they can beat market expectations of future exchange rates, or have special tax position which loads the dice in their favour after tax.
- Aggressive management is more likely to be successful with controller managed currencies or over very short periods. Aggressive position risk management is difficult, but not wrong in principle, as long as it is a calculated and adequately controlled and the relevant policy disclosed to and understood by investors.

3. Operating Risk

An operational risk is a risk arising from execution of a company's business functions. As such, it is a very broad concept including e.g. fraud risks, legal risks, physical or environmental risks, etc. The term operational risk is most commonly found in risk management programs of financial institutions that must organize their risk management program according to Basel II. In Basel II, risk management is divided into credit, market and operational risk management. In many cases, credit and market risks are handled through a company's financial

department, whereas operational risk management is perhaps coordinated centrally but most commonly implemented in different operational units (e.g. the IT department takes care of information risks, the HR department takes care of personnel risks, etc)

More specifically, Basel II defines operational risk as the risk of loss resulting from inadequate or failed internal processes, people and systems, or from external events. Although the risks apply to any organisation in business, this particular way of framing risk management is of particular relevance to the banking regime where regulators are responsible for establishing safeguards to protect against systemic failure of the banking system and the economy.

Definition : The Basel Committee defines operational risk as:

"The risk of loss resulting from inadequate or failed internal processes, people and systems or from external events."

However, the Basel Committee recognizes that operational risk is a term that has a variety of meanings and therefore, for internal purposes, banks are permitted to adopt their own definitions of operational risk, provided the minimum elements in the Committee's definition are included.

Difficulties

It is relatively straightforward for an organisation to set and observe specific, measurable levels of market risk and credit risk. By contrast it is relatively difficult to identify or assess levels of operational risk and its many sources. Historically organisations have accepted operational risk as an unavoidable cost of doing business.

Operational Risk

Operational risk for foreign exchange in particular involves problems with processing, product pricing, and valuation. These problems can result from a variety of causes, including natural disasters, which can cause the loss of a primary trading site, or a change in the financial details of the trade or settlement instructions on a FX transaction. Operational risk may also emanate from poor planning and procedures, inadequate systems, failure to properly supervise staff, defective controls, fraud, and human error.

Failure to adequately manage operational risk, in turn, can decrease a firm's profitability. Incorrect settlement of FX transactions, for example, can have direct costs in improper payments and receipts. In addition, trade processing and settlement errors can lead to indirect costs, such as compensation payments to counterparts for failed settlements or the development of large losses in a firm's portfolio as a result of managing the wrong position. Furthermore, investigating problems and negotiating a resolution with counterparty may carry additional costs. Failure to manage operational risk may also harm a firm's reputation and contribute to a loss of business.

Operational risk has another distinctive quality. Unlike credit and market risk, operational risk is very difficult to quantify. Clearly, an institution can measure some of the losses associated with operational errors or losses that result from the failure of the operational process to catch errors made by sales and trading areas. Determining expected losses, however, given the uncertainty surrounding those losses, is much more complicated for operational risks than for other risk categories.

4. Strategic Risk

Strategic risk is the current and prospective impact on earnings or capital arising from adverse business decisions, improper implementation of decisions, or lack of responsiveness to industry changes. This risk is a function of the compatibility of an organization's strategic goals, the business strategies developed to achieve those goals, the resources deployed against these goals, and the quality of implementation.

The resources needed to carry out business strategies are both tangible and intangible. They include communication channels, operating systems, delivery networks, and managerial capacities and capabilities. The organization's internal characteristics must be evaluated against the impact of economic, technological, competitive, regulatory, and other environmental changes.

Short Question & Answers

1. Need for Portfolio Revision

Ans :

The primary factor necessitating portfolio revision is changes in the financial markets since the creation of the portfolio. The need for portfolio revision may arise because of some investor related factors also. These factors may be listed as:

1. Availability of additional funds for investment
2. Change in risk tolerance
3. Change in the investment goals
4. Need to liquidate a part of the portfolio to provide funds for some alternative use.

2. Meaning of Portfolio Revision

Ans :

A portfolio is a mix of securities selected from a vast universe of securities. Two variables determine the composition of a portfolio; the first is the securities included in the portfolio and the second is the proportion of total funds invested in each security.

Portfolio revision involves changing the existing mix of securities. This may be effected either by changing the securities currently included in the portfolio or by altering the proportion of funds invested in the securities. New securities may be added to the portfolio or some of the existing securities may be removed from the portfolio.

The ultimate aim of portfolio revision is maximisation of returns and minimisation of risk.

3. Constraints in Portfolio Revision

Ans :

1. Transaction Cost

Buying and selling of securities involve transaction costs such as commission and brokerage. Frequent buying and selling of securities for portfolio revision may push up transaction costs thereby reducing the gains from portfolio revision. Hence, the transaction costs involved in portfolio revision may act as a constraint to timely revision of portfolio.

Frequent sales of securities in the course of periodic portfolio revision or adjustment will result in short-term capital gains which would be taxed at a higher rate compared to long-term capital gains. The higher tax on short-term capital gains may act as a constraint to frequent portfolio revisions.

2. Statutory Stipulations

The largest portfolios in every country are managed by investment companies and mutual funds. These institutional investors are normally governed by certain statutory stipulations regarding their investment activity. These stipulations often act as constraints in timely portfolio revision.

3. Intrinsic Difficulty

Portfolio revision is a difficult and time consuming exercise. The methodology to be followed for portfolio revision is also not clearly established. Different approaches may be adopted for the purpose. The difficulty of carrying out portfolio revision itself may act as a constraint to portfolio revision.

4. Portfolio Revision Strategies

Ans :

Two different strategies may be adopted for portfolio revision, namely an active revision strategy and a passive revision strategy. The choice of the strategy would depend on the investor's objectives, skill, resources and time.

Active revision strategy involves frequent and sometimes substantial adjustments to the portfolio. Investors who undertake active revision strategy believe that security markets are not continuously efficient.

The practitioners of active revision strategy are confident of developing better estimates of the true risk and return of securities than the rest of the market. They hope to use their better estimates to generate excess returns.

Active portfolio revision is essentially carrying out portfolio analysis and portfolio selection all over again. It is based on an analysis of the fundamental factors affecting the economy, industry and company as also the technical factors like demand and supply.

Passive revision strategy, in contrast, involves only minor and infrequent adjustment to the portfolio over time. They find little incentive for actively trading and revising portfolios periodically.

5. Formula Plan

Ans :

In the market, the prices of securities fluctuate. Ideally, investors should buy when prices are low and sell when prices are high. If portfolio revision is done according to this principle, investors would be able to benefit from the price fluctuations in the securities market. But investors are hesitant to buy when prices are low either expecting that prices will fall further lower or fearing that prices would not move upwards again. Similarly, when prices are high, investors hesitate to sell because they feel that prices may rise further and they may be able to realise larger profits.

Investors would not be acting in the way required to benefit from price fluctuations. Hence, certain mechanical revision techniques or procedures have been developed to enable the investors to benefit from price fluctuations in the market by buying stocks when prices are low and selling them when prices are high. These techniques are referred to as formula plans.

Formula plans represent an attempt to exploit the price fluctuations in the market and make them a source of profit to the investor. They make the decisions on timings of buying and selling securities automatic and eliminate the emotions surrounding the timing decisions. Formula plans consist of predetermined rules regarding when to buy or sell and how much to buy or sell.

The use of formula plans demands that the investor divide his investment funds into two portfolios, one aggressive and the other conservative or defensive. The aggressive portfolio usually consists of equity shares while the defensive portfolio consists of bonds and debentures.

6. Constant Rupee Value Plan

Ans :

This is one of the most popular or commonly used formula plans. In this plan, the investor constructs two portfolios, one aggressive, consisting of equity shares and the other, defensive, consisting of bonds and debentures. The purpose of this plan is to keep the value of the aggressive portfolio constant, i.e. at the original amount invested in the aggressive portfolio.

To keep the total value of the aggressive portfolio at its original level, the investor has to buy some shares from the market to be included in his portfolio. For this purpose, a part of the defensive portfolio will be liquidated to raise the money needed to buy additional shares.

Under this plan, the investor is effectively transferring funds from the aggressive portfolio to the defensive portfolio and thereby booking profit when share prices are increasing. Funds are transferred from the defensive portfolio to the aggressive portfolio when share prices are low.

7. Constant Ratio Plan

Ans :

This is a variation of the constant rupee value plan. Here again the investor would construct two portfolios, one aggressive and the other defensive with his investment funds. The ratio between the investments in the aggressive portfolio and the defensive portfolio would be predetermined such as 1:1 or 1.5:1 etc. The purpose of this plan is to keep this ratio constant by readjusting the two portfolios when share prices fluctuate from time to time. For this purpose, a revision point will also have to be predetermined. The revision points may be fixed as ± 0.10 for example. This means that when the ratio between the values of the aggressive portfolio and the defensive portfolio moves up by 0.10 points or moves down by 0.10 points, the portfolios would be adjusted by transfer of funds from one to the other.

Let us assume that an investor starts with Rs. 20,000, investing Rs. 10,000 each in the aggressive portfolio and the defensive portfolio. The initial ratio is then 1:1. He has predetermined the revision points as ± 0.20. As share price increases the value of the aggressive portfolio would rise. When the value of the aggressive portfolio rises to Rs. 12,000, the ratio becomes 1.2:1 (i.e. Rs. 12,000 : Rs. 10,000). Shares worth Rs. 1,000 will be sold and the amount transferred to the defensive portfolio by buying bonds. Now, the value of both the portfolios would be Rs. 11,000 and the ratio would become 1:1.

8. Dollar Cost Averaging

Ans :

All formula plans assume that stock prices fluctuate up and down in cycles. Dollar cost averaging utilises this cyclic movement in share prices to construct a portfolio at low cost.

The plan stipulates that the investor invest a constant sum, such as Rs. 5,000, Rs. 10,000, etc. in a specified share or portfolio of shares regularly at periodical intervals, such as a month, two months, a quarter, etc. regardless of the price of the shares at the time of investment. This periodic investment is to be continued over a fairly long period to cover a complete cycle of share price movements.

If the plan is implemented over a complete cycle of stock prices, the investor will obtain his shares at a lower average cost per share than the average price prevailing in the market over the period. This occurs because more shares would be purchased at lower prices than at higher prices.

The dollar cost averaging is really a technique of building up a portfolio over a period of time. The plan does not envisage withdrawal of funds from the portfolio in between.

9. Rupee Cost Averaging Strategy

Ans :

"The simplest and most effective strategy is the rupee cost averaging. First, stocks with good fundamentals and long-term growth prospects should be selected. Such stocks' prices tend to be volatile in the market and provide the maximum benefits from rupee cost averaging. Secondly, the investor should make a commitment of buying shares at regular intervals. Once he makes a commitment, he should purchase the shares regardless of the stock's price, the company's short-term performance and the economic factors affecting the stock market.

In the rupee cost averaging strategy, the investor buys varying number of shares at various points of the stock market cycle. In a way, it can be called time diversification. Let us assume that an investor decides to buy ₹1000 worth of a particular stock for four quarters in a year, ignoring the transaction costs.

10. International Investing

Ans :

The strategy of selecting globally-based investment instruments as part of an investment portfolio. International investing includes such investment vehicles as mutual funds, American Depository Receipts, exchange-traded funds (ETFs) or direct investments in foreign markets. People often invest internationally for diversification, to spread the investment risk among foreign companies and markets; and for growth, to take advantage of emerging markets.

Foreign direct investment (FDI) is an investment in a business by an investor from another country for which the foreign investor has control over the company purchased. The Organization of Economic Cooperation and Development (OECD) defines control as owning 10% or more of the business. Businesses that make foreign direct investments are often called multinational corporations (MNCs) or multinational enterprises (MNEs).

11. Advantages of FDI

Ans :

- **Access to markets**: FDI can be an effective way for you to enter into a foreign market. Some countries may extremely limit foreign company access to their domestic markets. Acquiring or starting a business in the market is a means for you to gain access.
- **Access to resources**: FDI is also an effective way for you to acquire important natural resources, such as precious metals and fossil fuels. Oil companies, for example, often make tremendous FDIs to develop oil fields.
- **Reduces cost of production**: FDI is a means for you to reduce your cost of production if the labor market is cheaper and the regulations are less restrictive in the target foreign market. For example, it's a well-known fact that the shoe and clothing industries have been able to drastically reduce their costs of production by moving operations to developing countries.

12. Disadvantages of FDI

Ans :

International investments can be included in an investment portfolio to provide diversification and growth opportunities. All types of investments involve risk, and international investing may present special risks, including:

- Fluctuations in currency exchange rates
- Changes in market value
- Significant political, economic and social events
- Low liquidity
- Less access to important information
- Foreign legal remedies
- Varying market operations and procedures

13. Factors Affecting Foreign investment Decision

Ans :

1. Stable, predictable macroeconomic policy.
2. An effective and honest government.
3. A large and growing market.

4. Freedom of activity in the market.
5. Minimal government regulation.
6. Property rights and protection.
7. Reliable 'infrastructure:
8. Availability of high-quality factors of production.
9. A strong local currency.
10. The ability to remit profits, dividends and interest.
11. A favorable tax climate.
12. Freedom to operate between markets

14. Management of Foreign Exchange Risk

Ans :

Foreign exchange risk is the exposure of an institution to the potential impact of movements in foreign exchange rates. Foreign exchange risk is linked to unexpected fluctuations in the value of currencies. A strong currency can very well be risky, while a weak currency may not be risky. The risk level depends on whether the fluctuations can be predicted. Short and long-term fluctuations have a direct impact on the profitability and competitiveness of business.

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15. Translation Exposure

Ans :

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If a firm has subsidiaries in many countries, the fluctuations in exchange rate will make the assets valuation different in different periods. The changes in asset valuation due to fluctuations in exchange rate will affect the group's asset, capital structure ratios, profitability ratios, solvency ratios, etc. FASB 52 specifies that US firms with foreign operations should provide information disclosing effects of foreign exchange rate changes on the enterprise consolidated financial statements and equity.

16. Transaction Exposure

Ans :

Transaction exposure refers to the extent to which the future value of firm's domestic cash flow is affected by exchange rate fluctuations. It arises from the possibility of incurring foreign exchange gains or losses on transaction already entered into and denominated in a foreign currency.

The degree of transaction exposure depends on the extent to which a firm's transactions are in foreign currency. For example, the transaction in exposure will be more if the firm has more transactions in foreign currency.

According to FASB 52, all transaction gains and losses should be accounted for and included' in the equity's net income for the reporting period. Unlike translation gains and loses which require only a bookkeeping adjustment, transaction gains and losses are realized as soon as exchange rate changes.

The exposure could be interpreted either from the standpoint of the affiliate or the parent company. An entity cannot have an exposure in the currency in which its transactions are measured.

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Ans :

An operational risk is a risk arising from execution of a company's business functions. As such, it is a very broad concept including e.g. fraud risks, legal risks,

physical or environmental risks, etc. The term operational risk is most commonly found in risk management programs of financial institutions that must organize their risk management program according to Basel II. In Basel II, risk management is divided into credit, market and operational risk management. In many cases, credit and market risks are handled through a company's financial department, whereas operational risk management is perhaps coordinated centrally but most commonly implemented in different operational units (e.g. the IT department takes care of information risks, the HR department takes care of personnel risks, etc)

More specifically, Basel II defines operational risk as the risk of loss resulting from inadequate or failed internal processes, people and systems, or from external events. Although the risks apply to any organisation in business, this particular way of framing risk management is of particular relevance to the banking regime where regulators are responsible for establishing safeguards to protect against systemic failure of the banking system and the economy.

Definition : The Basel Committee defines operational risk as:

"The risk of loss resulting from inadequate or failed internal processes, people and systems or from external events."

However, the Basel Committee recognizes that operational risk is a term that has a variety of meanings and therefore, for internal purposes, banks are permitted to adopt their own definitions of operational risk, provided the minimum elements in the Committee's definition are included.

18. Strategic Risk

Ans :

Strategic risk is the current and prospective impact on earnings or capital arising from adverse business decisions, improper implementation of decisions, or lack of responsiveness to industry changes. This risk is a function of the compatibility of an organization's strategic goals, the business strategies developed to achieve those goals, the resources deployed against these goals, and the quality of implementation.

The resources needed to carry out business strategies are both tangible and intangible. They include communication channels, operating systems, delivery networks, and managerial capacities and capabilities. The organization's internal characteristics must be evaluated against the impact of economic, technological, competitive, regulatory, and other environmental changes.

Choose the Correct Answer

1. _____ is a method of holding a well diversified portfolio for a long term with the buy and hold strategy [a]

   (a) passive management (b) active management

   (c) transaction cost (d) all of the above

2. _____ portfolio is dividend into 2 parts namely aggressively and defensive portfolio [a]

   (a) rebalancing plan (b) formula plan

   (c) constant ratio (d) dollar cost averaging

3. _____ is a technique of building up a portfolio over a period time [d]

   (a) rebalancing plan (b) formula plan

   (c) constant ratio (d) dollar cost averaging

4. _____ markets shows strong economic growth and rapid industrialisation [b]

   (a) developed (b) emerging

   (c) frontier (d) dis frontier

5. _____ markets represent "the next wave" of investment destinations [c]

   (a) developed (b) emerging

   (c) frontier (d) dis frontier

6. Buying and selling of securities involve _____ cost such as commission and brokerage [a]

   (a) Transaction (b) stipulation

   (c) Intrinsic (d) all of the above

7. _____ investment refers to the addition of foreign stocks, bonds, mutual funds and other securities in portfolio. [a]

   (a) International portfolio (b) portfolio

   (c) both (d) none of the above

8. _____ markets represent "the next wave" of investment destinations [c]

(a) developed markets (b) emerging markets

(c) frontier markets (d) all of the above

9. _____ markets show strong economic growth and rapid industrialisation [b]

(a) developed markets (b) emerging markets

(c) frontier markets (d) all of the above

10. _____ characterised by political stability and appropriate governance [a]

(a) developed markets (b) emerging markets

(c) frontier markets (d) all of the above

Fill in the blanks

1. A _____ is a mix of securities selected from a vast universe of securities.
2. Holding securities based on future forecast is called _____.
3. _____ strategy involves frequent and sometimes substantial adjustments to the portfolio.
4. _____ strategy, in contrast, involves only minor and infrequent adjustment to the portfolio over time.
5. _____ represent an attempt to exploit the price fluctuations in the market and make them a source of profit to the investor.
6. _____ averaging utilises this cyclic movement in share prices to construct a portfolio at low cost.
7. The simplest and most effective strategy is the _____.
8. _____ is an investment in a business by an investor from another country for which the foreign investor has control over the company purchased.
9. _____ risk is the exposure of an institution to the potential impact of movements in foreign exchange rates.
10. _____ is the degree to which a firm's foreign currency denominated financial statements is affected by exchange rate changes.

ANSWERS

1. portfolio
2. active management
3. Active revision
4. Passive revision
5. Formula plans
6. Dollar cost
7. rupee cost averaging
8. Foreign direct investment (FDI)
9. Foreign exchange
10. Translation risk

FACULTY OF COMMERCE

M.Com. (CBCS) III - Semester Examination

January / February - 2018

SECURITY ANALYSIS AND PORTFOLIO MANAGEMENT

Time : 3 Hours | Max. Marks : 80

Note : Answer all the questions from Part-A & Any Five questions from Part-B.

PART - A (5 × 4 = 20 MARKS)
(Short Answer Type)

1. What are the assumptions of efficient market hypothesis ?
2. What is share valuation ?
3. What are the assumptions of CAPM ?
4. What is portfolio performance evaluation ?
5. What is the need of portfolio revision ?

PART - B (5 × 12 = 60 MARKS)
(Essay Answer Type)

6. (a) Discuss the components of fundamental analysis.

OR

(b) Explain the basic principles of advantages of technical analysis.

7. (a) Describe various methods of bond valuation.

OR

(b) Mr. Ravi's equity share currently sells for Rs. 23 per share. The Company's finance manager anticipates a constant growth rate of 10.5% and an end-of-year dividend of Rs. 2.50.

(i) What is the expected rate of returns ?

(ii) If the investor requires a 17% return, should he purchase the stock ?

8. (a) Discuss the pricing strategies under APT model.

OR

(b) Stock A and B have yielded the following returns for the past two years.

Years	Returns (%)	
	A	B
2016	12	14
2017	18	12

(i) What is the expected return on portfolio made up of 60% of A and 40% of B.

(ii) Find out standard deviation of each stock.

(iii) What is the portfolio risk with an investment of 60% in A and 40% in B.

9. (a) Explain Treyover Shape and Jensen indices of portfolio performance.

OR

(b) Using the inputs, rank the funds according to the predictive ability of the fund's management.

Particulars	Rp	αP	β
Birla Advantage	25.38	4.0	0.23
Reliance	36.28	6.86	0.52
Alliance equity	45.56	4.31	0.63
S & P 500 CNX	36.74	3.69	1.00
Rf	9.00	–	–

10. (a) Discuss various portfolio revision strategies for a rationale investor.

OR

(b) Describe the pros and cons in global investing.

FACULTY OF COMMERCE

M.Com. III - Semester (CBCS/Non-CBCS) Examination, December - 2016

(Common Paper for M.Com (CBCS / Non-CBCS) & M.Com. (IS) Courses)

SECURITY ANALYSIS AND PORTFOLIO MANAGEMENT

Time : 3 Hours] [Max. Marks : 80

Note : Answer all the questions.

PART - A (5 × 4 = 20 Marks) **ANSWERS**

1. What are the industry characteristics ? **(Unit-I, S.A - 4)**
2. Explain the concept of 'Present value ? **(Unit-II, S.A - 4)**
3. What are the limitations of Arbitrate pricing theory? **(Unit-III, S.A - 11)**
4. What is the need for portfolio evaluation ? **(Unit-IV, S.A - 1)**
5. What do you meant by Foreign Exchange Risk ? **(Unit-V, S.A - 14)**

PART - B (5 × 12 = 60 Marks)

6. a) What is fundamental analysis ? Describe the key economic variables that an investor must monitor as part of his fundamental analysis. **(Unit-I, Topic-1.1,1.1.2)**

OR

b) Explain the merits and demerits of technical as a tool of security analysis. **(Unit-I, Topic-1.2,1.2.3)**

7. a) Describe the multiplier approach to share valuation. **(Unit-II, Topic-2.1.7)**

b) A 20 years, 10% coupon interest rate bond has Rs.1000 face value. The market rate of interest is 8%. Compute the intrinsic value of this bond if it has five years to maturity. Assume that interest is paid annually.

Sol :

Year	CFAT	YTM @ 8%	PV of CFAT
1	100	0.926	92.6
2	100	0.855	85.5
3	100	0.794	79.4
4	100	0.735	73.5
5	100	0.681	68.1
5	1000	0.681	681
		ΣPV of CFAT =	1,080

Intrinsic value of the bond = ₹ 1,080

8. a) What is Capital Asset Pricing Model ? List the assumptions and limitations of capital asset pricing model. **(Unit-III, Topic-3.1.1)**

OR

b) The estimated rates of return, beta coefficients and standard deviations of some securities are as given below :

Security	Estimated Return(%)	Beta	Standard Deviation(%)
A	35	1.60	50
B	28	1.40	40
C	21	1.10	30
D	18	0.90	25
E	15	0.75	20
F	12	0.60	18

The risk free rate of return is 8%. The market return is expected to be 20%. Determine which of the above securities are overpriced and which are under priced ?

Sol. :

Calculation of actual returns :

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

$$E(R_A) = 8 + 1.6\ (20 - 8)$$
$$= 27.2$$

$$E(R_B) = 8 + 1.4\ (20 - 8)$$
$$= 24.8$$

$$E(R_C) = 8 + 1.1\ (20 - 8)$$
$$= 21.2$$

$$E(R_D) = 8 + 0.9\ (20 - 8)$$
$$= 18.8$$

$$E(R_E) = 8 + 0.75\ (20 - 8)$$
$$= 17$$

$$E(R_F) = 8 + 0.6\ (20 - 8)$$
$$= 15.2$$

Security	Expected return	Actual return	Over priced/under priced
A	35	27.2	under priced
B	28	24.8	under priced
C	21	21.2	over priced
D	18	18.8	over priced
E	15	17	over priced
F	12	15.2	over priced

9. a) What are the different perspectives that can be adopted for evaluation of performance of investment activity. **(Unit-IV, Topic - 4.1, 4.3)**

b) From the following data on returns and risks of portfolio A to E. Calculate the Sharpe measure and Treynor measure of portfolio performance, if R_f is 3%.

Portfolio	Expected return	σ	Beta
A	7	3	0.4
B	10	8	1.0
C	13	6	1.1
D	15	13	1.2
E	18	15	1.4

Sol. :

Sharpe measure $= \dfrac{r_p - r_f}{\sigma_p}$

Ranks

$S_A = \dfrac{7-3}{3} = 1.33 \longrightarrow (2)$

$S_B = \dfrac{10-3}{8} = 0.875 \longrightarrow (5)$

$S_C = \dfrac{13-3}{6} = 1.67 \longrightarrow (1)$

$$S_D = \frac{15-3}{13} = 0.923 \longrightarrow (4)$$

$$S_e = \frac{18-3}{15} = 1 \longrightarrow (3)$$

Treynors measure $= \frac{r_p - r_f}{\beta_p}$

$$T_A = \frac{7-3}{0.4} = 10 \longrightarrow 2.5$$

$$T_B = \frac{10-3}{1} = 7 \longrightarrow 5$$

$$T_C = \frac{13-3}{1.1} = 9.09 \longrightarrow 4$$

$$T_D = \frac{15-3}{1.2} = 10 \longrightarrow 2.5$$

$$T_E = \frac{18-3}{1.4} = 10.71 \longrightarrow (1)$$

10. a) Distinguish between active revision strategy and passive revision strategy. **(Unit-V, Topic-5.4)**

OR

b) What are the factors influencing International Investigating ? **(Unit-V, Topic -5.6)**

FACULTY OF COMMERCE

M.Com. III-Semester (Non - CBCS) Examination

SECURITIES ANALYSIS AND PORTFOLIO MANAGEMENT

Time : 3 Hours **ANSWERS TO JUNE-2016** Max. Marks : 80

PART - A (5 × 4 = 20 MARKS)

Note : Answer all the questions in not more than one page each.

1. Write a brief note on Industrial Life cycle.

Ans :

Refer to Unit - I, S.A - 3

2. What are the types of Bond return?

Ans :

Refer to Unit - II, S.A - 7

3. What is Beta?

Ans :

Refer to Unit - III, S.A - 4

4. What is stock market index?

Ans :

Refer to Unit - IV, S.A - 7

5. Explain in detail the Dollar Cost Averaging.

Ans :

Refer to Unit - V, S.A - 8

SECTION - B (5 × 12 = 60)

Note: Answer all the questions by using internal choice in not exceeding 4 pages each.

6. (a) Explain the basic principles of Technical Analysis.

Ans :

Refer to Unit - I, Topic No. 1.2.3

OR

(b) Discuss the key macroeconomic indicators and their impact on stock market.

Ans :

Refer to Unit - I, Topic No. 1.6

7. (a) What are the important properties of Bond Duration?

Ans :

Refer to Unit - II, Topic No. 2.6

OR

(b) The market price of Rs. 1000 par value bond carrying a coupon rate of 14% and maturing after 5 years is Rs.1050. What is the yield to maturity on this bond?

Ans :

(P_0) Market value of bond = 1000

(c) Coupon rate = 14% × 1000 = 140 ₹

(P0) Maturity value = 1050

YTM = ?

Using approximate YTM method

$$AYTM = \frac{C + \left(\frac{P_0 - P_0}{5}\right)}{\frac{P_0 + P}{2}}$$

$$= \frac{140 + \left[\frac{1000 - 1050}{5}\right]}{\frac{1050 + 1000}{2}} = \frac{140 - \frac{50}{5}}{1025}$$

$$YTM = \frac{130}{1025} = 0.1268 = 12.68\% \cong 13\%$$

YTM = 13%

8. (a) What are the advantages and disadvantages of Capital Asset pricing model (CAPM)? Explain.

Ans :

Refer to Unit - III, Topic No. 3.1

OR

(b) The following table gives an analyst expected return on two stock for particular market returns:

Market return	Aggressive stock	Defensive stock
6%	2%	8%
20	30	16

(i) What are the betas of the two stocks?

(ii) What is expected return on each stock if the market return is equally likely to be 6% or 20%?

(iii) If the risk-free is 7% and the market return is equally likely to be 6% or 20%, what is the SML?

(iv) What are the alpha of the two stocks?

Ans :

(i) Calculation of Beta

$$\text{Aggressive stock} = \frac{30-2}{20-6} = 2$$

$$\text{Defensive stock} = \frac{16-8}{20-6} = 0.571$$

(ii) Calculation of expected return :

$$E(r) = \sum_{i=1}^{n} X_i R_i \; 0$$

Aggressive stock = 0.5 × 2% + 0.5 × 30%

= 0.1 + 0.15

= 0.16 or 16%

Defensive stock = 0.5 × 8% + 0.5 × 16%

= 0.04 + 0.08 = 0.12 or 12%

(iii) Expected return on portfolio = $0.5 \times 0.06 + 0.5 \times 0.12$

$= 0.03 + 0.1$

$= 0.13$ or 13%

The risk free rate is 7%, market risk premium is 13 – 7 = 6%

$SML = R_f + \beta(R_m)$

$= 7 + 6\%$

$SML = 13\%$

(iv) Calculation of alpha :

Aggressive stock = 0.07 + 2(6%) = 0.07 + 0.12 = 0.19 or 19%

Alpha = Expected return – Actual return

= 16% – 19%

= –3%

Defensive stock = 7% + 0.571 (6%) = 0.10426 or 10.426%

Alpha = 12 – 10.426 = 1.574%

9. (a) Explain the uses of stock market Index.

Ans :

Refer to Unit - IV, Topic No. 4.7

OR

(b) Five portfolio show the following results for the last 10 years.

Portfolio	Average Return (%)	SD (%)	Correlation Coefficient with Market
A	**15.6**	**27.0**	**0.81**
B	**11.8**	**18.0**	**0.55**
C	**8.3**	**15.2**	**0.38**
D	**19.0**	**21.2**	**0.75**
E	**-6.0**	**4.0**	**0.45**
Market	**13.0**	**12.0**	**-**
T-Bills	**8.0**	**-**	**-**

Give ranks to the portfolio using Share's and Treynor's methods.

Ans :

Calculation of Shape Index :

$$S = \frac{R_P - R_f}{\sigma_P}$$

$$\Rightarrow \quad S_A = \frac{15.6 - 8}{27} = 0.281$$

$$S_B = \frac{11.8 - 8}{18} = 0.21$$

$$S_C = \frac{8.3 - 8}{15.2} = 0.019$$

$$S_D = \frac{19 - 8}{21.2} = 0.519$$

$$S_E = \frac{-6 - 8}{4} = -3.5$$

Calculation of Trynor Index

$$T_P = \frac{R_p - R_f}{\beta_p}$$

In the given problem, β values are not given

$$\beta = r\frac{\sigma_p}{\sigma_n}$$

$$\beta_A = 0.81 \times \frac{27}{12} = 1.8225$$

$$\beta_B = 0.55 \times \frac{18}{12} = 0.825$$

$$\beta_C = 0.38 \times \frac{15.2}{12} = 0.481$$

$$\beta_D = 0.75 \times \frac{21.2}{12} = 1.325$$

$$\beta_E = 0.45 \times \frac{4}{12} = 0.15$$

$$T_A = \frac{15.6 - 8}{1.8225} = 4.17$$

$$T_B = \frac{11.8 - 8}{0.825} = 4.6$$

$$T_C = \frac{8.3 - 8}{0.481} = 0.624$$

$$T_D = \frac{19 - 8}{1.325} = 8.301$$

$$T_E = \frac{-6 - 8}{0.15} = -93.33$$

10. (a) Discuss the benefits and risks involved in Global investing.

Ans :

Refer to Unit - V, Topic No. 5.7, 5.9

OR

(b) Explain the need of portfolio revision.

Ans :

Refer to Unit - V, Topic No. 5.2

FACULTY OF COMMERCE

M.Com. III-Semester (Non - CBCS) Examination

December - 2015

SECURITIES ANALYSIS AND PORTFOLIO MANAGEMENT

Time : 3 Hours] [Max. Marks : 80

Note: Answer all the questions in not more than one page each.

SECTION - A **(5 × 4 = 20)**

1. What are the differences between fundamental analysis and technical analysis?
2. What is yield to call?
3. What are the assumptions of CAPM?
4. Explain in detail dollar cost averaging.
5. What is portfolio revision?

SECTION - B **(5 × 12 = 60)**

Note: Answer all the questions by using internal choice in not exceeding 4 pages each.

6. (a) Explain in detail economic, industry and company analysis.

OR

(b) Explain Dow Theory.

7. (a) Write in detail about bond duration.

OR

(b) The following information is available in respect of a bond :

Face value	Rs. 10,000
Market price	Rs. 8,790
Coupon rate	8%
Investor yield	10%
Time to maturity	4 years

Find out the yield-maturity (YTM) and intrinsic value of the bond. Should all investors buy this bond based on YTM and intrinsic value?

8. (a) Critically examine the APT.

OR

(b) The Evergreen investment company messages a stock fund consisting of four stocks with the following market value and betas:

Stock	Market value (Rs)	Beta
A	2,00,000	1.16
B	1,00,000	1.20
C	1,50,000	0.80
D	50,000	0.50

If the risk free rate of interest is 9% and the market return is 15%, what is the portfolio's expected return?

9. (a) Explain in detail the performance evaluation of portfolio under sharpe method.

OR

(b) Consider the following information for three funds P, Q and R and the market index.

Fund	Mean return (%)	S.D. (%)	Beta
P	15	20	0.50
Q	17	24	1.10
R	19	27	1.20
Market index	16	20	1.00

The mean risk-free rate was 10%. Calculate the Treynor, Sharpe and Jensen measures for the three mutual fund and the market index.

10. (a) What are the constraints in portfolio revision? Explain.

OR

(b) What are the factors that influence the international investing?

Solutions to December - 2015

SECTION - A **(5 × 4 = 20)**

1. What are the differences between fundamental analysis and technical analysis?

Ans :

Refer to Unit - I, S.A - 9

2. What is yield to call?

Ans :

Refer to Unit - II, S.A - 8

3. What are the assumptions of CAPM?

Ans :

Refer to Unit - III, S.A - 2

4. Explain in detail dollar cost averaging.

Ans :

Refer to Unit - V, S.A - 8

5. What is portfolio revision?

Ans :

Refer to Unit - V, S.A - 2

SECTION - B **(5 × 12 = 60)**

Note: Answer all the questions by using internal choice in not exceeding 4 pages each.

6. (a) Explain in detail economic, industry and company analysis.

Ans :

Refer to Unit - I, Topic No. 1.1.2, 1.1.5, 1.1.8

OR

(b) Explain Dow Theory.

Ans :

Refer to Unit - I, Topic No. 1.2.2

7. (a) Write in detail about bond duration.

Ans :

Refer to Unit - II, Topic No. 2.6

OR

(b) The following information is available in respect of a bond :

Face value	**Rs. 10,000**
Market price	**Rs. 8,790**
Coupon rate	**8%**
Investor yield	**10%**
Time to maturity	**4 years**

Find out the yield-maturity (YTM) and intrinsic value of the bond. Should all investors buy this bond based on YTM and intrinsic value?

Ans :

Face Value = ₹ 10,000

Market price = ₹ 8,790

Coupon rate = 8%

Coupon payment = 10,000 × 8% = ₹ 800

Time to maturity = 4 years

Calculation of YTM :

Year	Cash flow	Pv@ 10%	Pv of CFAT	PV@ 15%	PV of CFAT
1	800	0.909	727	0.870	696
2	800	0.826	661	0.756	605
3	800	0.751	601	0.658	526
4	800	0.683	546	0.572	458
5	10,000	0.683	6830	0.572	5720
			ΣPVCFAT = 9365		8005

$$YTM = 10\% + \frac{\frac{9365 - 8790}{11}}{\frac{9365 + 8005}{2}} \times (15 - 10)$$

$$= 10\% + \frac{143.75}{8685} (5)$$

$$= 10.085\%$$

Intrinsic value of the bond = ₹ 9365

Since the intrinsic value of the bond is more than market value of the bond. The investor is suggested to buy the bond.

8. (a) Critically examine the APT.

Ans :

Refer to Unit - III, Topic No. 3.6, 3.6.3

OR

(b) The Evergreen investment company messages a stock fund consisting of four stocks with the following market value and betas:

Stock	Market value (Rs)	Beta
A	**2,00,000**	**1.16**
B	**1,00,000**	**1.20**
C	**1,50,000**	**0.80**
D	**50,000**	**0.50**

If the risk free rate of interest is 9% and the market return is 15%, what is the portfolio's expected return?

Ans :

Portfolio expected return = $R_f + \beta_p (R_m - R_f)$

$\beta_p = \Sigma w_i . \beta_i$

Stock	Market value	w_i	β_i	$w_i \times b_i$
A	20,00,000	0.4	1.16	0.464
B	1,00,000	0.2	1.2	0.24
C	1,50,000	0.3	0.8	0.24
D	50,000	0.1	0.5	0.05
				$\Sigma w_i.b_i = 0.994$

$E(R_p) = 9 + 0.994\ (15 - 9)$

$= 14.964\% \cong 15\%$

$E(R_p) = 15\%$

$\therefore$ Portfolio expected return = 15%

9. (a) Explain in detail the performance evaluation of portfolio under shape method.

Ans :

Refer to Unit - IV, Topic No. 4.1, 4.3.

OR

(b) Consider the following information for three funds P, Q and R and the market index.

Fund	Mean return (%)	S.D. (%)	Beta
P	**15**	**20**	**0.50**
Q	**17**	**24**	**1.10**
R	**19**	**27**	**1.20**
Market index	**16**	**20**	**1.00**

The mean risk-free rate was 10%. Calculate the Treynor, Sharpe and Jensen measures for the three mutual fund and the market index.

Ans :

Fund	R_p	σ	b
P	15	20	0.5
Q	17	24	1.1
R	19	27	1.2
Market index	16	20	1

Calculation of Sharpe Measure

$$S_p = \frac{R_p - R_f}{\sigma_p}$$

$\Rightarrow$ Funds : p

$$S_P = \frac{15-10}{20} = 0.25$$

$$S_Q = \frac{17-10}{24} = 0.292$$

$$S_R = \frac{19-10}{27} = 0.333$$

$$S_M = \frac{16-10}{20} = 0.3$$

Calculation of Treynor Measure

$$T_P = \frac{R_P - R_f}{\beta}$$

$\Rightarrow$ $$T_P = \frac{15-10}{0.5} = 10$$

$$T_Q = \frac{17-10}{1.1} = 6.36$$

$$T_R = \frac{19-10}{1.2} = 7.5$$

$$T_M = \frac{16-10}{1} = 6$$

Jensen Measure :

$\infty = R_P - [R_f + \beta(R_m - R_f)]$

$\alpha_P = 15 - [10 + 0.5(16 - 10)]$

$\alpha_P = 2$

$\alpha_Q = 17 - [10 + 1.1(16 - 10)]$

$\alpha_Q = 0.4$

$\alpha_R = 19 - [10 + 1.2(16 - 10)]$

$\alpha_R = 1.8$

Ranks under Jenen measure $= \frac{\alpha}{\beta}$

$\Rightarrow$ Fund P $= \frac{2}{0.5} = 4$

$Q = \frac{0.4}{1.1} = 0.36$

$R = \frac{1.8}{1.2} = 1.5$

Ranking of Funds According to the Measures :

Fund	S_P	Rank	T_P	Rank	α_P	Rank
P	0.25	3	10	1	4	1
Q	0.292	2	6.36	3	0.36	3
R	0.333	1	7.5	2	1.5	2

10. (a) What are the constraints in portfolio revision? Explain.

Ans :

Refer to Unit - V, Topic No. 5.3

OR

(b) What are the factors that influence the international investing?

Ans :

Refer to Unit - V, Topic No. 5.5.3

FACULTY OF COMMERCE

M.Com. III-Semester (Non - CBCS) Examination

November / December - 2014

SECURITY ANALYSIS AND PORTFOLIO MANAGEMENT

Time : 3 Hours] [Max. Marks : 80

Note: Answer all the questions in not more than one page each.

SECTION - A **(5 × 4 = 20)**

1. What is EMH?
2. What is a Bond?
3. What is APT?
4. What is stock market index?
5. What is Foreign Exchange Risk?

SECTION - B **(5 × 12 = 60)**

Note: Answer all the questions by using internal choice in not exceeding 4 pages each.

6. (a) Explain the need for Fundamental Analysis.

OR

(b) What is Technical Analysis? Describe its basic Technical Assumptions.

7. (a) Explain different equity valuation models.

OR

(b) A bond with a face value of Rs. 500 and a coupon rate of 12% is currently quoting in the market at Rs. 420. It has a term to maturity of 4 years. The holder of this bond has an applicable income tax rate of 30% and a capital gains tax rate of 15%. Assuming that interest is paid annually you are required to

i) Compute the interest rate risk when the market interest rate falls by 200 basis points.

ii) Calculate the interest rate risk when the market interest rate rises by 100 basis points.

8. (a) Critically examine the CAPM theory.

OR

(b) The following yield structure was in existence on August 31, I998. Determine the missing forward yields.

Year	Forward rate	YTM
1	7.00%	7.00%
2		7.50
3	9.77	8.25
4		8.50
5		9.00

9. (a) Explain the various measures of portfolio performance.

OR

(b) The Carson Company's earnings and dividends have been growing at a rate of 7% the past several years, and this rate of growth is expected to continue in the foreseeable future. If Carson's current dividend per share is Rs. 3, what is its current value (or equilibrium Price)? Assume the following two-factor model applies and that b_M and b_{i2} for the Carson Company are .6 and 1.4, respectively.

$$E(r_1) = 5\% + 2\%b_{i1} + 6\%b_{i2}$$

10. (a) Describe how to construct security market indices and state its utility towards investment decisions.

OR

(b) Explain the various formula plans for the purchase and sale of securities.

Solutions to Nov., - Dec., - 2014

SECTION - A **(5 × 4 = 20)**

1. What is EMH?

Ans :

Refer to Unit-I, S.A - 12

2. What is a Bond?

Ans :

Refer to Unit-II, S.A - 5

3. What is APT?

Ans :

Refer to Unit-III, S.A - 8

4. What is stock market index?

Ans :

Refer to Unit-IV, S.A - 5

5. What is Foreign Exchange Risk?

Ans :

Refer to Unit-V, S.A - 14

SECTION - B **(5 × 12 = 60)**

6. (a) Explain the need for Fundamental Analysis.

Ans :

Refer to Unit-I, Topic : 1.1.1

OR

(b) What is Technical Analysis? Describe its basic Technical Assumptions.

Ans :

Refer to Unit-I, Topic: 1.2.1 and 1.2.3

7. (a) Explain different equity valuation models.

Ans :

Refer to Unit-II, Topic: No. 2.1.3, 2.1.4, 2.1.5, 2.1.6 & 2.1.7

OR

(b) A bond with a face value of Rs. 500 and a coupon rate of 12% is currently quoting in the market at Rs. 420. It has a term to maturity of 4 years. The holder of this bond has an applicable income tax rate of 30% and a capital gains tax rate of 15%. Assuming that interest is paid annually you are required to

i) Compute the interest rate risk when the market interest rate falls by 200 basis points.

ii) Calculate the interest rate risk when the market interest rate rises by 100 basis points.

Ans :

After tax income from coupon payment is; I(1 – t)

= 60 (1 – 30%) = Rs. 42

Calculation of Redemption value after considering the capital gain tax

= Fv – (Fv – MP)t

= 500 – (500 – 420) 15%

= 500 – (80) 0.15 = Rs. 488

$$\text{YTM after tax is} = \frac{I(1-t)+\left(\frac{Fv-MP}{n}\right)}{\frac{Fv+MP}{2}} = \frac{60(1-30\%)+\frac{500-420}{4}}{\frac{500+420}{2}}$$

$$= \frac{60(0.7)+\frac{80}{4}}{\frac{920}{2}} = \frac{42+20}{460} = 13.48\% \text{ or } 0.1348$$

$$\text{Current Yield after tax} = \frac{I(1-t)}{MP} = \frac{60(1-0.3)}{420} = \frac{42}{420} = 10\%$$

$$\text{Duration [D]} = \frac{r_e}{r_d} \text{ PVIFA } (r_d, n)\ (1 + r_d) + \left[1 - \frac{r_e}{r_d}\right] n$$

$$D = \frac{10.00}{13.19} \text{ . PVIFA } (13.19\%/4)\ (1 + 13.1\ \% + \left[1 - \frac{10.00}{13.19}\right] 4$$

$$D = 0.7582\ (2.9745)\ (1.1319) + [1 - 0.7582]4$$

$$D = 0.7582\ (3.3668) + (0.2418)4$$

$$D = 2.5527 + 0.9762 = 3.51 \text{ Years.}$$

That is, the duration of the given bond is 3.51 years. Before computing the interest rate risk or in other worlds the change in the price as a result of fall in the interest rates we compute the interest rate elasticity as shown below.

$$\text{Interest rate elasticity} = -D \times \frac{YTM}{YTM}$$

$$= -3.51 \times \frac{0.1319}{1.1319}$$

$$= -0.409.$$

(i) $$\%\text{ of price change} = \text{Interest rate elasticity} \times \frac{\Delta BP}{YTM}$$

$$= -0.409 \times \frac{-0.02}{0.1319} = 0.062\% \text{ or } 6.2\%$$

(ii) $$\%\text{ of price change} = \text{Interest rate elasticity} \times \frac{\Delta BP}{YTM} = -0.49 \times \frac{0.01}{0.1319}$$

$$= 0.035\% \text{ or } 3.1\%$$

8. (a) Critically examine the CAPM theory.

Ans :

Refer to Unit-III, Topic: 3.1.1.

OR

(b) The following yield structure was in existence on August 31, I998. Determine the missing forward yields.

Year	Forward rate	YTM
1	7.00%	7.00%
2		7.50
3	9.77	8.25
4		8.50
5		9.00

Ans :

Calculation of one year forward rate

$$\text{for 2nd year } f_{12} = \frac{(1+YTM_2)^2}{(1+YTM_1)^1} - 1 = \frac{(1+0.075)^2}{(1+0.07)^1} - 1$$

$$= \frac{1.55625}{1.07} = 1.0800 - 1 = 0.08 \text{ or } 8\%$$

$$\text{for 3rd year } f_{23} = \frac{(1+YTM_3)^2}{(HYTM)^2} - 1 = \frac{(1+0.85)^4}{(1+0.0825)^3}$$

$$= \frac{1.38586}{1.26848} - 1$$

$$= 1.0925 - 1 = 0.0925 \text{ or } 9.25\%$$

$$\text{for 4th year } f_{43.4} = \frac{(1+YTM_4)^4}{(1+YTM_3)^3} - 1 = \frac{(1+0.09)^5}{(1+0.085)^4} - 1$$

$$= \frac{1.53862}{1.38586} - 1$$

$$= 1.1102 - 1 = 0.1102 \text{ or } 11.02\%$$

9. (a) Explain the various measures of portfolio performance.

Ans :

Refer to Unit-IV, Topic: 4.3 and 4.3.2

OR

(b) The Carson Company's earnings and dividends have been growing at a rate of 7% the past several years, and this rate of growth is expected to continue in the foreseeable future. If Carson's current dividend per share is Rs. 3, what is its current value (or equilibrium Price)? Assume the following two-factor model applies and that b_M and b_{i2} for the Carson Company are .6 and 1.4, respectively.

$$E(r_1) = 5\% + 2\%b_{i1} + 6\%b_{i2}$$

Ans :

The constant-growth Gordon dividend model should be used. Where P s current price, D is current dividend per share, k = E(r) is the stock's required return or expected return, and g is the constant annual growth rate for dividends.

$$K = E(r_1) = 5\% + 2\% (.6) + 6\% (1.4) = 5\% + 1.2\% + 8.4\% = 14.6\%$$

$$p_0 = \frac{D(1+g)}{k-g} = \frac{3(1+0.07)}{0.146-0.07} = \frac{3.21}{0.076} = \text{Rs. } 42.24$$

10. (a) Describe how to construct security market indices and state its utility towards investment decisions.

Ans :

Thus far, the analysis has shown that the expected return of efficient portfolios under conditions of equilibrium is a linear function of the Portfolio's risk as measured by the standard deviation of its expected return. The next question, we consider, is what determines the rate of return of an individual security under conditions of equilibrium?

Sharpe argued that the essence of Markowitz's diversification is to combine securities with either low or negative covariance or alteratively, securities with low or negative beta. As a result securities with low or negative beta will be in great demand; causing their prices to rise and their expected returns to be pushed down. On the other hand, securities with high systematic risk (beta) will experience low demand, causing

their prices to fall and their expected return to be pushed up. Consequently, under conditions of equilibrium, securities will be priced in the market in such a way that securities with low systematic or market risk will receive low expected return, and securities with high systematic risk will receive relatively high expected return. The relationship is depicted in figure C where:

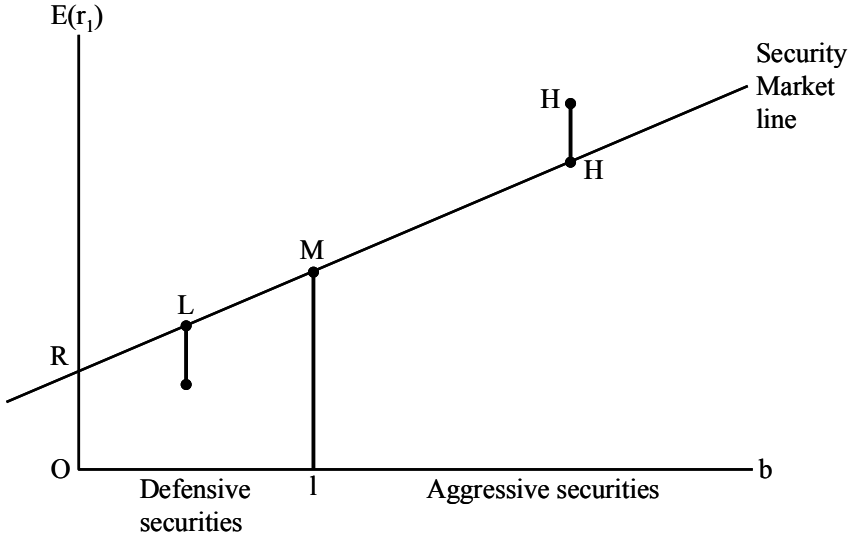
E(r) = Expected return of securities

OR = risk-free interest rate such as yield on 90-day treasury bill

b. = beta of securities

Under conditions of equilibrium, all securities will tend to locate on the security market line. If security H (Fig 'C') has a return which is higher for the amount of systematic risk associated with it, then the market will bid up its price until its expected return falls to the equilibrium level at H'. For the same reason, security L whose return is relatively low compared to its equilibrium level, will be under selling pressure until it falls sufficiently to bring forth a return at equilibrium level L.

In a nutshell what sharpe argues is that under conditions of equilibrium the expected return of a security does not depend on its total risk, but on it systematic risk (beta). The greater the systematic risk a security has, the more is the expected return of the security.



C. Security Market Line

Figure

The capital asset pricing model proposed by sharpe and depicted in figure C can be expressed mathematically by the following equation:

$$E[r_1 R_{i+} + E(r_M) - R]b_1$$

where

$E(r_M)$ = the expected return of security i

R_1 = risk, free interest rate

$E(r_M)$ = the expected return on the market (index)

β_1 = beta of security i

The relationship shown in figure C and above equation holds" not only for individual securities, but also for any combination of securities (i.e.,) portfolio) - efficient or inefficient.

OR

(b) Explain the various formula plans for the purchase and sale of securities.

Ans :

Refer to Unit-V, Topic: 5.4.3, 5.4.4, 5.4.5 and 5.4.6

FACULTY OF COMMERCE

M.Com. III-Semester (Non - CBCS) Examination

November / December - 2013

SECURITY ANALYSIS AND PORTFOLIO MANAGEMENT

Time : 3 Hours] [Max. Marks : 80

Note: Answer all the questions in not more than one page each.

SECTION - A **(5 × 4 = 20)**

1. What are the parameters for company analysis?
2. State various types of Bonds.
3. State the issues in APT model.
4. What is systematic and unsystematic risks?
5. What is portfolio revision?

SECTION - B **(5 × 12 = 60)**

Note: Answer all the questions by using internal choice in not exceeding 4 pages each.

6. (a) Explain the significance of Fundamental analysis in investment decisions.

OR

(b) Discuss the need and applicability of EMH approach.

7. (a) "Stocks are considered to be risky but bonds are not" - Discuss.

OR

(b) Well Being Drugs Ltd. reported a ₹100 sales per share for the current year. It paid a dividend of ₹4.00 on an earnings of ₹7.00 per share. It expects to grow at 7% per year in the long run. The required rate of return is 19% and its market price is ₹75. Given this data

a) Estimate the Price/Sales multiple.

b) If the growth rate is estimated correctly, how much should be the increase in the profit margin to justify the current market price.

8. (a) Discuss the advantages of adopting CAPM in the portfolio management and state its assumptions.

OR

(b) Avion Ltd. paid a dividend of ₹3.50 per share for the last year. The dividends are expected to grow at the rate of 6% per year thereafter. If the required rate of return is 15%, compute

a) The value per share.

b) If its current price is ₹50, what should be the growth rate in the dividends to justify this price?

9. (a) Explain the advantages of professionally managed portfolio and state techniques or portfolio evaluation.

OR

(b) The following three portfolios provide the particulars given below.

Portfolio Return	Average Annual deviation	Standard coefficient	Correlation
A	18	27-	0.8
B	14	18	0.6
C	15	8	0.9
Market	13	12	-

(i) Risk free rate of interest is 9. Rank these portfolio using Sharpes and Treynor's method,

(ii) Compare both the indices

10. (a) What is rupee cost averaging? Explain its benefits and limitations.

OR

(b) What is meant by foreign exchange risk and state the techniques for exchange risk minimization?

Solutions to Nov., - Dec., - 2013

SECTION - A **(5 × 4 = 20)**

1. What are the parameters for company analysis?

Ans :

Refer to Unit - I, S.A - 5

2. State various types of Bonds.

Ans :

Refer to Unit - II, S.A - 6

3. State the issues in APT model.

Ans :

Refer to Unit - III, S.A - 10

4. What is systematic and unsystematic risks?

Ans :

A) Systematic Risk

Systematic risk is due to the influence of external factors on an organization. Such factors are normally uncontrollable from an organization's point of view. It is a macro in nature as it affects a large number of organizations operating under a similar stream or same domain. It cannot be planned by the organization.

The types of systematic risk are depicted and listed below.

1. Interest rate risk
2. Market risk and
3. Purchasing power or inflationary risk.

B) Unsystematic Risk

Unsystematic risk is due to the influence of internal factors prevailing within an organization. Such factors are normally controllable from an organization's point of view.

It is a micro in nature as it affects only a particular organization. It can be planned, so that necessary actions can be taken by the organization to mitigate (reduce the effect of) the risk.

The types of unsystematic risk are depicted and listed below.

Business or liquidity risk,

Financial or credit risk and

Operational risk.

5. What is portfolio revision?

Ans :

Refer to Unit - V, S.A - 2

SECTION - B **(5 × 12 = 60)**

6. (a) Explain the significance of Fundamental analysis in investment decisions.

Ans :

Refer to Unit - I, Topic No. 1.1.1

OR

(b) Discuss the need and applicability of EMH approach.

Ans :

Refer to Unit - I, Topic: 1.8.2

7. (a) "Stocks are considered to be risky but bonds are not" - Discuss.

Ans :

An accepted fact among investors is that the higher the returns on an investment, the higher the risks are. Safe investments carry low risk, but the returns are also lower. Different levels of risk apply to common and preferred stock, as well as to corporate bonds. Corporate bonds generally have the lowest level of risk of the three investment types, but also offer lower returns, in spite of regular dividend payments. Common stocks have the highest risk of the investments and the highest potential returns.

Corporate Bonds

Bonds issued by companies represent the largest of the bond markets, bigger than U.S. Treasury bonds, municipal bonds, or securities offered by federal agencies. The risk associated with corporate bonds depends on the financial stability and performance of the company issuing the bonds, because if the company goes bankrupt it may not be able to repay the value of the bond, or any return on investment. Assess the risk by checking the company's credit rating with ratings agencies such as Moody's and Standard & Poor's. Good ratings are not guarantees, however, as a company may show an excellent credit record until the day before filing for bankruptcy.

Common Stocks

When you purchase stock in a company during a public offering, you become a shareholder in the company. Some companies pay dividends to shareholders based on the number of shares held, and this is one form of return on investment. Another is the profit realized by trading on the stock exchange, provided you sell the shares at a higher price than you paid for them. The risks of owning common stock include the possible loss of any projected profit, as well as the money paid for the shares, if the share price drops below the original price.

Preferred Stocks

This type of stock is rated by the agencies in the same way as corporate bonds are, which is based on the company's performance, and gives buyers a degree of reassurance. The stock is purchased either online or through a broker, and offers a variety of different share options compared with common stocks, which are relatively straightforward. Most preferred stocks pay shareholders a fixed dividend based on profits over a specific period. A disadvantage of preferred stocks is the lower yield compared with common stocks. This is due to the reduced risk of the investment, which is linked to the company's performance instead of the trading price.

Levels of Risk

Corporate bonds hold the lowest risk of the three types of investments, provided you choose the right company in which to invest. The main reason for this is that in the event of bankruptcy, corporate bond holders have a stronger claim to payment than holders of common or preferred stocks.

Bonds carry the risk of a lower return on investment, as the performance of stocks is generally better.

Common stocks carry the highest risk, because holders are last to be paid in the event of bankruptcy. Preferred stocks generally have higher yields than corporate bonds, lower risk than common stocks, and a better claim to payment in the event of bankruptcy

	Bond	**Stock**
Kind of Instrument	Debt	Equity
Meaning	In finance, a bond is a debtsecurity, in which the authorized issuer owes the holders a debt and is obliged to repay the principal and interest	In financial markets, stock capital raised by a corporation or joint-stock company through the issuance and distribution of shares
Centralization	Bonds markets, unlike stock or share markets, often do not have a centralized exchange or trading system	Stock or share markets, have a centralized exchange or trading system
Holders	Bond holders are in essence lenders to the issuer	The stock holders own a part of the issuing company (have an equity stake)
Kind	Securities	Securities
Yield Analysis	Nominal yield, Current yield, Yield to maturity, Yield curve, Bond duration, Bond convexity	Gordon model, Dividend yield, Income per share, Book value, Earnings yield, Beta coefficient
Participants	Investors, Speculators, Institutional Investors	Market maker, Floor trader, Floor broker
Issued By	Bonds are issued by public sectorauthorities, credit institutions, companies and supranational institutions	Stock are issued by corporation or joint-stock companies
Owners	bondholders	stockholders/shareholders
Derivatives	Bond option, Credit derivative, Credit default swap, Collateralized debt obligation, Collateralized mortgage obligation	Credit derivative, Hybrid security, Options, Futures, Forwards, Swaps

OR

(b) Well Being Drugs Ltd. reported a ₹100 sales per share for the current year. It paid a dividend of ₹4.00 on an earnings of ₹7.00 per share. It expects to grow at 7% per year in the long run. The required rate of return is 19% and its market price is ₹75. Given this data

i) Estimate the Price/Sales multiple.

ii) If the growth rate is estimated correctly, how much should be the increase in the profit margin to justify the current market price.

Ans :

(i) Calculation of Dividend pay out ratio $= \frac{DPS}{EPS} = \frac{4}{7} = 57.14\%$

$$\text{Net profit margin} = \frac{EPS}{Sales} = \frac{7}{100} = 0.07 \text{ or } 7\%$$

$$\text{Price/sales Ratio} = \frac{(\text{Profit Margin})\,(D.P.\text{Ratio})\,(Hg)}{k-g}$$

$$= \frac{(7\%)\,(57.14\%)\,(1+7\%)}{19\% - 0.7\%}$$

$$= \frac{(0.07)\,(0.5714)\,(1+0.07)}{0.19 - 0.07}$$

$$= \frac{0.0428}{0.12}$$

$$= 0.3566 \text{ or } 35.66\%$$

(ii) Calculation of Increase in profit margin $= \frac{(MP\%)\,(k-g)}{(\text{D.P. Ratio})\,(1+g)}$

$$= MP\ \% = \frac{75}{100} = 0.75$$

$$= \frac{(0.75)\,(0.19 - 0.07)}{(0.5714)\,(1+0.07)}$$

$$= \frac{(0.75)\,(0.12)}{(0.57154)\,(1.07)}$$

$$= \frac{0.09}{0.6114}$$

$$= 0.1472 \text{ or } 14.72\%$$

8. (a) Discuss the advantages of adopting CAPM in the portfolio management and state its assumptions.

Ans :

Refer to Unit - III, Topic: 3.5.1

OR

(b) Avion Ltd. paid a dividend of ₹3.50 per share for the last year. The dividends are expected to grow at the rate of 6% per year „ thereafter. If the required rate of return is 15%, compute

a) The value per share.

b) If its current price is ₹50, what should be the growth rate in the dividends to justify this price?

Ans :

(a) Given that the DPS during the current year as ₹ 3.50 Growth rate in dividends = 6%

Required rate of return = 15%

Value of the share is its current market price. It is given by

$$P_0 = \frac{D_0(1+g)}{k-g} = \frac{3.50(1+0.06)}{0.15-0.06} = ₹\ 41.22$$

b) The current price is ₹ 50.00. The growth rate in the dividends is obtained as show below:

$$P_0 = \frac{D_0(1+g)}{k-g}$$

Substituting the known values, we have

$$50 = \frac{3.50(1+g)}{0.15-g}$$

$$50(0.15) - 50\,g = 3.50 + 3.50\,g$$

$$7.5 - 50\,g = 3.50 + 3.50\,g$$

$$7.5 - 3.50\,g = 3.50\,g + 50\,g$$

$$4 = 53.5\,g \quad g = 4/53.5$$

$$g = 0.0748 \text{ or } 7.48\%$$

That is, the growth in the divideds should be 7.48% if the current price is to be justified.

9. (a) Explain the advantages of professionally managed portfolio and state techniques or portfolio evaluation.

Ans :

Refer to Unit-IV, Topic: 4.5

OR

(b) The following three portfolios provide the particulars given below.

Portfolio Return	Average Annual deviation	Standard coefficient	Correlation
A	**18**	**27-**	**0.8**
B	**14**	**18**	**0.6**
C	**15**	**8**	**0.9**
Market	**13**	**12**	**-**

(i) Risk free rate of interest is 9. Rank these portfolio using Sharpes and Treynor's method,

(ii) Compare both the indices

Ans :

$$\text{Share Index } S_t = \frac{R_p - R_f}{\sigma_p}$$

$$St_A = \frac{18-9}{27} = 0.333$$

$$St_B = \frac{14-9}{18} = 0.277$$

$$St_C = \frac{15-9}{8} = 0.75$$

Order of Ranking is C $\rightarrow$ A $\rightarrow$ B

$$\text{Treynor Index} = \frac{R_p - R_f}{\beta_p}$$

Beta values are not given, hence, β can be calculate by using the following formulae i.e.,

$$\beta = r\frac{\sigma_p}{\sigma_m}$$

$$\beta_A = 0.8 \times \frac{27}{12} = 1.8$$

$$\beta_B = 0.6 \times \frac{18}{12} = 0.9,\ \beta_C = 0.9 \times \frac{8}{12} = 0.6$$

$$\text{Treynor Index for A} = \frac{18-9}{1.8} = 5$$

$$\text{Treynor Index for B} = \frac{14-9}{0.9} = 5.56$$

$$\text{Treynor Index for C} = \frac{15-9}{0.6} = 10$$

Order of Ranking is C, B, A

10. (a) What is rupee cost averaging? Explain its benefits and limitations.

Ans :

Refer to Unit-V, Topic No. 5.4.6

OR

(b) What is meant by foreign exchange risk and state the techniques for exchange risk minimization?

Ans :

The, most frequently used financial instruments by companies in India and abroad for hedging the exchange risk are discussed below. These instruments are available at varying costs to the company. Two criterions have been used to contrast the different tools. **First,** there are different tools that serve practically the same purpose differing only in details like default risk or transaction cost or some fundamental market imperfection. **Second,** different tools hedge different kinds of risk.

1. Forward Contracts

A forward contract is one where a counterparty agrees to exchange a specified currency at an agreed price for delivery on a fixed maturity date. Forward contracts are one of the most common means of hedging transactions in foreign currencies.

In a forward contract, while the amount of the transaction, the value data, the payments procedure and the exchange rate are all determined in advance, no exchange of money takes place until the actual settlement date. For example, an Indian company having a liability in US dollars due in December end may buy US dollars today for the maturity date (December end). By doing so, the company has effectively locked itself into a rate. A forward contract for a customer involves a spot and a swap transaction, as the customer cannot cover the transaction outright for the forward data. This is because the market quotes only spot transactions on an outright basis. In the example given above, the customer (or the company) will have to first buy US dollars in the spot market and then enter into a swap where he sells spot and buys forward (December end).

The problem with forward contracts however, is that since they require future performance, sometimes one party may be unable to perform the contract. Also, many times forward rate contracts are inaccessible for many small businesses. Banks often tend to quote unfavorable rates for smaller business because the bank bears the risk of the company defaulting in the payments. In such situations, futures may be more suitable.

2. Futures contracts

Futures is the same as a forward contract except that it is standardized in terms of contract size is traded on future exchanges and is settled daily. In practice, futures differ from forwards in 3 important ways.

First, forwards could be for any amount while futures are for standard amount with each contract being much smaller than the average forward transaction. Also, futures are also standardized in terms of delivery dates while forwards are agreements that can specify any delivery date that the parties choose. Second, forwards are traded by phone and letters while futures are traded in organized exchanges, such as SIMEX in Singapore, IMM in Chicago. Third, in a forward contract, transfer of funds takes place only once - i.e. at maturity while in a futures contract, cash transactions take place practically every day during the life of the contract. Thus, the default risk is largely avoided in a futures contract.

Despite the above mentioned advantages, futures contract also entails some limitations. Since the futures trade only in standardized amounts, flexibility is missing and thus the . Hedges are not always perfect. Also, many big companies tend to prefer futures because of their adaptability.

3. Option Contract

An option contract is one where the customer has the right but not the obligation to contract on maturity date. Options have an advantage as compared to forward contracts as the customer has no obligation to exercise the option in case it is not in his favour.

An option can be a call or a put option. A call option is the right to buy the underlying asset whereas a put is the right to sell the underlying asset at the agreed strike price. For the purchase of an option, a customer will have to pay a premium. Likewise, the seller of the option receives premium. The option premium depends on the strike price, the maturity date, current spot rate and the volatility.

For example, a customer having a liability in Euro with a view that the Euro/ USD rate will be higher on maturir. Date will buy an Euro call. On the maturity date, he has the option to buy the Euro at the strike race or buy it from the market in case it is cheaper.

If the customer buys a Call Option with a strike price at 0.9000 and on maturity date, the rate is 0.8700, the customer has the right to exercise the option. Since in the example cited, it would be cheaper for the customer to by the Euro from the market, the customer will not exercise the option.

There are various structures available in the option market and the more frequently used ones are the Vanilla Options-structures with Knock In and Knock Out structures, Forward Extras, Range Forwards.

4. Currency Swap

A currency swap is defined as an agreement where two parties exchange a series of cashflows in one currency for a series of cashflows in another currency, at agreed intervals over an agreed period. Typically, a corporate would want to do such a swap if it wants to convert its liabilities in a particular currency to that of another currency.

The most popular instrument used to hedge are forward exchange contracts in India. Although in the more developed markets, options and derivatives are used to a larger extent. Forward contracts are more popular for the following reasons:

1. Forward exchange markets are well established and transparent.
2. Forward contracts are accessible even by the smaller corporates. There are few corporates in the country who have volumes which are tradeable in the option and derivative markets.
3. Mary corporate policies do not allow them to trade in options and derivatives. This is because these instruments are perceived to be risky and expensive. Options are relatively new to the Indian market. There is also a lack of product knowledge. Hence, many corporates are not too comfortable while dealing with options. Market imperfections/inefficiencies that characterize the Indian markets for these instruments.

FACULTY OF COMMERCE

M.Com. III-Semester (Non - CBCS) Examination

November / December - 2012

SECURITY ANALYSIS AND PORTFOLIO MANAGEMENT

Time : 3 Hours] [Max. Marks : 80

Note: Answer all the questions

SECTION - A **(5 × 4 = 20)**

1. Industry analysis

2. Bond Portfolio Selection

3. Arbitrage Price Theory

4. Melissa Tate is considering purchasing a financial asset and holding it for 4 years. If the asset has the following expected cash flows, what should she pay for the asset?

Year	Cash flow Rs.
1	100
2	200
3	400
4	500

The financial asset has a factor beta of 1.25 Assume the following one-factor APT model applies:

5. International Diversification?

SECTION - B **(5 × 12 = 60)**

Note: Answer all the questions by using internal choice

6. (a) (i) A company has outstanding shares of 1 crore and their value is Rs. 50 crore. The most recent dividend paid by the company was of Rs. 2.25 per share. EBIT to Assets ratio is 16% and the

ROE is 20%. Given this data, compute the growth rate in EPS and EBIT.

(b) Protech Ltd. has total capital of Rs. 100 crore and a Debt-Equity ratio of 4 : 9. The rate on investment earned was 25% and its effective tax rate was 40%, If the cost of debt is 15%, what would be the PAT of Protech Ltd.?

OR

(b) What are the methods adopted to analyses the financial statements of a company?

7. (a) The following yield structure was in existence on August 31, 1998, Determine the missing forward yields.

Year	Forward rate	YTM
1	7.00%	7.00%
2		7.50
3	9.77	8.25
4		8.50
5		9.00

OR

(b) Suppose the real rate is fixed at 3 percent, if the following inflation rates next 5 years, determine the yield curve for risk- free bonds:

Year	Expected Inflation
1	4.0%
2	4.5
3	5.0
4	6.0
5	5.5

8. (a) The following information is available on a bond:

Face value : Rs 100

Coupon rate: 12 percent payable annually

Years to maturity: 6

Current market price: Rs 110

What is the duration of the bond? Use the approximate formula for calculating the yield to maturity.

OR

(b) The following table gives an analyst's expected return on two stocks for particular market returns:

Market Return	Aggressive Stock	Defensive Stock
6%	2%	8%
20	30	16

(a) What are the betas of the two stocks?

(b) What is the expected return on each stock if the market return is equally likely to b 6% or 20%?

(c) If the risk-free rate is 7% and the market return is equally likely to be 6% or 20% what is the SML?

(d) What are the alphas of the two stocks?

9. (a) The rates of return on stock A and market portfolio for 15 periods are given below:

Period	Return on Stock A(%)	Return of market portfolio(%)	Period	Return on Stock A(%) Portfolio(%)	Return on market
1	10	12	9	-9	1
2	15	14	10	14	12
3	18	13	11	15	-11
4	14	10	12	14	16
5	16	9	13	6	8
6	16	13	14	7	7
7	18	14	15	-8	10
8	4	7			

What is the beta for stock A?

What is the characteristic line for stock A?

OR

(b) Nithya firm is trying to decide two out of the four investment funds. From the past performance, they were able to calculate the following average returns and standard deviations of these funds. The current risk free rate of interest is 9 per cent.

	Alpha Fund	Vinu Fund	Meenu Fund	Arvind Fund
Average Return	17	18	16	14
Standard Deviation	19	20	13	12

10. (a) Assume CAPM equilibrium model with unlimited borrowing and lending at the riskless rate of interest. Complete the blanks in the following table.

Security	E(R)	a	b	e_t^2
A	.15	–	2.0	.10
B	–	.25	0.75	.04
C	.09	–	0.50	.17

OR

(b) Estimate the stock return by using the CAPM model and the arbitrage model. The particulars are given below,

The expected return of the market is 15 per cent and the equity's beta is 1.2. The risk free rate of interest is 8 per cent.

Factor	Market price of Risk	Sensitivity Index
Inflation	6%	1.1
Industrial Production	2%	0.8
Risk premium	3%	1.0
Interest rate	4%	– 0.9

What explanations can you offer to explain the difference in two estimates?

Solutions to Nov., - Dec., - 2012

SECTION - A **(5 × 4 = 20)**

1. Industry analysis

Ans :

An industry analysis refers to an evaluation of the relative strengths and weaknesses of particular industries. It studies the fundamental factors affecting the performance of different industries

Industry analysis includes, (a) Industry Life Cycle - growth, maturity or decline, b) Industry History - how old is the industry, In-depth historical financial performance ratio analysis, Industry Trends - cyclical or seasonal, increased competition etc, Industry Influential Factors - does economy, government, or competition effect industry, Primary Competitors along with entry risk and barriers to entry, and, Projected Industry Sales - total sales in the industry.

2. Bond Portfolio Selection

Ans :

The bond portfolio design problem consists of choosing a mix of bonds which has the desired duration and provides the highest YTM. Of course, this must be done keeping in mind the default risk of the bonds also.

There are two distinct ways in which default risk can be taken into account in designing the bond portfolio:

1. The legalistic approach establishes a minimum rating which a bond must have to be include in the portfolio. Many bond portfolio managers throughout the world operate under such explicit or implicit restrictions which prohibit them from investing in low grade bonds.
2. The more sophisticated approach looks at the average quality of the bond portfolio. The overall risk aversion of the investor determines the desired average quality of the total portfolio. But it is not necessary that all bonds be of this quality. Some lower grad bonds may be bought if the rest of the portfolio is of sufficiently higher grade to maintain the average quality.

The second approach requires greater skill and effort, but it provides the route to higher returns, It allows the investor to choose the mix of bonds which provides the highest YTM while still achieving the target quality level.

Thus the bond portfolio selection problem has three aspects :

1. The portfolio duration must be equal the duration of the outflows.
2. The average quality of the portfolio (in terms of the credit rating) must not fall below the acceptable.

3. Arbitrage Price Theory

Ans :

Refer to Unit - III, S.A - 8

4. Melissa State is considering purchasing a financial asset and holding it for 4 years. If the asset has the following expected cash flows, what should she pay for the asset?

Year	Cash flow Rs.
1	100
2	200
3	400
4	500

The financial asset has a factor beta of 1.25 Assume the following one-factor APT model applies:

Ans :

First, the return should be determined as follows :

$E(r_i) = 5\% + 8\% (1.25) = 15\%$

The price of the asset should be determined using the 15 percent rate determined above.

$$\text{Price} = \frac{\text{Rs. } 100}{(1.15)^1} + \frac{\text{Rs. } 200}{(1.15)^2} + \frac{\text{Rs. } 400}{(1.15)^3} + \frac{\text{Rs. } 500}{(1.15)^4}$$

$$= \text{Rs. } 86.96 + \text{Rs. } 151.23 + \text{Rs. } 263.01 + \text{Rs. } 285.88 = \text{Rs. } 787.08$$

5. International Diversification?

Ans :

Refer to Unit-V, S.A - 10

SECTION - B **(5 × 12 = 60)**

Note: Answer all the questions by using internal choice

6. (a) (i) A company has outstanding shares of 1 crore and their value is Rs. 50 crore. The most recent dividend paid by the company was of Rs. 2.25 per share. EBIT to Assets ratio is 16% and the ROE is 20%. Given this data, compute the growth rate in EPS and EBIT.

(ii) Protech Ltd. has total capital of Rs. 100 crore and a Debt-Equity ratio of 4 : 9. The rate on investment earned was 25% and its effective tax rate was 40%, If the cost of debt is 15%, what would be the PAT of Protech Ltd.?

Ans :

(a) (i) Earnings per share $= \frac{\text{Total Earnings}}{\text{No. of Shares}} = \frac{10 \text{ Crore}}{1 \text{ Crore}}$ = Rs. 10/-

(ii) Calculation of Retention Ratio = 1 – Dividend Pay out Ratio

$$\text{Dividend Payout Ratio} = \frac{\text{Dividend per share}}{\text{Earnings per share}} = \frac{2.25}{10} = 0.225$$

Retention ratio = 1 – 0.225 =0.775

(iii) Calculation of Growth rate = ROE × Retention ratio

= 20% × 0.775 = 15.5%

$$\text{Calculation of Growth in EBIT} = \frac{\text{EBIT}}{\text{Asses}} \times \text{Retention ratio}$$

= 16 × 0.775 = 12.4%

(b) Valuation of equity and debt is also follow

Total value = 100 cores

Debt : Equity ratio = 4 : 9

$$\therefore \quad \text{Debt} = \frac{4}{13} \times 100 = \text{Rs. } 30.77 \text{ corers}$$

$$\text{Equity} = \frac{9}{13} \times 100 = \text{Rs. } 6923 \text{ corers}$$

$$\text{Then, PBT} = \frac{\text{PAT}}{1-t} = \frac{X}{1.40\%} = \frac{X}{1-0.4\%} = \frac{X}{0.6}$$

$$\text{PBT} = \frac{X}{0.6}$$

$$\text{Interest on Debt} = 15\% \text{ on Debt i.e., } \frac{30.77 \times 15}{100} = 4.614$$

$$\text{PBT} = \frac{X}{0.6} + \text{Interest} = \frac{X}{0.6} + 4.614$$

$$\text{Given, } \frac{\text{PBIT}}{E+D} = 25\%, \text{ PBIT} = 100 \times \frac{25}{100} = 25 \text{ corers}$$

$$25 = \frac{X}{0.6} + 4.616$$

$$25 \times 0.6 = X + 4.616$$

$$15 = X + 4.616$$

$$X = 4.616 - 15 = X = 10.384$$

$$\text{PBIT} = \text{Rs. } 10.386 \text{ Lakhs.}$$

OR

(b) What are the methods adopted to analyses the financial statements of a company?

Ans :

The analysis of financial statements reveals the nature of relationship between income and expenditure and the sources and application of funds. The investor determines the financial position and the progress of the company through analysis. The investor is interested in the yield and safety of his capital. He cares much about the profitability and the management's policy regarding the dividend. Towards this end he can use the following simple analysis: Comparative financial statements Trend analysis Common size statements. Fund flow analysis Cash flow analysis Ratio analysis

Comparative financial statement in the comparative statement balance sheet figures are provided for more than one year. The comparative financial statement provides time perspective to the balance sheet figures. The annual data are compared

with similar data of previous years, either in absolute terms or in percentages. Trend analysis Here percentages are calculated with a base year. This would provide insight into the growth or decline of the sale or profit over the years. Sometimes sales may be increasing continuously, and the inventories may also be rising. This would indicate the loss of market share of the particular company's product. Likewise sales may have an increasing trend but profits may remain the same. Here the investor has to look into the cost and management efficiency of the company.

Common size statement shows the percentage of each asset item to the total assets and each liability item to the total liabilities. Similarly, a common size income statement shows each item of expense as a percentage of net sales. With common size statements comparison can be made between two different size firms belonging to the same industry. For a same company over the years common size statement can be prepared.

Fund flow analysis The balance sheet gives a static picture of the company's position on a particular date. It does not reveal the changes that have occurred in the financial position of the unit over a period of time. The investor should know,

a) How are the profits utilised?

b) Financial source of dividend

c) Source of finance for capital expenditures

d) Source of finance for repayment of debt

e) The destiny of the sale proceeds of the fixed assets and

f) Use of the proceeds of the share or debenture issue or fixed deposits raised from public.

These items of information are provided in the funds flow statement. It is a statement of the sources and applications of funds. It highlights the changes in the financial condition of a business enterprise between two balance sheet dates. The investor could see clearly the amount of funds generated or lost in operations. He could see how these funds have been divided into three significant uses like taxes, dividends and reserves. Moreover, the application of long term funds towards the acquisition of current assets can be found out. This would reveal the real picture of the financial position of the company.

Cash flow statement The investor is interested in knowing the cash inflow and outflow of the enterprise. The cash flow statement is prepared with the help of balance sheet, income statement and some additional information. It can be either prepared in the vertical form or in the horizontal form. Cash flows related to operations and other transactions are calculated. The statement shows the causes of changes in cash balance between two balance sheet dates. With the help of this statement the investor can review the cash investments over an operating cycle. The factors responsible for the reduction of cash balances in spite of increase in profits or vice versa can be found out.

Ratio analysis Ratio is a relationship between two figures expressed mathematically. Financial ratio provides numerical relationship between two relevant financial data. Financial ratios are calculated from the balance sheet and profit and loss account. The relationship can be either expressed as a percent or as a quotient. Ratios summaries the data for easy understanding, comparison and interpretation. Financial ratios may be divided into six groups.

7. (a) The following yield structure was in existence on August 31, 1998, Determine the missing forward yields.

Year	Forward rate	YTM
1	7.00%	7.00%
2		7.50
3	9.77	8.25
4		8.50
5		9.00

Ans :

Refer to November - 2014, Q.No. 8(b).

OR

(b) Suppose the real rate is fixed at 3 percent, if the following inflation rates next 5 years, determine the yield curve for risk-free bonds:

Year	Expected Inflation
1	4.0%
2	4.5
3	5.0
4	6.0
5	5.5

Ans :

Using equation and setting rp = 0, you have r = rr + q. The expected inflation rate for each year will be the geometric average of the expected 1-year rates as follows.

$$\text{Exp. inf. for 2 years} = \sqrt{(1.04)(1.045)-1} = \sqrt{1.0868-1}$$

$$= 1.0425 - 1 = 0.425 \text{ or } 4.25\%$$

$$\text{Exp. inf. for 3 years} = \sqrt[3]{(1.04)(1.045)(1.05)} - 1$$

$$\sqrt[3]{1.14114} - 1 = 1.045 - 1 = .045 \text{ or } 4.5\%$$

$$\text{Exp. inf. for 4 years} = \sqrt[4]{(1.04)(1.045)(1.05)(1.06)-1}$$

$$= \sqrt[4]{1.2096084} - 1 = 1.0487 - 1$$

$$= .0487 \text{ or } 4.87\%$$

$$\text{Exp. inf. for 5 years} = \sqrt[5]{(1.04)(1.045)(1.05)(1.06)(1.055)} - 1$$

$$\sqrt[5]{1.27613686} - 1 = 1.05 - 1 = .05 \text{ or } 5\%$$

Year	(1) rr	(2) q	(3) = (1) + (2) r
1	3%	4.00%	7.00%
2	3	4.25	7.25
3	3	4.50	7.50
4	3	4.87	7.87
5	3	5.00	8.00

8. (a) The following information is available on a bond:

Face value : Rs 100

Coupon rate: 12 percent payable annually

Years to maturity: 6

Current market price: Rs 110

What is the duration of the bond? Use the approximate formula for calculating the yield to maturity.

Ans :

$$\text{Expected YTM is} = \frac{C \pm \frac{P \text{ or } D}{N}}{\frac{P_O + F}{2}} = \frac{12 + \left(\frac{10}{6}\right)}{\frac{100+110}{2}} = \frac{13.67}{105} = 13\%$$

$$\text{Duration } D = \sum_{t=1}^{T} \frac{P_{VCf}}{P_O} \times t$$

Year	Cashflows	PV@ 13%	PVCF	$\frac{PVCF}{P_0}$	$\frac{PVCF}{P_O} \times t$
1	12	0.8849	10.62	0.0965	0.0965
2	12	0.7831	9.397	0.0855	0.171
3	12	0.6931	8.317	0.0756	0.2268
4	12	0.6133	7.369	0.0670	0.268
5	12	0.5428	6.5131	0.0592	0.296
6	12 + 100	0.4803	53.7958	0.4891	2.9346
					3.9929

Duration is 3.9929 years.

OR

(b) The following table gives an analyst's expected return on two stocks for particular market returns:

Market Return	Aggressive Stock	Defensive Stock
6%	2%	8%
20	30	16

(a) What are the betas of the two stocks?

(b) What is the expected return on each stock if the market return is equally likely to b 6% or 20%?

(c) If the risk-free rate is 7% and the market return is equally likely to be 6% or 20% what is the SML?

(d) What are the alphas of the two stocks?

Ans :

(a) Calculation of Beta

The betas of the two stocks are:

$$\text{Aggressive stock} = \frac{30\% - 2\%}{20\% - 6\%} = 2$$

$$\text{Defensive stock} = \frac{16\% - 8\%}{20\% - 6\%} = 0.571$$

(b) Calculation of expected return $E_{(r)} = \sum_{i=1}^{N} X_i R_i$

X_i = Proportion of Investment

R_i = Security return

Aggressive Stock = $0.5 \times 2\% + 0.5 \times 30\%$

$= 0.5 \times 0.02 + 0.5 \times 0.3$

$= 0.1 + 0.15 = 0.16$ or 16%

Defensive stock = $0.5 \times 8\% + 0.5 \times 16\%$

$= 0.5 \times 0.08 + 0.5 \times 0.16$

$= 0.04 + 0.08 = 0.12$ or 12%

(c) Expected return on port folio

$= 0.5 \times 0.06 + 0.5 \times 0.02$

$= 0.03 + 0.1 = 0.13$ or 13%

The risk free rate is 7%, then market risk premium is 13% – 7% = 6%

$\therefore$ SMC = $R_f + \beta_i$ (Rm)

$= 7\% + \beta_i$ (6%)

(d) Calculation of alphas for Two Stocks is =

Aggressive stock required return of return 7% + 2 (6%)

$= 0.07 + 0.12 = 0.19$ or 19%

Alpha = Expected return – required return = 16% – 19% = – 3%

Defensive stock required rate of return = 7% + 0.571 (6%)

= 0.07 + 0.03426 = 0.10.426 or 10.426%

Alpha = 12% – 10.426% = 1.574%

9. (a) The rates of return on stock A and market portfolio for 15 periods are given below:

Period	Return on Stock A(%)	Return of market portfolio(%)	Period	Return on Stock A(%) Portfolio(%)	Return on market
1	10	12	9	-9	1
2	15	14	10	14	12
3	18	13	11	15	-11
4	14	10	12	14	16
5	16	9	13	6	8
6	16	13	14	7	7
7	18	14	15	-8	10
8	4	7			

What is the beta for stock A?

What is the characteristic line for stock A?

Ans :

Period	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Total (S)
R_m	12	14	13	10	9	13	14	7	1	12	–11	16	8	7	10	135
$R_m - \bar{R}_m$	3	5	4	1	0	4	5	–2	–8	3	–20	7	–1	–2	1	
$(R_m - \bar{R}_m)^2$	9	25	16	1	0	16	25	4	64	9	400	49	1	4	1	624
R_i	10	15	18	14	16	16	18	4	–9	14	15	14	6	7	– 8	150
$(R_i - \bar{R}_i)$	0	5	8	4	6	6	8	–6	–19	4	5	4	–4	–3	–18	
$(R_i - \bar{R}_i)^2$	0	25	64	16	36	36	64	36	361	16	25	16	16	9	324	1044
$(R_m - \bar{R}_n) \times (R_i - \bar{R}_i)$	0	25	32	4	0	24	40	12	152	12	–100	28	4	6	–18	221

$$\bar{R}_m = \frac{\Sigma R_m}{r} = \frac{135}{15} = 9,\ \bar{R}_i = \frac{\Sigma R_i}{n} = \frac{150}{15} = 10$$

$$\beta = \frac{\Sigma(R_i - \bar{R}_1) \times (R_m - \bar{R}_m)}{\Sigma(R_m - \bar{R}_m)^2} = \frac{221}{624} = 0.354$$

Alpha $\alpha = \bar{R}_i - b \times \bar{R}_m = 10 - 0.354 \times 9 = 6.814\%$

Characteristic line $= \alpha + \beta$ Rm

$= 6.814 + 0.354$ Rm

OR

(b) Nithya firm is trying to decide two out of the four investment funds. From the past performance, they were able to calculate the following average returns and standard deviations of these funds. The current risk free rate of interest is 9 per cent.

	Alpha Fund	Vinu Fund	Meenu Fund	Arvind Fund
Average Return	**17**	**18**	**16**	**14**
Standard Deviation	**19**	**20**	**13**	**12**

Ans :

Using Sharpe Index

$$St = \frac{R_p - R_f}{\sigma_p}$$

S_t for Alpha Fund $= \frac{17-9}{19} = .421$

S_t for Vinu fund $= \frac{18-9}{20} = .45$

S_t for Meenu fund $= \frac{16-9}{13} = .538$

S_t for Arvind fund $= \frac{14-9}{12} = .417$

Nithya firm is advised to choose the Meenu fund and the Vinu fund because their performances are better than the other two.

10. (a) Assume CAPM equilibrium model with unlimited borrowing and lending at the riskless rate of interest. Complete the blanks in the following table.

Security	E(R)	a	b	e_t^2
A	.15	–	2.0	.10
B	–	.25	0.75	.04
C	.09	–	0.50	.17

Ans :

The equation of CML

$$R_i = R_f + b_1 R_m$$

$$.15 = R_f + 2\ R_m$$

$$.09 = R_f + .5\ R_m$$

$$.06 = +\ 1.5\ R_m$$

$$R_m = .04$$

Substituting it in equation 1

$$.15 = R_f + 2 \times .04$$

$$R_f = .07$$

$$\sigma_1^2 = \text{Explained variance} + \text{Residual variance}$$

Explained variance = $\beta^2 \times$ Variance of index

In the case of security B:

The explained variance = Total variance – Residual variance

$$= (.25)^2 - .04$$

$$= .0625 - .04$$

$$= .0225$$

Explained variance = $\beta^2 \times$ Variance of index

$$.0225 = (.75)^2 \times \sigma_m^2$$

$$\sigma_m^2 = .04$$

Standard deviation for A security :

$$= \sqrt{\text{Explained variance} + \text{Residual variance}}$$

$$= \sqrt{(4 \times .04) + .1}$$

$$= .42$$

Security	E(R)	α	β	e_t^2
A	.15	.51	2.0	.10
B	.10	.25	0.75	.04
C	.09	.42	0.5	.17

OR

(b) Estimate the stock return by using the CAPM model and the arbitrage model. The particulars are given below,

The expected return of the market is 15 per cent and the equity's beta is 1.2. The risk free rate of interest is 8 per cent.

Factor	**Market price of Risk**	**Sensitivity Index**
Inflation	**6%**	**1.1**
Industrial Production	**2%**	**0.8**
Risk premium	**3%**	**1.0**
Interest rate	**4%**	**– 0.9**

What explanations can you offer to explain the difference in two estimates?

Ans :

$$\bar{R} = R_f + b_1 (R_m - R_f)$$

$$= .08 + 1.2 (1.5 - .08)$$

$$= .08 + .084$$

$$= .164$$

APT model

$$\bar{R} = \lambda_0 + \lambda_1 \beta_{i1} + \lambda_2 \beta_{i2} + \lambda_3 \beta_{i3} + \lambda_4 \beta_{i4}$$

Since λ_0 is not given the APT equilibrium model with riskless asset can be found out using the formula.

$$\bar{R}_i = R_f + (\beta_{i1} \lambda_1 + \beta_{i2} \lambda_2 + \beta_{i3} \lambda_3 + \beta_{i4} \lambda_4) (R_m - R_f)$$

$$= .08 + (.06 \times 1.1 + .02 \times .8 + .03 \times 1.0 + 0.4x - .9) (.15 - .08)$$

$$= .08 + (0.66 + .016 + 0.3 - .036) .07$$

$$= .08 + .005$$

$$= .085$$

The rates of return differ in the CAPM and APT models because the variables used are entirely different. The return is low according to APT model because interest rate has a negative effect on the return.

FACULTY OF COMMERCE

M.Com. III-Semester (Non - CBCS) Examination

November / December - 2011

SECURITY ANALYSIS AND PORTFOLIO MANAGEMENT

Time : 3 Hours] [Max. Marks : 80

Note: Answer all the questions in not more than one page each.

SECTION - A **(5 × 4 = 20)**

1. What is Economic Analysis?
2. State different types of Bonds?
3. What is APT?
4. How to construct Stock Index?
5. What is Foreign Exchange Risk?

SECTION - B **(5 × 12 = 60)**

Note: Answer all the questions by using internal choice in not exceeding 4 pages each.

6. (a) Explain parameters for Industry and company analysis?

OR

(b) What is EMH and state its implications in investment decisions.

7. (a) State different types of Bonds and also explain the valuation of bonds.

OR

(b) Vani enterprise has a beta of 1.5. The risk rate is 7% and the expected return on the market portfolio is 14 percent. The company presently pays a dividend of Rs. 2.50 per share and investors expect a growth in dividend of 12% per annum for many years to come. Compute the required rate of return on equity according to CAPM. What is the present market price of the equity share assuming the computed return as required return.

8. (a) Explain the assumptions and applicability of Capital Asset pricing model.

OR

(b) Mr. Shetty is considering an investment in the stock of X company. He expects to earn a return of 17 percent in the next year. X's beta is 1.3 and risk free return is 7 per cent. Market return is 15 percent. Should Mr. Shetty invest in that company. If beta is 1.1, any change in your advice?

9. (a) Explain various methods for valuation of portfolio based on return and risk.

OR

(b) The following table gives data on four stocks.

Stock	Alpha	Variance Systematic	Unsystematic
A	-.06-	5	4
B	.1	2	6
C	.00	3	1
D	-.14	3	2

The market is expected to have a 12 per cent return over a forward period with a return variance of 6 per cent. Calculate the expected return for a portfolio consisting of equal portion of stocks A, B, C and D.

10. (a) Explain the formula plans for the purchase and sale of different types of securities.

OR

(b) Discuss the essentials for International Investment Process.

Solutions to Nov., - Dec., - 2011

SECTION - A **(5 × 4 = 20)**

1. What is Economic Analysis?

Ans :

Refer to Unit-I, S.A - 1

2. State different types of Bonds?

Ans :

Refer to Unit-II, S.A - 6

3. What is APT?

Ans :

Refer to Unit-III, S.A - 8

4. How to construct Stock Index?

Ans :

Refer to Unit-IV, S.A - 7

5. What is Foreign Exchange Risk?

Ans :

Refer to Unit-V, S.A - 14

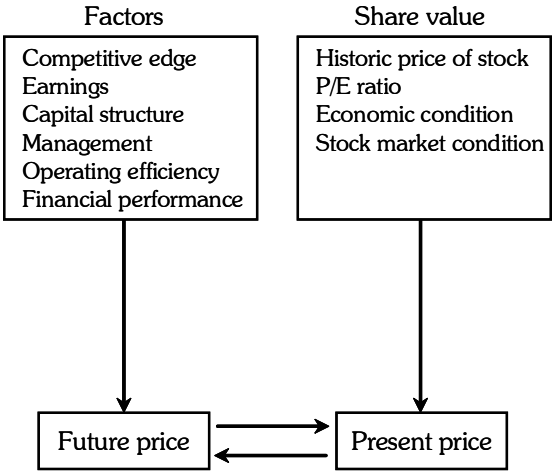
SECTION - B **(5 × 12 = 60)**

6. (a) Explain parameters for Industry and company analysis?

Ans :

Refer to Unit-I, Topic: 1.1.5

In the company analysis the investor assimilates the several bits of information related to the company and evaluates the present and future values of the stock. The risk and return associated with the purchase of the stock is analysed to take better investment decisions. The valuation process depends upon the investors ability to elicit information form the relationship and interrelationship among the company related variables. The present and future values are affected by a number of factors.



Figure

The competitive edge of the company major industries in India are composed of hundreds of individual companies. In the information technology industry even though the number of companies is large, few companies like Tata Infotech, Satyam computers, Infosys, NUT etc., control the major market share. Like-wise in all industries, some companies rise to the position of eminence and dominance. The large com-panies are successful in meeting the competition. Once the companies obtain the leadership position in the market, they seldom lose it. Over the time they would have proved their ability to withstand competition and to have a sizeable share in the market. The competitiveness of the company can be studied with the help of the market share.

The growth of annual sales

The stability of annual sales

The market share The market share of the annual sales helps to determine a company's relative competitive position within the industry. If the market share is high, the company would be able to meet the competition successfully In the information technology industry, NUT and Tata Infotech topped the list in terms of sales in 1997. While analysing the market share, the size of the company also should be considered because the smaller companies may find it difficult to survive in the future. The leading companies of today's market will continue to lead at least in the near future. The companies in the market should be compared with like product groups otherwise, the results will be misleading. A software company should be compared with other software companies to select the best in that industry.

Growth of sales the company may be a leading company, but if the growth in sales is comparatively lower than another company, it indicates the possibility of the company losing the leadership. The rapid growth in sales would keep the shareholder in a better position than one with the stagnant growth rate. The company of large size with inadequate growth in sales will not be preferred by the investors. Growth in sales is usually followed by the growth in profits. Investor generally prefers size and the growth in sales because the larger size companies may be able to withstand the business cycle raider than the company of smaller size.

The growth in sales of the company is analysed both in rupee terms and in physical terms. Physical term is very essential because it shows the growth in real terms. The rupee term is affected by the inflation. Companies with diversified sales are compared in rupee terms and percentage of growth over time.

Stability of sales If a firm has stable sales revenue, other things being remaining constant, will have more stable earnings. Wide variation in sales leads to variations in capacity utilization, financial planning and dividend. Periodically all the financial newspapers provide information about the market share of different companies in an industry. The fall in the market share indicates the declining trend of the company, even if the sales are stable in absolute terms. Hence, the stability of sales also should be compared with its market share and the competitors' market shares.

Sales forecast the company maybe in a superior position commanding more sales both in monetary terms and physical terms but the investor should have an idea whether it will continue in future or not. For this purpose, forecast of sale's has to be done. He can forecast the sales in different ways.

1. The investor can fit a trend line either linear or non linear whichever is. suitable.
2. Historical percentage of company sales to the industry sales can be analysed. Even simple least square technique could be used to find out the function $C_s = f(I_s)$ i.e. C_s - Company sales; 1 - Industry sales.
3. The sales growth can be compared with the macro-economic variables like gross domestic product; per capita income and population growth.
4. The different components of demand for the company's product have to be analysed because the demand may arise from different sources. For some product the demand may be from the consumers as well as from the industries. For example, steel and petroleum products are demanded by consumers and industries.
5. The demand for the substitutes and competitors" product also should be analysed using least square techniques.

OR

(b) What is EMH and state its implications in investment decisions.

Ans :

Refer to Unit-I, Topic: 1.8.2

7. (a) State different types of Bonds and also explain the valuation of bonds.

Ans :

Refer to Unit-II, Topic: 2.3.1

OR

(b) Vani enterprise has a beta of 1.5. The risk rate is 7% and the expected return on the market portfolio is 14 percent. The company presently pays a dividend of Rs. 2.50 per share and investors expect a growth in dividend of 12% per annum for many years to come. Compute the required rate of return on equity according to CAPM. What is the present market price of the equity share assuming the computed return as required return.

Ans :

According to SML equation

$$R_1 = R_f + \beta_i (R_m - R_f)$$

$$R_1 = 7 + 1.5 (14 - 7)$$

$$R_1 = 17.5$$

The return computed is taken as required rate of return then

$$P = \frac{D_0(1+g)}{K-g}$$

$$= \frac{\text{Rs. } 2.5\,(1+.12)}{.175-.12}$$

$$= \frac{2.8}{.055}$$

Present market price = Rs. 50.91

8. (a) Explain the assumptions and applicability of Capital Asset pricing model.

Ans :

Refer to Unit-III, Topic: 3.1.1

OR

(b) Mr. Shetty is considering an investment in the stock of X company. He expects to earn a return of 17 percent in the next year. X's beta is 1.3 and risk free return is 7 per cent. Market return is 15 percent. Should Mr. Shetty invest in that company. If beta is 1.1, any change in your advice?

Ans :

The equilibrium return according to CAPM

$$E(R_p) = R_f + \beta [E(R_m) - R_f]$$
$$= 7 + 1.3 (15 - 7)$$
$$= 17.4\%.$$

The actual return is less that the equilibrium return i.e., 17.0 < 17.4, he should not buy the stock. The stock is overvalued and its price may fall.

9. (a) Explain various methods for valuation of portfolio based on return and risk.

Ans :

Refer to Unit-IV, Topic: 4.3.2 and 4.4

OR

(b) The following table gives data on four stocks.

Stock	Alpha	Variance Systematic	Unsystematic
A	.06	5	4
B	.1	2	6
C	.00	3	1
D	.14	3	2

The market is expected to have a 12 per cent return over a forward period with a return variance of 6 per cent. Calculate the expected return for a portfolio consisting of equal portion of stocks A, B, C and D.

Ans :

$$R_i = \sum_{i=1}^{N} X_i(\alpha_i + \beta_i, R_m)$$

Beta value not given, hence, it calculate through the following i.e.,

$$\beta = \frac{\text{Variance}}{\text{Return Variance}}$$

$$\beta_A = \sqrt{\frac{5}{6}} = 0.91, \ \beta_B = \sqrt{\frac{2}{6}} = 0.57,$$

$$\beta_C = \sqrt{\frac{3}{6}} = 0.71, \beta_D = \sqrt{\frac{3}{6}} = 0.71$$

Expected Return

$R_i = \alpha + \beta R_m$

$R_{iA} = -0.06 + 0.91 \times 12 = 10.86$

$R_{iB} = 0.1 + 0.57 \times 12 = 6.94$

$R_{iC} = 0.0 + 0.71 \times 12 = 8.52$

$R_{iD} = -0.14 + 0.71 \times 12 = 8.38$

Then, total risk = systematic risk + unsystematic risk

A = 0.91 + 4 = 4.91

B = 0.57 + 6 = 6.57

C = 0.71 + 1 = 1.71

D = 0.71 + 2 = 2.71

10. (a) Explain the formula plans for the purchase and sale of different types of securities.

Ans :

Refer to Unit - V, Topic: 5.4.3 to 5.4.6

OR

(b) Discuss the essentials for International Investment Process.

Ans :

Refer to Unit-V, Topic: 5.5.3

FACULTIES OF COMMERCE

M.Com. III-Semester (CBCS) Examination

December - 2018 / January - 2019

SECURITY ANALYSIS AND PORTFOLIO MANAGEMENT

Time : 3 Hrs] [Max. Marks : 80

PART- A (5 × 4 = 20 Marks)

[Short Answer Type]

Note: Answer all the questions not more than one page each.

1. What is economy analysis? **(Unit - I, Topic - 1.1.2)**
2. What is constant growth model? **(Unit - II, Topic - 2.1.5)**
3. What is efficeint frontier? **(Unit - III, Topic - 3.2)**
4. How can you construct the indexes? **(Unit - IV, Topic - 4.7.1)**
5. What is the need for revision of porfolio? **(Unit - V, Short Answer - 1)**

PART - B (15 × 4 = 60 Marks)

[Essay Answer Type]

Note: Answer all the questions by using internal choice is not exceeding 4 pages each

6. (a) What is technical analysis? Explain the basic principles of technical analysis. **(Unit - I, Topic - 1.2 & 1.2.3)**

OR

(b) Describe the types of tests that have been commonly employed to verify the weak-form efficient market hyporthesis. **(Unit - I, Topic - 1.8.3 & 1.8.4)**

7. (a) Expalin and illustrate the current yield, yield to maturity and yield to call. **(Unit - II, Topic - 2.4)**

OR

(b) The current dividend on an equity share of Pioneer Technology is Rs. 3. Pioneer is expected to enjoy an above-normal growth rate of 40.per cent for 5 years. Thereafter, the growth rate will fall and stabilize at 12 per cent. Equity investors required a return of 15 percent from Pioneer's stock. What is the intrinsic value of the equity share of pioneer?

Ans :

Given current dividend (D) = 3

Expected abnormal Growth for 5 years = 40%

Growth rate (g) = 12%

Required Rate of Return (k) = 15%

Intrinsic value $S_0 = V_1 + V_2$

$$V_1 = \frac{D_1}{(1+K)^1} + \frac{D_2}{(1+K)^2} \ldots\ldots \frac{D_n}{(1+K)^n}$$

$$V_1 = \frac{3}{(1+0.15)} + \frac{3+0.4(3)}{(1+0.15)^2} + \frac{4.2+0.4(4.2)}{(1+0.15)^3} +$$

$$\frac{5.88+0.4(5.88)}{(1+0.15)^4} + \frac{8.232 + 0.4\ (8.232)}{(1+0.15)^5}$$

$$= \frac{3}{(1.15)} + \frac{4.2}{(1.15)^2} + \frac{5.88}{(1.15)^3} + \frac{8.232}{(1.15)^4} + \frac{11.5}{(1.15)^5}$$

$$= 2.6 + 3.17 + 3.80 + 4.7 + 5.7$$

$$= 19.97$$

$$V_2 = \frac{D(1+k)}{(k-g)(1+g)}$$

$$= \frac{3(1+0.15)}{(0.15-0.12)(1+0.12)}$$

$$= \frac{3(1.15)}{(0.3)(1.12)}$$

$$= \frac{3.45}{0.336}$$

$$= 10.26$$

Intrinsic value of equity share

So $= V_1 + V_2$

$= 19.97 + 10.26$

$= 30.23$

8. (a) Discuss, the assumptions underlying the standard capital asset pricing model. **(Unit - III, Topic - 3.1.1)**

OR

(b) The following information is available:

Expected return for the market: 14%

Standard deviation of the market return: 20%

Risk-free return: 6%

Correlation co-efficient between stock – A and the market – 0.7.

Correlation co-efficient between stock – B and the market = 0.8.

Standard deviation of stock – A = 24%

Standard deviation of stock – B – 32%

i) Calculate the beta for stock – A and stock – B.

ii) Calculate the required return for each stock.

Ans :

Given

Expected Return for market = 14%

Standard deviation of market return (σ_M) = 20%

Risk free rate of return (r) = 6%

Correlation coefficient between stock A and market r'_A = 0.7

Correlation coefficient between stock B & market r'_B = 0.8

Standard deviation of stock A(r_A) = 24%

Standard deviation of stock B (r_B) = 32%

β of stock A

$$\beta_A = r'_A \frac{\sigma_A}{\sigma_M} = 0.7 \times \frac{24}{20} = 0.84$$

$$\beta_B = r'_B \frac{\sigma_B}{\sigma_M} = 0.8 \times \frac{31}{20} = 1.28$$

Stock Return (A) = $\alpha + \beta r$

= 0.7 + 0.84 (0.14)

= 0.7 + 0.84 (0.14)

= 0.7 + 0.117

R_A = 0.82

Stock Return (B) = $\alpha + \beta r$

= 0.8 + 1.28 (0.14)

R_B = 0.97

9. (a) What is portfolio? How-can you evaluate the performance of the portfolio? Explain. **(Unit - IV, Topic - 4.1)**

OR

(b) Consider the following information for three Mutual Funds; P, Q, and R and the market.

	Means Return (%)	Standard Deviation (%)	Beta
P	15	20	0.90
Q	17	24	1.10
R	19	27	1.20
Market Index 16	20	1.0.0	

The mean risk-free rate was 10%.

Calculate the Treyrior measure, Sharpe measure and Jensen measure for the three mutual funds and the market index.

Ans :

Given

Fund	Mean Returns (R)	Standard Deviation(σ)	Beta (β)
P	15	20	0.90
Q	17	24	1.10
R	19	27	1.20
Market Index	16	20	100

Risk free Rate of Return $R_F = 10\%$

Calculation of sharp Measure

$$S_p = \frac{R_p - R_8}{\sigma_P}$$

Fund P. $S_P = \frac{15-10}{20} = 0.25$

$$S_Q = \frac{17-10}{24} = 0.292$$

$$S_R = \frac{19-10}{27} = 0.333$$

$$S_M = \frac{16-10}{20} = 0.3$$

Calculation of Treg nor Measure

$$T_P = \frac{R_P - R_F}{\beta}$$

$$T_P = \frac{15-10}{0.9} = 5.5$$

$$T_Q = \frac{17-10}{1.1} = 6.36$$

$$T_R = \frac{19-10}{1.2} = 7.5$$

$$T_M = \frac{16-10}{1} = 6$$

Jenson Measure

$$\infty = R_P - [R_f - \beta(R_m - R_f)]$$

$$= 15 - [10 + 0.9 (16 - 10)]$$

$$\infty_P = -0.4$$

$$\infty_Q = 17 - [10 + 1.1 (16 - 10)]$$

$$\infty_Q = 0.4$$

$$\infty_R = 19 - [10 + 1.2 (16 - 10)]$$

$$\infty_R = 1.8$$

Rank under Jenson Measure $= \frac{\infty}{\beta}$

$$\Rightarrow \text{Fund P} = \frac{5.5}{0.9} = 6.11$$

$$\Rightarrow \text{Fund Q} = \frac{0.4}{1.1} = 0.36$$

$$\Rightarrow \text{Fund R} = \frac{1.8}{1.2} = 1.5$$

10. (a) What is portfolio revision? Explain the constraints in portfolio revision.

(Unit - V, Topic - 5.1 & 5.3)

OR

(b) Discuss the various factors influencing international investing.

(Unit - V, Topic - 5.5.3)