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INVESTMENT MANAGEMENT

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SYLLABUS FOR INVESTMENT MANAGEMENT

Unit – I

Nature and Scope of Investment Management – Organisation and Structure of the security Market in India – Stock Market indices – SEBI and protection of investors.

Unit – II

Security Analysis – Approaches to Security Analysis – Fundamental and Technical Analysis.

Unit – III

Risk and Return Analysis

Unit – IV

Valuation –Valuation Models of Equity, Preference, Convertible and Debt securities.

Unit – V

Efficient Market Hypothesis – Weak, Semi –strong and Strong Market and its Testing Techniques.

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Portfolio Management – Portfolio Risk and Return – Markowitz Model.

Unit – VII

Sharpe's Single Index and Selection of Optimal Portfolio.

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Capital Asset Pricing Theory – Risk Free Lending and Borrowing – Capital Market Line – Security Market Line.

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UNIT -1 NATURE AND SCOPE OF INVESTMENT MANAGEMENT

Structure

1.0. INTRODUCTION

Investment is nothing but allocation of monetary resources to the profit yielding assets in the future. Funds are employed with an aim of getting positive return over a period of time. However, the future is uncertain and hence the assets in which funds are employed may be safe and risky as well. Investment is made on stocks, and bonds known as securities, in order to achieve additional income or growth in value of investment at a future date

1.1. UNIT OBJECTIVES

- To understand the meaning of investment and speculation
- To know the characteristics of investment pogramme and process of investment
- To explain the functions of stock exchange and SEBI
- To analyse the concept of mutual funds and its characteristics

1.2. MEANING OF INVESTMENT AND SPECULATION

Investing money on the assets with the expectation of getting gain or positive return over a given period of time is known as financial investment. The future income resulting from such investments may take the form of interest, dividends, rent, premium, or appreciation of value of capital. It is different from the pseudo investment of a consumer. Financial investment involves an exchange of financial claims that include securities, real estate mortgages and others.

Economic investment on the other hand includes net additions to the capital stock, the goods which are used in the production of other goods. They consist of increase in buildings, machinery and equipments and inventories over the amount of such goods existed previously.

1.2.1. Speculation:

Speculation is different from investment in the sense, speculation involves buying and selling of securities with the expectation of getting profits from the price fluctuations. Speculation is interested in making short term gain, taking business risk. When a person buys shares with an intention of getting dividend in future, it is known as investment. The same person sells the shares, when there is a rise in the price in the future, it implies speculation.

The differences between investment and speculation can be summarized as follows. The investor plans for a longer time horizon, whereas a speculator plans for a shorter period viz., few months.

1. An investor is interested in getting returns from his investments in the form of dividends or interests, whereas a speculator wants to get windfall profits by selling securities at higher prices in the near future.
2. The investor takes only moderate risk, but a speculator is willing to assume high risk. The returns, of an investment are expected to be moderate, while a speculator expects higher returns at a higher risk.
3. The investor takes fundamental factors into consideration and makes periodical evaluation of companies, whereas a speculator considers only inside information, hearsays and market behaviour.
4. An investor avoids employment of borrowed funds and solely uses his own funds. The speculator, on the other hand makes use of borrowed funds to a great extent to indulge in speculative activities.
5. Investment is also different from gambling. Gambling involves high risk and there is an expectation of very high returns, e.g. horse race, game of cards etc. There is no careful planning, evaluation and allocation of funds in various investment opportunities in gambling.

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1.3. GROWTH OF INVESTMENTS

Gone are the days when investment was considered as the mainstay of the rich and business classes of the society. Now a day, investment in securities has become order of the day even among the working classes due to the following factors:

1. Increase in working population; consequently rise in family incomes and larger savings.
2. Availability of attractive investment options.
3. Tax incentives for certain categories of investments.
4. Spurt in information technology access to information on stock markets online increased tendency of people to hedge against inflation.

1.4. CHARACTERISTICS OF INVESTMENT PROGRAMME

It is essential that an investment programme has to possess certain salient features to guide the investors to choose approximate portfolios and meet the objectives of investors. These include

1.4.1. Safety in Investment:

The principal invested in securities has to be protected against losses. This requires careful periodic review of economic and industry trends before venturing into any investment alternative. The investor has to decide the types and timing of investment to play safe. Diversification of portfolio acts as a cushion against risks and protects investor from heavy losses. Classification of securities and investing in appropriate shares and bonds ensures safety of the principal.

1.4. 2. Liquidity:

Easy marketability of securities enables an investor to have liquidity in his assets. The investment portfolio should be sound enough to have liquid assets, thus ensuring the investor with adequate funds for business opportunities.

1.4.3. Stability of Income:

The investor is also interested in stability of earnings from securities. However, this objective is in conflict with the objectives of security of the principal and capital growth. The stability of income boosts up the morale of investors, and creates inclination among them to continue their investments.

1.4.4. Capital Appreciations:

The investors are concerned with capital appreciation which depends on growth of industries. They have to make ideal choice of portfolio consisting of right kinds of securities from the right industries bought at the right time.

1.4.5. Stability of Purchasing Power:

As the monetary resources are allocated to make investments in securities which offer benefits in the future, it is imperative to consider purchasing power of

the future funds. The investors are required to make careful study of degree of price level inflation and the possibilities of gain or loss in the investment.

1.4.6. Tax Benefits:

The income derived from the investment and consequent tax burden have to be taken into account. Income taxes affect the choice of investment as they tend to reduce certain types of investment incomes lesser than others.

Investment objectives thus include increased rate of return and reduced risk. Rate of return can be defined as the total income received during the holding period by an investor expressed as the percentage of purchasing price at the beginning of the holding period concerned.

$$\text{Return} = \frac{[\text{Value at the time of disposal} - \text{Value at the beginning}\ ] + \text{Dividend}}{\text{Value at the beginning}} \times 100$$

An investor gets dividend and capital appreciation as returns when he makes investment in stock. Capital appreciation is any increase in value between the values at the time of disposal and at the time of purchase.

Check your Progress

I Fill in the blanks:

a.....is the allocation of funds to assets and securities after consideration their return and risk features.
b. .....are interested in earning short- term capital gains and their buying and selling activities are based on the market price movement.
c. .....is usually a very short-term investment in a game of chance.

II Choose the correct answer:

(i) Investment is the
(a) net addition made to the nation's capital stock
(b) person's commitment to buy a flat
(c) employment of funds on assets to earn return
(d) employment of funds on goods and services that are used in production process.
(ii) Gambling is
(a) an intelligent speculation
(b) based on rumours
(c) successful speculation
(d) a well planned investment decision

1.5. RISKS OF INVESTMENT

Investment in securities has an element of risk as the future is uncertain, forcing an investor to make right combination of securities to minimize the risk of investment. Business risk represents possibility of loss and changes in returns caused by a firm's uses of funds. It is concerned with earnings before interest and taxes. Financial risk, on the other hand is the chance of loss and variability of owner's return created by sources of funds of a firm. It is concerned with earnings available to equity shareholders.

Investors face the risk of getting their total wealth diminished by inflationary trends. This is purchasing power risk. In order to ward off the risk, the investors have to select investments, whose market values change with consumer prices, compensating them for the increase in cost of living.

Investors face market risk when they shift their preference for different forms of investment. This is due to the fact that market prices and collateral values of securities vary substantially. The causes of changes in the market price are beyond the control of any company. Political uncertainties, threat of a war, speculative activities etc. lead to market risks. The market risk in equity shares is greater than the risk in bonds.

High quality bonds are subjected to interest rate risk. Their prices are determined mainly by existing interest rates in the market. When the interest rates fall, the prices of bonds will increase and vice versa. Changes in interest rate have greater impact on the market price of long term bonds than that of short term bonds.

There are many other risks which also affect the investment namely social risk, monetary value risk, political and environmental risks etc. Price controls, indebtedness of foreign companies, threat of nationalization of industries by the government and the like lead to fall in expected returns.

1.6. INVESTMENT PROCESS:

The process of investment involves five stages namely,

1. Formulation of investment policy
2. Investment analysis
3. Valuation of securities
4. Portfolio construction and
5. Portfolio evaluation

Let us discuss each stage in detail.

1.6.1. Formulation of Investment Policy

The investor before making investment develops investment policy. It requires determination of volume of funds required for investment, objectives for investment and knowledge about investment alternatives and markets. The investor gets funds through his savings or from borrowings. He then determines the objectives of investment viz., rate of return required, need for regularity of income and liquidity etc.

Investor should possess adequate knowledge about risks and returns associated with various investment alternatives. He has to get adequate information about the stock market structure and the functions of the brokers.

1.6.2. Investment Analysis

The investor has to make analysis of market, industry and company. General economic conditions in a nation are reflected by stock market operations. Industry analysis enables an investor to ascertain economic significance and growth potential of industries in a nation. The investors have to make analysis of company to know about its profitability, operative efficiency, growth prospects capital structure etc. companies with high market share are able to create wealth to the investors through capital appreciation.

1.6.3. Valuation of Securities

The investor has to determine earning per share. He can make use of discounting models for the valuation of shares. There are many models available for stock valuation and investment decision is made by comparing real worth of the share with the market price.

1.6.4. Portfolio Construction

A portfolio is nothing but a combination of securities. It is constructed to meet the objectives of investor. The best combination of securities is identified to attain maximum return with minimum risk. Diversified portfolio is less risky than a single portfolio. Diversification may take the form of debt and equity diversification

(iii) If the investment is properly undertaken, then
(a) the return will commensurate with the risk
(b) the return will be certain
(c) it will be illiquid
(d) no possibility of loss
(iv) Investors buy
(a) high grade securities
(b) low grade securities
(c) securities for short-term purposes
(d) to earn money due to price fluctuation

III State whether the following statements are True or false

a) All investments are risk free.
b) Risk is a possibility of incurring a loss in a financial transaction
c) The main objectives of prudent investors are maximizing return and minimizing risks

in which investment is made in debt instruments which provide assured returns and in equity shares which offer income and capital gain but at a higher degree of risk.

The investor also makes industry diversification to reduce risks. This requires study on growth potential of industries and their abilities to withstand changes in the environment. The shares of an industry have to be selected for investment on the basis of regular returns with adequate capital appreciation. Company diversification requires a careful technical analysis to buy securities based on price movement and a fundamental analysis to choose financially sound companies.

Once the study on various forms of diversification is completed, selection of securities takes place and sufficient funds are allocated to construct portfolio.

1.6.5. Portfolio Evaluation

The portfolio has to be effectively managed. It requires measurement of variability of returns of the securities and appraisal of changes in the trends of economy, industry and companies. Revision of portfolio takes place by replacing low returns high risk investments by high yielding securities with low risk factor.

1.7. INVESTMENT ALTERNATIVES

The investment alternatives are classified as follows:

1.7.1. Direct investment alternatives

1. Fixed principal investments which include cash, savings certificates, government bonds and corporate bonds and debentures.
2. Variable principal securities including equity shares, and convertible debentures
3. Non-security investments comprising real estate, commodities, mortgages etc.

1.7.2. Indirect investment alternatives

Indirect investment alternatives consists of pension fund, provident fund, insurance, mutual funds, investment companies etc. Direct investments are those investment alternatives in which investors make their own choices, whereas under indirect investment, an investor entrusts his monetary resources with an organization for example unit trust of India for making investment on his behalf. Fixed principal investments have both principal and terminal values known unlike variable principal securities in which terminal values are not known with certainty. Non security investments differ from the securities in terms of liquidity and terminal values.

1.8. INVESTMENT ENVIRONMENT

In our country, there is a favourable climate for making investment. Business activities in any nation are governed by social, economic, political, technological and legal environments. Favourable economic conditions and political situation are cornerstones for achieving success in investment. Following is the list of factors which ensure favourable trends for investment in India.

1.8.1. Political Stability:

Political stability is the strength of our nation. Though the government is formed by mutiparty alliance, it is ensured that the government would last its five year term. This gives great hopes to investors both domestic and abroad. Foreign Institutional Investors (FIIs) have high stakes in Indian industries, which is never under threat due to political uncertainties.

1.8.2. Legal Safeguards:

Investors in India are enjoying advantages of free enterprise and government control as well. This gives assurance of protection of contractual and property rights of the investors.

1.8.3. Stable Currency:

Inflation in our country is kept at low level with effective monetary policy being brought in force, Bank deposits, life insurance and shares are paid in a fixed amount of currency of the country. A stable price level with wise monetary and fiscal management contributes towards proper control and a well disciplined growth oriented investment market, offering protection to the investors.

1.8.4. Existence of Financial Institutions:

The financial institutions encourage savings, channelising them to productive uses. Institutions like LIC, UTI and others offer a variety of schemes to the people with tax benefits. Others include IDBI, ICICI, IFCI and SFCs. These institutions provide strength to capital market and encourage growth.

1.8.5. Form of Business Organisation:

In our country, there are large business undertakings taking the form of public limited company. The investors have desirable features of limited liability, perpetual life and transferability of shares. Partnership firms impose unlimited liabilities on the partners as also sole trading concerns. These do not enjoy the privileges of public limited companies, thus paving the way for public limited companies a safe place for investment.

1.9. SECURITY MARKET IN INDIA

Security markets are indispensable in the economic development of a nation. The tasks of mobilization and allocation of savings are performed by stock exchanges. Long term securities like bonds, equity shares and preference shares are traded in the secondary market which is none other than the stock exchange. Stock exchange means any body of individuals whether incorporated or not, constituted for the purpose of regulating or controlling the business of buying, selling or dealing in securities. Apart from long term securities, government securities and rights in securities are traded in stock exchanges.

1.9.1. Organizational Structure of Stock Exchanges

There are 23 stock exchanges in India all of which are equipped with screen based trading system. Most of them are incorporated as "Association of Persons"

under section 25 of the Companies Act, 1956. The stock exchanges are controlled by the trading members themselves. In order to regulate the functioning of the exchanges, the trading members elect representatives.

It is essential for the companies to get their securities listed in the nearby regional stock exchange to facilitate the investors to trad in them. There are three stock exchanges recently set up viz., Over the Exchange of India (OTCEI), National Stock Exchange of India (NSE) and inter connected Stock Exchange of India (ICSE), permitted to have nation-wide trading. Trading terminals have been set up by the exchanges in different parts of the country as a means of expansion of trading operations. The trading platforms are accessible from anywhere in the country, thanks to phenomenal growth of information technology, thus facilitating the investors to go for trading in exchanges having nationwide network.

There is broad based growth in stock exchanges with many stock exchanges vying with each other in offering improved services. These include apart from equity trading, the facilities like internet trading, wireless application protocol, debt market segment, derivative trading, modified carry forward system. Automated lending and borrowing mechanism, clearing, establishment of settlement guarantee fund, etc. The registered members were 9,487 and 43,874 registered sub-brokers trading on the various stock exchanges at the end of March 2008. The listed companies were 9922.

The All-India market capitalization was around Rs.51,497,010 million (US $ 1,288,392 million) at the end of March 2008. The market capitalization ration is defined as market capitalisatioin of stocks divided by GDP. It is used as a measure to denote the importance of equity markets relative to the GDP. It is of economic significance since market is positively correlated with the ability to mobilize capital and diversify risk. The All-India market capitalisation ratio increased to 109.26% in 2007-08 from 86.02% in 2006-07. NSE Market Capitalisation ratio was 103.08% during 2007-08 while BSE Market Capitalisation ratio was 109.01%. The trading volumes on stock exchanges have been witnessing phenomenal growth over the past years. The trading volume, which peaked at Rs.28,809,900 million (US $ 617,708 million) in 2000-01. Posted a substantial fall of 68.91% to Rs.8,958,180 million (US $ 183,569) in 2001-02. However, from 2002-03 onwards the trading volumes picked up. It stood at Rs.9,689,098 million (US $ 203,981 million) in 2002-03 and further witnessed a year -on-year increase of 67.29% in 2003-04 standing at Rs.16,209,326 million (US $ 373,573 million). The upsurge continued and in 2006-07, the turnover showed an increase of 21,40% to Rs.29,014,715 million (US $ 665,628 million) from Rs.23,901,030 million (US $ 535,777 million) in 2005-06. During 2007-08, the trading volumes on the Cash Market segment of Exchange increased significantly by 76.83% to Rs.51,308,160 million (US $ 1,283,667 million)

The relative importance of various stock exchanges in the market has undergone dramatic changes over a decade. The increase in the turnover took place mostly at the big stock exchanges. The NSE registered as the market leader with 90.27% of the total turnover in 2007-08. Top two stock exchanges (BSE & NSE) accounted for 99.99% of turnover, while the rest of stock exchanges add negligible volumes during 2007-08.

Securities and Exchange Board of India 1992 provides that a broker or sub-broker is permitted to buy, sell or deal in securities in a stock exchange only when he is in possession of certificate of registration granted by SEBI. The stock exchanges are empowered to stipulate rules and guidelines for its members other than those provided by SEBI.

National Stock Exchange of India (NSE) has prescribed norms for admission of members, incorporating factors, such as corporate structure, adequacy of capital, track record, education and experience to ensure quality broking services. For instance, corporates are required to have net worth of Rs.2 crores each and interest free security deposit of Rs.2.5 crores each to become members of NSE on capital market segment. Most of the brokers (88%) on NSE had the corporate status, followed by OTCEI with 77 percentage of corporate brokers. Though it is limited in number, the brokers are allowed to hold multiple memberships of exchanges.

1.10. FUNCTIONS OF A STOCK EXCHANGE

1.10.1. Promotes Active Trading

In stock exchanges, securities are bought and sold by the investors. Stock exchanges promote trading on securities which increases liquidity and marketability of the shares.

1.10.2. Price Fixation

The prices of securities are determined by the transactions that arise due to the demand of the investors and the supplier's preferences. Investors are able to make right decisions as the traded prices are made known to the public.

1.10.3. Capital Mobilisation

The characteristics of securities viz., negotiability and transferability help the companies to raise long term funds. As the stock exchanges facilitate trading on securities, investors who are willing to subscribe to shares of companies contribute to the formation of capital.

1.10.4. Safe and Fair Dealing of Securities

The stock exchanges are governed by the rules, regulations and by - laws which ensure safety to the investors.

1.10.5. Dissemination of Information

The information on the functioning of stock exchanges are disseminated by pamphlets, and handouts apart from other publications. Access to internet provides

information about share prices traded on daily basis along with the volume of trade. Television channels also lend their hands in providing the required information an stock market operations.

1.10.6. Help in Image Building

The companies, whose stocks are traded on, get more concerned about their images at stake. Stock exchanges pass sensational news to the public, forcing the companies to maintain good performance and be conscious about their activities.

1.10.7. Monitoring Institution

Stock exchanges monitor the functioning of their members, brokers and listed companies. Investors are protected against unfair trade practices of a few unscrupulous brokers. Disputes between investors and brokers are amicably settled.

1.11. REGULATION SYSTEM:

The functioning of stock exchanges is regulated by a three tier structure consisting of Ministry of Finance, SEBI and the Governing Boards of the Stock Exchanges.

1.11.1. Ministry of Finance:

The Ministry of Finance has stock exchange division which is empowered relating to the application of provisions under the securities contract regulation act and licensing of dealers. The SEBI Act provides the Ministry of Finance appellate and supervisory powers over the SEBI. The ministry of finance has the powers to grant recognition to the stock exchanges and regulate their functioning. It also has powers to approve the appointments of executive chief officers and nominations of public representatives in the governing boards of stock exchanges.

1.11.2. Securities and Exchange Board of India

SEBI was constituted in 1988 and it has enormous powers to deal with regulation of business of stock exchanges, other security markets and mutual funds. Unfair trade practices and insider dealings are prohibited by SEBI..SEBI takes necessary measures to promote healthy growth of capital market and offer protection to the investors.

1.11.3. The Governing Board:

Each stock exchange has a Governing Board comprising elected member directors, nominees of the government and public representatives. The board maintains an orderly and well regulated market.

1.11.4. Companies Act, 1956:

The Companies Act, 1956 provides rules relating to the issue, allotment and transfer of securities. It stipulates standards of disclosure in public issues of capital. The act regulates underwriting, use of premium and discounts on issue of shares, rights and bonus issues, payment of interest and dividends, supply of annual report etc.

1.11.5. Depositories Act, 1996:

The Depositories Act, 1996 provides the establishment of depositories in securities in order to ensure bee transferability of securities with speed and accuracy. The act envisages transfer of ownership of securities electronically by book entries without movement of securities from one individual to another.

The regulatory frame work thus ensures that the market participants behave in a desired way to have the securities market continue to be a major source of finance for companies and government and that the interests of investors are protected.

1.12. OVER THE COUNTER EXCHANGE OF INDIA (OTCEI):

OTCEI was established in 1990 to provide an alternate market for the securities of smaller companies, public sector companies, closely held companies interested in listing etc., It has been jointly promoted by UTI, IDBI, ICICI, SBI Capital Markets Ltd., IFCI, GIC and Canbank Financial Services Ltd., The Status of 'recognised Stock Exchange' is conferred with OTCEI by the government, thus promoting at par with other stock exchanges in the nation.

All the activities viz., trading, billing, payments etc., are computerized. PTI, OTC scan available to each dealer displays the best bids and offers of the market makers in respect to each scrip. OTCEI has two trading documents Counter Receipt (CR) which is handed over to the buyer when a deal is made and sale confirmation slip (SCS) which is passed on to the seller when a deal is made.

Listing of securities is a must for trading of securities in OTCEI. Listing is obtained by (a) companies with issued equity capital between RS.30 lakhs and Rs.25 crores: (b) closely held companies desirous of listing; (c) venture capital companies (d) companies not listed on any other stock exchange after meeting certain conditions as for instance, offer to the public has to be made at least 40 percentage of issued equity -capital or Rs.20 lakhs whichever is higher where the issued equity ranges from Rs.30 lakhs to Rs.3 crores.

Sponsor members of OTCEI make appraisal of the project and get satisfied with technological and financial viability before recommending a company for enlistment. Investment worthiness of the company and its profit is scrutinized. Ultimately, they make valuation of the shares of the company, see that SEBI guidelines are complied with and manage the public issue.

OTCEI provides easy marketability and better liquidity to the securities of the investors. It provides facilities for transfer of shares listed. The transfer documents can be submitted at any OTCEI counter in the country. A company with 40 percentage of public issue can obtain enlistment with OTCEI. It was reduced to 25 percent in 1995. SEBI permitted finance and leasing companies to get listed on the OTCEI.

However, the minimum issued capital for finance companies was increased to Rs.1 crore and a three year track record of profitability was made compulsory for listing. An eight member committee headed by Dr.S.A. Dave was constituted in 1996 to review the working of OTCEI. The committee recommended that companies which do not have minimum share holding norm of at least five share holders for every Rs.1 lakh of issued capital can get listed on OTCEI, provided they appoint sponsors and market makers. The committee recommended the appraisal by a financial institution or a nationalized bank mandatory if a company does not have a good track record of dividend payment for three years out of immediately preceding five years for making a public issue. Up to September 1996, OTCEI recorded a total trading volume of Rs.737 crores. The number of securities in the permitted equity segment exceeds 300.

1.13. NATIONAL STOCK EXCHANGE OF INDIA (NSE)

NSE was established in 1993 to encourage stock exchange reforms through system modernization. It has electronic screen based system to facilitate members having equal access and opportunity of trade across the country. It is the first screen based trading system in the country. The trading system at NSE is known as the National Exchange for Automated Trading System (NEAT). NEAT has enabled large number of members all over the country to trade simultaneously. A single consolidated order book (storing limit orders only) for each stock, displays buy and sell orders from all over the country on a real time basis. (Under limit orders, orders are limited by a fixed price, for instance 'Buy Acc at Rs.150', implying that the investor is willing to buy Acc share at a price Rs.150, not more than that). Several time related and volume related conditions can be built easily into an order. The trading system provides complete market information on- line, up dated on real time basis.

The securities in Wholesale Debt market (WDM) of NSE include government bonds, treasury bills, state enterprise bonds, bank bonds, certificates of deposits, commercial paper, corporate debt and others.

1.14. STOCK MARKET INDICES

Stock market indices are the yardsticks to measure the market movement. The stock market behaviour is reflected by the indices, as it is impossible to study the prices of each stock to study the market movement by looking into 7000 odd companies listed on the Bombay Stock Exchange.

The stock market indices include BSE-Sensex, BSE-200, Dollex, Crisil-500, NSE-50, Business line 250 and RBI indices of ordinary shares.

1.14.1. Uses of Indices:

The stock market indices serve the following:

1. Indices help to ascertain the broad trends in the market, whether there is upward or downward trend in market movement.
2. Indices show the impact of economic policies on the development of a nation.
3. They serve as bench marks for evaluating investors' portfolios.
4. On studying market movements, the investor can allocate funds rationally among stocks. This prevents from incurring heavy losses.
5. Index funds and futures can be formulated with the help of indices. For instance, ICICI has floated ICICI index bonds, with the return of the bond linked with index movement.
6. Prediction of future movement of stock market is possible by studying the performance of the indices. The relationship between the individual stock and index explains the individual share price movement.

1.14.2. Computation of Stock Market Indices:

A stock market index may be either a price index or a wealth index. The price index without any weights assigned to it, is a simple arithmetic average of share prices with a base date. It shows the general price movement of constituents which reflect the entire market.

For the construction of wealth index, the prices have to be weighted by market capitalization. The base period values have to be adjusted for subsequent rights and bonus offers. Thus real wealth is created for shareholders over a period of time. The following example shows the manner in which wealth index is constructed.

There are three scrips viz., X, Y and Z (each having par value of Rs.10) for which index is to be constructed.

Equity of company X	:	100 shares
Equity of company Y	:	200 shares
Equity of company Z	:	300 shares
Market price of scrip X	:	Rs.20 ; Y: Rs.25 and Z: Rs.30.

Market capitalization = Number of shares X Price of shares

X	= 100x20	= Rs.2000
Y	= 200 x 25	= Rs.5000
Z	= 300 x 30	= Rs.9000

Aggregate market capitalization = Rs.16,000

Index at period N = 100 (base date)

The Market prices at N + 1 are as follows

X = Rs.30

Y = Rs.35

Z = Rs.40

Market Capitalization

X	= 100x30	= Rs.3000
Y	= 200 x 35	= Rs.7000
Z	= 300 x 40	= Rs.12000

Aggregate market capitalization = Rs.22,000

$$\text{Wealth index at period N + 1} = \frac{22000 \times 100}{16000} = 137.5$$

When trading volume is used as weight, the index shows the depth of the market in terms of trading volumes and conditions,

The Business Line (BL) 250 has the base as January 17, 1994 and it uses market capitalization as its weight. It is a comprehensive index comprising 43 industrial groups. When the index is broad based, it can indicate market movement in a big way. However, individual scrips have little impact in a broad based index. Regarding un weighted price index, price average of selected scrips is calculated in relation to a base year, showing only the price movement. The ordinary share price index of economic times with base year 1984-85 is an example of the above type.

1.14.3. The BSE Sensitive Index:

BSE Sensitive Index was constructed by taking a sample of 30 companies from different industries. Later, representatives from services, telecom, consumer goods, two and three wheeler auto sector were accommodated', though the number of scripts were kept at the same 30. The companies in BSE sensitive index include

ACC Ltd. Bharat Heavy Electricals Ltd. Bharti Airtel Ltd. Cipla Ltd. DLF Ltd. Jindal Steel & Power Ltd. HDFC, HDFC Bank Ltd. Hero Honda Motors Ltd. Hindalco Industries Ltd. Hindustan Unilever Ltd. ICICI Bank Ltd. Infosys Technologies Ltd. ITC Ltd. Jaiprakash Associates Ltd. Larsen & Toubro Limited Mahindra & Mahindra Ltd. Maruti Suzuki India Ltd. NTPC Ltd. ONGC Ltd. Reliance Communications Limited, Reliance Industries Ltd. Reliance Infrastructure Ltd. State Bank of India, Sterlite Industries (India) Ltd. Tata Consultancy Services Limited, Tata Motors Ltd. Tata Power Company Ltd. Tata Steel Ltd. Wipro Ltd.

The criteria followed for the selection of scrips are as follows:

1. Industry Representation

Companies selected should be the representatives of their respective industries for instance; TISCO represents iron and steel, whereas ACC represents cement industry. It has to be ensured that the company's scrip should reflect the present state of the industry and its growth potential.

2. Market Capitalisation:

The real value of the stock is reflected by market capitalization. High market price coupled with increased outstanding shares boost up market capitalization.

3. Market Depth:

Broad based equity offers increased number of deals in the market. This helps in achieving increased market depth which is the average deal as a percentage of company's shares outstanding.

4. Liquidity:

High liquidity is the result of number of deals of a scrip. The average number of deals of particular scrip in the past two years is taken into account. The trading volume determines market fancy for a share. For instance, Financial Express equity index is weighted by trading volume.

5. Depth of Floating Stock:

The floating stock depth sector is the average number of deals as a percentage of floating stock. Low floating stock is over priced. MRF has low floatation and is able to dictate terms with high prices. Reliance has 45 per cent free float and hence it has high trading volume.

NSE-50 Index (NIFTY)

This index is constructed by India Index Services Product Ltd., (IISL) and Credit Rating Information Services of India Ltd. (CRISIL). The strategic alliance of CRISIL with standard and poor rating services, has led to naming of the index as SXPCNX.

NSE-50 index has the objectives viz., accurate reflecting of market movement, providing tool for measuring portfolio returns in relation to market returns, and serving as a basis for introducing index based derivations. Nifty composition in 2010 included scripts of

ABB Ltd , ACC Ltd, Ambuja Cements Ltd, Axis Bank, BHEL, Bharat Petroleum Corporation Ltd(BPCL)REFINERIES, Bharti Airtel Ltd, Cairn India Ltd Cipla Ltd,DLF Ltd, GAIL (India) Ltd, HCL Technologies Ltd, HDFC Bank Ltd, Hero Honda Motors Ltd., Hindalco Industries Ltd, Hindustan Unilever Ltd,Housing Development Finance Corporation Ltd(HDFC), IDFC, ITC Ltd, ICICI Bank Ltd, Idea Cellular Ltd, Infosys Technologies Ltd, Jindal Steel, JP Associate, Kotak Bank, Larsen & Toubro Ltd, Mahindra & Mahindra Ltd, Maruti Suzuki India Ltd, NTPC Ltd , Oil & Natural Gas Corporation Ltd(ONGC), Power Grid Corporation of India Ltd, Punjab National Bank Ranbaxy Laboratories Ltd , Reliance Communications Ltd, Reliance Industries Ltd, Reliance Infrastructure Ltd, Reliance Capital, Reliance Power Ltd, Siemens Ltd, State Bank of India, Steel Authority of India Ltd(SAIL), Sterlite Industries (India) Ltd , Sun Pharmaceutical Industries Ltd, Suzlon Energy Ltd Tata Consultancy Services Ltd(TCS), Tata Motors Ltd, Tata Power Co. Ltd , Tata Steel Ltd , Unitech Ltd, Wipro Ltd.

Nifty considers market capitalization and liquidity as the criteria for the selection of scrips of companies. The sample set covers equities of more than 1200 companies. The liquidity otherwise called as impact cost is nothing but the cost of executing a transaction in security in proportion to the weightage of its market capitalization as against index market capitalization at any point of time. The scrips should have been traded for 85 percentage of trading days at less than 1.5 percent of impact cost.

The base period for SXP, CNX Nifty index is the closing prices as November 3, 1995, with the base value of index fixed at 1000. It has special features as follows.

1. SXP CNX Nifty represents nearly 45 percent of total market capitalization.
2. It is chosen for trading of derivatives such as options and futures.
3. The impact cost of Nifty portfolio is less.
4. It provides an effective hedge against risk.

CNX NIFTY JUNIOR:

The Nifty junior comprises 50 stocks belonging to the mid cap companies. Stocks with market capitalization greater than Rs.2 billion are included in Nifty Junior. It has the same base date of Nifty and the impact cost should not be beyond 2.5 percent for 85 percent of traded days. The Nifty Junior consists of

Adani Enterprises Ltd. Aditya Birla Nuvo Ltd. Andhra Bank,Ashok Leyland Ltd., Asian Paints Ltd., Bank of Baroda,Bank of India, Bharat Electronics Ltd.,Bharat Forge Ltd.,Biocon Ltd.,Canara Bank,Colgate Palmolive (India) Ltd.,Container Corporation of India Ltd., Corporation Bank, Crompton Greaves Ltd.,Cummins India Ltd.,Exide Industries Ltd.,Federal Bank Ltd.,GMR Infrastructure Ltd., Glaxosmithkline Pharmaceuticals Ltd.,Glenmark Pharmaceuticals Ltd., Grasim Industries Ltd., Hindustan Petroleum Corporation Ltd.,Housing Development and Infrastructure Ltd., IDBI Bank Ltd., IFCI Ltd.,Indiabulls Real Estate Ltd.,Indian Hotels Co. Ltd.,Indian Overseas Bank ,JSW Steel Ltd.,LIC Housing Finance Ltd.,Lupin Ltd.,Mangalore Refinery & Petrochemicals Ltd., MphasiS Ltd., SOFTWARE,Mundra Port and Special Economic Zone Ltd.,Oracle Financial Services Software Ltd., Patni Computer Systems Ltd.,Power Finance Corporation Ltd.,Punj Lloyd Ltd.,Rural Electrification Corporation Ltd.,Shriram Transport Finance Co. Ltd., Syndicate Bank, Tata Chemicals Ltd.,Tech Mahindra Ltd.,Torrent Power Ltd., UltraTech Cement Ltd., Union Bank of India, United Phosphorus Ltd.,United Spirits Ltd., Yes Bank Ltd.

SXP CNX 500:

It is a broad based index covering 500 scrips. The market capitalization, industry representation, trading interest and financial performance are the criteria followed for the selection of the companies. There are 79 industry groups in this index. The market capitalization is used as the weight. The index has 1994 as the base year and the companies selected should have at least three years of operation with positive net worth.

SXP CNX 500 represents nearly 72 per cent of total market capitalization and 98 per cent of total traded value.

The index reflects market movement effectively and the broad base of the index acts as a benchmark for measuring portfolio return and comparing it with market return.

The main factors which cause differences among the stock market indices are as follows:

1. Number of component stocks included.
2. composition of stocks
3. weights and
4. base year.

1. Number of Component Stocks

The behaviour of an index depends on the number of component stocks included. If there are a large number of stocks, the market movement will be reflected in a better manner. For instance, the sensex has 30 scrips and BSE has 100 stocks. Nifty has 50 stocks. The variation in number of stocks causes variation in movements of indices.

2. Stock Composition:

The economic changes of a nation are reflected by the composition of stocks in the index. The centre for Monitoring Indian Economy maintains an index. The scrip which has lost the market interest has to be dropped and is to be replaced by another. Composition of stocks in sensex, Nifty, and Nifty Junior got changed during the last decade, with the scrips of information technology finding place.

3. Weights Assigned:

The indices may be weighted with the price or value. The Dow Jones Industrial Average of U.S. and Nikkei Stock Average of 225 scrips of Tokyo Stock Exchange are weighted with the price. The price weighted index is computed by adding the current prices of stocks in the stock exchange and getting it divided by the total number of stocks. The stocks with higher prices influence the index more. In the value weighted index, the weight is computed by multiplying number of outstanding shares by the current market price. The changes in prices of the scrips with heavy market capitalization influence the changes in the index.

4. Base Year:

The variations among the indices are also caused by the selection of the base year. The base year should as far as possible be close to the current year, but should also facilitate historical comparison. However, it has to be ensured that the base year should be free from any abnormal fluctuations in the market.

1.15. MUTUAL FUND

A mutual fund is a financial intermediary which acts as an instrument of investment. It collects funds from different investors to a common pool of investible funds and then invests these funds in a wide variety of investment opportunities. Small investors who are unable to participate in capital market, can access the stock market through the medium of mutual funds which can manage their funds for maximizing return. The investment may be diversified to spread risk and to ensure a

good return (dividend or capital gains or both) to the investors. The mutual funds employ professional experts and investment consultants to conduct investment analysis and then select the portfolio of securities where the funds are to be invested. Thus, a mutual fund is a pool of funds contributed by individual investors having common investment preferences.

1.15.1 Characteristics of Mutual Fund:

A mutual fund is a financial intermediary and works as an investment company. It has distinct features and characteristics which differentiate it from other financial intermediaries. Some of the features of a mutual fund are:

(i) Mutual fund is a pool of financial resources.

Investors bring their individual funds together. Sometimes the funds which otherwise may not come for investment in the capital market, are invested through mutual funds.

(ii) Mutual funds are professionally managed.

The resources collected by mutual funds are managed by professionals and expert in investment. These professionals can undertake specialized investment analysis such as fundamental analysis, technical analysis, etc., which are not otherwise expected on the part individual investors.

(iii) Mutual fund is an indirect investing.

The individual investors invest in the mutual fund which in turn invests in the shares, debentures and other securities in the capital market. The proportionate funds given by an investor are represented by the units of mutual fund. Investors own these units. The shares, debentures are owned by the mutual fund. Investors have no direct claim on these securities. Of course, in case of closure or liquidation of the mutual fund, all the proceeds of these securities are proportionally distributed among the unit holders.

(iv) Investment in mutual fund is not borrowing-lending relationship.

Investors do not lend money to the mutual fund; consequently, the investors have to share the gains or losses of operations of the mutual fund.

(v) Mutual fund is a representative of investors.

The mutual funds collect the funds from investors under a particular investment scheme. As a representative, the mutual fund has to invest these funds as per the designated scheme only.

In nutshell, a mutual fund mobilises the savings of a large number of small investors and invest the amount in a common investment. Investors get the benefit of diversifying their portfolio and experience of professional managers to make best investments.

1.15.2Advantages of Mutual Funds

1. It is not the investors but an experienced team of fund manages choose appropriate securities. This ensures professional management of funds.
2. Mutual funds provide liquidity as investors can realize money at any time byselling back units to the fund. Further, the investor has the option to sell the units through stock exchange under closed end fund.

3. Paper work is largely reduced and time is saved in making investments.
4. Economies of large scale operations cut down the cost of brokerage and other costs of operations.
5. Transparency in investment is possible
6. There is an element of flexibility in regular investment plans, withdrawal plans and dividend reinvestment schemes.
7. High returns are possible from medium and long term mutual funds.
8. The major advantage of mutual funds is diversification. Wide range of investment in different securities covering various industries is possible, which otherwise is not possible for an individual investor at reduced cost.
9. As the funds are registered with SEBI, Continuous scrutiny of operations is ensured.

1.15.3 SCHEMES OF MUTUAL FUNDS

The funds from investors are pooled and used to purchase securities, bonds, stocks, etc., Each investor buys units of mutual fund. The closed end fund offers units which are fixed in number and are available only for a pre-determined period. These schemes are listed in the stock exchanges. The units are traded in stock markets, with the prices quoted either at a premium or a discount. Under open end schemes, the investors can directly approach fund mangers to buy or sell units. The price of unit is based on net asset value of the scheme concerned, calculated as daily or weekly basis.

Mutual funds may have a load factor which is nothing but the commission paid by investors while purchasing or selling mutual fund. Front end load is charged when units are sold by the funds, thus reducing the units Net Assets vaule.. Back end load is charged when units are repurchased by the funds. This reduces the investor's proceeds when he sells the units. The load factor ranges from 1 to 6 percent on the net asset vale.

Mutual funds having the characteristics of both close ended and open ended schemes are also sometimes launched. They are known as interval funds which can be listed in stock exchange and are available for repurchase during specific periods at net asset value or related prices.

The choice of mutual funds is on the basis of net assets, portfolio composition, income composition, expense ratio, realized gains per unit, gross income as a percentage of net assets etc.

1.16. SECURITIES AND EXCHANGE BOARD OF INDIA

The Securities and Exchange Board of India Act (SEBI) came into force in 1992 and it has three main objectives.

1. to protect the interests of investors in securities

2. to promote the development of securities market
3. and to regulate the securities market.

Organisation of SEBI:

SEBI has the organization structure, with separate departments to deal with policy matters related to primary market and redressal of grievances of investors and guidance (Primary Department), registration, regulation and monitoring or intermediaries, and scrutiny of offer document (Issue management and intermediaries department), policy matters related to major stock exchanges, price monitoring, broker's registration (secondary market department), and mutual funds, FIIs, mergers and acquisitions (Institutional Investment).

SEBI and Protection to Investors

SEBI has undertaken several measures to protect the interest of investors. Such measures include tightening of entry and disclosure norms to prevent exploitation of investors by unscrupulous promoters.

SEBI and Primary Market

SEBI's role in the primary market can be discussed in the following lines.

1.16.1. Entry Norms:

SEBI has tightened entry norms for companies which have access to capital market. These include

i. The company should have a track record of payment of dividends for a minimum of 3 years preceding the issue.

ii. A company whose shares are already listed, should have post issue networth five times more than the pre issue networth.

iii. Appraisal by a public financial institution or by a scheduled commercial bank is needed for a manufacturing company, if it does not have the above track record.

iv. At least five public shareholders for every Rs:1 lakh of net capital offer made to the public are needed for a corporate body making a public issue.

1.16.2. Contribution by Promoters:

SEBI issued guidelines by fixing promoter's contribution not less than 20 per cent of issue capital and receiving the same before the public issue.

1.16.3. Draft Prospectus - a public document:

SEBI has made draft prospectus as a public document which should provide information about the present position of the company, its prospects and risk factors associated with investment. It has advised all the listed companies to publish unaudited financial results on a quarterly basis.

1.16.4. Book - Building Exercise:

Book building involves firm allotment of the instrument to a syndicate formed by the lead managers, who sell the issue to the public at an acceptable price. The syndicate members would be responsible for the primary underwriting and the book runners (the persons nominated by the issuing companies) would assume liability in case of any default.

Check your Progress

IV Fill in the blanks:

1. NSE was incorporated in .....
2. ..... is the regulatory authority of the capital market.
3. .....and..... are two fundamental factors of investment decision.

V Choose the correct answer from the following

1. investment made in real estate is a
(a) real investment
(b) financial investment
(c) non-financial investment
(d) intangible investment

2. Which one of the following is not a fixed income bearing security?
(a) Debenture
(b) Bonds
(c) Fixed deposits
(d) Equity shares

3. which one of the following schemes helps in reducing tax liability?
(a) investment in real estate
(b) national saving certificate
(c) equity shares
(d) saving bank account

1.16.5. Encouraging Small Investors:

A minimum of 50 per cent of net offers has to be reserved for small investors (small investors are those who have applied for 1000 or less number of shares). The companies have to complete allotment of securities within 30 days of closure of public issue. If refund of application of money is not made with in the specified period, the companies will be liable to pay it with interest at 15 per cent per annum.

1.16.6. Control of Market Intermediaries:

SEBI regulates market intermediaries - (merchant bankers), financial intermediaries namely underwriters, registers and transfer agents by licensing them. SEBI has the powers to inspect the records of intermediaries.

1.17. REFORM MEASURES

SEBI has formulated several reform measures in stock market operations.

1.17.1. Governing Board of Stock Exchanges:

Regulations regarding the public representatives and the government nominees on the Governing Boards of Stock Exchanges were issued by SEBI. As per the new guidelines, trading members will be given only 40 per cent representation in the governing council of derivatives.

1.17.2. Screen Based Trading:

As per SEBI's guidelines, new stock exchanges would be recognized only when they go for on line screen based trading for trade purpose.

1.17.3. Regulations for Settlement and Clearing:

SEBI notified all stock exchanges to introduce T+2 Rolling settlement. In case members fail to deliver the shares, the stock exchanges should conduct auctions within three days of the settlement. SEBI also banned carry forward transactions (carrying over the settlement to the next settlement period). Regarding short sales, SEBI issued directions to all stock exchanges to submit scripwise information for select scrips on net short sales position at the end of each trading day for passing of information to the public, (short sales, selling of shares which are not owned).

1.17.4. End to Credit Rating Shopping:

SEBI made it mandatory for all the debt instruments to be rated from any one of the authorized credit rating company. Dual rating is mandatory for issue crossing Rs.500 million mark. Thus credit rating shopping is put to an end as a company is not allowed to withhold the disclosure of adverse rating.

1.17.5. Price Monitoring:

A division is set up by SEBI to monitor the abnormal price movements. It has asked stock exchanges to monitor the prices of newly listed scrips from the very first day of trading. Price filters are introduced by SEBI, to prevent circular trading and price rigging (circular trading refers to trading that takes place among the brokers to manipulate the prices for their personal gain). These include intra day

4. The open- ended scheme of mutual funds is
(a) open on a continuous basis
(b) open for a particular period
(c) having a fixed period of maturity
(d) interest earning scheme

VI State whether the following statements are True or false

1. Savings accounts and term deposits with banks are not liquid assets.
2. A treasury bill is basically an instrument of short-term borrowing by the Government of India
3. Only salaried class can participate in public provident fund
4. The close-ended mutual funds have a fixed maturity period
5. Mutual funds collects funds from investors and invest in equities or money market instruments as specified by the schemes
6. Sensex is an index number of 50 shares the oldest stock exchange is India is NSE
7. Only large investors invest in mutual funds.
8. All mutual funds in India must be registered with SEBI.

price band which permits the stock to be traded within a range during a trading session. Inter week price band prevents wild swings in prices.

1.17.6. Delisting Norms:

SEBI introduced norms for delisting which include (i) the company to make a buy offer to all share holders in the particular region and (ii) the promoters to buy or arrange buyers for the security.

1.17.7. Regulations of Brokers:

SEBI lays down code of conduct to be followed by the stock brokers. Contract notes have to show transparency in deals regarding price, broker age and service tax. Brokers have to furnish SEBI a copy of the audited balance sheet and profit and loss account within six months of each accounting period. SEBI has set up regional offices to attend to the complaints of investors against brokers and stock exchanges. Disciplinary actions including suspension and cancellation of registration are taken against the erring stock brokers.

1.17.8. Prevention of Insider Trading:

Insider trading is nothing but using one's access to price sensitive information ahead of others for his own benefit. The person connected with a company viz., a director, an officer or employee of a company is called an insider who has access to price sensitive information. SEBI prohibits an insider from dealings and the person investigated by SEBI is required to produce books, accounts and other documents needed. This is a major step in protecting the investors as the trading volume and price would get declined if insider dealing was not checked and let the information made public.

SEBI also directed the companies to disclose material events which could have impact on the earnings of the company or the prices of the stock. Companies are required to disclose all information pertaining to litigation, revision in debt or equity ratings, issue of any class of securities, mergers, cancellation of dividends, rights or bonus etc.

However, SEBI has to ensure the quality of information flow and timeliness of disclosure. The delay in dissemination of information has to be avoided by creating websites. Implementation of uniform settlement cycle will improve quality of price formation and reduce the cost incurred by investors.

Carry forward system has to be regulated otherwise it would lead to abnormal price rise due to speculation. There are hundreds of unregistered sub brokers who are paid little attention due to lack of enforcement power. Rectification of these activities, would boost up the morale of investing public.

1.18. KEY TERMS

• INVESTMENT

Investing money on the assets with the expectation of getting gain or positive return over a given period of time is known as financial investment

• SPECULATION

Buying or selling securities with the expectation of getting profit from the price fluctuations.

• STOCK EXCHANGE

Stock exchange means any body of individuals whether incorporated or not, constituted for the purpose of regulating or controlling the business of buying, selling or dealing in securities.

• NATIONAL STOCK EXCHANGE

The National Stock Exchange of India Limited (NSE) was incorporated in November 1992 by IDBI and other All-India Financial Institutions and became recoganised stock exchange with effect from April 26, 1993 to provide nationwide stock trading facilities.

• SECURITIES AND EXCHANGE BOARD OF INDIA

Securities and Exchange Board of India (SEBI) is the nodal agency to regulate the capital market and other related issues in India . It was established in 1988 as an administrative body and was given statutory recognition in January 1992 under the SEBI Act, 1992 which came into force on January 30, 1992

1.19. SUMMARY

The term Investment refers to exchange of money wealth into some tangible wealth. Investors invest the money in anticipation of regular income like interest and dividend and / or capital appreciation. Investment is different from speculation. In the present day context investment is essential for every one. While investing the hard earned money safety, liquidity, stability of income and purchasing power, capital appreciation, tax benefit etc shall be taken into account. No investment is free from risk. The investment process includes the following five stages: 1. formulation of investment policy 2. Investment analysis 3. valuation of securities 4. portfolio construction and 5. portfolio evaluation. Investment alternatives may be classified into direct and indirect alternatives. Stock exchange means any body of individuals whether incorporated or not, constituted for the purpose of regulating or controlling the business of buying, selling or dealing in securities. The stock exchanges render the following services to the investors: 1.promotes investment in shares 2. price fixation 3. capital mobilization 4. fair dealing 5. dissemination of information 6.help in image building 7. monitoring institutions. Securities and Exchange Board of India (SEBI) is the nodal agency to regulate the capital market and other related issues in

India . It was established in 1988 as an administrative body and was given statutory recognition in January 1992 under the SEBI Act, 1992 which came into force on January 30, 1992

The SEBI has formulated several reform measures to protect the interest of investors.

1.20. ANSWERS TO CHECK YOUR PROGRESS

I. 1. Investment 2. Speculators 3. gambling
II. 1. (c) 2. (b) 3. (a) 4. (a)
III. 1. False 2. True 3. True
IV. 1. 1992 2. SEBI 3. liquidity & return
V. 1. (a) 2. (d) 3. (b) 4. (a)
VI. 1. False 2. True 3. False 4. True 5. True 6. False 7. False 8. True

1.21. QUESTIONS / EXERCISE

Section - A

1. Define investment. Distinguish investment from speculation.
2. Why is investment necessary?
3. What are the functions of stock exchange?
4. What are the uses of stock market indices?
5. What are the criteria to be followed while selecting scrips for inclusion in index?

Section - B

1. What are the points to be considered while making an investment?
2. Briefly explain the various stages of investment process.
3. Discuss the role of SEBI in regulating the stock exchanges.
4. What is mutual fund? What are its characteristics? What are the advantages of mutual funds?

1.22. FURTHER READINGS

1. Donald E.Fischer and Ronal J. Jordan "Security Analysis And Portfolio Management" - Prentice -Hall of India , New Delhi.
2. V.K. Bhalla "Investment Management" - S.Chand & Company Ltd., New Delhi.
3. R.P. Rustagi "Investment Analysis And Portfolio Management" - Sultan Chand & sons., New Delhi.
4. Preethi Singh, "Investment Management" - Himalays Publishing House, Mumbai.
5. Punithavathy Pandian - "Security Analysis And Portfolio Management" - Vikas Publishing House.
6. William F.Sharpe "Investment Management" - Prentice Hall of India, New Delhi.

UNIT - II SECURITY ANALYSIS - FUNDAMENTAL ANALYSIS AND TECHNICAL ANALYSIS

Structure

2.0. INTRODUCTION

Generally, all the securities are associated with risk. The expected return on securities varies with the level of risk associated with such securities. So, an investor must understand the fluctuation of prices of securities and the behaviour pattern of the market before investing in any securities. The nature of analysis could either be at a micro level or macro level. If only one scrip is analysised it is known as micro analysis of the company. On the other hand, if the whole market behaviour is analysed it is known as macro analysis.

The purchase and sale of securities depend on the movement of stock prices. When there is an increasing trend in the prices, an investor may purchase the scrip and he may sell it when there is a continuous fall in price. There are many factors which affect the price movement. These include earnings of the company, growth rate', risk exposure of the company, general economic conditions, political stability etc.

There are basically two approaches to analyze share price movement. They are fundamental approach and the technical approach.

2.1. UNIT OBJECTIVES

- To understand the meaning of fundamental and technical analysis
- To analyze the Economic factors which influence the stock price movement
- To explain various stages of industrial cycle
- To find out the usefulness of various ratios for analyzing the performance of the company
- To identify the technical indicators which reveal future price behaviour of the market.
- To know the chart pattern which this may help us to predict the future price movement.

2.2. FUNDAMENTAL ANALYSIS

Equity shares have an economic worth which is based on existing and expected earning capacity. Fundamental analysis attempt to find out the true value of securities so that the investor can decide to buy or not to buy the securities at the current market price. It encompasses a logical and systematic approach to estimate the returns from shares and their true value. In order to find out the true value, what is required is the forecast and analysis of the dividends and earnings that can be expected from the firm. The analysis of the determinates of the fair value of a security is called the fundamental analysis. The basic philosophy underlying the fundamental analysis is that if an investor invests one rupee in buying a share of a company, how much expected returns from this investment he has. These future expected returns when discounted at the required rate of return of the investors, give the fair value of the shares.

A fundamental analyst compares the fair value of the share with its market price. In case former is higher than the later, it denotes under valuation of shares in the market and signals the buying of share. On the other hand, if fair value is less than the market price, the share is considered to be over priced and signals the selling of shares. The basic premise is that the long run the market price tends to move towards its fair or intrinsic value.

Fundamental approach appraises intrinsic value of share, through (a) economic analysis (b) industry analysis and (c) company analysis.

2.3. ECONOMIC ANALYSIS

The investment largely depends on the level of economic activities in a nation. When the economic growth is high, the industry can also be expected to show rapid growth, resulting in increased stock prices. It is essential to make analysis of macro economic environment to understand the behaviour of stock prices. Such economic factors are listed below.

2.3.1. Gross Domestic Product (GDP)

GDP is the indicator of economic growth of a country. It represents aggregate value of goods and services produced in the economy. It is around 8% in 2008-2009 in India and any growth in GDP reflects good prospects in the industrial sector and increases the morale of the investors.

2.3.2. Savings and Investment

Economic growth leads to increased savings which would lead to increased investment in assets like equity shares, deposits, mutual fund units, real estate, bullian and others. Such savings of investors are available to the companies through stock market. Savings represent around 32% of GDP in 2007-2008, with investment around 28%.

2.3.3. Interest Rates

The cost of financing to the firms depends on the availability of funds at low rates of interest. Any decrease in interest rates leads to lower cost of finance for firms and increased profitability. The rate of interest which was 11 per cent per annum in 1997 got reduced to 8 per cent in 2008 and thereafter.

2.3.4. Inflation

Inflationary trends halt the progress of any nation. When it increases, real rate of growth falls leading to increase in prices. However mild inflation is needed for industries and stock market as well. The rate of inflation was in double digit in 1990s reduced to around 5% in 2006-2007.

2.3.5. Budget

The fiscal policy of a country has a strong bearing on the behaviour of stock market. The budget which provides account of government revenues and expenditure, must be a balanced one to make it favourable to the stock market.

2.3.6. Tax Structure

The tax relief measures announced by the government would boost savings. Tax holidays, concessions and incentives offered to an industry promote investment in the industry and increase profitability.

2.3.7. Growth of Agriculture

Stock market behaviour is connected with agricultural development of a nation. A good onset of monsoon leads to bumper crop. Sugar, cotton and food processing industries depend on agriculture for their raw materials. Further, economic development of a nation hinges on its ability to attain self sufficiency in agriculture.

2.3.8. Balance of Payments

Balance of payments is an indicator of competitiveness of a nation. When a country earns money through its exports more than it spends for its imports, it is implied to have favorable balance of payments. It is a measure of strength of rupee on external account. The stability in foreign exchange rate leads to a positive effect on the stock market.

2.3.9. Infrastructure Facilities

For the development of any country, infrastructure facilities viz., transport, banking, power, communication and financial sectors have to be made available sufficiently. Thanks to liberalization, lot of private sector companies and foreign companies have shown interests in making investments for the promotion of infrastructure facilities in our nation.

2.3.10. Supply of Labour

Study of population provides information about ages, occupation, literacy, and geographic distribution of population. In our country, labour is available cheaply thus encouraging multinationals to set up their plants and their back officers in different parts of the country. Adequate supply of labour promotes the growth of industries like BPOs and KPOs and the stock market.

2.4. SCANNING OF ECONOMIC ENVIRONMENT

The macro economic environment has to be analyzed in order to estimate stock price fluctuations. Any fall in GDP will lead to fall in corporate profits and the security prices also tend to fall. In order to make a proper analysis of economy, one has to be familiar with economic indicators, diffusion index and econometric model building, the techniques which are used in economic forecasting.

Economic indicators include Capital investment, corporate profits, money supply, interest rates, fiscal policy, productivity etc. There are leading indicators which help the investor to estimate the path of economy. For instance, a deficit budget may lead to high rate of inflation, affecting the cost of production adversely. The incentives offered to export oriented units may improve exports of the nation. The monetary policy followed by the government also has its effect on the industry. Stock market indices reflect the economic growth. In the May 2004 elections, the stock indices have been pushed down by 1000 plus points since the day election results were announced. The sensex had pitched at 5000 mark, with little sign of recovery. But later on, the sensex scaled new high in the following months due to favourable economic reform policies followed by the government. In 2008, the stock market crashed from 21000 points to 8500 points due to global economic crisis. From February 2009 onwards the stock market is going up slowly because of the strength of the Indian economy.

There are coincidental indicators which indicate the state of the economy. These include GNP, interest rates, industrial production and reserve funds. Recessionary trends will affect corporate profits and industrial production. Lagging indicators include unemployment rate, consumer price index and flow of foreign funds. The lagging indicators reflect the changes occur in leading and coincidental indicators.

Diffusion index is a consensus index consisting of leading, coincidental and lagging indicators. This type of index has been constructed by National Bureau of Economic Research in U.S.A. The drawback of diffusion index is that it is difficult to calculate and the irregular movements in individual indicators cannot be fully eliminated.

Econometric model building requires construction of mathematical model showing relationship between the independent and the dependent variables. Simultaneous equations are used in these models to make a forecast.

2.5. INDUSTRY ANALYSIS

A group of companies manufacturing same products belong to a single industry. They use more or less same technology for the production. Industries may be classified as, Food and beverages, Textiles, Leather and leather products, Chemicals, Wood and wood products, Basic metals, alloys and metal products, Non-metallic mineral products, Rubber and plastics, Machinery and machine tools, Transport equipment and parts, (automobile industry) Power, tobacco products, and Other manufacturing industries.

2.5.1. Industry Life cycle

The industries can be classified on the basis of business cycle phases viz., growth, cyclical, defensive and cyclical growth.

Growth industries have high rate of earnings and expansion. Industries like IT, pharmaceutical and telecommunications have shown remarkable growth. Cyclical industries experience prospects and downfalls along with the business cycle. For instance, consumer durables have good market during the boom phase and slack season during recession.

Defensive industries with stand even bad phases of cycle namely recession and depression e.g. Food Industry.

Cyclical growth industries have the nature of cyclical and growth as well. The automobile industry has both experienced slackness and growth. Introduction of large number of consumer friendly models with improved technology proves the point.

Industry analysis also involves industry life cycle analysis which involves four stage, viz., introduction stage, growth stage, maturity stage and finally decline stage. This is similar to product life cycle (PLC). The firm which has introduced a new product has distinct advantages over others. It can establish its brand name widely and create a good product image. It can adopt `skimming the cream' pricing policy to make huge profits by fixing prices at a high level.

In the growth stage, many firms enter the market with their products, posing severe competition to the pioneering firm. The cost of production is kept low thanks

to the improvements in technology. All companies have more or less stable growth rate and declare dividends to their shareholders. Firms in information technology have achieved a higher growth rate than the industry's average.

In the maturity stage, growth rate tends to be moderate with technology becoming obsolete. The firms in order to survive have to bring innovation in technology.

The last stage is decline stage in which the product becomes liability to a firm, as the earnings of the companies tend to fail rapidly. The investors have to avoid investing in such firms even in the boom condition.

2.6. FACTORS TO BE CONSIDERED FOR ANALYZING THE INDUSTRY

In addition to the analysis of the industry life cycle, an investor has to take into consideration certain other factors which are discussed as follows:

2.6.1. Industrial Growth

The performance of industries over the past few years has to be analyzed to drive home the point. For instance, Indian industry has achieved an impressive growth of 9.4 per cent in April 2004, with mining sector achieving a 9.5 per cent increase up from 6.3 per cent in the same month last year. Electricity generation was at a record high of 10.7 per cent. Goods consumed data released by the CSO show that basic goods production was higher by 8.2 per cent, capital goods by 23.2 per cent and intermediate goods by 9.4 per cent. Consumer durables achieved a growth rate of 17.7 per cent. The highest growth of 88 per cent was achieved in the case of wool, silk and man made fibre textile, followed by 24.9 per cent in the case of chemicals and chemical products. Food products showed a decline of 21.9 per cent and wood products had a decline of 9.7 per cent during April 2004.

2.6.2. Nature of the Product

The products may be classified into industrial goods and consumer goods. The consumer goods can further be classified into durables ad non-durables. Industrial goods like iron sheet, cranes, trucks, steel wires and coils are demanded by engineering industry. The investor has to determine the condition of related goods manufacturing units to ascertain the demand for industrial goods.

2.6.3. Cast Structure and Profitability

The investor has to analyse the cost structure of the product manufactured by the industry in which he is desirous of investing. The cost is divided into fixed cost which has to be incurred in the form of plant and equipment required for the manufacture of products and variable cost which varies depending on the level of output. The cost sheet of a product helps to find out the cost of production and ultimately cost of sales. It is essential for a firm to maximize the output to keep the fixed cost per unit minimum. The firm has to first achieve break even sales to avoid losses. When the firm desires to increase its output beyond the maximum, it has to

bring in additional capital to get it invested in machinery and equipments. A firm can resort to this only when it expects increased demand for its products.

2.6.4. Level of Competition

Market share of a firm indicates the market standing of the firm in the industry. All firms in an industry design appropriate strategies to withstand onslaught of competition and get their positions secured. Thanks to the policy of LPG (Liberalisation, Privatisation and Globalisation) by the government, MRTP companies are allowed to augment their capacities and multinationals have entered the fray with high stakes in the economy. This situation has posed a great threat to the survival of many Indian companies and led the prices decline.

The investor has to study the level of competition, demand for the product concerned, profitability and price of scrips of the company, before making investment.

2.6.5. SWOT Analysis

The investor has to make SWOT analysis of the industry. It means strengths, weaknesses, opportunities and threats analysis. In order to make such an analysis, the investor has to possess adequate knowledge of the industry. For example, brand equity is the strength of Coca-cola, whereas low price is the strength of Nirma detergent powder in the lower middle class market segment. Weaknesses may include poor financial strength, inadequate promotional measures, irregular supply of products to the markets etc. The investor has to see that how far an industry makes uses of opportunities available. For instance, globalization has brought many opportunities to the Indian industries which can venture out into foreign markets. Threats may come in the form of competition, import restrictions followed by importing countries, (offering subsidies to the domestic firms to make imports costlier), changes in cusiomer tastes and preferences etc. The industry has to survive all these to emerge successful and boost the confidence of investors.

2.6.6. Government Policy

!n order to augment exports, tax holidays and tax concessions are provided to export oriented products. Government regulates size of production and pricing of certain products. For instance, the pricing of all petroleum products other than cooking gas and kerosene was freed from government control in 2002. The subsidies on these two products under price control are scheduled to be removed by 2005. The sugar, fertilizer and pharmaceutical industries are very often affected by the inconsistent government policies. Hence, it becomes essential to make careful evaluation of government policies regarding a particular industry.

2.6.7. Research and Development

Innovations in products and processes are needed to make them technically competitive. Constant endeavour has to be made to update technology. Economies of scale have to be achieved to cut down the cost of production. Technological supremacy gives great hopes both in domestic markets and abroad.

2.6.8. Supply of Labour

The investor has to ensure that abundant supply of labour is available for the industry concerned. The firms have to establish cordial relationship with the trade unions to bring in new measures. Industrial disputes lead to loss of mandays and there would be a fall in industrial production. This situation has to be avoided to achieve labour productivity. Availability of required type of labour in adequate size at cheaper rates is a welcome measure and this is the reason as to why many MNCs prefer to make investments in India.

2.7. COMPANY ANALYSIS

All information pertaining to the company must be collected by the investor in order to evaluate present and future stock values. The risk and returns associated with the purchase of stock have to be analysed to take sound investment decisions. A company's performance depends on many factors which include competitive edge, earnings, capital structure, operating efficiency, financial performance apart from the style of management. These factors have strong effect an Price-Earning ratio of the firm along with external factors viz., economic and stock market conditions.

2.7.1. Competitive Edge of a Company

Every industry consists of many individual companies in which depending on the performance the compnies acquire different market shares. In the toothpaste market, Colgate and Hindustan Lever have gone into prominence and in the automobile industry, Maruti leads in front IT industry is dominated by TCS, Infosys, HCL Tech etc., The competitiveness of a firm can be studied through its market share, annual sales, growth achieved over the years etc. In soft drinks market, Coca-cola and Pepsi have dominated the market pushing local firms way behind. Technical supremacy, wide distribution network, economies of scale, brand equity, heavy promotional expenditure etc. give dominant positions to such business undertakings and offer sizable market shares.

The sales of a company should constantly grow at a steady rate if not rapidly. The shareholders would be happier if they bought the shares of a firm which leads others. Stagnant growth rate demoralizes the investors. The growth should both be in rupee terms and physical units. When a firm grows in size that will delight the investors as the firm will gain strength to withstand changes in the business cycle.

The investors are very much concerned with the present sales and as also the future one. This requires an investor to make a rather accurate sales forecast by adopting mathematical techniques like the method of least squares. The different components of demand for the company's product, competitors' products and demand for the substitutes have to be analysed.

2.7.2. Earnings of the Company

The earnings of a company have to increase in the same proportion as that of sales. When sales alone shows increasing trend, with earnings not matching the increase, it is a cause for worry as the expenses start increasing in the concern. Analysis of both sales and earnings by an investor helps him to get a real picture of the concern. It is the precaution to be taken by the investor to see whether the income generated is out of sale of assets or from investments.

Income of the company is affected due to the following reasons viz., changes in costs and sales, depreciation method adopted, stock valuation, depletion of resources, income taxes, wages, salaries and fringe benefits and other tax measures etc. For instance, if a company adopts first in first out method (FIFO) in the costing of issue of materials, the closing stock will reflect the latest prices, resulting in increased closing stock value. If it follows LIFO (Last In First Out) the closing stock shows a lesser value, thus indicating lesser gross profit for the same number of units.

2.7.3. Capital Structure

A company may increase return on equity share captial by financial leverage (using both debt financing and equity financing). The debt ratio indicates the status of short term and long term debts in the company's capital structure.

The proportion of preference shares in the capital structure has to be assessed by the investors. The preference shares have lesser leverage effects than the debts, since the dividend to preference shares are not tax deductible. The instability in the earnings of equity shares may be caused by fluctuations in the earnings of the company, particularly when the preference share occupies larger portion in the capital structure.

The debt element in the capital structure needs scrutiny. During boom period, the positive side of the leverage effect increases earnings of the shareholders and there is instability in earnings per share during recession due to the leverage effect. The interest coverage ratio (ratio of net income after taxes to interest paid on debt) shows the ability of the firm to pay the interest charges. Fixed assets to debt ratio have to be worked out to check whether financing of fixed assets by the debt is within a reasonable limit. (The ratio should be below 0.5 for industrial units).

2.7.4. Style of Management

The performance of any firm depends on the way it is managed. The manager's abilities to plan, organize, direct and control have great impact in the functioning of an enterprise. The symptoms of well managed concern can be summarized as follows:

1. There is a steady growth in sales and earnings of the firm. Market share tends to increase steadily.
2. Customers are well satisfied with the products offered by the firms. The products with proven quality are offered at the right prices at the right time to the consumers to force them to make repeat purchases.

3. There is Optimum utilization of plant and equipment. When the percentage utilization of capacity increases, the cost gets decreased leading to increased profitability.

4. Constant endeavor is made to make innovations in product design and performance. and processes to achieve technical supremacy over the competitors.

5. Production planning and control is made effective, leading to timely completion of production activities, thus ensuring strict adherence to production schedules.

6. Wastage due to quality variations gets minimized by fixing appropriate quality standards.

7. Cordial industrial relations are maintained, paving the way for the management to introduce their schemes with little objections from the labour. Mandays lost due to strikes and lockouts get reduced and productivity tends to increase.

8. SWOT analysis of the firm and competing firms is made, which will enable the former to convert the weaknesses of the latter into opportunities.

9. The firm discharges its functions effectively for the cause of the society consisting of shareholders, customers, employees, community and the government. It cannot shirk social responsibility.

10. The inventories of the firm are kept at optimum level to avoid the capital getting locked up. At the same time, out of stock situations most be avoided by timely placement of purchase orders.

11. All factors that lead to increase in cost have to be taken into account. Cost reduction techniques like value analysis, work study, preventive plant maintenance, ABC analysis of inventory control etc. have to be followed to effect cost control.

All the above depend on the educational background, skills and experience of managerial personnel apart from their abilities to keep the firm flexible enough to accommodate changes in the environment. The confidence reposed in the management of a company by the investors will increase when the company is taken along the growth path.

2.7.5. Operating Efficiency

High operating efficiency is the need of the hour for a company aiming at expansion. The production resources like machinery and equipments, materials, and labour have to be effectively utilized to derive more income from sales.

2.7.6. Operating Leverage

A firm is said to have high degree of operating leverage when a small change in sales leads to a big change in return on equity (other factors remaining constant). This can be explained with an example. Two firms namely A and B have different fixed costs. Firm A does not have automated equipment with only Rs.60,000 invested on fixed assets. It has variable cost Rs.3 per unit. Firm B employs automation, resulting in Rs.1.00,000 invested on machinery. It has lower variable cost of Rs.2.50 per unit. Both firms have the same selling price of Rs.5 per unit. Breakeven point has to be determined for both the firms.

Breakeven point occurs when there is no profit or no loss. That is, return on equity is zero and thereby earnings before interest and taxes (EBIT) also become zero.

$$\text{Break Even Point (BEP)} = \frac{\text{Fixed Cost}}{\text{Contribution per unit}}$$

$$\text{Contribution} = \text{Selling price} - \text{Variable cost}$$

$$\text{BEP for firm A} = \frac{60{,}000}{5-3} = 30{,}000 \text{ units}$$

$$\text{BEP for firm B} = \frac{1{,}00{,}000}{5-2.50} = 40{,}000 \text{ units}$$

Companies which invest heavily on fixed assets viz., iron and steel, engineering, chemicals experience high operating leverage. On the other hand production of consumer non-durables especially cosmetics does not have huge fixed costs, thus experiencing lower operating leverage.

2.7.7. Financial Analysis

Financial statements of company provide the historical and current information about the company's operations. The statements include Balance Sheet and profit and loss account.

The balance sheet shows sources and uses of funds of a company at a given point of time. It can be represented in the horizontal or vertical form.

Balance Sheet of M/s. Hope Ltd., as on 31st March 2001 (R. in Lakhs)

Liabilities	2001	2000	Assets	2001	2000
Share capital:					
Equity	40,000	40,000	Fixed assets Less Depreciation	1,40,000	1,20,000
			Current Assets		
Preference	50,000	50,000	Inventories	48,000	44,000
Reserves and Surplus	60,000	60,000	Sundry debtors	35,000	32,000
Profit and Loss a/c	52,000	45,000	Marketable Securities	40,000	45,000
Loan Funds					
12% Debentures	43,000	43,500	Cash	60,000	67,000
Term Loans	20,000	20,500			
Current Liabilities					
Bills payable	10,000	9,000			
Sundry Creditors	18,000	15,000			
Other Current Liabilities	30,000	25,000			
	3,23,000	**3,08,000**		**3,23,000**	**3,08,000**

The above balance sheet shows the net worth and long term debt of the company. The use of debt creates financial leverage. When revenues are stable, shareholder derives benefits even a large amount of debt burden is carried. However, it is in the interest of an investor, that a company with excessive debt component in the capital structure is not preferred.

The profit and loss account shows the items of income and expenditure. The excess of income over expenditure is shown as profit and vice versa. The investor is able to determine financial position of a company and its progress through careful analysis. This is facilitated by comparative financial statements, trend analysis, common size statements, fund flow analysis, cash flow analysis and ratio analysis. Comparative financial statement facilitates comparison of balance sheet figures for more than one year either in absolute terms or in percentages.

Under trend analysis, percentages are calculated with a base year. It helps in determining growth or decline of sales and profits over the years. The company's efficiency in controlling the cost is reflected by trend analysis.

Common size statement facilitates comparison between two different sizes of firms belonging to the same industry. Here, the percentage each liability item to the total liabilities and the percentage to each asset to the total assets are calculated. It also depicts each item of expense as a percentage of net sales.

Funds flow statement is a statement of sources and the applications of funds. It provides information relating to the extent of utilization of profits, sources of finance for dividends, capital expenditure and repayment of debt, uses of sale proceeds of fixed assets, and uses of share issue, debenture issue or fixed deposits received from the public. The investor is able to find out application of long term funds towards acquisition of current assets, thus giving real picture of financial position of the company.

Cash flow statement shows both the cash inflow and outflow of a concern. It indicates the causes of changes in cash balance between two balance sheets. The investor can review movements of cash over an operating cycle through this statement. It is prepared with the help of balance sheet and income statement.
With the balance sheet of M/s Hope Ltd and the profit and loss account of the same company (given below), we shall prepare common size balance sheet, fund flow statement and cash flow statement.

Profit and Loss Account of Hope Ltd., as on 31st March 2001 (Rs. in lakhs)

	Net Sales		3,20,000
Less	Cost of Goods Sold	2,20,000	
	Selling Expenses	30,000	
	Administrative Expenses	25,000	
	Interest	10,000	2,85,000
	Profit before Tax		35,000
Less	Income Tax at 50%		17,500
	Profit after Tax		17,500
	Preference Dividend		2,500
	Net Profit available to equity shareholders		15,000
Less	Dividend to equity shareholders		8,000
	Retained earnings		7,000
	Cost of goods sold includes depreciation amount Rs. 20 000		

Common size Balance sheet of M/s Hope Ltd. As on 31st March 2001 (Rs. In lakhs)

	As on 31.03.2001		As on 31.03.2001	
Assets	**Amount**	**% of Total**	**Amount**	**% of Total**
Capital and Reserves				
Equity Share Capital	40000	12.4	40000	13
Preference Capital	50000	15.5	50000	16.2
Reserves and Surplus	60000	18.6	60000	19.5
P x L a/c	52000	16.1	45000	14.6
	202000	62.6	195000	63.3
Long Term debt				
12% Debentures	43000	13.3	43500	14.1
Term Loans	20000	6.2	20500	6.7
	63000	19.5	640000	20.8
Current Liabilities				
Bills Payable	10000	3.1	9000	2.9
Sundry Creditors	18000	5.6	15000	4.9
Other Current Liabilities	30000	9.2	25000	8.1
	58000	17.9	49000	15.9
Total	**323000**	**100%**	**308000**	**100%**

Assets	Amount	% of Total	Amount	% of Total
Current Assets				
Cash	60,000	18.6	67,000	21.8
Investment	40,000	12.4	45,000	14.6
Inventory	48,000	14.9	44,000	14.3
Debtors	35,000	10.8	32,000	10.4
Total Current Assets	1,83,000	56.7	1,88,000	61.1
Fixed Assets				
Gross Fixed Assets	2,80,000		2,40,000	
Less: Accumulated Depreciation	1,40,000		1,20,000	
	1,40,000	43.3	1,20,000	38.9
Total	**3,23,000**	**100%**	**3,08,000**	**100%**

Statement showing Changes in Working Capital (Rs. in Lakhs)

Particulars	2000	2001	Changes in Working Capital	
			Increase	Decrease
Current Assets				
Cash	67,000	60,000		7,000
Short Term Investment	45,000	40,000		5,000
Sundry Debtors	32,000	35,000	3,000	
Investment	44,000	48,000	4,000	
Total Current Assets	1,88,000	1,83,000		
Current Liabilities				
Bills Payable	9,000	10,000		1,000
Sundry Creditors	15,000	18,000		3,000
Other Current Liabilities	25,000	30,000		5,000
Total Current Liabilities	49,000	58,000		
Current Assets – Current Liabilities	1,39,000	1,25,000	14,000	
			21,000	21,000

Fund Flow Statement (Rs.in Lakhs)

Sources		Uses	
Funds from Operation	55,000	Purchases of Fixed Assets	40,000
Decrease in Working Capital	14,000	Redemption of 12% Debentures	500
		Repayment of Term Loans	500
		Payment of Tax	17,500
		Payment of Preference Dividend	2,500
		Payment of Equity Dividend	8,000
	69,000		69,000

Funds from Operations (P&L Appropriation A/C (Rs. In Lakhs)

To Depreciation	20,000	By Bal b/d (Opening Balance)	45,000
To Income Tax	17,500	By Funds from Operations (Balancing Figure)	55,000
To Preference Dividend	2,500		
To Equity Dividend	8,000		
To Balance c/d (Closing Balance)	52,000		
	1,00,000		1,00,000

Cash Flow Statement (Rs. in Lakhs)

Sources		Uses	
Opening Balance of Cash	67,000	Increase in S. Debtors	3,000
Add			
Cash from Operation	55,000	Increase in inventories	4,000
Decrease in Investments	5,000	Purchase of Fixed Assets	40,000
Increase in B/P	1,000	Redemption of 12% Debentures	500
Increase in Sundry Creditors	3,000	Repayment of Term Loans	500
Increase in Other Current Liabilities	5,000	Payment of Income Tax	17,500
		Payment of Preference Dividend	2,500
		Payment of Equity Dividend	8,000
		Closing Balance of Cash	60,000
	1,36,000		1,36,000

Cash from Operations (Rs. In Lakhs)

	Retained Earnings		7,000
Add			
	Non-Cash / Non Operating Expenditure		
	Depreciation	20,000	
	Income Tax	17,500	
	Preference Dividend	2,500	
	Equity Dividend	8,000	48,000
			55,000
Less	Non Cash / Non Operating Incomes		Nil
		Cash from Profit	55,000

Fluctuations in the profit are due to the change in the capital components. The common size balance sheet shows that there is a reduction in long term loans, and there is an increase in current liabilities.

The fund flow statement reveals that the majority of the fund is obtained from business operations. The funds are used for the purchase of fixed assets and redemption of debentures. Cash flow statement shows that the company is following the policy of credit sales as there is an increase in both inventories and sundry debtors.

2.8. RATIO ANALYSIS

Financial ratios are calculated from the balance sheet and profit and loss account. Ratios help in easy understanding, comparison and interpretations of the financial data.

The ratios can be classified into liquidity ratios, turnover ratios, leverage ratios, return on investment ratios, valuation ratios, and profit margin ratios.

2.8.1. Liquidity Ratios

These ratios are calculated to determine the ability of a firm to meet its short term obligations. They include current ratio and acid test ratio.

$$\text{Current Ratio} = \frac{\text{Current Assets}}{\text{Current Liabilities}}$$

In the above example,

$$\text{Current Ratio} = \frac{1,83,000}{58,000} = 3.15:1$$

$$\text{Acid Test Ratio} = \frac{\text{Current Assets} - \text{Inventories}}{\text{Current Liabilities}}$$

$$= \frac{1,83,000 - 48,000}{58,000} = 2.33 : 1$$

The firm is in a healthy position as far as the liquidity is concerned. The firm can meet current liabilities effectively.

2.8.2. Turnover Ratios

These are also known as activity ratios or asset management ratios. Turnover ratios are of the following types:

$$\text{Inventory turnover ratio} = \frac{\text{Net Sales}}{\text{Inventories}} = \frac{3,20,000}{48,000} = 6.67 \text{ times}$$

$$\text{Receivables turnover ratio} = \frac{\text{Net Sales}}{\text{Receivables}} = \frac{3,20,000}{35,000} = 9.14 \text{ times}$$

$$\text{Fixed asset turnover ratio} = \frac{\text{Net Sales}}{\text{Fixed Assets}} = \frac{3,20,000}{1,40,000} = 2.3 \text{ times}$$

$$\text{Total assets turnover ratio} = \frac{\text{Net Sales}}{\text{Total Assets}} = \frac{3,20,000}{3,23,000} = 0.99 \text{ times}$$

2.8.3. Leverage Ratios

The financial leverage affects the risk and return of holding the shares. The investors are generally concerned with the debt portion in the capital structure of a company. It is because debt affects the payment of dividend due to outflow of interest from the profit.

Check your Progress

I Fill in the blanks:

1. . .....refers to analysis of the whole market of securities
2. The purpose of ..... analysis is to find out the true value of securities.
3. ..... approach attempts to study economic scenario industry position and the companies expectation.
4. ..... is arrived at by dividing profit after tax by the number of equity shares.

II. Choose the correct answer:

1. Which of the following is used in economic analysis?
(a) Gross domestic product (GDP)
(b) Stock market prices
(c) Labour cost
(d) Profitability of the company
2. The fall in the interest rate is conducive to the stock market because
(a) Money may flow from the bond market to stock market.
(b) Corporate can barrow on easy terms.
(c) Brokers can do business at borrowed funds.
(d) B and c.

$$\text{Debt to assets ratio} = \frac{\text{Total Debt}}{\text{Total Assets}} = \frac{1,21,000}{3,23,000} = 37.5\%$$

It implies that 37.5 per cent of assets are financed by the borrowed funds.

$$\text{Debt – Equity ratio} = \frac{\text{Total Debt}}{\text{Networth}} = \frac{1,21,000}{2,02,000} = 59.9\%$$

It shows that the creditors also have placed about 60 per cent of funds as that of equity shareholders.

$$\text{Long term debt to equity} = \frac{\text{Long Term Debt}}{\text{Networth}} = \frac{63,000}{2,02,000} = 31.2\%$$

The above ratio indicates the proportion of long term borrowings. The company depends more on owner's equity than on the borrowed funds.

2.8.4. Interest Coverage Ratio

$$\text{Interest Coverage Ratio} = \frac{\text{Earnings Before Interest and Taxes}}{\text{Interest}}$$

$$= \frac{45,000}{10,000} = 4.5 \text{ times.}$$

The ratio shows a healthy sign as the firm is able to serve the debt to the extent of 4.5 times.

2.8.5. Profitability Ratios

The investors are very particular in knowing net profit margin ratio, return on assets and return on equity as well to measure overall efficiency of the firm.

$$\text{Net profit margin ratio} = \frac{\text{Profit After Tax}}{\text{Sales}} = \frac{17,500}{3,20,000} = 5.5\%$$

$$\text{Return on Assets} = \frac{\text{Net Income}}{\text{Total Assets}} = \frac{17,500}{3,23,000} = 5.42\%$$

The ratio implies that for every rupee invested in assets, the yield is 5.42 per cent.

$$\text{Return on equity} = \frac{\text{Net Profit}}{\text{Networth}} = \frac{17,500}{2,02,000} = 8.7\%$$

The difference between the return of equity and the return on assets in caused by financial leverage. The difference in favour of return on equity shows that the

3. A growth industry is
(a) An industry with 10% growth per annum.
(b) An industry where demand for its product is exceeding supply.
(c) A capital intensive industry.
(d) An industry whose average growth is higher than the growth of economy.

III State whether the following statements are True or False:

1. With the "bottom up" approach, investors focus on a company's basics
2. A wise investor sells a security when its intrinsic value is less than the market price.
3. In the case of equity shares, yield refers to the rate of return on the market price of equity shares.
4. In fundamental analysis the basic source of information is the stock market quotations.
5. In EIC approach, E stands for Earnings of the company

company has employed borrowed funds efficiently to incease the rate of return to the advantage of shareholders.

2.8.6. Valuation Ratios

The value of a share depends on the performance of the firm and the market factors.

$$\text{Book value per share} = \frac{\text{Equity Share Capital} + \text{Reserve}}{\text{Total Number of Equity Shares Outstanding}}$$

or

$$= \frac{\text{Networth} - \text{Preference Share Capital}}{\text{Total Number of Equity Shares Outstanding}}$$

Suppose equity share capital and reserve amount to Rs.20,000 lakhs and the company has 1000 lakh shares outstanding, book value per share.

$$= \frac{20{,}000(\text{Rs.in lakhs})}{1{,}000(\text{Shares in lakhs})} = \text{Rs.}20$$

It implies that the book value of the share is 2 times more than the par value of Rs.10. The profits and accumulated reserves lead to high book value and it is a healthy sign. The firms may tend to issue bonus shares, from the reserves.

2.8.7. Dividend Yield

The ratio shows the relationship between the market price and dividend.

$$\text{Dividend Yield} = \frac{\text{Dividend per Share}}{\text{Market Price per Share}}$$

Suppose Company X pays a dividend of Rs.5 per share and the market value is Rs.60.

$$\text{The dividend yield} = \frac{5}{6} \text{x} 100 = 8.33\%$$

Though it appears that the company pays 50 per cent dividend (par value Rs.10) the dividend yield is low due to high market price. Whenever the companies go for expansion or ploughing back the profits for loan settlement, the yield will be low.

2.8.8. Earnings Per Share

$$\text{EPS} = \frac{\text{Earnings After Tax}}{\text{Number of Shares Outstanding}}$$

$$EPS = \frac{(1-T)[R+(R-1)L/E]E}{\text{Number of Common Shares Outstanding}}$$

Where,

EPS = Earnings per share

T = Effective tax rate (tax exposure / earnings before tax)

$$R = \text{before tax return on assets} \left(\frac{\text{Earnings Before Interest and Taxes}}{\text{Assets}}\right)$$

I = effective interest rate (interest expense / liabilities)

L = total liabilities

E = equity.

The earnings per share is good indicator in investment decisions. It is affected by the factors viz., equity base of the company, debt-equity ratio, utilization of assets by the company, effective cost of borrowed funds, effective tax rate paid by the company etc.

The value of stock is also influenced by growth in earnings. The growth depends on earnings retained and reinvested in the firm.

Growth Rate = Retention rate x Return on equity.

$$\text{Return on equity} = \frac{\text{Sales}}{\text{Total Assets}} x \frac{\text{Total Assets}}{\text{Equity}} x \frac{\text{Net Income}}{\text{Sales}}$$

The same is rearranged as

$$ROE = \frac{NI}{Sales} x \frac{Sales}{TA} x \frac{TA}{EQ}$$

Known as Dupont analysis, which is popularized by Dupont Company.

2.8.9. Price Earnings Ratio

Price earnings ratio relates the share price with earnings per share. It is the multiplying factor that the market is willing to offer to the future earnings of the company.

$$\text{Price Earnings Ratio} = \frac{\text{Market Price per Share}}{EPS}$$

Suppose, company A has earnings per share as Rs.5 and price Rs.50,

$$\text{Price earning ratio} = \frac{\text{Market Price per Share}}{EPS} = \frac{50}{5} = 10 \text{ times}$$

The price earnings of 10 times means that the market is prepared to pay Rs.10 for every rupee of future earnings. High P/E ratio signifies high expectation of

market. It has links with other financial parameters like dividend payout, dividend growth rate and the cost of funds employed by the company.

The investors have to compare P/E ratio of the company with that of the industry and the market. The stock is under priced when a P/E ratio is lower than the industry. Further, he has to compare the present P/E with the forecast future ratio. The comparison may lead to the following decisions.

1. Sale of shares before a fall in price when the current P/E ratio is larger than the expected one.
2. Purchase of shares before a rise in price when the current P/E ratio is smaller than the expected P/E.
3. No need to buy or sale if the current P/E is equal to expected P/E ratio. It implies that the stock is correctly priced.

The economic worth of a share is its intrinsic value. It is calculated as follows:

Intrinsic value of a share = Normalised EPS X Expected P/E ratio

Cash dividend / Expected EPS is known as payment ratio Intrinsic value is also calculated as

Intrinsic value = Average PIE ratio over the years X Present earnings per share

OR

= Average P/ Book value ratio over the years X Present book value per share.

OR

$$\text{Value of Equity Share} = \frac{\text{Cash Divided / Expected EPS}}{\text{Discount Rate} - \text{Growth Rate}}$$

Illustration:

The following particulars are related to year 2001 (Rs. In Lakhs)

Assets : 6,000 ; 8% Debentures ; Rs. 1,200 ; Short Term Liabilities: 500 ; 10% Bonds; 400 ; Common Stock (Rs.10 par) 3,500 ; Surplus : Rs.400. Sales: 6,500 ; Operating Expenses ; 5,800 ; EBIT : 700; Interest : 200; EBT : 500; Taxes : 200 Dividend : 50.

Determine the following ratios

1. Asset Turnover 2. Effective interest rate 3. Effective tax rate 4. Debt / Equity ratio 5. Dividend payout rate 6. Expected Growth Rate of EBIT.

Solution:

$$\text{Asset Turnover} = \frac{6,500}{6,000} = 1.08$$

$$\text{Effective interest rate} = \frac{\text{Interest}}{\text{Liabilities}} = \frac{200}{2,100} = 0.09$$

$$\text{Effective tax rate} = \frac{\text{TaxExposure}}{\text{EBT}} = \frac{200}{500} = 0.4$$

$$\text{Debt-Equity} = \frac{2,100}{3,500} = 0.6$$

$$\text{Dividend Payout} = \frac{\text{Dividend per Share}}{\text{EPS}}$$

$$\text{Earnings per share} = \frac{\text{EAT}}{\text{No. of Shares Outstanding}} = \frac{300}{350} = 0.86$$

$$\left[\text{No. of Shares Outstanding (in lakhs)} = \frac{3,500}{10} = 350\right]$$

$$\text{Dividend per share} = \frac{50}{350} = 0.14$$

$$\text{Dividend payout} = \frac{0.14}{0.86} = 16.28\% = 0.163(\text{app.})$$

$$\text{Return on Assets} = \frac{\text{EBIT}}{\text{Assets}} = \frac{700}{6,000} = 0.116$$

Retention rate = 1 - 0.163 = 0.84 (app.)

Growth in EBIT = [1 - 0.163] x 0.116

= 0.837 x 0.116

= 9.7%

2.9. TECHNICAL ANALYSIS

Technical analysis attempts to explain and estimate changes in prices of securities by studying only the market data rather than information about a company or its prospects. The technical analysis considers that the price of a stock depends on supply and demand in the market place, not on the value to a great extent.

Characteristics of Technical analysis

The characteristic features of technical analysis are as follows:

2.9.1. Technical analysis considers volume as the vital factor

When the number of shares traded is greater, volume is favourable and when it is lower the volume comes down. The decision points of investors can be spotted on charts.

2.9.2. Formations and patterns signify changes in real value

The changes in real value are caused by investor expectations, hopes, industry developments etc.

2.9.3. Technicians are not committed to a buy and hold policy

Technical analysts hold a stock as long as the trend is on the upper side. They will start selling it immediately on watching the reversal of trends.

2.9.4. Separation of income from capital gains is not undertaken

Technicians do not hold high dividend paying stock years together. Instead, they look for total returns that are the price realized minus price paid plus dividends received.

2.9.5. The activities of technicians are quick whether to make commitments or to make profit and losses

Technicians show willingness to assume smaller gains in the upmarket and accept quick losses when the market shows a declining trend.

2.9.6. Technical analysis calls for more experience

Technical analysis requires attention and discipline, keeping the quality stocks for long terms. They use technical indicators to gain experience in facing pitfalls.

2.9.7. Technical analysts believe in historic performance

Current movements in stock prices would repeat in the future, thus being used for future projections. The charts used in technical analysis. provide the most convenient method of comparison.

2.9.8. Technical analysis recognizes even small breakouts that would have important impact

Any shift in the supply and demand is considered as an important signal by the technicians.

2.9.9. Chart's are used to confirm fundamentals

When the trend of overall stock market is favourable, both fundamental and technical analysis agrees leading to favourable profitable movement.

2.9.10. Technical analysis recognizes that securities of strong companies are often weak and vice versa

Such instances, in the opinions of technical analysis, would occur very often.

Technical analysis Vs. Fundamental analysis.

Fundamentalists are generally conservatives who invest for the long term, whereas the technicians are traders who buy and sell for short term profits. Fundamentalists make their decisions based on quality, and value. They take the corporations' financial strength past growth in sales and earnings, profitability, investment acceptance etc. into account.

Fundamentalists select quality stocks when they are undervalued and sell them when they become fully priced, thus making huge profits. Technicians are in general interested in keeping their money working as profitably as possible at all times. They want to make profits quickly and if the market does not perform well

they are willing to take a small fast loss. Investors with technical orientation check the market action of the stock and when it is favourable, they examine the fundamentals to ensure the strength and profitability of the company.

Assumptions of Technical Analysis

Technical analysis is based on the following assumptions.

1. The market value of a scrips determined by the interaction of demand and supply.
2. The price of security quoted represents hopes and tears of players in the market. Any information regarding issue of bonus shares and right issues cause increase in prices whereas information on any strike in the near future may cause fall in price.
3. The market always exhibit trends. The trend may be either increasing trend or decreasing trend. It continues for sometime.

The technical analysts assume that past prices predict the future. For instance, the rising market leads to increased purchases and the downtrend causes large scale selling of shares

2.10. TOOLS OF TECHNICAL ANALYSIS

Technical analysis measure supply and demand of the stock and forecast prices of securities, using the following tools.

2.10.1. FIBONACCI Numbers

Fibonacci was a mathematician who discovered the series of numbers, while making the study on reproductive behaviour of rabbits.

The Fibonacci series is

1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144.....

The unique feature of the above series is that after the initial pair of ones (1,1), each succeeding number is simply the sum of previous two numbers. Technical analysis makes use of the number 1.618, which the analysis call it golden mean. It is obtained by

dividing each Fibonacci number by its immediate predecessor. $\left[\frac{55}{34}, \frac{89}{55}, \frac{144}{89}.....\right]$

Fibonacci Ratios

0.618	1	0.618	1.000	1.618	2.618
÷	÷	X	X	X	X
1.618	1.618	1.618	1.618	1.618	1.618
0382	0.618	1.000	1.618	2,618	4.236

Those who follow Fibonacci ratios for the investment purpose, use the first two ratios viz., 0.382 and 0.618 for completing retracement levels of a previous move. For instance, a stock falling from Rs.50 to Rs.35 (30 per cent drop) encounters resistance to further advances after it checks the loss to the extent of 38.2 per cent.

Some technicians keep close tabs on resistance and support levels as predicted by the Fibonacci ratios.

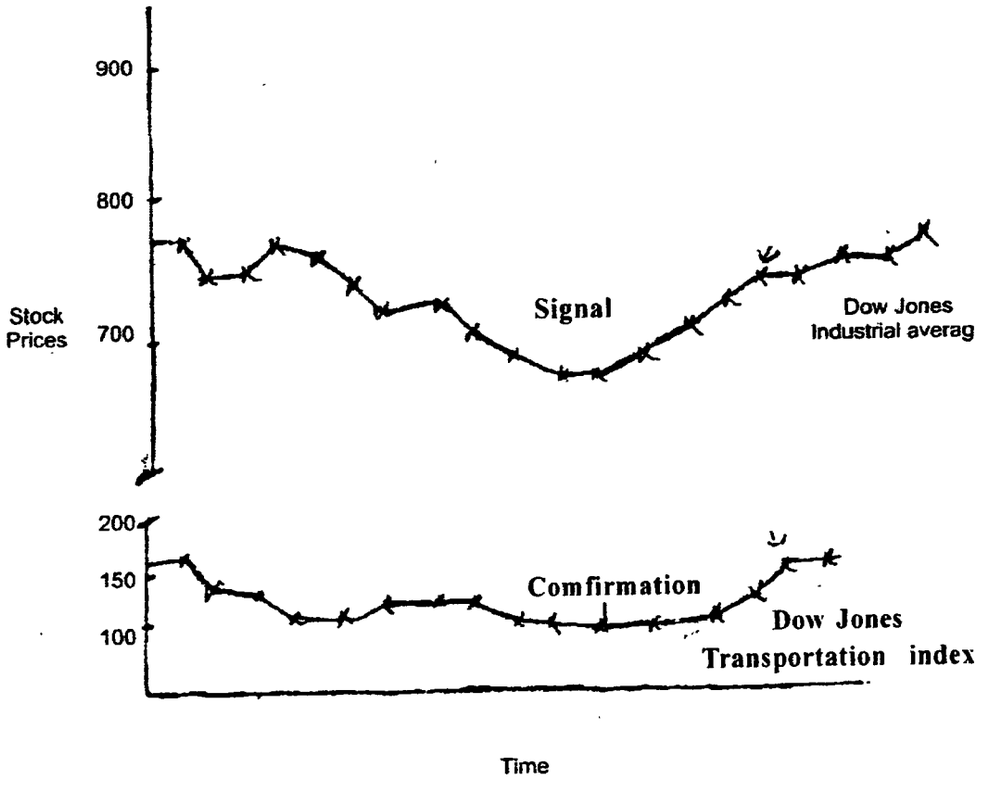
2.10.2. Dow Theory

The Dow theory advocated by Charles Dow is one of the oldest technical methods, being widely followed. The theory consists of three types of market movements, namely the major market trend lasting a year or more; a secondary intermediate trend, moving against the primary trend for one or several months; and minor movements lasting for hours to a few days.

Dow theory asserts that stock prices demonstrate patterns for over four to five years and these patterns are reflected by stock price indices. The Dow theory employs the industrial average and the transportation average, two of the Dow Jones averages. Dow theory believes that its measures of stock prices tend to move together. When the Dow Jones industrial average is on the rise, the transportation average will also tend to rise. Such simultaneous movements in prices signify a strong bull market. When the industrial average is rising and the transportation average is falling, the industrials may not continue to rise, with the result, that the investor starts selling the securities and converts them into cash. The reverse occurs when one of the averages starts to rise after a period of falling, while the other continue falling. The Dow theory suggests that this divergent phase is over and the security prices will soon start to rise in general. The shrewd investor will then start purchasing securities in anticipation of increase in prices.

The above signals are illustrated in the following figures.

(A) BUY SIGNAL



(B) SELL SIGNAL

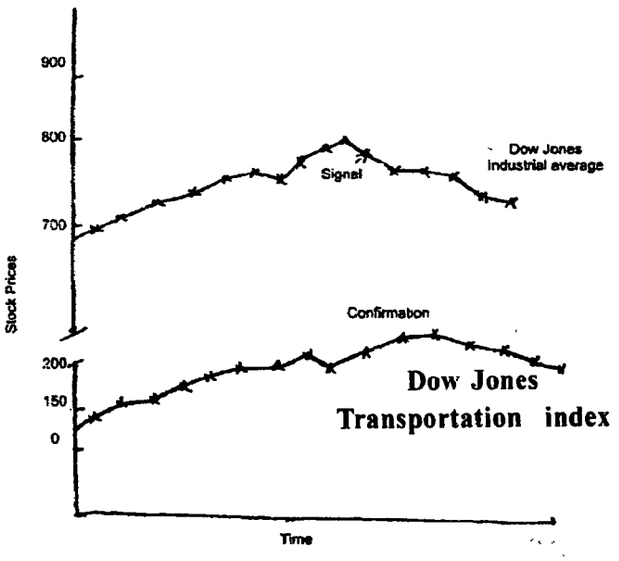


Figure A illustrates a buy signal. When the industrial starts to rise, both the industrial and transportation averages have been declining. The increased industrial average even there is a decline in the transportation index, suggests that the declining market is over. The above change is confirmed when the transportation average also starts to rise.

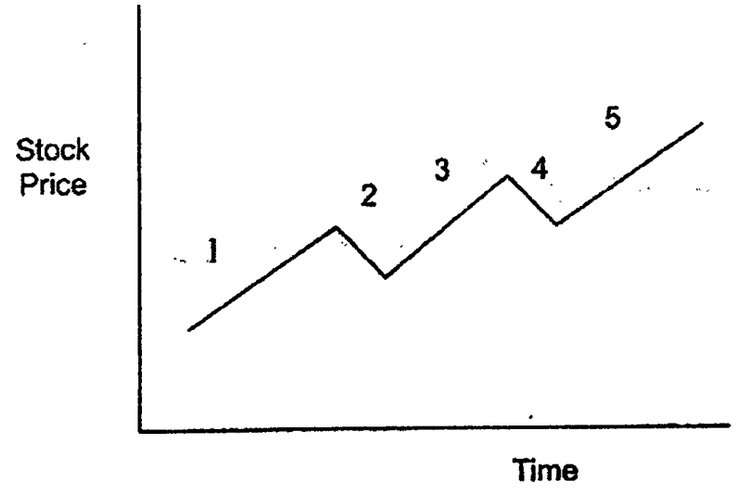
The sell signal is illustrated in figure (B). Here, both the industrial and transportation averages are on the rise. The industrial average continues rising. This implies that the market is witnessing an unsettled period, signifying uncertainty regarding the future direction of stock prices. The falling transportation average confirms the direction of industrial average, indicating the bear market underway.

When there is a sell signal, the believer - (investor) of this theory will try to liquidate, thus driving down prices. Buy signals force investors to purchase securities, which will ultimately drive up their prices.

There are certain criticisms of the Dow theory, The Dow theory does not explain why the two averages should be able to forecast future stock prices. Further, there may be a time lag between actual turning points and those determined by the forecast. The Dow theory was well only when a long, wide movement is found in the market. When the market trend frequently reverses itself in the short term, this theory is not found useful. Another drawback is that this theory does not make attempt to explain consistent pattern of stock price movements.

2.10.3. Elliott Wave Principle

Elliott Wave principle develops a rationale for a long term pattern in stock price movements by advocating five successive steps resembling tidal waves. In a bull market, the first move is upward, the next downward, the third are upward, the fourth downward and the last phase upward. The above steps show a reverse trend in a bear market.



The above figure is a simple demonstration of Elliott Wave Principle (EWP). The EWP can be applied to real situations by recording past movements in stock prices at different points of time. The EWP offers investors a basis for developing important market strategies. However, it is difficult to identify the turning point of each stage. Further, an investor cannot differentiate major movement from a minor movement.

2.10.4. Kondratev Wave Theory

Kondratev was a Russian economist who studied economics of western nations. He was known after the U.S. market crash in 1929, which he predicated that U.S. crash would follow of 1870. His hypothesis of a long term business cycle is known as the Kondratev Wave Theory.

The market crash in 1987 came after 55 years of previous crisis which was found consistent with Kondratev's theory. Though certain factors like exchange rates, elimination of gold standard, minimization of barriers to free trade etc, make the decision cycle less predictable, the market analysts consider the work of Kondratev commendable.

2.10.5. Neutral Networks

Neutral network is a trading system in which desired output from past trading data is obtained by trying a forecasting model. If the desired output is not found, more volume of data are included. It has feedback mechanism to gain experience from past errors. However, the stock market is not always deterministic. The changes in situations would affect the stock market, making neutral network vulnerable.

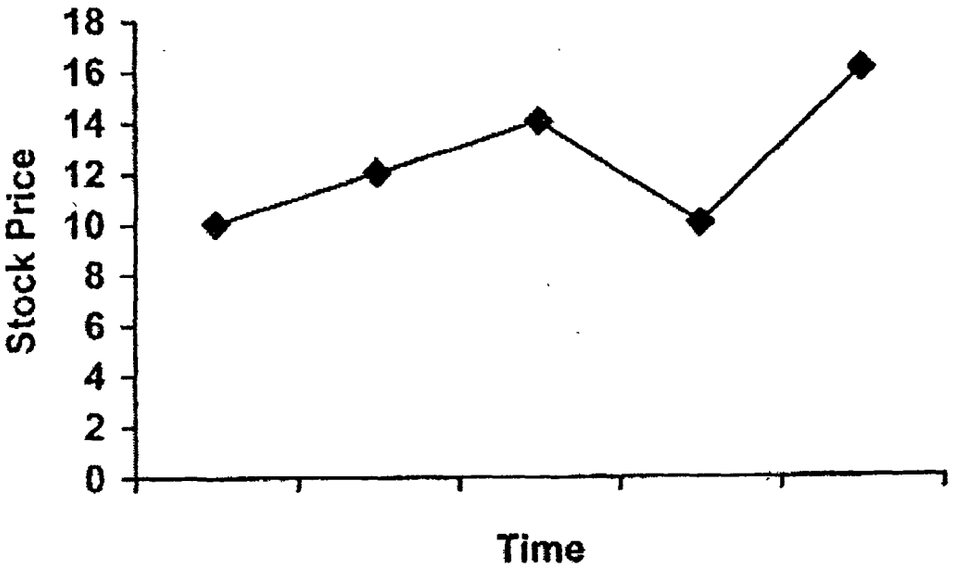
2.11. TECHNICAL CHARTS

Charts of prices and trading volume are used for analysis by the technicians. The chart analysis is used to determine the probable strength of demand in relation to supply at various price levels so that prediction of direction of stock movement is made possible. Technical analysts believe that stock price fluctuations generally form characteristic pattern, having important preductive value.

Types of charts

2.11.1. Line Chart

The closing prices of successive time periods are connected by means of straight lines, without taking note of high or low prices of stock for each period as shown below.



IV . Fill in the blanks:

1. ..... is the study of the market date in terms of factors which affect demand and supply forces.
2. ..... is the level in which advances are temporarily stopped and the sellers overcome the demand.
3. ..... is the net number of stocks advancing versus those declining in the market.
4. ..... show the market or scrip momentum to find out the overbought and oversold conditions of the market or scrip
5. ..... are the major analytical tools used in the technical analysis.

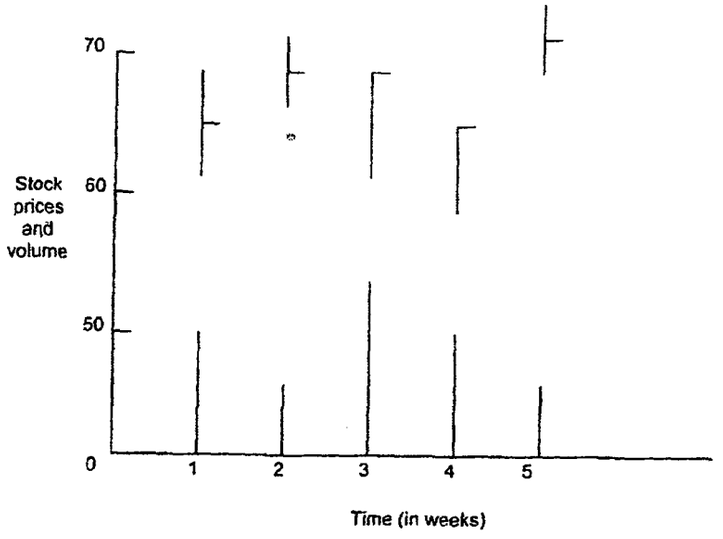
V Choose the correct answer:

1. The purpose of technical analysis is to
(a) Take "buy or hold or sell" decisions.
(b) Determine the intrinsic value of shares
(c) Estimate the performance of the company.
(d) to find out future profit of the company

2.11.2. Bar Chart

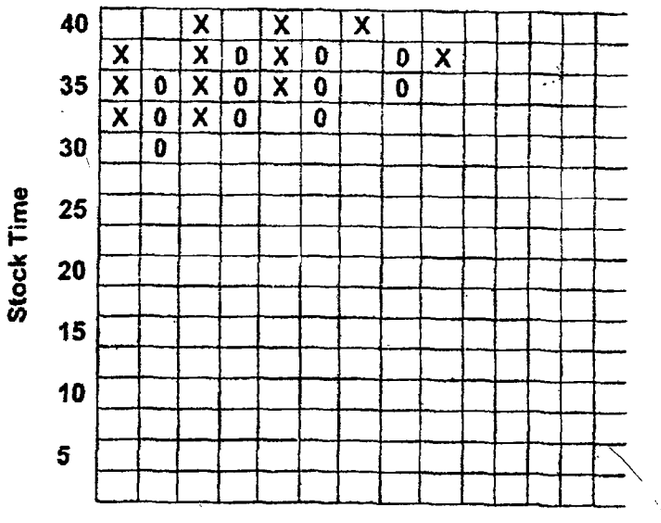
Bar Chart is drawn with time taken in the X .axis and stock prices in the Y axis. It can be drawn for different time periods, a day, a week, a month or even a year. The bar shart as shown below shows the high price, low price and the closing price-represented by a small horizontal line projected from the vertical line.

The below chart shows weekly stock price movements for a 5-week period. The trading volume can be placed at the bottom of the chart, thus giving move details about the stock.



2.11.3. Point and Figure Chart

The advocates of point and figure chart believe that the changes in prices need only be analysed to predict future price fluctuations. They ignore both volume action and time dimension. Point and figure chart stars with putting X in the appropriate price column of a graph. Successive price increases are entered in the upward column by putting X. If the price drops, the figures move to the next column and `O's are entered in a downward progression until the trend trend is revered. Covering a fairly long period gives definite shapes. The following figure is the simple point and figure chart.



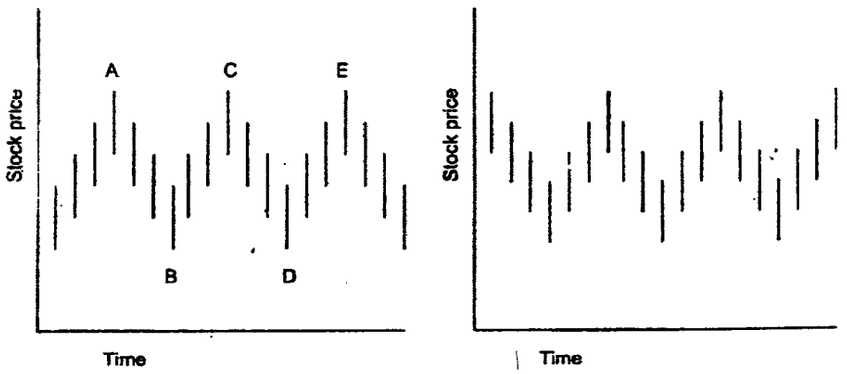
2. The first market index was introduced by charts in
(a) 1984
(b) 1985
(c) 1986
(d) 1987
3. Minor trends last for
(a) For weeks
(b) For months
(c) For quarters
(d) For years

VI State whether the following statements are True of False

1. Technical analysis helps to identify the trend and expected behaviour of security prices.
2. Elliot wave Theory holds that the wave represents a movements of the market price from once change to the next change in the small direction
3. Objectives of fundamental and technical analysis is same.
4. Resistance level is the minimum level below which the share prices are not expected to fall.
5. In candlestick chart, a shade at candle is use the denote decrease in price.

2.11.4. Bar Chart with "head and shoulders"

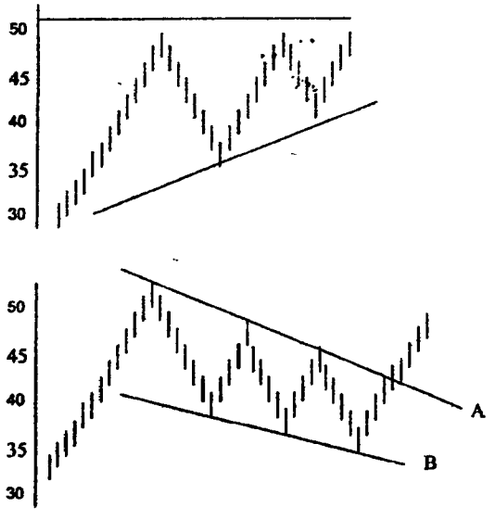
Technical analysis identifies the turning points through basic reversal patterns to decide when to buy or sell stock. Such a key reversal pattern is known as head and shoulders configuration.



The figure (a) is a bar chart that exhibit "head and shoulders" pattern. It can be inferred from the figure that when time passes, the price of stock rises to the point A only to fall down to B. It starts recovering by reaching the point C and falls again to the bottom (D). It once again rises to the peak of E and shows declining trend finally.

The figure (b) shows the inverted "head and shoulders" pattern which starts with falling trend and finally results in a forecast that its stock is about to rise to a great extent.

2.11.6. Ascending Triangle



The above figure shows a falling wedge, which usually occurs in a major uptrend pattern. Line A shows steep decline, since the sellers are found aggressive. The charts, though are found useful, have a few limitation. Charts need proper interpretation. Further, the chart patterns make the followers to change their opinions very frequently. Technical analysis give their options to buy stock at a time only to change their decisions in the immediate future. This makes the investors to be in and out of the market time and again. The buyers are totally relying on actions of the stock, assuming that investors, who are causing changes, have thorough knowledge of the company. They make decisions on the basis of chart patterns, instead of analyzing the real causes of stock price movements.

2.11.7. Technical Indicators

Technical indicators provide useful information when they are examined individually, but when many technical indicators are interpreted collectively, they provide confusing results.

I. Short Interest Ratio

The short interest ratio is derived by dividing the number of shares sold short by the average volume for about 30 days. The ratio has the logic that speculators and other investors sell stocks at high prices in anticipation of buying them back at lower prices.

II. Confidence Index

It is the ratio of a group of lower grade bonds to a group of higher grade bonds. When the ratio is high, investor's confidence is high, reflecting in the purchase of relatively more of lower grade securities.

III. Spreads

Large spreads between yields indicated low confidence among investors, leading to bearish market. Small spreads indicate high confidence and are bullish in nature.

IV. Advance - Decline Ratio

When advances are more than the decline, the ratio increases. Such a situation will lead to bullish condition.

V. Market Breadth Index

It is computed by taking the net difference between the number of stocks rising and number of stocks falling and adding it to (or subtracting from) the previous one. If both the stock index and the market breadth index increase, the market leads to bullish condition.

VI. Insider Transactions

Insiders (people who are connected with the company) have knowledge about performance of the company, future earnings, dividend and stock price performance. It is bearish indicator when insiders start selling heavily.

2.11.8. Moving Average

It is a statistical technique, making use of the historical data. For instance. a ten day moving average measures the average over the previous ten trading days. Under this method, the changes in the slope of the line are important.

There are certain witchcraft indicators like super bowl indicator, sunspots, and hemline indicator, attracting the attention of investment personnel. For instance, super bowl indicator states that stock market will register advances if the super bowl foot ball game is won by a team from the original national foot ball league in U.S. The sunspot theory is based on the principle that increased sunspots lead to more rains finally resulting in higher stock prices.

2.12. EVALUATION OF TECHNICAL ANALYSIS

Successful use of technical analysis requires talent, intuition and experience. It is a tool to be used along with fundamental analysis and commonsense. It is because the data used in technical analysis are past data. It may provide false signal to sell, forcing the believers of technical analysis to sell out the shares immediately without waiting for confirmation. This would lead to the payment of commissions for the sale and repurchase if the value bounces back.

2.13. KEY TERMS

- **Fundamental analysis**

The analysis of the determinants of the fair value of a security is called fundamental analysis.

- **Economic analysis**

A study of the economic factors which influence the future corporate earnings of the company is called economic analysis.

- **Industry analysis**

The analysis of fundamental factors which affect the growth prospects of the industry is called industry analysis

- **Company analysis**

Company analysis is the study of those variables which influence the future prospects of the company both qualitatively and quantitatively.

- **Technical analysis**

Technical analysis is a method of evaluating securities by analyzing information generated by stock market activities, past prices and volume. It uses charts for patterns and other indicators to forecast the future price behaviour.

2.14 SUMMARY

Securities analysis aims at finding the true economic value and the future prospects of specific securities. In the valuation process, an investor tries to find out the true intrinsic value. Approach to equity analysis may be active approach or passive approach. In active approach the investor attempts to make an in depth analysis of different facts and figures. In passive approach the investor relies on analysis made by others. Security analysis is broadly classified into Fundamental Analysis and Technical Analysis. Though these two differ in their approach and methodology, still both have their relevance in the investment decision. In fundamental analysis, the determinants of fair value of a security are investigated. This analysis is also called E-I-C because the fundamental analysis is consisting of the step-by-step analysis of economy, industry and the company. The earnings potential of a firm are related and depends on the prospects of the industry to which the firm belongs. In turn, the industry prospects are highly related to the macroeconomic prospects. In economic analysis, various macroeconomic variables such as GDP, Inflation, Interest Rates, etc., are studied to forecast the economic position in the country. Analysis of industry is also required as it provides the structure in which a particular firm operates. In the company analysis, the future earnings capacity is investigated through the use of accounting ratios and other related parameters.

Technical Analysis is the analysis of historical prices and volumes through use of charts and indicators. The objective of technical analysis is to forecast the future behavious of prices by identifying the trend and patterns in prices. Fundamental analysis and Technical analysis differ with respect to source of information, type of information, objectives, types of techniques used, emphasis and basic philosophy. Basic tool of technical analysis is chart. Dow Theory and Elliot Wave Theory attempt to identify major trends of prices. Different tools and techniques of technical analysis can be classified as price and volume charts, price patterns and tools and indicators. Price and volume charts can be classified as Bar Charts, Line Charts, Point and Figure Charts, Candlestick Charts. Price and Volume Charts can be used to identify various types of price patterns. Some of the commonly used price patterns are: Head and Shoulders, Inverted Head and Shoulders, Triangles, Flags, Support and Resistance Levels, etc.

2.15 ANSWERS TO CHECK YOUR PROGRESS

I.1. Macro analysis of the market 2. Fundamental analysis

3. Top down approach 4. Earning per share

II. 1.(a) 2.(d) 3.(d)

III. 1.True 2. True 3 True. 4. False 5. False

IV. 1. Technical analysis 2. Resistance Level 3. Breadth of the market 4. Oscillators 5. Charts.

V. 1.(a) 2.(a). 3.(a)

VI. 1. True 2.True 3. False 4. False 5. True

2.16 QUESTIONS / EXERCISES

Section - A

1. How is a fundamental analysis useful to a prospective investor?
2. What do you mean by industry analysis?
3. What factors would you look for in analyzing a particular industry?
4. What are the assumption of technical analysis?
5. Distinguish technical analysis from fundamental analysis.

Section - B

1. Explain the meaning rationale procedure and limitations of fundamental analysis.
2. Discuss the factors involved the company analysis.
3. Discuss the role of charts in technical analysis.
4. Explain the Dow Theory and Elliot Wave Theory with the help of diagrams. How the former can be used to determine the direction of stock market?

2.17 FURTHER READINGS:

1. Donald E.Fischer and Ronal J. Jordan "Security Analysis And Portfolio Management" - Prentice -Hall of India , New Delhi.
2. V.K. Bhalla "Investment Management" - S.Chand & Company Ltd., New Delhi.
3. R.P. Rustagi "Investment Analysis And Portfolio Management" - Sultan Chand & sons., New Delhi.
4. Preethi Singh, "Investment Management" - Himalays Publishing House, Mumbai.
5. Punithavathy Pandian - "Security Analysis And Portfolio Management" - Vikas Publishing House.

UNIT - III RISK AND RETURN

Structure

3.0 INTRODUCTION

Investment refers to commitment of resources in expectation of some benefits which may accrue in future. An investor invests the money by sacrificing his present consumption and expects a suitable return. The return may be in the form of regular return like interest/Dividend and capital appreciation. The return may vary with the risk associated with investment. . It is essential on the part of an investor to analyse the risks in order to plan his portfolio for minimizing the risks.

3.1 UNIT OBJECTIVES

- To understand the concept of return and risk
- To know the method of computation of risk and return
- To ascertain the various risk associated with investment
- To analyse the measures to be taken to minimize the risk

3.2 CONCEPT OF RETURN

The return is the basic motivating force and the principal reward in the investment process. The return may be defined in terms of (a). Realised return i.e., the return which has been earned and (b). Expected return i.e., the return which the investor anticipates to earn over some future investment period. The expected return is an estimated return based on realized return in the past which may or may not occur. For an investor, the return from an investment is the expected cash inflows in terms of dividends, interest, capital gain etc.,

3.2.1 Bond return

An investor can buy a bond, hold it for sometimes and sell it. The rate of interest in the holding period is as follows:

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

The holding period rate of return is also known one period rate of return

Example

An investor purchased a bond at a price of Rs.800 with Rs.100 as coupon payment and sold it at Rs.1000. Calculate holding period return of the bond

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

$$= \frac{(1000 - 800) + 100}{800}$$

$$= \frac{200 + 100}{800} = \frac{300}{800} = 37.5\%$$

Suppose the bond is sold for Rs.650 after getting Rs.100 as coupon payment, the holding period return would be.

$$\text{Holding period return} = \frac{\text{Price gain or loss} + \text{Coupon payment}}{\text{Purchase price}}$$

$$= \frac{(800 - 650) + 100}{800}$$

$$= \frac{(-150 + 100)}{800} = -6.25\%$$

3.2.2Current Yield

The current yield is the coupon payment as a percentage of current market price.

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

Current yield helps the investors to find out the rate of cash flow from their investments every year.

3.2.3 Stock Return

Stocks are selected on the basis of return expected to them and the risks associated with them. The stock return includes both current income and capital gain caused by the appreciation of the price. The income flow is the dividend, an investor receives during the holding period.

$$\text{Stock return (r)} = \frac{\text{Change in price} + \text{Cash dividend}}{\text{Purchase Price}}$$

Example

The share price of a company was Rs.250 on March 31, 2009 and the price on October 25, 2009 was Rs.320. Dividend received was Rs.25. What is the rate of return.

Solution:

$$R = \frac{[P_{t+1} - P_t] + D}{P_t}$$

Where,

P t+1 = the price of share during the current period.

P t = the price of share at the beginning.

D = dividend received.

$$r = \frac{(320 - 250) + 25}{250} \text{x} 100 = \frac{70 + 25}{250} + 100 = 38\%$$

To calculate average return for different periods of stock,

$$r = \frac{1}{n}[r_1 + r_2 + r_3 + ... + r_n]$$

Where r_0, r_2, r_3..... indicate returns of stock during different periods of time.

Calculation of Future Return

The calculation of future return uses the element of probability. Probability - describes the likelihood of getting a certain rate of return.

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

Example

The various returns and their possibilities are as follows:

Return (R_t) (in %)	Probability (P_t)	P_tR_t
8	0.1	0.8
10	0.2	2.0
12	0.4	4.8
14	0.2	2.8
16	0.1	1.6
$\sum P_iR_i$		12.0

3.2.4 Dividend Yield

$$\text{Dividend Yield} = \frac{\text{Dividend}}{\text{Price of share at the beginning}} = \frac{D}{P}$$

Example

An investor holds shares of one of the leading cement companies from 15.01.2001 to 24.01.2002. The prices at the beginning and he end period were Rs.285 and 361. The dividend paid was 35 per cent.

$$\text{Dividend Yield} = \frac{3.5}{285} x100 = 1.2\%$$

$$\text{Capital gains yield} = \frac{361-285}{285} x100 = 26.67\%$$

$$\text{Holding period return} = \frac{(361-285)+3.5}{285} x100 = 27.9\%$$

The return has to be expressed at the beginning of the holding period, to find out the present value of the return.

$$P_o = \frac{D_1}{1+r} + \frac{P_1}{1+r}$$

Where,

Po = Present Selling Price

P_1 = Selling price at the end of one year

D_1 = Dividend received during the one year holding period

r = Investor's required rate of return

The above formula helps an investor to determine whether the price he has to offer is suitable to his required rate of return.

Suppose, the investor wants to get 20 per cent return in the previous example.

$$P_o = \frac{3.5}{1+0.2} + \frac{361}{1+0.2}$$

$$= 2.92 + 300.83$$

$$= \text{Rs. } 303.75$$

The value of stock would have to be Rs.303.75. As the stock price Rs.285 is lower than Rs.303.75, the investor can buy it.

For a firm which is achieving growth rate in dividends, the required rate of return is calculated as follows:

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

where,

r	=	required rate of return
D_1	=	The next year dividend
P	=	Selling Price
g	=	Growth rate

Example

Mr. Vijay estimates that investment on stock X would give 15 percent dividend next year. It is expected to grow at 12 per cent for the rest of the period. The selling price is Rs.50. He wants a return of 20 per cent per year. Advise whether it is ideal to invest on stock X.

Solution

$$r = \frac{D_1}{P} + g = \frac{0.15}{50} + 0.12 = 12.3 \text{ Per cent}$$

As the rate of return from investment on stock X would be only 12.3 per cent it is not ideal to invest on stock X, as the expected return is 20 per cent.

Example

Mr. X has Rs.50,000, 40 per cent of which is invested in Company A, which has expected rate of return of 15 per cent and 60 per cent of which is invested in company B, with an expected return of 12 per cent. Determine the return of portfolio and expected percentage rate of return.

The rate of return is the percentage of the fund invested in a stock multiplied by its expected rate of return.

Company A

40 per cent of total with 15 per cent rate

0.40 x 50,000 x 0.15 = Rs.3,000

Company B

60 per cent with a 12 per cent rate of return

0.60 x 50.000 x 0.12 = Rs.3,600

The total return is Rs.6,600.

The expected percentage rate of return

$$R = \frac{\text{Total Re turn}}{\text{Total amount invested}} = \frac{6,600}{50,000} = 13.2\%$$

Check Your Progress

I Fill in the Blanks

1. ..... is arrived at by dividing the annual coupon return by purchase price.
2. ..... return consists of capital appreciation and dividend.
3. . ..... is arrived at by dividing the market price per share by earnings per share.
4. ..... risks are non-diversifiable and arise out of the market. nature of the industry. state of the economy, etc.
5. ..... Risk is that portion of total risks that is unique, or peculiar to firm or an industry.

II Choose the correct answer:

1. Which of the following risks emerges from the debt component of the capital structure? (a). Financial risk (b) Business risk (c) Purchasing power risk (d) Market risk.
2. Interest rate risks is a (a) Systematic risk (b) Unsystematic risk (c) Internal risk (d) un diversifiable risk

3.3 MEANING OF RISK

Risk in investment analysis means that the future returns from an investment are unpredictable. The concept of risk may be defined as the possibility that the actual return may not be same as expected. In other words risk refers to the chance that actual return from an investment will differ from the expected out come.

Investments having greater chances of variations are considered more risky than those with lesser chances of variations.

The probable outcomes of all possible events have to be listed and derived probabilities are to be assigned to such events. For instance, the investor can assign some subjective probabilities to his returns, such as 50 per cent of the time he is likely to get Rs.2 per share as dividend; 30 per cent of the time Rs.3 per share as dividend and 20 per cent of the time Rs.4 per share as dividend.

There are two components of risk viz., systematic risk and unsystematic risk. Systematic risk affects the market as a whole and is caused by the uncontrollable factor external to the company. Unsystematic risk, on the other hand is specific, unique and related to a particular industry or a company.

3.4 SYSTEMATIC RISK

Systematic risk affects the market as a whole and is caused by the uncontrollable factor external to the company. Systematic risk is uncontrollable and it indicates the direction of the movement of stock market. When the stock market is in the hands of bulls, it implies that there is an upward movement and vice versa. The movement of the market may be influenced by various factors like economic conditions, political situations and sociological changes etc., which are unpredictable and not under the control of investors. For example, the global financial crisis experienced by the world in 2008 affected the stock market all over the world. An individual investor could not have escaped from the loss which has arisen due to global melt down and he should have borne the systematic risk. The systematic risk can be classified into (a) market risk (b) interest rate risk and (c) purchasing power risk.

3.4.1 Market Risk

The market risk can be defined in the words of Francis as that portion of total variability of return caused by the alternative forces of bull and bear markets. The bull market is characterized by the moving of index from a low level to the peak. During the Bear market the index is declining from the peak to a low point (trough) for a considerable period of time. There are many events which cause buoyancy and debacles in stock market. These include war, earthquake, political uncertainty, depreciation in the value of currency, trade protectionism measures followed by importing countries etc. When political turmoil and recession cause havoc in the economy, there would be a rush to sell the share and the stocks which are floated in the primary market, do not get adequate market reception. Further when a leading financial institution starts disposing the stocks, the investors get panic and start selling the stocks. Such an over reaction of the-market is beyond the control of investors.

3.4.2. Interest Rate Risk

It is the variation in the rates of return in a particular period caused by the fluctuations in the market interest rate. The monetary policy of the government and changes in the interest rates of treasury bills and the government bonds affect the interest rates. The bonds issued by the government and quasi-government are considered risk free. When higher interest rate is offered by the government for a new bond or a loan, there would be a shift in the funds from low yielding bonds to high yielding bonds. Further, the investors would tend to shift their funds to the bond market during depression, to ensure assured rate of return. For instance, in 1996 IDBI and IFC bonds were oversubscribed, when public offerings of many companies went undersubscribed.

The cost of borrowing funds is affected by the rise or fall in the interest rate. Many stock traders use borrowed funds to trade in the stock market. Any increase in the interest rate affects the morale of speculative traders leading to a fall in the demand for securities.

Increases in Interest rate affects the corporate bodies too. When the cost of borrowing goes up, the companies would witness a heavy outflow of profit in the form of interest, leading to a reduction in EPS and fall in the price of the share.

3.4.3. Purchasing Power Risk

Purchasing power of a currency is another important factor that affects variations in returns. Inflation leads to loss of purchasing power of the returns. Any rise in price is not desirable to the investors as he receives lesser returns. Demand pull inflation leads to the supply not matching the demand which finally results in upward push in the price. Increase in cost of raw material, labour and equipment leads to increased cost of production ultimately resulting in higher price level. The consumer price index measures the changes in the price levels by taking into account the goods used by the consumers' viz., industrial workers in different parts of the country. Whole sale price index is also used to measure the rate of inflation.

Real return of any investment could be calculated by using the equation given below:

3. The statistical tool used to measure a company's risk is
(a) Mean (b) Mode (c) standard deviation (d) Covariance
4. Ex-dividend on shares refers to
(a) Purchase price that inciudes dividend (b) Purchase price does not include any dividend (c) Purchase price includes interest and dividend. (d) Purchase price includes transaction cost
5. Identify the uncontrollable risk of a company.
(a) Technological obsolescence. (b) Cut in subsidy (c) Labour problem
(d) Increase in loan service charges.

III. State whether the following statements are True or False:

1. Investor like return and dislike risk
2. The return from holding a stock consists of capital appreciation and dividend.
3. Beta Measures non-diversifiable risk.
4. Systematic risk remains constant irrespective of number of securities in portfolio
5. No investor is ready to take risk in whatsoever situation.

NOTES

$$\text{Real Future Value} = \frac{\text{Nominal Future Value}}{1.0 + \text{Inflation Rate}}$$

$$\text{Hence, Real Rate of Return} = \frac{1 + \text{Actual Rate of Return}}{1 + \text{Inflation Rate}} - 1$$

For instance, if an investor gets a return of 12% on his investment, with inflation rate at 5.7 per cent, the real rate of return

$$= \frac{1+r}{1+IR} - 1 \qquad = \frac{1+0.12}{1+0.057} - 1$$

$$= \frac{1.12}{1.057} - 1 \qquad = 1.05960 - 1 = 0.0596 = 5.96\%$$

The real rate of return is only 5.96 per cent not 12 per cent. If he wants to get protected from the inflation, his rate of return should be 18.38 per cent as determined below:

$$RR = \frac{1+r}{1+In} - 1$$

$$0.12 + 1 = \frac{1+r}{1+0.057}$$

$$R = (1.12)\,(1.057) - 1$$

$$= 1.1838\text{-}1 = 18.38\%$$

When an investor earns lower rate of return than the rate of inflation, his real rate of return would be negative. Thus, the changes in the purchasing power cause variations in the expected return and the actual return.

3.5 UNSYSTEMATIC RISK

Unsystematic risk is peculiar to a firm or an industry and it is caused by inefficiency of the management, changes in the technology relating to production processes, availability of raw materials, changes in consumer preference, industrial relations etc. Changes in technology are not uniform in all industries. Debt-equity ratio is not the same for all firms, Consumers of durables like washing machines, television sets and refrigerators do not have the same preference like the consumers of industrial products. All these lead to unsystematic risk, contributing a significant part in the total variability of the return.

Unsystematic risk may be classified into (i) business risk and (ii) financial risk.

3.5.1 Business Risk

Business risk arises from the inability of a firm to maintain its competitive edge over other firms and maintain the growth or the stability of the earnings. The variation in the expected operating income indicates the business risk. It is concerned with the difference between revenue and earnings before interest and tax. Business risk can be classified into internal business risk and external business risk.

Internal business risk is associated with the operational efficiency of a firm. The operational efficiency is affected by sales fluctuations, research and development measures of the firm, management of human resources, fixed cost, product diversification, industrial relations, credit policy etc. For instance, a firm should have a wide customer base to avoid loss of customers due to competition. Maruti udyog has introduced customer oriented technologies, which has led to oversubscription of Maruti shares by more than six times.

Firms having several product lines are facing lesser business risk than those which have single product line. It is because some products are more vulnerable to the business cycle while others withstand and start achieving growth against the tide. However, diversification must be limited to the known path of the company as unwieldy diversification would land the firm in deep trouble.

3.5.2 External Risk

The factors in the external environment of a firm have strong impact on its operations. These include monetary and fiscal policies of the government, various phases of business cycle, social and regulatory factors, general economic environment, political situations and others.

Regulatory measures followed by the government would affect business operations. For instance, the government may exercise price control, volume control, import and export control which may affect the profitability of a firm. The interest rates on bank deposits and on borrowings have declined very sharply in the past few years. The Pollution Control Board has brought out strict guidelines for safe guarding the natural environment, and asked many tanneries in Tamilnadu to close down the business for failing to setup effluent treatment plants.

Political stability has to be ensured as political uncertainties would lead to crash in stock prices. For instance, immediately on assuming power, the Congress government at the centre ruled out disinvestment of companies in oil sector. When there is a change in the ruling party, changes are expected in the economic policies which would affect share market operations. Business cycle fluctuations lead to fluctuations in the fortunes of a company. Almost all industries would suffer when the recession sets in. Many firms may be forced to close down and others witness fall in profits. During the boom period, the development of economy would be witnessed in the form of increased earnings and consumption.

3.5.3 Financial Risk

Financial risk is associated with the capital structure of a company. A company's capital consists of both equity funds and borrowed funds. The presence of debt and preference capital results in financial commitment of paying interest or predetermined rate of dividend. This affects the payments of dividend to the equity shareholders. Such a debt financing causes variability of returns to equity shareholders. Financial leverage uses the debt with the owned funds to increase the return to the shareholders.

The earnings of a company must be more than the cost of borrowed funds in order to achieve an increase in the earnings of shareholders. Debt financing enables the corporate to have funds at a low cost and ensures financial leverage to the shareholders. The following example illustrates the above point.

Company A	Year		
	2000	2001	2002
Equity Capital (Rs.10 per share)	10,00,000	10,00,000	10,00.000
Debt Fund (10% Interest)	5,00,000	5,00,000	5,00.000
Operating Income	1,50,000	2,00,000	1,00.000
Earnings per Share	1	1.5	0.5
Company B			
Equity Capital (Rs.10 per share)	5,00,000	5,00,000	5,00,000
Debt Fund (10% Interest)	10,00,000	10,00,000	10,00,000
Operating Income	1,50,000	2,00,000	1,00,000
Earnings per Share	1.0	2.0	Nil

In the above example, both the companies earned same amount of income and had same earnings per share for the year 2000. In the year 2001, there is 50 per cent increase in EPS for company A, whereas 100 per cent increase was recorded for company B.

The year 2002 recorded the downfall in operating income, resulting in reduction of EPS. There is dismal performance for company B, as EPS was zero in the year 2002.

The above results signify the fact that increase in debt fund has resulted in the reduction in EPS, if earnings fall. The payment of interest affects earnings of the company stock. The financial leverage or financial risk can be minimesed if the management decide the amount to be funded with equity capital and borrowed capital in the right proportion depending on the prospects of the company.

3.6 MEASURES TO MINIMIZE THE EFFECT OF RISK

The investor has to understand nature of risk and take suitable precautions to minimize the dangers caused by various risks.

3.6.1 Protection against Market Risk

1. The stocks which show steady growth may be preferred to the ones which are cyclical in nature.
2. The investor has to choose appropriate times for purchase and sale of stock. Holding the stock during rising trend in the market for a certain period only to dispose it later, would give the required benefits.
3. The information on the standard deviation and beta values of the stock provided by the National Stock Exchange bulletin is useful in gauging the risk factor to take correct decisions.

3.6.2 Warding off Interest Rate Risks

1. The investment in securities with predetermined maturity periods has to be preferred and it is essential to hold the investment till the date of maturity. This would protect against heavy loss of capital.
2. Bonds with different maturity dates may be preferred. This would provide sufficient funds for reinvestment/consumption.
3. The bonds of short maturity and treasury bills can be bought, to enable an investor to reinvest in the market at the appropriate time.

3.6.3 Facing Inflationary Trends

1. The yield from a bond should be around 15 per cent with low risk factor to prevent inflation causing panic among the investors.
2. Investment in short term securities would minimize the risk associated with the inflation. It is because rising consumer price index would eat away the real rate of interest in the long run.
3. Diversified investment would, to a great extent, provide a hedge against inflation. The effect of fall in purchasing power can be minimized.

3.6.4 Measures against Business and Financial Risks

1. It is essential that an investor has to make SWOT analysis of the firm in a particular industry. He should have the confidence in the ability of the company that it would create opportunities from the weaknesses of its competitors.
2. The consistency in the earnings of a firm has to be ensured. Standard deviation tells the variability of the return and facilitates comparison.

3. The debt - equity ratio of a company has to be kept at the manageable level as the interest payments on borrowings would affect the earnings of the investors. An investor can opt for a high levered company in a boom period.

3.7 MEASUREMENT OF RISK

Risks associated with a stock have to be expressed in quantitative terms to facilitate comparison. The standard deviation is used as a statistical tool used for measurement of risk. The variability of returns is illustrated with an example.

Check Your Progress

IV Fill in the blanks:

1. ..... risk affects the market as a whole.
2. ..... risk is the variation in return cause by the changes in the market interest rate.
3. ..... Risk is caused by inflation.
4. ..... Risk is unique to the particular industry or company.

V Choose the correct answer:

1. A stock is selling for Rs.40 and earns Rs.4 annually. What is its price earning ratio?
(a) 10:1 (b) 10% (c) 10 times (d) 1 time
2. Mr. X purchased a stock for Rs. 50 and sold it for Rs. 48. During the holding period. he received Rs.3 as dividend.
Then the holding period return is:
(a) 1% (b) 2% (c) 3% (d) 4%

3. Which of the following is a measures of the values of the variables around its mean.
(a) Standard deviation (b) Beta factor (c) Mean (d) Median.

Company – A

Return (r_i)	Probability (p_i)	(p_i) (r_i)
5	0.10	0.50
7	0.25	1.75
9	0.30	2.70
11	0.25	2.75
13	0.10	1.30
	$\sum E(r) =$	9.00

Company – B

Return (r_i)	Probability (p_i)	(p_i) (r_i)
6	0.2	1.2
8	0.4	3.2
10	0.2	2.0
12	0.1	1.2
14	0.1	1.4
	$\sum E(r) =$	9.00

The above table shows that the expected returns are same for both the companies. It ranges from 5% to 13% for company A and 6% to 14% in the case of company B. For determining the variation, the standard deviation technique is used.

$$\sigma = \sqrt{\sum_{i=1}^{N} P[r_i - E(r)]^2}$$

For,

Company – A

r_i	p_i	$r_i - E(r)$	$[r_i - E(r)]^2$	$p_i [r_i - E(r)]^2$
5	0.10	-4	16	1.6
7	0.25	-2	4	1.0
9	0.30	0	0	0
11	0.25	2	4	1.0
13	0.10	4	4	1.6
$\sigma = \sqrt{5.2} = 2.28$				5.2

Company - B

r_i	p_i	$r_i - E(r)$	$[r_i - E(r)]^2$	$p_i [r_i - E(r)]^2$
6	0.2	-3	9	1.8
8	0.4	-1	1	0.4
10	0.2	1	1	0.2
12	0.1	3	9	0.9
14	0.1	5	25	2.5
$\sigma = \sqrt{5.8} = 2.41$				5.8

The expected returns are same for both the companies but the variations in expected returns are different. The expected return of company A is more stable than the return of company B. The variability of return measured by standard deviation consists of systematic and unsystematic risks.

VI State whether the following statements are True or False:

1. Business risk is a function of operating conditions faced by a firm.
2. Risk arises when there are variations between expectation and realization
3. External factors that cannot be controlled cause unsystematic risks.
4. Financial risk of a firm depends upon composition of capital structure.
5. Degree of risk and risk premium are positively related.

Characteristic Regression Line (CRL)

CRL is a simple liner regression model estimated for a particular stock against the market index return to measure both its diversifiable and undiversifiable risks.

The model takes the form of

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

where

Ri = return of the ith stock

α_i = intercept

β_i = slope of the ith stock

R_m = return of the market index

e_i = error term.

Security return is calculated as follows:

$$\text{Today's security return} = \frac{\text{Today's price} - \text{Yesterday's price}}{\text{Yesterday's Price}} \times 100$$

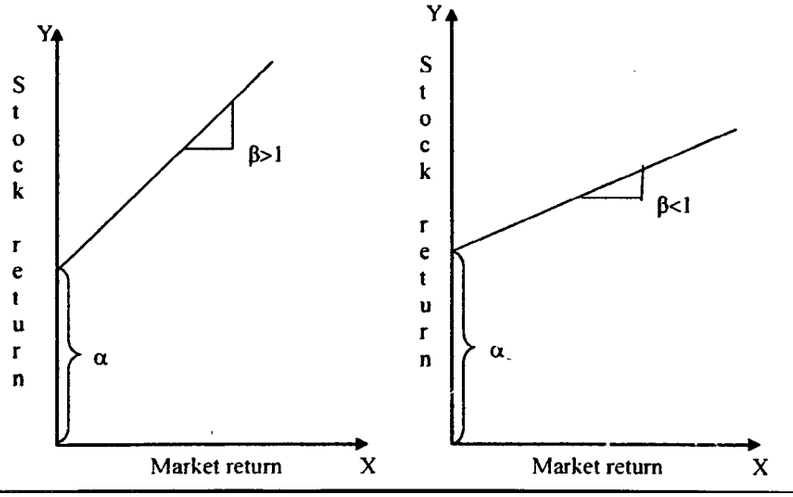
The market return is calculated as below:

$$\text{Today's market return} = \frac{\text{Today's index} - \text{Yesterday's index}}{\text{Yesterday's index}} \times 100$$

Daily, weekly and monthly returns are also can be calculated by using the prices of previous periods.

Beta

Beta is the slope of CRL. It describes relationship between return of the stock and index returns. For instance, the value of beta as 1 indicates that one per cent change in market index return causes exactly one per cent change in the stock return. Negative beta value indicates that the stock return moves in opposite direction to market return. When beta takes the value of two, it signifies that one per cent change in market index causes 2 per cent change in the stock return.



The above figures show both high systematic risk (fig. a) and low systematic risk (fig. b). When beta is more than one, it indicates high systematic risk and vice versa.

The intercept of CRL is alpha that is, the distance between the intersection and horizontal axis. It signifies that the stock is independent of the market return. Positive values of alpha would yield profitable returns. According to the portfolio theory, the average value of alpha of all stocks turns out to be zero in a well diversified portfolio.

Correlation co-efficient can be used to measure the nature and extent of relationship between the stock market index return and the stock return in a particular period.

Illustration:

The data given below, pertain to the market return and scrip return on Hypothetical company for a particular period.

Index Return (R_m)	Scrip Return (R_i)
0.6	0.4
0.5	0.3
0.7	0.6
0.6	0.4
0.4	0.3
0.5	0.4
0.6	0.5
0.8	0.8
0.7	0.7
0.6	0.6

Questions

a) Find out the beta value of the company's scrip?

b) If the market return is 2.5, what would be the return of the scrip?

Solution

The beta value can be obtained by using the formula.

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

R_m	$R_m - \bar{R}_m$	$(R_m - \bar{R}_m)^2$	R_i	$R_i - \bar{R}_i$	$(R_i - \bar{R}_i)^2$	$R_m - \bar{R}_m R_i - \bar{R}_i$
0.6	0	0	0.4	-0.1	0.01	0
0.5	-0.1	0.01	0.3	-0.2	0.04	0.02
0.7	+0.1	0.01	0.6	+0.1	0.01	0.01
0.6	0	0	0.4	-0.1	0.01	0
0.4	-0.2	0.04	0.3	-0.2	0.04	0.04
0.5	-0.1	0.01	0.4	-0.1	0.01	0.01
0.6	0	0	0.5	0	0	0
0.8	+0.2	0.04	0.8	+0.3	0.09	0.06
0.7	+0.1	0.01	0.7	+0.2	0.04	0.02
0.6	0	0	0.6	+0.1	0.01	0
6.0		**0.12**	**5.0**		**0.26**	**0.16**

$$\beta = \frac{\sum(R_i - R_i)(R_m - \bar{R}_m)}{\sum(R_m - \bar{R}_m)^2} = \frac{0.16}{0.12} = 1.33$$

$$\bar{R}_m = \frac{\sum R_m}{n} = \frac{6.0}{10} = 0.6$$

$$\bar{R}_i = \frac{\sum R_i}{n} = \frac{5.0}{10} = 0.5$$

$$R_i - \bar{R}_i = \beta(R_m - \bar{R}_m)$$

$$R_i - 0.5 = 1.33(R_m - 0.6)$$

Ri = 1.33 Rm - 0.798 + 0.5

= 1.33 Rm - 0.298

(a) The beta value is 1.33

(b) The value of company's scrip when the market return is 2.5.

= 1.33 (2.5) + (- 0.298)

= 3.325 - 0.298

= 3.027

The value of beta measures the degree to which the particular stock is affected by the market as whole. The co-efficient of determination (square of correlation

co-efficient) measures the strength of relationship between market return and the security return, whereas the risk associated with the investment is measured by volatility.

Risks and Return Associated with the Bonds

Bonds are generally considered not risky but they too have risk viz., interest rate risk, default risk, marketability risk and callability risk.

Interest rate risk is nothing but the variability in the return from debt instruments to investors caused by the changes in the market interest rate. The changes which occur in interest rate affect the bonds more directly than the equity.

The default risk arises when there is a failure to pay agreed value of debt instrument by the issuer in full on time. Treasury bills and bonds issued by the central government do not have such risks. Marketability risk is caused by variation in return due to the sale of bonds quickly without having to make a substantial price concession. The marketability depends on the companies which issue the bonds. The bonds of reputed companies like Reliance enjoy high liquidity which may not be the case with other companies. A risk also arises when there is uncertainty created in the return of an investor due to the ability of issuer to call the bond at any time. The issuer has the option to call the bond with high interest rate and again raise funds at a lower interest rate. Hence, there is a risk of uncertainty regarding the period of maturity.

3.8 KEY WORDS

- **RETURN**

The return from an investment is the expected cash inflows in terms of dividends, interest, capital gain etc.

- **RISK**

Risk refers to the chance that actual return from an investment will differ from the expected out come.

- **SYSTEMATIC RISK**

Systematic risk affects the market as a whole and is caused by the uncontrollable factor external to the company.

- **UNSYSTEMATIC RISK**

Unsystematic risk is specific, unique and related to a particular industry or a company.

3.9 SUMMARY

No investment is free from risks. An investor before committing his funds, he has to analyse the expected return and risk associated with investment. The return may be in the form of regular income like interest, dividend and rent and growth of

capital. The return may be classified into (i) holding period return (ii)current yield (iii) expected return. Risk refers to the chance that actual return from an investment will differ from the expected out come. Systematic risk affects the market as a whole and is caused by the uncontrollable factor external to the company. Unsystematic risk is specific, unique and related to a particular industry or a company. Systematic risk may be classified into (i) market risk (ii) interest rate risk (iii) purchasing power risk. Unsystematic risk may be classified into (i) Business risk, (ii) financial risk and (iii) external risk. The risk can be measured using standard deviations and beta.

3.10 ANSWERS TO CHECK YOUR PROGRESS

I. 1. Current yield 2. Holding period return
3.Price earning ratio 4. Systematic risk 5. Unsystematic

II. 1 (a) 2. (a) 3. (c) 4. (b) 5. (b)

III. 1. True 2. True 3. True 4. True 5. False

IV. 1. systematic 2. interest risk 3. purchasing power 4. unsystematic

V. 1. (a) 2. (b) 3. (a)

VI. 1. True 2. True 3. False 4.True 5. True

3.11 QUESTIONS/EXERCISES

Section-A

1. How will you measure various kinds of return?
2. What are the measures to be taken to minimize systematic risk?
3. How will you protect yourself from unsystematic risk?

Section-B

1. Discuss the different kinds of risks associated with the investment?
2. Briefly explain difference statistical methods used to measure risks?

3.12 FURTHER READINGS:

1. Donald E.Fischer and Ronal J. Jordan "Security Analysis And Portfolio Management" - Prentice -Hall of India , New Delhi.
2. V.K. Bhalla "Investment Management" - S.Chand & Company Ltd., New Delhi.
3. R.P. Rustagi "Investment Analysis And Portfolio Management" - Sultan Chand & sons., New Delhi.
4. Preethi Singh, "Investment Management" - Himalays Publishing House, Mumbai.
5. Punithavathy Pandian - "Security Analysis And Portfolio Management" - Vikas Publishing House.
6. Avadhani, V.A. "Investment Management" -Himalaya Publishing House, Mumbai.

UNIT - IV STOCK VALUATION

Structure

4.0 INTRODUCTION

An investor takes a lot of decisions before he selects the right asset(s) for making investment. He considers the level of risk he can assume, and the nature of assets available. He has investment options like bonds, stocks and real estates. Once he decides the type of assets for instance commons stock, he has to decide which company's equity he has to look for. He should possess large volume of funds to make investment on the stock of companies like Reliance and Infosys. Apart from that, his decision should be based on the return and risks associated with the assets.

The valuation does not pose much problems in the case of bond and preference stock as the benefits are generally constant and certain. Equity valuation is difficult in the sense, the return on equity is not certain and high fluctuations are experienced frequently. Hence, the size of the return and the risk determine the value of a share to an investor. A portfolio manager performs three important activities viz., deciding the equity to buy or sell, trading of securities and monitoring the performance of portfolio.

4.1 UNIT OBJECTIVES

- To understand the various models of Equity valuation
- To know the concept of Time value of money and yield to maturity
- To appraise the valuation of models of Bonds
- To analyse the valuation model of convertible Bonds and
- To Explain the valuation models of Rights

4.2 EQUITY VALUATION MODELS

Equity valuation models help to identify whether a stock is under priced or overpriced.

Under priced stock can be purchased whereas overpriced stock has to be sold. The returns for the stock occur at the end of the period. It has to be given in terms of the present value, if it is to be expressed at the beginning of the holding period.

$$P_o = \frac{D_1}{1+r} + \frac{P_1}{1+r} \text{ where}$$

Po = Present selling price

P_1 = Selling price at its end of one year period.

D_1 = Dividend received during the holding period of one year.

r = required rate of return of the investor (Discussed in Unit III)

Using the above formula, the present value of stock can be calculated.

Example

An investor holds equity shares of a company from 14.02.1999 to 29.03.2000. The prices at the beginning and end period are Rs.385 and Rs.451. The dividend paid is 30 per cent. The investor wants to get 20 per cent return by holding the stock of the company for one year. State whether the investor can buy the stock or not.

Solution:

$$P_o = \frac{D_1}{1+r} + \frac{P_1}{1+r}$$

$$= \frac{3.0}{1+0.2} + \frac{451}{1+0.2}$$

$$= 2.5 + 375.83$$

$$= 378.33$$

The value of the stock would have to be Rs.378.33. As the present stock price is Rs.385 which is higher the value of stock (378.33), the investor need not buy it.

The investor can determine the anticipated selling price for the stock with his expected rate of return (20 per cent) from holding the stock.

$$P_o = \frac{D_1}{1+r} + \frac{P_1}{1+r}$$

$$\text{Rs. } 385 = \frac{3.0}{1.2} + \frac{P_1}{1+0.2} = 2.5 + \frac{P_1}{1.2}$$

$$\frac{P_1}{1.2} = 382.5$$

$$P1 = 459$$

The present value of the stock for a year can early be calculated as above.

4.3 MULTIPLE YEAR HOLDING PERIOD:

When the investors hold the investment for more than one year the following formula is used:

$$P_o = \left[\sum_{n=1}^{N} \frac{\left[(e_o)\frac{d}{e}\right][1+g]^n}{(1+r)^n}\right] + \left[\frac{P/E\left[(e_o(1+g)^{N+1}\right]}{(1+r)^N}\right]$$

Where,

eo	=	most recent earnings per share
d/e	=	dividend payment
g	=	annual expected growth rate (for earnings, dividends and price)
r	=	required rate of return
$\frac{P}{E}$	=	Price earnings ratio
N	=	holding period in years

Example

A study was conducted in XYZ Company and it was found that the rate of return after making adjustment for the outflow of income is 18.4 per cent for the period 1998-2003. It is assumed that the return would grow at this rate for another

four years. The dividend recently paid to the stockholders is 40 per cent and the earnings per share during November 2003 is Rs.32 and price earning ratio is 5. What would be the ideal price if an investor expects 20 per cent rate of return and wants to hold the stock for another four years. The price of the stock is Rs.142 on 15.11.2003.

Solution

$$P_o = \left[\sum_{n=1}^{N} \frac{\left[(e_o)\frac{d}{e}\right][1+g]^n}{(1+r)^n}\right] + \left[\frac{P/E\left[(e_o(1+g)^{N+1}\right]}{(1+r)^N}\right]$$

Where,

The expected growth rate of g = 18.4. The most recent earnings per share eo=36.

$$\text{Dividend payment} = \frac{\text{Dividend per share}}{\text{EPS}}$$

$$= \frac{4}{32} = 12.5\%$$

Required rate of return = 20 per cent

$$\frac{P}{E} = 5$$

Holding Period N = 4 years

Firstly, we shall determine the value of $(e_o)\left(\frac{d}{e}\right)$ $= 32 \times \frac{12.5}{100} = 4$

The value of $\sum_{n=1}^{N} \frac{\left[(e_o)\frac{d}{e}\right][1+g]^n}{(1+r)^n}$

$$= \frac{4x(1.184)^1}{(1+0.2)^1} + \frac{4x(1.184)^2}{(1+0.2)^2} + \frac{4x(1.184)^3}{(1+0.2)^3} + \frac{4x(1.184)^4}{(1+0.2)^4}$$

$$= \frac{4.736}{1.2} + \frac{5.6074}{1.44} + \frac{1.6598}{1.728} + \frac{7.8608}{2.0736}$$

$$= 3.9467 + 3.8940 + 0.9605 + 3.7909$$

$$= 12.592$$

The present value of dividend stream is 12.592

$$\text{Value of } \left[\frac{P/E\left[\left(e_0(1+g)^{N+1}\right)\right]}{(1+r)^N}\right]$$

$$= \frac{5x32(1+0.184)^5}{(1+0.2)^4} = \frac{372.2875}{2.0736}$$

= 179.537

The expected present value of XYZ Company stock is 12.592 + 179.537

= Rs. 192.129

Since the expected present value of stock is higher than the prevailing price (Rs.142), the share can be purchases.

4.4 CONSTANT GROWTH MODEL

Under this model, it is assumed that the dividends will grow at the same rate for an indefinite future.

Present value of the share (P_o)

$$P_o = \frac{D(1+g)}{1+r} + \frac{D(1+g)^2}{(1+r)^{2\cdot}} + \frac{D(1+g)^3}{(1+r)^3} \ldots\ldots\ldots\ldots + \frac{D(1+g)^N}{(1+r)^N}$$

Where,

Po = Present Value of the stock

r = required rate of return

g = growth rate

When the period approaches to infinity the present value of stock is calculated as follows:

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

D_1 = dividend for the next year

The above model can be applied only when the analyst is able to predict a) next year's dividend; b) long term growth rate of the firm and c) the required rate of return of the investor. This makes easier for the analyst to make comparison between the theoretical value (or present value) of the stock with the prevailing price of stock.

The analyst can advise the investor to sell the stock when the theoretical value (computed value or present value) of the stock is less than the actual price.

The investor can make the purchase of stock if the theoretical value is more than than the actual price. The investor can also make purchase when the present rate of return is in excess of the required rate of return. He can decide to sell its stock, when the present rate of return falls shorts of required rate of return.

However, constant growth model is based on two assumptions.

1. The firm will have stable dividend policy.
2. The firm will earn a stable return over the time.

4.5 TWO STAGE GROWTH MODEL

Under this model, the growth stages are divided into (i) a period of extraordinary growth (or decline) and (ii) a constant growth for an infinite period In an industry, the extraordinary growth period may continue for some period only to be followed by the constant growth rate. eg. Information technology.

$$\text{Present value of stock} = \frac{\text{Present Value of dividend during the above normal growth period}}{\text{Present Value of Stock price at the end of the above normal growth period}}$$

$$P_o = \sum_{i=1}^{N} \frac{D_o(1+g_s)^t}{(1+r_s)^t} + \left[\frac{D_{N+1}}{(r_s - g_n} x \frac{1}{(1+r_s)^n}\right]$$

Where,

P_o = Present Value of stock

D_o = Dividend for the previous period

g_s = above normal growth rate

g_n = normal growth rate

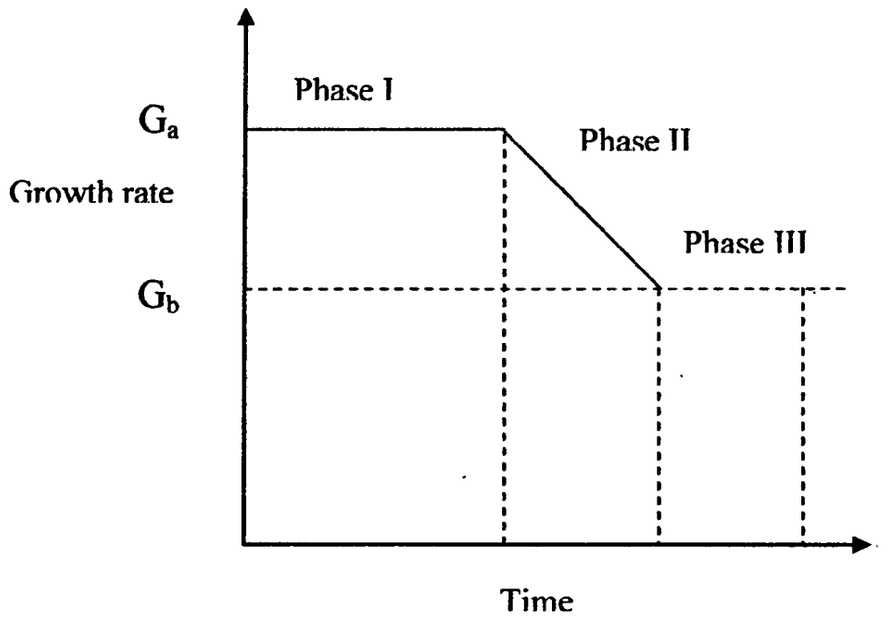
r_s = required rate of return

N = Period of above normal growth

4.6 THE THREE PHASE MODEL

Under this model, there are three phases of dividend growth pattern. Initially, dividends are assumed to growth at a constant rate. 'ga' for a period of 'A' years. The growth rate of dividend starts declining for A+1 years throughout phase B and the decline in the rate of dividend would be linear. After this phase, there would be perpetual growth rate (Gn). There is a possibility that Ga would be less than Gn and there would be linear growth rate in the second phase. The perpetual growth rate is

known as the firm's long run normal growth rate. The three stage growth rates are illustrated in the following figure.



The above figure illustrates three phase model of stock return and valuation wherein after a constant growth rate, dividend growth rate starts declining before reaching perpetual growth rate.

$$P_o = \sum_{i=1}^{A} \frac{D_o(1+g_a)^t}{(1+r)^t} + \sum_{i=A+1}^{B} \frac{D_t(1+g_b)}{(1+r)^t} + \frac{D_b(1+g_n)}{r-g_n(1+r)^B}$$

Where,

D_o = next year dividend

g_a = growth rate during period 'A'

g_b = growth rate during period 'B'

g_n = growth rate in the III phase

D_b = divided at the beginning to III phase

The above model appears to be complex as there is an increase in the number of variables over constant growth rate model and two phase model. The analyst has to strike a balance between the complexity and manageability, before choosing a model for accurate forecast of value of the stock.

Illustration

Dividend per share of the company XYZ is expected to be Rs.4.25. The dividend in the subsequent years is expected to grow at 8 per cent per year. If the required rate of return is 15 per cent per year determine the price, assuming the prevailing market price as Rs.85.

Solution

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

D1 = Rs.4.25 r = 15 per cent g = 8 per cent

$$P_o = \frac{4.25}{0.15-0.08} = \frac{4.25}{0.07} = \text{Rs.}60.71$$

It implies that the investor would be willing to pay Rs.60.71 only. As the theoretical price is less than market price, the investor should be advised not to buy the shares.

Illustration

The return of XYZ company at present is 20 per cent. This return is assumed to continue for the next 4 years and after that, it is assume it may grow at the rate of 9 per cent during 2002-03. The required rate of return is 18 per cent and the present price is Rs.64 what is the estimated price?

Solution

The above problem relates to two stage model as the initial rate of return is assumed to continue for 4 years and then reduced rate will follow suit.

$$P_o = \sum_{i=1}^{N} \frac{D_o(1+g_s)^t}{(1+r_s)^t} + \left(\frac{D_N+1}{R_s-g_n} x \frac{1}{(1+r_s)^N} \right)$$

Where,

D_o = Rs.3.50

g_s = 0.20 or 20%

g_s = 9% or 0.09

r_s = 18% or 0.18

N = 4 years

$$\sum_{i=1}^{N} \frac{D_o(1+g_s)^t}{(1+r_s)^t} = \frac{3.5(1+0.2)^1}{(1+0.18)^1} + \frac{3.5(1+0.2)^2}{(1+0.18)^2} + \frac{3.5(1+0.2)^3}{(1+0.18)^3} + \frac{3.5(1+0.2)^4}{(1+0.18)^4}$$

$$= \frac{3.5(1.2)}{1.18} + \frac{5.04}{1.3924} + \frac{6.048}{1.643} + \frac{7.2576}{1.9388}$$

$$= 3.559 + 3.6196 + 3.6811 + 3.7433$$

$$= 14.603$$

$$\frac{D_n + 1}{r_s - g_n} \times \frac{1}{(1+r_s)^N}$$

Where,

DN = 7.2576

D1N +1 = 7.2576 x 1.09

$$= \frac{7.2576 \times 1.09}{0.18 - 0.09} \times \frac{1}{(1+0.18)^4}$$

$$= \frac{87.8976 \times 1}{1.9388} = \text{Rs.}45.34$$

P_o = 14.60 + 45.34

= Rs.59.94

Illustration

Firm ABC is assumed to grow at rate of 10 per cent for the first four years of its inception. After the period of 4 years, the growth rate of dividend is assumed to decline linearly to 6 per cent. After seven years, the firm is assumed to grow at a rate of 6 per cent infinitely. The next year dividend is Rs.3 and the required rate of return is 12 per cent determine the value of the stock.

Solution

The problem belongs to three phase model with varying returns in the three phases value of stock

$$P_o = \sum_{i=1}^{A} \frac{D_o(1+g_a)^t}{(1+r)^t} + \sum_{i=A+1}^{B} \frac{D_t(1+g_b)}{(1+r)^t} + \frac{D_b(1+g_n)}{r - g_n(1+r)^B}$$

Do = Rs.3

r = 12% or 0.12

g_a = 0.1

D_b = declining rate of return from 10% to 6% that is 0.09, 0.08, 0.07, 0.06

B = 7 years (Signifying the beginning of III Phase)

G_n = 0.06

The formula has three parts. Each part is calculated separately and then is added to others.

Part - 1

$$\sum_{i=1}^{A} \frac{D_o(1+g_a)^i}{(1+r)^i}$$

$$= \frac{3}{(1.12)} + \frac{3(1.1)}{(1.2)^3} + \frac{3(1.1)^2}{(1.12)^3} + \frac{3(1.1)^3}{(1.12)^4}$$

Part - 2

$$\sum_{i=l+1}^{B} \frac{D_1(1+g_n)^i}{(1+r)^i}$$

$$= \frac{3(1.1)^3(1.09)}{(1.12)^5} + \frac{3(1.1)^3(1.09)(1.08)}{(1.12)^6} + \frac{3(1.1)^3(1.09)(1.08)(1.07)}{(1.12)^7}$$

$$= \frac{4.35237}{1.7623} + \frac{4.7005}{1.9738} + \frac{5.0295}{2.2107}$$

$= 2.4697 + 2.3814 + 2.2751 = 7.1262$

Part - 3

$$\frac{D_B(1+g_n)}{(r-g_n)(1+r)^B}$$

$$= \frac{3(1.1)^3(1.09)(1.08)(1.07)(1.06)}{(0.12-0.06)x(1.12)^7}$$

$$= \frac{5.3313}{0.1326} = 40.21$$

Add all the three parts to get the value of stock

$P_0 = 10.43 + 7.1262 + 4.021$

$= 57.7662$ that is Rs 57.77

4.7 VALUATION OF STOCK THROUGH PRICE - EARNINGS RATIO

The investors make use of price earnings ratio to estimate value of stocks and they find that the price earnings ratio models have the following advantages over the discounting models.

1. P/E ratio indicates price per rupee of share earnings, facilitating comparison of price of stocks, having different earnings per share.
2. Even the stocks of companies which do not pay dividends, but having earnings can be analysed by means of price earnings ratios.
3. The variables used in P/E ratio models are easier to estimate.

However, P/E ratio analysis is difficult to use, when there is loss. Further, one can not find out the appropriate price for particular stock. An investor can only find out relative positions of various stocks.

The constant growth model written in price earnings model takes the form

$$P = \frac{d}{r-g}$$

By dividing both sides with E, we can obtain $P/E = \frac{d/e}{r-g}$, where d/e is the payout ratio. P/E ratio now is the function of payout ratio, discount rate and growth rate. When r and g remain constant, higher the payout ratio, higher will be the price earning multiples. The growth rate is also directly proportional to the P/E ratio. However, the required rate of return of the discount rate is inversely proportional to the value of P/E ratio.

When growth rate is considered to be depending on return of equity (ROE),

$$P/E = \frac{d/e}{r - ROE(1 - d/e)}$$

This makes the P/E ratio depending on dividend payout, discount rate, and return on equity.

4.8 WHITBECK KISOR MODEL

Whitbeck Kisor used multiple regression technique in his model to relate P/E ratio to the variable concerned.

P/E = f (growth rate of earnings g, dividend payment rate D/E, risk in growth ratio)

The relationship between P/E and the above variables is estimated by taking 135 stocks, into account by Whitbeck Kisor. The following result is obtained.

$$P/E = 8.2 + 1.5\,g + 0.067\,D/E - 0.2\sigma$$

The co-efficient of equation indicate weights of variables on the P/E ratio. The direction of impact of particular variable on the P/E ratio is indicated by the signs. For instance, one per cent increase in the standard deviation of growth rate would result in 0.2 unit decrease in the P/E ratio. The equation thus indicates higher growth, higher dividends and lower risk.

Using Whitbeck Kisor model, theoretical value of P/E ratio can be calculated and compared with actual value to make buy or sell decision. That is when theoretical value of P/E ratio is more than the actual value, stock may be sold out and vice versa.

Illustration

ABC company has stock growth rate of 12 per cent, its dividend payout ratio is 40 per cent and standard deviation of growth rate is 6 per cent. The value of P/E ratio is 21 times. State whether the stock can be sold.

Solution

Whitbeck Kisor model takes the form

$$P/E = 8.2 + 1.5g + 0.067\ d/e - 2\sigma$$

$$= 8.2 + 1.5\ (12) + 0.067\ (40) - 0.2\ (6)$$

$$= 8.2 + 18 + 2.68 - 1.2 \qquad = 27.68$$

Since theoretical value is more than the actival value, stockcan be sold

4.9. ADDITIONAL ILLUSTRATIONS:

4.9.1 Booma co. would pay Rs. 3, as dividend per share next year and is expected to grow indefinitely at 12.5%. Determine the equity value if the investor requires 22% return.

$P_0 = \frac{D_1}{K-g}$ where, D_1 = next year dividend

D1 = Rs. 3; k = 22%; g = 12.5%

$$P_0 = \frac{3}{0.22-0.125} = \text{Rs. } 31.58$$

4.9.2. Illustration

Rajesh bought Ice Mountain Company stock which paid Rs. 3.50 dividend per share during the last financial year. His anticipated return is 21% . He expects two situations viz., a 5 per cent decline in the dividend, or 5 per cent growth in the dividend next year. Determine the price for both the situations.

Solution

(i) 5% Decline

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

$$= \frac{3.5(1-0.5)}{0.21-(-0.5)} = \frac{3.325}{0.26} = \text{Rs. } 12.79$$

(ii) 5% growth

$$P_o = \frac{D_1}{k-g}$$

$$= \frac{3.50(1+0.5)}{(0.21-0.05)} = \frac{3.675}{0.16} = 22.97$$

4.9.3. Illustration

Baskar is interested in buying Sunshine Co's stock and holding it for five years. He anticipates that the company would pay Rs. 3.60 continuously for the next five years. He hopes to sell the shares at RS. 70 at the end of the fifth year. Determine the present price, when his required rate of return is 12%

$$\text{Present value of stock } (P_o) = \frac{D_1}{(1+r)^1} + \frac{D_2}{(1+r)2} + \frac{D_3}{(1+r)^3} + \frac{D_4}{(1+r)^4} + \frac{D_5}{(1+r)^5} + \frac{P_n}{(1+r)^5}$$

$$P_o = \frac{3.6}{(1.12)^1} + \frac{3.6}{(1.12)^2} + \frac{3.6}{(1.12)^3} + \frac{3.6}{(1.12)^4} + \frac{3.6}{(1.12)^5} + \frac{70}{(1.12)^5}$$

= 3.21 + 2.87 + 2.56 + 2.29 + 2.04 + 39.72

= Rs. 52.69.

4.9.4. Illustration

Pride co's stock could be purchased at Rs. 50 in the beginning of 2006. The dividend per share would be Rs. 3 for the next three years. It was estimated that the stock would be sold for Rs. 65/- at the end of 2009. Determine the rate of return of stock of Pride Co.

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

$$50 = \frac{3}{(1+r)^1} + \frac{3}{(1+r)^2} + \frac{3}{(1+r)^3} + \frac{P_1}{(1+r)^3}$$

Taking 15 per cent return by trial and error method we get,

$$50 = \frac{3}{(1+0.15)} + \frac{3}{(1.15)^2} + \frac{3}{(1.15)^3} + \frac{65}{(1.15)^3}$$

= 2.61 + 2.27 + 1.97 + 42.74 = 49.59

The rate of return can be taken as 15 per cent.

4.9.5.Illustration

The common stock of Best image company is currently sold for Rs. 75 per share. Dividend per share has risen from Rs. 2.5 to the current level of RS. 5 over the past ten years and this growth in dividend is expected to continue in the future. Determine the required rate of return of the company.

Solution

$$P_o = \frac{D_o(1+g)}{k-g}$$

$$g = \left[\frac{\text{Future value}}{\text{Present value}}\right]^{1/n} - 1$$

$$= \left(\frac{5}{2.5}\right)^{1/10} - 1 = 1.072 - 1$$

$$g = 0.072 = 7.2\%$$

$$k = \frac{D_0(1+g)}{P_0} + g$$

$$= \frac{5(1+0.072)}{75} + 0.072 = \frac{5.36}{75.} + 0.072 = k = 14.34\%$$

Check your progress

I. Fill in the Blanks

1. ..... Value of a share means the value of assets available per share.
2. ..... Shares are regarded as a hybrid stock between a bond and a common stock.
3. Zero growth model assumes that the dividend remains ..... over years.
4. ..... growth model assumes that the dividends grows constantly at a fixed rate every years.
5. ..... denotes the earnings of the firm attributable to one share

II Choose the correct answer:

1. Earning per share (EPS) is
(a) Profit after tax- Preference dividend / no.of equity shares
(b) Profit before tax / No.of equity shares.
(c) Profit before tax - Preference dividend / No.of equity shares.
(d) profit of the tax + preference dividend / number of equity shartes
2. Scrip dividend is in the form of
(a) cash
(b) a promissory note with interest
(c) Stock
(d) None of the above.

4.10 VALUATION OF PREFERENCE SHARES

Preference shares are having preference over equity shares in respect of payment of dividend and repayment of capital. Preference shares offer a fixed rate of income to the investors. The following model may be used for the valuation of preference shares:

$$P_o = \frac{D}{r}$$

D = the dividend paid

r = required rate of return

Example

Preferred stock of Jollywell Company has annual dividend of Rs.6 and the required rate of return is 10 per cent. Determine present value of stock.

Solution

$$P_0 = \frac{D}{r} = \frac{6}{0.10} = \text{Rs. } 60.$$

When the market price is given, it is possible to determine rate of return of preferred stock. For instance, preferred stock paying Rs.6 as dividend is sold in the market for Rs.54, the return is calculated as follows:

$$P_0 = \frac{D}{r}$$

$$54 = \frac{6}{r}$$

$$r = 0.11 = 11\%.$$

4.11 BOND VALUATION

The investment options of an investor include bonds and debentures apart from the stock. A debenture is nothing but a legal document containing an acknowledgement of indebtedness by a company. It contains a promise to pay a prescribed rate of interest for a defined period and to repay the principal at a given date of maturity.

Investment in bonds makes an investor as the creditor. Bond holders assume risk but much lower than the equity holders in the same company. Most of the bonds have the feature of fixed interest payment till the period of maturity. This specific interest rate is known as coupon rate. The coupons are paid quarterly, half-yearly and annually.

Reasons for the issue of bonds

Companies have several options to finance their operation. They include use of retained earnings and issue of new equity shares. However they prefer borrowing due to the following reasons.

4.11. 1. To minimize the cost of capital

Bonds offer the cheapest source of financing. The cost of capital gets reduced when a portion of a company's assets are financed by the issue of bonds, having a fixed rate of return.

4.11.2. To gain the benefit of leverage

The financial structure of a company may have the presence of debt and / or preference shares. This results in financial leverage, where the changes in earnings

3. An equity share is a (a) Fixed income bearing security (b) Variable income bearing security (c) Hybrid security
(b) (d) Dead Instrument

III State whether the following statements are True or False.

1. Equity shares cannot be valued because equity shares have no redemption
2. Intrinsic value and market price of equity shares are always equal.
3. In dividend discount model, the valuation of equity shares is based on expected stream of dividends.
4. Zero growth dividend model does not involve present value concept.
5. Growth in earnings is equal to the growth in the value of the share.

before interest and Tax (EBIT) give rise to larger changes in earnings per share (EPS). For instance, if a company borrows at 10 per cent and puts in the business to earn more than 10 per cent, it will result in increased earnings to equity shareholders.

4.11.3. To gain tax saving benefits

The interest on bonds is deductible unlike dividends on equity. This increases EPS.

4.11.4. To widen the scope of sources of funds

A company can attract funds from individual investors by the issue of bonds. This widens the scope, as some institutions are not permitted to invest in equity shares.

4.11.5. To maintain control

As the bonds have no voting rights, the voting power of existing share holders is not at all affected, there by preserving control over the operations.

4.12. CONCEPTS OF BOND VALUATION

Bond valuation is based on several concepts.

4.12.1. Time value concept:

The time value concept assumes that the rupee received today has more value then a rupee to be received tomorrow. The interest, paid by the borrower to the lender causes the money to have a future value different from the present value. The one period future time value of money is given by the equation,

Future value = Present value (1 + interest rate)

When the deposited money is allowed to accumulate for more than a year, it takes the form,

Future value = Present value (1 + interest rate)2

For instance, Rs.1000 is invested for two years at 8% rate of interest, the future value will be,

Future value = (Present value) x (1 + interest value)2

= 1000 (1 + 0.08)2

= 1000 (1.1664)

= Rs.1166.40

Present value can be obtained as below:

$$\text{Present value} = \frac{\text{Future value}}{1 + \text{interest rate}}$$

Using discounting principle, for instance, today's worth of Rs.100, to be received after one year at 10 per cent interest would be,

$$\text{Present value} = \frac{\text{Future value}}{1 + \text{interest rate}}$$

$$= \frac{100}{1+0.1} = \text{Rs.}90.90$$

4.12.2.Yield to Maturity:

Yield to maturity is the single discount factor which makes present value of future cash flows from a bond equal to the current price of the bond. It is the rate of return, the investor expects to earn if the bond is held till the date of maturity.

The yield to maturity concept works under the following assumptions.

1. There should not be any default in the payment of coupon rate and principal.
2. The investor has to hold the bond till the date of maturity.
3. The coupon payments received should be reinvested immediately at the same interest rate as the same yield to maturity of the bond.

The present value technique is followed to determine the yield to maturity.

$$\text{Present Value} = \frac{\text{Coupon}_1}{(1+y)^1} + \frac{\text{Coupon}_2}{(1+y)^2} + \ldots\ldots + \frac{\text{Coupon}_n + \text{Face value}}{(1+y)^n}$$

Where, y= Yield to maturity.

Thus, net present value of bond is calculated as follows:

$$P_o = \sum_{i=1}^{n} \frac{\text{Coupon rate}}{(1+y)^1} + \frac{P_m}{(1+y)^n}$$

Where, P_o = net present value of the bond.

y = yield to maturity.

t = time in years.

Pm = terminal price or value of the bond.

Examples:

A bond having Rs.100 as par value bears a coupon rate of 12% and it matures after 5 years. The expected yield to maturity is 15%. The present market price is Rs.85. Advise

Whether the investor can buy it.

$$NPV = \sum_{i=1}^{n} \frac{\text{Coupon rate}}{(1+y)^1} + \frac{P_m}{(1+y)^n}$$

$$\frac{12}{(1.15)} + \frac{12}{(1.15)^2} + \frac{12}{(1.15)^3} + \frac{12}{(1.15)^4} + \frac{12}{(1.15)^5} + \frac{100}{(1.15)^5}$$

= 10.43 + 9.07 + 7.89 + 6.86 + 5.97 + 49.72

= Rs.89.94.

The net present value is higher than the market value (Rs.85). Hence the bond is under priced and the investor can very well buy the bond.

4.12.3. Theorems of bond valuation

There are three factors viz., coupon rate, years to maturity and the expected yield to maturity (required rate of return).which affect the value of bonds.

I Theorem

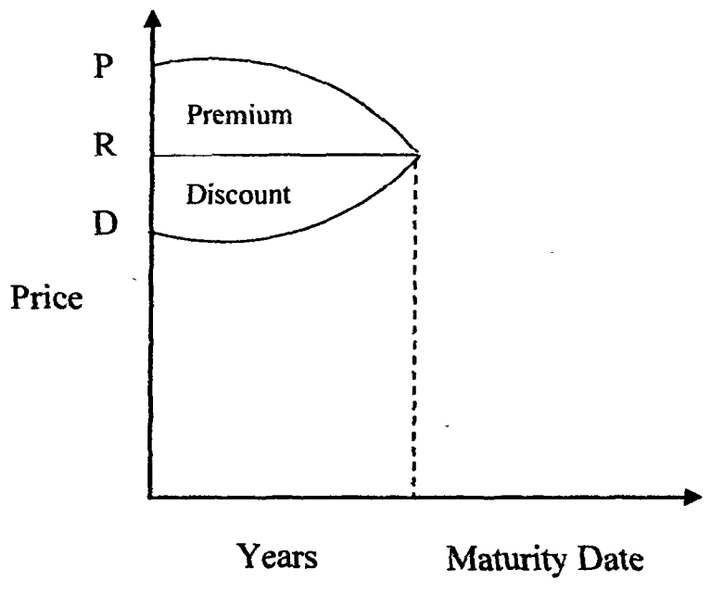
If the market price of bond increases, the yield would decline.

II Theorem

When the yield of the bond remains constant over its life, the discount or premium depends on the period of maturity. It implies that the bond with a short term to maturity sells at a lower discount than the bond with a long term to maturity.

III Theorem

If the yield of a bond remains constant over its life, the discount or premium amount will decrease/ increase at an increasing rate as it s life gets shorter. This is well illustrated by the following figure.



The above figure shows that the discount rate declines at a lower rate when the bond approaches to maturity.

IV Theorem

A rise in bond's price for a decline in the yield of the bond is greater than the fall in bonds price for a rise in the yield.

For instance, a bond has 10% coupon rate, maturity period of 5 years with the face value of Rs.100.

Suppose the yield declines by 2% that is to 8%, the bond price will be,

IV Fill in the blanks:

1. ..... securities are those which bring a stream of fixed income to the holder during the holding period and redemption value at the end of the maturity period
2. ..... is an example for fixed income securities
3. In India issue of bonds and debentures is regulated by .....
4. ..... is the rate of return that will be earned if the bond is purchase today at the current market price and his held by the investors till maturity.
5. ..... refers to shielding the bond investment against the interest rate risk.

V State the weather the following statements are True or False:

1. Required rate of return and coupon rate are inversely related.
2. Zero coupon bonds have no coupon rate hence no yield.
3. YTM of a bond is a same as IRR of the bond investment.
4. Value of a callable bond is less than the fixed maturity bond
5. Incase of a bond investment, the required rate of return his always fixed and constant irrespective of type of the bond.

$$\sum_{i=1}^{n} \frac{\text{Coupon rate}}{(1+y)^1} + \frac{P_m}{(1+y)^n} = \sum_{i=1}^{n} \frac{10}{(1.08)^1} + \frac{100}{(1.08)^{7}}$$

$= 9.26 + 8.57 + 7.94 + 7.35 + 6.81 + 68.06$

$=$ Rs.107.99

The fall in yield leads to a raise in value of bond and vice versa.

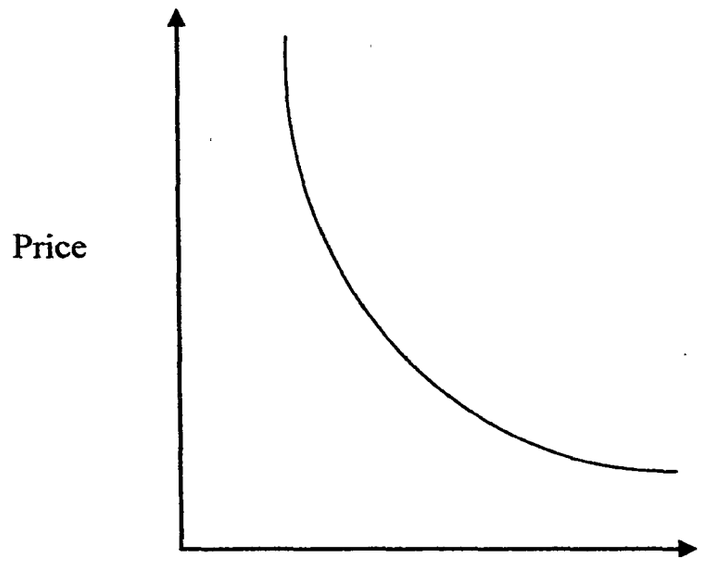
V Theorem

The change in the price will be lesser for a percentage change in the yield of the bond, if its coupon rate is higher.

4.12.4. Bond Convexity

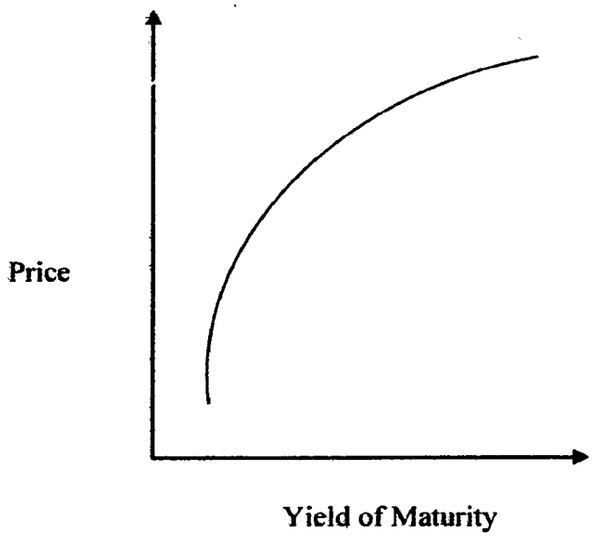
Bond's price and yield are inversely related. Any rise in bond price will result in a fall in the yield and vice versa. The amount of increase in the price of the bond for a given decline yield is higher than the decline in price of bond for a similar amount of increase in yield of the bond. Thus, there is no linear relationship, which is referred to as convexity. The degree of convexity differs from bond to bond depending upon the size of the bond, years to maturity and the current market price.

The following figure shows bond convexity.



4.12.5 Yield Curve:

The relationship between the yield and time or years to maturity is called yield curve or term structure as shown below.

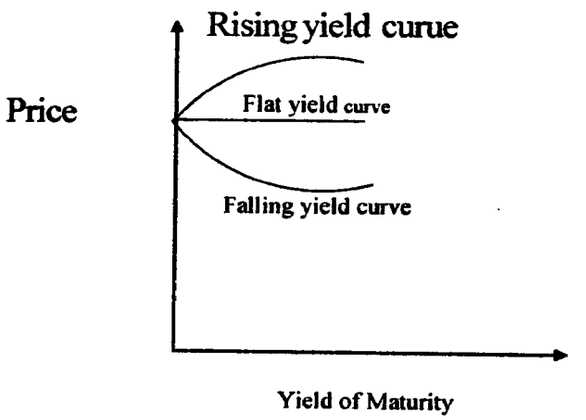


When the long term coupon rates are higher than the short term rates, the yield curve would have an upward sloping shape. Portfolio manager of bonds tries to make use of the situation to increase the yield by purchasing long term bonds. This is known as riding the yield curve. Riding the yield curve would be successful only when the market interest does not increase. The bond portfolio manager has to watch continuously about the shape of the yield curve and the shifts that occur in the market interest rates.

There are three theories which explain yield curve of interest rates viz., expectation theory, liquidity preference theory and segmentation theory.

4.12.6. Expectation Theory:

The expectation theory was developed by Hicks, Lutz and Malkiel. According to it, the shape of the curve is determined by the expectations of investors about the future interest rates. For instance, if the short term rates are expected to be relatively low in the future, the long term rate will be below the short term rate.



The above figure shows a rising yield curve - indicating the investor's expectation of a continuous increase in interest rate; flat yield curve, showing that investors expect the interest rate to remain constant; and the declining yield curve indicating the expectation of investor to have a fall in interest rate.

4.12.7. Liquidity Preference Theory

Hicks advocated liquidity preference theory of Keynes to suggest that investors' expectations influence the shape of yield curve. Investors prefer short term bonds if they are very particular about liquidity. There must be a premium to motivate the investors to buy long term bonds.

4.12.8. Segmentation Theory

Culbertson, Modigliani opined that the investors also prefer long term securities viz., insurance policies, pension funds etc. to avoid possible fluctuation in interest rates. For instance, life insurance companies offer insurance policies, which require payment of premium for a long time. Premia payments are fixed by the expected future rate of interest. The company gains when the earned interest rate is higher than the promised interest rate. As the long term bonds offer higher interest rates, the insurance companies prefer them.

However, institutions like commercial banks prefer liquidity and hence they opt for short term bonds. Supply and demand for funds are segmented in sub-markets because of the preferred choices of individuals.

4.12.9. Duration

Duration measures the time structure of a bond and the bond's interest rate risk. It is defined as the weighted average of time periods to maturity, with the weights being values of cash flow in each time period.

$$D = \sum_{i=1}^{r} \frac{P_v(C_1)}{P_o} x\, t, \text{ where}$$

D = Duration

C = 'Cash flow

r = current yield to maturity.

T = number of years.

Pv (Ct) = present value of cash flow.

PO = sum of present values of cash flow.

Illustration

Calculate the duration for bond A and bond B with 8 per cent and 9 per cent coupon, with the maturity period of four years. The face value is Rs.1000. Assume that bonds are currently yielding 7 per cent.

Solution

$$D = \sum_{i=1}^{r} \frac{P_v(C_1)}{P_o} x\, t, \text{ can be rewritten as}$$

NOTES

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

At the end of 4th year (that is C4), principal repayment takes place.

Bond - A with the yield rate of 7 per cent, and 8% coupon rate

Year	Cash flow (C_t)	$\frac{1}{(1+r)^t}$	PV x CT	$\frac{\frac{C_1}{(1+r)^1}}{P_0}$	$\frac{\frac{C_1}{(1+r)^1}}{P_0} \times t$
1	80	0.935	74.80	0.0723	0.0723
2	80	0.873	69.84	0.0675	0.1350
3	80	0.816	65.28	0.0631	0.1893
4	1080	0.763	824.04	0.7969	3.1876
			P_O = Rs. 1033.96		D = 3.5842

Bond - B with the yield rate of 7 per cent, and 9% coupon rate

Year	Cash flow (C_t)	$\frac{1}{(1+r)^t}$	PV x CT	$\frac{\frac{C_1}{(1+r)^1}}{P_0}$	$\frac{\frac{C_1}{(1+r)^1}}{P_0} \times t$
1	90	0.935	84.15	0.0788	0.0788
2	90	0.873	78.57	0.0736	0.1472
3	90	0.816	73.44	0.0688	0.2064
4	1090	0.763	831.67	0.7788	3.1152
			P_O = Rs. 1067.83		D = 3.5476

	'A' Bond	'B' Bond
Face Value	Rs. 1000.00	Rs. 1000.00
Coupon Rate	8%	9%
Years to Maturity	4.0	4.0
Duration	3.5842 years	3.5476 years

From the above example, it can be inferred that the bond with larger coupon payments has a shorter duration compared to the bond with low coupon rate.

Thus, the time structure of investment in bonds can be expressed in two ways. The common way to state is how long an investor has to wait till the bond matures and the principal amount is paid back. It is known as asset time to maturity or its years to maturity. The other way is to measure the average time until all interest coupons and the principal are recovered. This is known as Mccualay's duration. Following is the list of general rules to be observed relating to the bonds.

1. When the coupon rate is larger, the duration is lower, and the bond price is less volatile.
2. Longer the term to maturity, the larger is the duration and more volatile is the bond.
3. Higher the yield to maturity, lower is the bond duration and bond volatility and vice versa.
4. The bond's term to maturity and duration are the same in a zero coupon bond.

4.12.10. Bond Volatility:

Price of bond changes according to the interest rate. Price changes in the bond are generally called as bond volatility. The relationship between the duration of a bond and the price volatility for a change in the market interest rate is given by the following formula.

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

Where, MD = Modified Duration

BP = is the Basis Point which is 0.01 of 1%(1 %= 100).

Modified Duration can be calculated as follows:

$$MD = \frac{D}{\frac{1+MY}{I}} \text{ Where,}$$

D = Duration,

MY = Market Yield and

I= Interest payment per year.

Illustration

Vignesh buys a bond with 4 years to maturity. The bond has a coupon rate of 8% and is priced at Rs.100 in the market. Determine (i) the duration of bond and (ii) the percentage change in the price of bond if the interest rate increases to 10%.

Solution

$$\text{Duration (D)} = \sum_{i=1}^{r} \frac{P_v(C_1)}{P_o} \times t,$$

Year	Cash flow (C_t)	PV@ 8%	PV x CT	$\frac{P(C_1)}{P_O}$	$\frac{P_v(C_t)}{P_O} \times t$
1	8	0.926	7.408	0.0741	0.0741
2	8	0.857	6.856	0.0686	0.1372
3	8	0.794	6.352	0.0635	0.1905
4	108	0.735	79.380	0.7938	3.1752
			99.996		3.5770

Duration is 3.58 years.

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

$$\text{MD Modified Duration} = \frac{D}{\frac{1+MY}{I}} \quad \text{Where,}$$

D = Duration (in years)

MY = Market Yield

I= Interest payments per year.

$$M.D = \frac{3.577}{9/8} = 3.180$$

Percentage change in price = $\frac{-MD[\Delta BP]}{100} = \frac{-3.18(100)}{100} = -3.18\%$

This implies that for 1 per cent increase in the interest rate, the price declines by 3.18 per cent.

4.13. IMMUNIZATION

Immunization is a technique which makes the bond holder to be certain of promised cash flows. The changes in the market interest rate affect the bond interest rate. The coupon rate and price of bond thus get affected by market rate. However in the process of immunization, the coupon rate risk and the price risk are made to offset each other. When there is an increase in market interest rate, the prices of bonds fall. But, at the same time, newly issued bonds fetch higher interest rates. The coupon can very well be reinvested in the bonds which offer higher interest rates and losses that occur due to fall in the price of bond can be offset, resulting in the immunization of portfolio.

The immunization process can be explained by means of an example.

For instance, if an investor invests equal amount of money in three bonds viz., X, Y and Z, with a duration of 2,3 and 4 years respectively, the bond portfolio duration will be

$$D = \frac{1}{3}x2 + \frac{1}{3}x3 + \frac{1}{3}x4$$

$= 0.67 + 1 + 1.33$

$= 3$ years.

The money to be invested in different bonds can be found by using the equation,

Outflow of investment =(X1) (duration of bond1) +(X2) (duration of bond2)

Where X1 and X2 are the proportions of investment on bond 1 and bond 2. The process of immunization is criticized under the following grounds:

1. Immunization and duration are based on the assumption that change in interest rates would occur before payments are received. However, it may not be true always. The change may occur even after the cash flow is received.
2. The assumption that the bonds have same yield may not hold good always.
3. The shift in the interest rate affects different bonds differently. This is in variation with the assumption that the shift affects all the bonds equally.
4. The assumption that there will not be any call risk or default risk does not also hold good.

4.13.1. Illustration

Determine the price of Rs.1000 zero coupon bond with yield to maturity of 16 per cent and 10 years to maturity. What is yield to maturity if the price of the bond is Rs.250?

Solution

$$\text{Price of the bond} = \frac{\text{Facevalue}}{[1 + \text{yield to maturity}]^N}$$

$$= \frac{1000}{(1+0.16)^{10}} = \frac{1000}{4.411} = \text{Rs.226.68}$$

$$\text{Yield to maturity} = \left[\frac{\text{Facevalue}}{\text{Bond value}}\right]^{1/r} - 1$$

$$= \left[\frac{1000}{250}\right]^{1/10} - 1$$

$= 1.149 - 1 = 0.149$

$= 14.9\%$.

4.13.2. Illustration

Mr. Balan has Rs.40,000 to make one time investment. He requires money back after two years to meet house construction expenses. He has two options.

1. Bond A has a coupon rate of 8 per cent and maturity period of 4 years with a current yield of 10 per cent. Current price is Rs.825.50.
2. Bond B has the coupon rate of 7 per cent, a maturity period of one year and a current yield of 10 per cent. The current price is Rs.865.70.

Solution

Mr. Balan has two types of risks. If he opts for Bond A, he cannot retain it till the maturity period, as he need money after two years. He has to sell it midway. If there is an increase in market interest rate, the price of bond will fall. He will incur loss if there is an increase in interest rate.

On the other hand, if he chooses B ; he can invest all his money in the bond and reinvest the proceeds from the bond matured into another issue for one year period. If the interest rate declines in the market next year, he has to reinvest his money in low yielding bonds, which may result in loss.

To solve the problem, he can invest a part of his money in one year bonds and the rest in four year bonds. To determine, how much to be invested, the following equation is used.

$[X_1, x D_1]+ [X_2 x D_2] = 2$, where

X_1 = Proportion of investment in Bond A

X_2 = Proportion of investment in Bond B

D = Duration of Bond A

D_2 = Duration of Bond B

Duration of Bond B needs calculation, as it has maturity period of 4 years.

$$D = \left[\sum_{i=1}^{r} \frac{P_v(C_1)}{P_o} x\ t,\right]$$

Year	Cash flow	Present value factor (10%)	$P_V C_t$	$\frac{P(C_1)}{P_O}$	$\frac{P_v(C_t)}{P_O} x\ t$
1	80	0.9091	72.73	0.0776	0.0776
2	80	0.8264	66.11	0.0706	0.1412
3	80	0.7513	60.10	0.0642	0.1926
4	1080	0.6830	737.64	0.7876	3.1504
			936.58		3.5618

Using the formula, we get

$[X_1 x 1] + [X_2 x 3.5618] = 2$

X_1 X2 x 3.5618 $= 2$

But $X_1 = 1 - X_2$

$\therefore [1 + X_2] + 3.5618\ X_2 = 2$

$1 - X_2 + 3.5618\ X_2 = 2$

$2.5618\ X_2 = 2 - 1 = 1$

$X^2, = \frac{1}{2.5618}$

$= 0.3904$

$\therefore X_1 = 1-0.3904 = 0.6096$

This implies Mr. Balan has to invest 0.6096 that 60.96% of his funds in one year bonds and 39.04% funds in 4 year bond.

To have fully immunized bond portfolio, the amount of funds, he needs

$= \frac{40,000}{[1.10]^2}$ = Rs. 33057.85

Investment in one year bond = 33057.85 x 0.6096 = Rs. 20152.07

Investment 14 year bond

= 33057.85 - 20152.07

= Rs.12905.78

Number of bonds in each category,

$$\text{One Year bond} = \frac{20152.07}{865.70}$$

= 23.28 that is 23 bonds

$$\text{Four year bond} = \frac{12905.78}{825.5}$$

= 15.63

That is, approximately 16 bonds.

4.13.3. Illustration

Vinoth thinks of purchase of a bond currently selling at Rs.846.50. The bond has 4 years to maturity, face value of Rs.1000 and 9% coupon rate. The next annual interest payment is due after one year from today. The required rate of return is 12%. Determine present value (intrinsic value) of the bond and state whether Vinoth can buy the bond, calculate yield to maturity of he bond.

Solution

Present value of the bond

$$P_O = \frac{C_1}{1+y} + \frac{C_2}{(1+y)^2} + \frac{C_3}{(1+y)^3} + \frac{(C_4 + \text{Face value})}{(1+y)^4}$$

= (90 x 3.038) + (1000 x 0.636)

= 273.42+636

= Rs.909.42

As the market price of the bond is lower than the present price (909.42), Vinoth can buy the bond.

The yield to maturity can be found out by trial and error method.

$$P_O = \frac{C_1}{1+y} + \frac{C_2}{(1+y)^2} + \frac{C_3}{(1+y)^3} + \frac{(C_4 + \text{Face value})}{(1+y)^4}$$

We can try 14% (Present value of Re.1 Table to be referred)

846.50 = [Present value of coupon rate in flows] + [Present value of face value]

= 90 x 2.913 + 1000 x 0.592 = 262.17 + 592 = 854.17

Which is close to Rs.846.5 As the calculated bond yield (14%) is higher, Vinoth can buy the bonds.

4.14. VALUATION OF CONVERTIBLE BONDS / DEBENTURES

Convertibles have the benefits of both debt (in the initial period) and equity (at a later stage). The terms of conversion decide the pricing of these convertibles, which is left to free market forces.

Need for convertible financing

Convertible financing is resorted to due to following reasons:

1. It gets the issue of equity shares delayed and hence dilution of EPS is avoided.
2. It gives enough time to the company for increasing its earnings, when it is in a position to expand equity base and service them.
3. Bond financing at the initial stage will earn leverage for the company as interest expense on debt is not taxable and in certain cases, the cost of debt financing is lesser than cost of equity.
4. Convertibles are preferred by companies which are in the initial stage of expansion or project financing of with low credit rating but having high potential for larger earnings in the near future.
5. Convertibles attract investors as they get shares at low premium on conversion and dividends, with capital appreciation to follow later.

4.14.1. Valuation of convertibles

The pricing of convertible portion is complicated whether it is fully convertible debentures (FCD) or partially convertible debentures (PCD). The coupon rate on debt portion will be lesser than market rate of non convertible debentures (NCD) of the same duration, due to the benefits enjoyed on conversion at a larger stage. When the conversion takes place within 18 months, they are as good as equity for debt equity ratio and if they are convertible within next 12 months, they will be eligible to rights after conversion or bonus declared during the preceding 12 months.

For instance, let us assume that the conversion period is 12 months, when the PCD will be converted into equity upto 50% and the rest will be NCD. Suppose, the expected gain on conversion is 2 per cent to 5 per cent, the debenture will be offered at a coupon rate of 12 per cent to 13 per cent, if the normal market rate is 14 per cent to 15 per cent. The coupon rate will be lower, if higher premium is permitted on conversion into equity.

4.14.2. Conversion Ratio

Conversion ratio is the number of equity shares to be issued for every one debenture of Rs. 100. If the conversion price is kept at Rs.50 with the market price ruling at Rs.60 or Rs.70, one debenture will be converted into two equity shares. Conversion value is the conversion price multiplied by the number of shares given for each debenture. If conversion value is Rs.50 and market price is Rs.60, the conversion premium will be Rs.10 per share, and the investor gains Rs.20 by holding a debenture of Rs.100 for a year. Suppose the interest rate is 12 per cent debenture holder will get 32 per cent (12% + 20%) as rate of return.

4.14.3. Conversion Premium

A company may offer a lesser premium for the initial period of one year and a larger premium for 18 months to 36 months. After that, any conversion offer is subject to call and put options. A call gives the right to buy from the company the share at the offer price if it is lower than the market price. A put option gives the right to sell the share eligibility to the company enabling the investor to buy shares in the market when the offer price is higher than market price. A call option is exercised when the market price is higher and if the market price is lower at the time of conversion Put option is exercised.

4.15. VALUATION OF RIGHTS

Right issue is a method of selling equity or debt securities to existing shareholders at concessional rates. They are attractive to investors, as they give incentives or discounts on market prices.

Rights pricing can be illustrated as follows:

Existing paid up capital = Rs.30 crores, Present issue of rights = Rs.20 crores, Ratio of rights issue is 3:2, which implies that an investor is entitled to two rights shares at a discount, if he holds three shares. Let us assume that the market price is Rs.40 and rights offer is based on their book value of Rs.30. The market price quoted cum rights is Rs.40. If three shares are bought, it will cost Rs.120. When registered with the company which will entitle the investor to get 2 shares at a price of Rs.30 each.

The total cost of 5 shares is Rs120 + Rs.60 = Rs.180

The cost of one share is 180/5 = Rs.36

The price of one right share thus becomes Rs.36, whereas the market price is Rs.40. The difference of Rs.4 is available subject to the last date of renunciation of rights by right holders. When the quotation becomes exrights, the market price would adjust to Rs.36, the benefit of Rs.4 being wiped out. The assumption here is that the company is a reputed one and is well rated. Its shares are in demand implying that there is a market for renunciations. However the brokerage costs and other incidental costs associated with the rights are not taken into account.

4.16. KEY TERMS

- **Equity Shares**

Equity represents the real ownership interest in a company. They have a residual claim. They can receive any payment only after the creditors and preference share holders are paid.

- **Preference shares**

Preference shares enjoy priorities over equity shares in terms of payments of principal at the time of liquidation of the company and of dividend during the continuity of company.

• Bond

A Bond is nothing but a legal document containing an acknowledgement of indebtedness by a company. It contains a promise to pay a prescribed rate of interest for a defined period and to repay the principal at a given data maturity.

• Time Value of Money

The time value concept assumes that the rupee received today has more value then a rupee to be received tomorrow.

• Yield to Maturity

Yield to maturity is the single discount factor which makes present value of future cash flows from a bond equal to the current price of the bond. It is the rte of return, the investor expects to earn if the bond is held till the date of maturity.

• Rights

Right issue is a method of selling equity or debt securities to existing shareholders at concessional rates. They are attractive to investors, as they give incentives or discounts on market prices.

4.17 SUMMARY

Equity shares, like other financial assets, can be valued as per the discounted cash flow technique. Other methods include valuation based on Accounting Values and Price Earnings method. Valuation of equity shares differs from bond valuation in respect of Uncertainty of Dividends, No Redemption Value and Relation to Earnings. Investment decision be based on the comparison of intrinsic value of a share with the market value. In dividend-based valuation, the value of equity shares is taken as the present value future stream of expected dividends. In case of valuation of equity shares based on expected dividends, there are three possibilities. Constant Dividend forever, Dividends growing at constant rate and Dividends growing at different rates for different years. If a company is not expected to pay dividends for few years then the share is first valued at the point of time when dividends are expected. Such value is then discounted to find out current value. PE ratio is a useful measure of the investors' assessment of the firm's growth opportunities.

Bond pricing or Bond valuation is made on the basis of future cash inflow, rate of discount and timing of cash flow. Yield to maruuity is a measure of the income an investor receives on his investment until maturity. Required rate is the minimum income a bond must offer in order to attract investors. A Yield curve may take a shape of upward sloping, downward sloping or flat.

Duration of a Bond is a measure of length of time over which the initial investment in a bond can be recovered back in present value terms. Immunization refers to shielding the bond investment against the interest rate risk.

4.18 ANSWER TO CHECK YOUR PROGRESS

I. 1. intrinsic 2. preference 3. constantly 4. constant 5. EPS

II. 1. (a) 2 (a) 3. (b)

III. 1. False 2. False 3. True 4. False 5. True

IV. 1. fixed income security 2. bond or debenture 3. SEBI
4. Yield to maturity 5. Immunization

V. 1. False 2. False 3. True 4. True 5. False

4.19 QUESTIONS / EXERCISES

Section - A

1. How does the growth factor of dividend affect the value of shares?
2. What is the relationship between earnings and value of a share?
3. How the valuation of equity shares different from valuation of Bonds? Give examples.
4. Explain the basic valuation models used for valuation of Bonds.
5. What do you mean by Yield to maturity?

Section - B

1. What are the different approaches to the valuation of an equity share?
2. How is the intrinsic value of Bond determined? Explain with suitable examples.
3. Following information is available in respect of a bond:

Face Value	Rs.10,000
Market Price	Rs.8,790
Coupon Rate	8%
Investors Yield	10%
Time to Maturity	4 Years

Find out the YTM and Intrinsic value of the bond. Should an investor buy this bond based on the YTM and intrinsic value?

4. An investor has invested his savings in a company from whom dividends are expected to grow @ 20% for 15 years and thereafter @ 7% forever. Find out the value of the equity share given that the current dividend per share is Re.1 and the required rate of return of the investor is 9%.

4.20. FURTHER READINGS:

1. Donald E.Fischer and Ronal J. Jordan "Security Analysis And Portfolio Management" - Prentice -Hall of India . New Delhi.
2. V.K. Bhalla "Investment Management" - S.Chand & Company Ltd., New Delhi.
3. R.P. Rustagi "Investment Analysis And Portfolio Management" - Sultan Chand & sons., New Delhi.
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UNIT - V EFFICIENT MARKET THEORY

Structure

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5.0 INTRODUCTION

The efficiency of a capital market is often defined in terms of its ability to reflect the impact of all relevant information in the prices of the securities. An efficient market is one which ensures that the prices of the securities quickly adjust to new information and reflect in the market prices of the securities. The information is reflected in share prices with such speed that there are no opportunities for investors to profit from publicly available information. An efficient market is one in which any new information is rapitly processed so that securities are properly priced. An efficient market is characterized by large number of profit driven individuals who act independently of one another.In addition, the new information arrives in the market in a random manner. The investors react to this new information immediately and buy and sell the securities until they feel that the current market price correctly reflects the information. Efficient market theory states that fluctuations in share prices are random and they do not follow any regular pattern.

5.1 UNIT OBJECTIVES

- To know the characteristics of efficient market
- To understand the impact of information on price behaviour of the stocks
- To analyse the various forms of efficient market

5.2 CHARACTERISTICS OF PERFECTLY EFFICIENT MARKETS

NOTES

The following is the list of features of perfectly efficient market.

5.2.1. Investors anticipate to make a fair return of investment

It is generally believed that investors relying either technical analysis or fundamental analysis do not generate abnormal returns.

5.2.2. Market is considered efficient only when sufficient number of investors feel that they are efficient

Investors who are very watchful tend to analyse securities very carefully. However, everyone starts believing that the market is efficient, thus not bothering to analyse securities.

5.2.3. Investment strategies known publicly do not provide abnormal returns

The investors must be aware of a strategy that provides means of identifying mispriced securities and they have to capitalize on the strategy.

5.2.4. There are some investors who exhibit excellent performance

It is also a fact that not all the investors are skillful. They are lucky enough to show impressive performance. Few investors make a forecast an upmarket for certain securities and the rest think otherwise. The former might have made an accurate forecast in the first year. A portion of the same investors who made accurate forecasts previously might have made reliable forecast and this may continue for a few more years.

5.2.5. Professional investors and ordinary investors are alike in selecting securities

As the prices reflect investment values, there is no point in searching for mispriced securities in order to generate abnormally high returns.

5.2.6. Future performance does not have past performance, as any indicator

Investors who fared better in the past may end up with failure now. Some might have had an element of luck, whereas others suffered due to misfortune.

Following assumptions are made, for the capital market efficiency theory to operate.

1. The required information is freely available and there is a quick flow of information.
2. All investors have the same level of access to information.3. Transaction costs, taxes and bottle necks are not found and they in no way, affect the free forces of market.4. All investors have access to lending and borrowing at the same rate.5. Investors are highly rational and behave in a cost effective and competitive manner to optimize returns.
6. Market prices absorb the market information quickly and the market is flexible enough to accommodate changes in technology, tastes and benefits of consumers, in a quick and efficient manner.

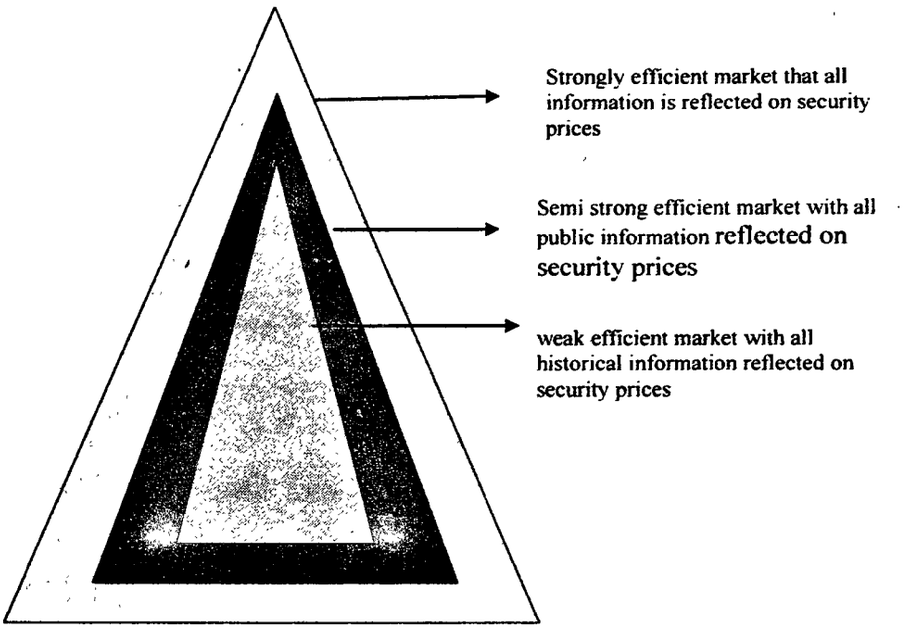
5.3 RANDOM WALK THEORY

It is the French Mathematician Louis Bachelier who wrote in his paper that security price fluctuations were random. Maurice Kendall also accepted this viewpoint. In 1970, Fama stated that efficient markets fully reflect the available information. According to Random Walk theory, changes in stock prices are independent of each other. The present price is in no way connected with the past trends and is randomly determined. It is the information flow that can influence the prices. Since information is free and independent the prices resulting from it are also free and independent. Only market efficiency promotes randomness and the fact that prices move independently has been proved by empirical studies. The equilibrium price of a stock is determined by demand and supply forces based on available information.

5.4 ASSUMPTIONS OF RANDOM WALK THEORY

1. An individual investor or a group of investors cannot have any influence over market operations.
2. Stock prices discount all informations quickly.
3. Markets are efficient and there is free and unbiased flow of information.
4. Every investor has free access to the same information and no one is considered to have superior knowledge.
5. The free forces of demand and supply make the market quickly adjusted to any deviation from the equilibrium level.
6. Only when the equilibrium level shifts, market prices tend to change only as information relating to the fundamentals.
7. There is no undue pressure or manipulation acting on the prices, as the latter move independently.
8. Nobody has better knowledge or inside information.
9. Investors are rational and thier of rational investment decision influence the demand and supply forces.
10. Institutional investors have to follow the market and market cannot be influenced by them
11. There is a large number of buyers and sellers, leading to perfect competition.

According to Fama, the efficient market hypothesis can be divided into three categories viz., weak form, semi-strong form and the strong form. The level of information considered in the market is the basis for this classification, represented by the following figure.



Thus, efficient market hypothesis is based on the flow of free and correct information and the absorption of it by the market. There are three types of informations affecting the market as shown in the figure viz., past prices and trends, other public information and inside information.

As indicated by the figure, the analysts have placed the market absorption and the related theory under the following heads viz., weak form of efficient market hypothesis, semistrong form and strong form.

5.5 WEAK FORM OF EMH

According to weak form of EMH, current prices reflect all information found in the past prices and traded volumes. It is closely related to the Random Walk Hypothesis. The past prices are already absorbed by the market, with the present prices moving independently of the past, (same as the Random Walk Hypothesis). The present trends are nothing but random variables and past data cannot be used to predict the future.

In a weak form of the market, the price of the stock and its intrinsic value diverse substantially and short term traders may earn a positive return.

5.5.1 Empirical Tests

Empirical tests were conducted both in the past and the present on the validity of Random Walk Hypothesis. Cowles, Jones and Kendall conducted research and showed that security prices moved in a random fashion. Investors who made analysis of the past fundamental factors involving price behaviour of the past went on to

pick up blue chips in their portfolio, but did not show up superior portfolio performance.

5.5.2 Filter Tests

These tests are based on the principle of fixing a filter level, varying from 0.5 per cent to 50per cent and examining how well price changes pick up both trends and reversals. For instance, when a stock moves up a filter point to 5 per cent, the stock is bought and is held for long. When it reverses by the same filter point 5 per cent, it is sold and a short position is taken. (A short position is one where one sells even without holding shares to deliver)

Filtering is thus screening of the important information affecting the prices from unimportant and to see how well the price changes picking up the trends and reversals.

When the filter level is low, the market fluctuations capture these levels and when the filter level is taken as large, the results do not prove the hypothesis. Even in case of small filters the investors do not gain by using filter tests when the transaction costs and charges are taken into account.

Stock prices do not move in an expected movement and reversals. Hence, one cannot make return in excess of the results warranted by the risks assumed by the investors. All these prove that the weak form of market efficiency holds good since it is not possible to gain more based on price information of the market.

5.5.3 Serial Correlation Tests

These tests were conducted by Moore to study the movement of stock prices. Serial correlation was used for the study. He measures the correlation co-efficient of changes in prices for a week with the price changes a week later and so on down the line. The result indicated that there is very low correlation coefficient implying that a price increase not showing the tendency to the price fall and vice versa in any predictable manner. Hence, the price changes of the current week do not depend on the past price changes to any significant extent.

Fama conducted the correlation tests on daily price changes, taking into account, the companies included in the Dow Jones Industrial average for five years. Serial correlation of price data of different periods of time did not show any significant positive results. Thus it is proved that the prices move in an independent fashion to a large extent.

5.5.4 Run tests

A run is a set of consecutive price changes in the same direction. The time series data on price changes of stocks are used to study whether there are dependencies among these series in terms of signs and reversal of signs. Fama used run tests to examine whether the changes in prices were likely to be followed by further price changes in the same direction. This can be illustrated as follows:

$$\text{Runs Test} = \frac{R - \overline{X}}{\sigma}$$

R = Number of runs

$$\bar{X} = \frac{2n_1n_2}{n_1+n_2}+1$$

$$\sigma^2 = \frac{2n_1n_2(2n_1n_2-n_1-n_2)}{(n_1+n_2)^2(n_1+n_2-1)}$$

Where,

$n_1 + n_2$ = Number of observations in each category

σ = Standard Deviation

Z = Standard normal variate

Following is the example used to explain the runs test

The stock prices of ABC companies during January - February 2009 were assumed to be as follows:

Date	Price	Runs	Date	Price	Runs
Jan 2	51		Jan 19	60.1	
3	52.50	+1	22	57.5	
4	53.4		23	55.8	-4
5	50.8		24	53.0	
6	50.3	-2	29	52.0	
7	50.9		Feb 2	55	
11	52.8		4	57	+5
12	53.4	+3	5	58.2	
13	56.7		9	57	-6
16	59.5		11	59	
			15	60.2	+7
			19	58.5	
			22	58	-8
			25	59	
			28	59.2	+9

NOTES

Runs test $Z = \frac{R - \bar{X}}{\sigma}$, where

R = Number of runs

$\bar{X} = \frac{2n_1n_2}{n_1 + n_2} + 1$

n_1 observation in increasing trend

n_2 observation in decreasing trend

$= \frac{2 \times 16 \times 9}{25} + 1$

$= 12.52$

$\sigma^2 = \frac{2n_1n_2(2n_1n_2 - n_1 - n_2)}{(n_1 + n_2)^2(n_1 + n_2 - 1)}$

$= \frac{(2 \times 16 \times 9)[(2 \times 16 \times 9) - 16 - 9]}{(16 + 9)^2(16 + 9 - 1)}$

$= \frac{75744}{15000}$

$= 5.0496$

$\sigma = 2.247$

$Z = \frac{9 - 12.52}{2.247} = -1.567$

As 95 per cent of area under normal curve lies within ±1.96 standard deviation of the mean. The runs have occurred by chance since the calculated value that is, -1.567 is less than -1.96.

There are certain other tests conducted in this regard. For instance, the research conducted by Osborne indicated that stock prices moved in a Brownian fashion. (Brownian motion in physics is a kind of Random Walk). It means that simulation tests conducted by a few authors showed that the mechanism of Random Walk generated variables which are similar to movement of stock prices. For instance, Robert's research in simulation tests confirmed that price changes in the present period are independent of past trends.

Sharpe and Jensen studied relative performance of mutual funds. The hypothesis that the mutual funds could earn extraordinary returns and, constantl

achieve a higher average performance as they have better access to insider information, was tested and was found void, Blume and Williamson in the studies proved that the mutual fund performance was not extraordinary or superior to average market performance.

5.6 SEMI STRONG FORM

According to semi strong form of efficient market hypothesis, the market absorbs quickly and efficiently the price information and all publicly available information. Such public information is found in the financial reports, balance sheets, profit and loss accounts, earnings and dividend reports, financial results etc. Any other information that affects financial position such as liquidity, financial structure, solvency etc. is also found useful and is absorbed by the market in the price formation. Thus, the prices not only reflect the past price data, but also available information which relates to the earnings of the company, dividend, bonus issue, mergers etc. Semi strongly efficient market offers profits to a few insiders as a short run price changes.

Timely and correct dissemination of information is needed to have semi strongly efficient market. However, the semi strong form is not well supported by empirical evidences, Fama, Fisher, Jenses and Roll analysed the effect of stock split on share prices. The study threw light to the existence of semi strong form market and it analysed whether stock splits lead to an increase in the wealth of shareholders. A method was developed to calculate abnormal returns by using the simple regression technique.

$$RR_{nt} = \alpha_1 + \beta_1 r_{mt} + e_{nt}$$

where

RR_{nt} = Realised return for the nth stock in the time period t

r_{mt} = realized return for index in time period t

c = regression coefficients

e_{nt} = error term or residual for time period t

normal return = $\alpha_1 + \beta_1 r_{mt}$ and

abnormal return ARnt = e_{nt}

Such an analysis for estimating abnormal return is called as residual analysis.

In 1972, Scholes conducted a study to analyse the reaction of security prices to the offer of secondary stock issues. The study showed that the price of security decreases when the company issue the securities indicating that such an offer as bad news. However, secondary offerings to investors, banks and insurance companies were not viewed negatively and the security prices did not fall significantly.

Check Your Progress

I. Fill in the Blanks.

1. ..... of efficient market theory assumes that current prices reflect the information found in the past prices and traded volumes.
2. In the ..... Or market, the security prices reflect all the publicly available information.
3. In the ..... of market stock prices reflect all the information

II. Choose the correct answer.

1. which of the following statement defines the efficient market?
(a) Free entry and exit of the investors.
(b) The market that is closely watched by the regulatory agencies
(c) Stock prices fully reflecting all the market information.
(d) The stock exchange is fully automated.
2. In the weak form of market stock prices reflect
(a) The past prices and traded volumes (b) the demand for the scrip
(b) the country's economic conditions. (d) the past price of the scrip

Pettit and Watts examined the reaction of market when changes in dividends were announced. They concluded that there was no evidence that a firm's dividend announcement affected the firm's price in the period which immediately followed the announcement. Beaver conducted a study which looked into the information of the announcements of annual earnings and the speed of changes in the pries of securities. He examined the level of trading volume and size of changes in prices. He inferred that the absolute values of price changes and levels of trading were significantly higher during the week of announcement. However, they returned to (original) pre announcement levels after a week. This leads to a conclusion that abnormal returns cannot be realized after the announcement was made.

3. which of the following evidences the semi-strong efficient market theory forms?
(a) Weekend effect.
(b) Low P/E ratio effect
(c) Effect of the stock split
(d) The size effect
4. A run in the stock price is
(a) An uninterrupted sequence of either fall or rise in stock prices.
(b) An alternative sequence of stock price movement
(c) An interrupted sequence of either fall or rise in stock prices.
(d) A residual analysis.

III. State whether the following statements are True or False:

1. Efficient market theory assumes that the market is so supreme that no individual investor or group can influence it.
2. the Filter rule test is intended to find out if any abnormal return could be earned using past price date.
3. Under the hypothesis of the strong form of efficient market theory. The security prices do not represent all the information.

5.7 STRONG FORM

In the strong form of market, it is stated that all information is represented in the security prices in such a way that there is no opportunity for any person to make an abnormal gain on the basis of any information. The strong form of efficient market hypothesis maintains that all available information including the publicly available is useless to an investor. Most of the research work indicate that efficient market hypothesis in the strongest form does not hold good. Collins listed the strong form of the market in 1975 and showed that the consolidated earnings of a multi product firm would be accurately predicted by using data as segment and profit rather than making use of consolidated historical earnings data.

Friend, Sharke and Jensen tested the performance of mutual funds. The hypothesis was that mutual funds could earn extraordinary return and constantly achieve a higher than average performance as they are likely to have access to inside information, not publicly known, different samples of firms and time periods were chosen for the study. However, it was inferred that the mutual funds were not better in performance than an individual investor who makes purchase of same securities with the same risk. Mutual funds are expected to earn extraordinary return but empirical evidence shows otherwise.

5.8 RANDOM WALK MODEL - AN OVERVIEW

Random Walk theory mainly deals with the successive changes rather than the price or return levels. The theory postulates that the market may have imperfections like transaction costs and delay in disseminating relevant information to all market investors. However these sources of inefficiency may not result in excess returns above the level of normal or equilibrium.

The random theory is criticized on the ground that it does not say anything about the relative price changes. It does not make any remark on the decomposing of price in the market due to industry or firm factors. The random walk hypothesis

deals only with absolute price changes, but not with the relative prices. The hypothesis is entirely consistent with the upward and downward movement of stock prices.

There are studies to prove that their stocks with low price earning ratios yield higher returns than stocks with higher price earnings. For instance, a study made by Basu indicated that low price earning portfolio experienced superior returns related to the market and high P/E portfolio performed badly related to overall market. This contradicts semi-strong form of efficient market hypothesis.

Several studies confirmed the existence of small firm effect which maintains that investing in small firms that is, those with low capitalization, offers superior risk adjusted returns. The average returns for the smallest firms and the largest firms (10 each) were computed with small firm portfolio gaining upper hand over that of large firm. There is also weekend effect as in Bombay stock exchange it was observed that there is heavy buying in blue chips on Mondays, and heavy selling on Fridays.

5.8.1 Implications of random walk for technical and fundamental analysis: Value of the Analyst

The most general implication o the efficient market hypothesis is that most security analysis is logically incomplete and valueless. For true believers in efficient markets, an analyst's recommendations to buy or sell must be predicted on the significant difference between the analyst's views and those of the other investors whose opinions have established the stock's current market price.

Economic of Scale in Security of Portfolio Management

The question of efficient allocation of human resources is also stepped up by increasing competition. Analysis of securities costs about same whether the amount available for investment is Rs. 1000 or 10 crores. Thus if each endeavour could produce superior returns of, say, 0.5 per cent, they state this would produce additionsl returns of Rs. 5 on the investment of Rs. 1000 and of Rs.5 crores on the investment of Rs.1.000 crores. On this basis they conclude that security research might make sense for large financial institutions having crores of rupees to manage while it would not make sense for investors with smaller sums.

Consistently Superior Performance

Another implication of the efficient markets theory is the extreme unlikelihood that one can consistently earn superior rate of return by analyzing public information in conventional ways. The only hope for superiority in results lies in seeking unique ways of forming expectations about the prospects for individual companies.

5.9 KEY TERMS

- **Efficient Market Hypothesis**

The efficient market hypothesis assumes that the information travels in a random independent fashion and that the prices make an unbiased reflection of all the currently available information.

- **Weak form**

In the weak form of efficiency, the security prices reflect all past data i.e., all historical information about the company is already reflected in the current prices.

- **Semi-Strong form**

In the semi-strong form of market efficiency, the current prices in the capital market not only reflect the historical information but are also able to rapidly adjust to all the publicly available information.

- **Strong form**

In the strong form of market, it is stated that all information is represented in the security prices in such a way that there is no opportunity for any person to make an abnormal gain on the basis of any information.

5.10 SUMMARY

Efficient Market Hypothesis assumes that all publicly available information is reflected in the securities prices and it is difficult for an investor to outperform the market. Three Levels of efficiency in the capital market are weak form, semi-strong form and strong form. In the weak form of efficiency, the security prices reflect all past data i.e., all historical information about the company is already reflected in the current prices. In the semi-strong form of market efficiency, the current prices in the capital market not only reflect the historical information but are also able to rapidly adjust to all the publicly available information. In the strong form of market, it is stated that all information is represented in the security prices in such a way that there is no opportunity for any person to make an abnormal gain on the basis of any information. A market is said to be inefficient when there is a time lag between the availability of information and its absorption in the security prices. Efficient Market Hypothesis rules out the validity and usefulness of fundamental and technical analysis.

5.11 ANSWERS TO CHECK YOUR PROGRESS

I. 1. weak form 2. Semi-strong form 3. strong form

II. 1.(c) 2.(a) 3.(c). 4.(a)

III. 1.True 2. True 3. False.

5.12 QUESTIONS / EXERCISES

Section - A

1. What are the characteristics of an efficient market?
2. What are the assumptions of random walk theory?

3. What are the texts can be applied to check the validity of weak form of efficient market hypothesis?

Section - B

1. Briefly explain the efficient market hypothesis in each of its three forms.
2. If the security markets are in fact strong-form efficient, should anyone decide to become a security analyst or an active portfolio manager? What would the impact of such a decision be on the strong - form efficiency?
3. The random walk hypothesis resembles the fundamental school of thought but is contrary to the technical analysis - Discuss.

5.13 FURTHER READINGS

1. Donald E.Fischer and Ronal J. Jordan "Security Analysis And Portfolio Management" - Prentice -Hall of India , New Delhi.
2. V.K. Bhalla "Investment Management" - S.Chand & Company Ltd., New Delhi.
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UNIT - VI PORTFOLIO MANAGEMENT

Structure

6.0 INTRODUCTION

A portfolio is a mixture of securities. It is combination of various securities viz., stocks, bonds and money market instruments. As it is not desirable for any investors to invest all of his funds in one individual security / Asset, it is essential that every security / Asset should be viewed in a portfolio context. An investor, while constructing his Portfolio, is faced with the problem of choosing a few from amongst a large number of securities. His attempt would be to select the most desirable securities and to allocate his available funds over these securities in the most rational way. His choice would depend upon the risk-return characteristics of individual securities and that of the Portfolio. It may be noted that the risk-return characteristics of a Portfolio differ from those of the individual securities combined into it.

Portfolio management is concerned with the determination of future risk and return in holding various blends of securities in order to obtain optimum return with minimum risk. In a diversified portfolio, actual return of the portfolio is close to the anticipated one, as the poor performance of a few securities is offset by the good performance by the other securities.

6.1 UNIT OBJECTIVES

- To Understand the concept of Portfolio and the principles to be followed to construct a Portfolio
- To know the method of computing Portfolio return and risk
- To explain how to determine efficient frontier using Markowitz model

6.2 MEASUREMENT OF PORTFOLIO RETURN

The expected return of a portfolio depends on the expected return of each of the securities entailed in the portfolio.

The following table illustrates the point

Security and portfolio values

Security	No.of shares	Current price per share	Current value	Expected share price	Expected share value
ABC	200	25	5000	28	5600
DEF	100	12	1200	15	1500
IJK	250	30	7500	40	10000
XYZ	150	20	3000	25	3750
			16700		20850

The expected holding period value Relative for the portfolio = $\frac{20850}{16700} = 1.25$

That gives expected return of 25%.

The expected return of Portfolio is simply the weighted average of the returns of individual securities that are comprised in the Portfolio. The weights are the fraction of the total funds invested in a particular security.

The expected return of Portfolio may be stated as:

$$\text{Return of Portfolio} = \sum_{i=1}^{n} Wi \, X \, ri$$

Where Wi = Proportion (weight) of funds employed in security i

ri = Expected return of security i and n = number of securities in the Portfolio

This is illustrated from the following table

Security	Proportion of current value	Expected return (%)	Contribution to portfolio's expected return
ABC	.30	20	6
DEF	.07	15	1.05
IJK	.45	12	5.4
XYZ	.18	20	3.6
	1.00		16.05

Investors, who want to maximize their returns, may invest all their funds in one security which yields the highest returns. But, it is advisable to diversify in order to reduce risk.

6.3 MEASUREMENT OF PORTFOLIO RISK

Actual return from a security may not be equal to the expected return. There is an element of probability of loss. A useful measure of risk has to be considered in order to take into account various possible outcomes of losses and their magnitudes. The standard deviation may serve the purpose.

Event	Probability (P)	Deviation of expected return from the actual (D)	D^2	PD^2
Good	0.40	+10.0	100	40
Normal	0.30	+20.0	400	120
Poor	0.30	-10.0	100	30
				190

Variance = weighted average squared deviation
Standard deviation = $\sqrt{190}$ =13.7840

Standard deviations of returns of securities are used to determine the standard deviation of portfolio's return. Hence, it is preferred for investment analysis.

Portfolio risk

The portfolio risk has to be estimated using the variance of each individual security in the portfolio and the correlation co-efficient of each security with each of other securities.

A positive value of co-variance shows that the returns of securities in a portfolio tend to occur in the same way whereas negative covariance signifies offsetting of returns that is, a few securities showing better than expected results, and a few others fall below the expectations.

The relationship between the covariance and correlation co-efficient can be represented as follows:

$$r_{xy} = \frac{C_{xy}}{\sigma_x \sigma_y}$$

where,

r_{xy} = Coefficient of correlation between return on x and return on y.

C_{xy} = Covariance between return on x and return on y

σ_x = Standard deviation of return for x

σ_y = Standard deviation of return for y

For two securities namely x and y the relationship between the risk of a portfolio of two securities, and the relevant variables. The following formula is used.

$$\sigma^2_p = x^2 \sigma^2_x + y^2 \sigma^2_y + 2xy\, r_{xy} \sigma_x \sigma_y$$

Where, σ^2_p = the variance of return for the portfolio

2_x = variance of return for security x

2_y = variance of return for security y

X = proportion of portfolio's value invested in security x

Y = proportion of value of portfolio invested in security y

C_{xy} = covariance between the return on security x and the return on security.

When a portfolio has more than two securities, the formula for the variance of portfolio is,

$$V_p = \sum_{X=1}^{N} \sum_{Y=1}^{N} x\, y\, r_{xy}\, \sigma_x\, \sigma_y$$

Where N = Number of securities.

To ascertain the percentage of investment in each of the securities in the portfolio, resulting in the lowest risk, the following formula is used.

$$X = \frac{\sigma_y^2 - c_x \sigma_y r_{xy}}{\sigma_x^2 + \sigma_y^2 - \sigma_x \sigma_y r_{xy}}$$

Where X = Percentage of investment in security X

σ^2_y = Variance of return for security y

2_x = variance of return for security x

σ_x = Standard deviation of return for x

σ_y = Standard deviation of returns for y

r_{xy} = correlation co-efficient between x and y

Problem 1:

Returns on investment in two companies for 5 years are as follows.

Companies	Percent return for the years				
	1	2	3	4	5
ABC	25	20	-4	8	6
DEF	22	24	-6	2	10

1. Determine standard deviation of returns of each company.
2. Calculate correlation co-efficient of returns of companies.
3. What would be the standard deviation of portfolio and average yearly returns, when equal amount of money was invested in each of the securities?
4. State the percentage of investment in each to achieve the lowest risk.

Ans:

a) Average return for ABC $= \frac{25+20-4+8+6}{5} = 11\%$

for DEF $= \frac{22+24-6+2+10}{5} = 10.4\%$

Standard Deviation for ABC

$$\sigma_{ABC} = \frac{\sqrt{(25-11)^2+(20-11)^2-(-4-11)^2+(8-11)^2+(6-11)^2}}{\sqrt{5}} = 10.35\%$$

$$\sigma_{DEF} = \frac{\sqrt{(22-10.4)^2+(24-10.4)^2+(-6-10.4)^2+(2-10.4)^2+(10-10.4)^2}}{\sqrt{5}}$$

$$= \frac{\sqrt{134.56+184.96+268.96+70.56+0.16}}{\sqrt{5}} = 11.48\%$$

b) To find covariance term

$$\text{Cov} = \frac{\sqrt{(25-11)(22-10.4)+(20-11)(24-10.4)+(-4-11)(-6-10.4)+(8-11)(2-10.4)+(6-11)(10-10.4)}}{\sqrt{5}}$$

$$= \frac{\sqrt{162.4+122.4+246.25.2+2}}{\sqrt{5}}$$

$$= \frac{23.622023}{2.2360679} = 10.56\%$$

$$\text{The correlation coefficient ®} = \frac{10.56}{(10.35)(11-48)}$$

$$= \frac{10.56}{118.818} = 0.09$$

c) $\sigma_p = \sqrt{(0.5)^2(10.35)^2+(0.5)^2(11.48)^2+2(0.5)(0.5)(10.35)(11.48)(10.09)}$

$$= \sqrt{26.78+32.95+5.35} = 8.07\%$$

E(Rp) = 0.5(11) +0.5(10.4) = 10.7%

d) To determine percentage investment in each to reduce the lowest risk.

Minimum variance equation is used

$$W_{ABC} = \frac{\sigma^2{}_2 - \sigma_1\sigma_2 r_{1,2}}{\sigma^2{}_1 + \sigma^2{}_2 - \sigma_1\sigma_2 r_{1,2}}$$

NOTES

$$= \frac{(11.48)^2 - (10.35)(11.48)(0.09)}{(10.35)^2 + (11.48)^2 - (10.35)(11.48)(0.09)}$$

$$= \frac{121.09678}{238.9129 - 10.69362} = 53\%$$

WDEF = 47%

Problem 2

Mr. Balan has a portfolio of three securities. The expected rate and amount of investment in securities are as follows:

Security	A	B	C
Expected Return	0.15	0.10	0.12
Amount Invested	Rs.40,000	Rs.30,000	Rs.30,000

Ans: The expected return on Balan's portfolion is

$$E(Rp) = \frac{40,000}{1,00,000} \times 0.15 + \frac{30,000}{1,100,000} \times 0.10 + \frac{30,000}{1,00,000} \times 0.12$$

= 0.06+0.03+0.036

= 0.126

= 12.6%

Problem 3

Baskar has two-stock portfolio. Stock ABC has a standard deviation of returns of 0.4 and stock XYZ has a standard deviation of 0.6. The correlation coefficient of two stocks returns is 0.3. He has equal amounts of each stock calculate portfolio standard deviation of two stock portfolio.

Answer

$$\sigma_p = \sqrt{(0.5^2 \times 0.4^2) + (2 \times 0.5 \times 0.5 \times 0.4 \times 0.6 \times 0.3) + (0.5^2 \times 0.6^2)}$$

$= \sqrt{0.04+0.036+0.09} = 0.407$

Problem 4

You are given the following information

Probability	Returns on x	Return on y
0.10	-2	-3
0.20	10	5
0.40	12	10
0.20	15	14
0.10	20	19

(i) Find out the expected rates of return for x and y.

(ii) If equal investment is made on each, what would be the return?

(iii) If the proportion is 40% and 60% and then 60% and 40%, what would be the expected rates of return?

Return on x = $\sum_{i=1}^{N} R_i P_i$

= -2(0.1)+10(0.2)+12(0.4)+15(0.2)+20(0.1)

=-0.2+2+4.8+3+2

= 11.6

Return on y = -3(0.1)+5(0.2)+10(0.4)+14(0.2)+19(0.1)

= -0.3+1+4+2.8+1.9

= 9.4%

ii) If an investor invests equal proportion,

Returns of the portfolio = (0.5x11.6) +(0.5x9.4)

= 5.80+4.70

= 10.50%

iii) a) 40% on security x and 60% on security y

Return Rp = 0.4x11.6) +0.6x9.4)
=4.64+5.64 =10.28
b) 60% on security x and 40% on security y
Return Rp = (0.6x11.6) +0.4x9.4
=6.96+3.76
=10.72

6.4 CONSTRUCTION OF PORTFOLIO USING MARKOWITZ MODEL

Harry Markowitz model, shortly knows as HM Model, was developed by Harry Markowitz in 1952. It analyses the various possible portfolios of a given number of securities and identifies the most efficient portfolio.

Harry Markowitz introduced new concepts of risk measurement which are quite useful while selecting portfolios. In fact, Markowitz started his work by taking into account the idea of risk aversion of the average investor. Generally, the average investors wish to maximize their return with least risks. With this objective in mind, Markowitz related his model to the analysis of risk and return and their interrelationship. He employed statistical analysis for measuring risks and mathematical programmes for selecting investments for Portfolio. His framework analysis paved the way for the concept of efficient portfolio. An efficient portfolio is one which assures the investor the highest yield for a given level of risk or lowest risk for a given level of return. As HM model is based on the expected returns (means) and the standard deviation (variance) of different portfolios, it is also called Mean - Variance Model.

Assumptions of Markowitz theory:

Markowitz theory is based on the following assumptions.

1. Investors are generally rational. They attempt to maximize their return from investment with minimum risk.
2. The market is efficient and all investors have a complete knowledge about the market. This is possible because the investors have a free access to correct and precise information on returns and risks.
3. The investment decisions taken by the investors are based on the expected rate of return on an investment. Variance or standard deviation of these returns is the important parameter for ascertaining the worthiness of the investment.
4. Security returns are correlated in such a way that an investor could get maximum returns at a given level of risk.
5. Before selecting any portfolio, the factors to be considered are (i) returns, (ii) standard deviation; and (iii) co-efficient of correlation.
6. The markets are so efficient that they can absorb the information quickly and perfectly.

7. Investors are risk-averse and they attempt to minimize risk and maximize return.
8. The investor can reduce his risk if he adds more investments to his portfolio.

Illustration

There are two stocks viz. ABC and XYZ.

	Stock ABC	Stock XYZ
Return%	11 or 17	20 or 8
Probability	0.5 for each return	0.5 for each return

Expected return for ABC	=	(0.5x11) + (0.5x17)	=	14
Expected return XYZ	=	0.5(20) +0.5(8)	=	14
Variance for ABC	=	$0.5(11-14)^2 + 0.5(17-14)^2$	=	9
Variance for XYZ	=	$0.5(20-14)^2 + 0.5(8-14)^2$	=	36

Standard Deviation for ABC $= \sqrt{9}$

Standard Deviation for XYZ $= \sqrt{36}$

Both ABC and XYZ stocks have some expected returns. However, XYZ stock is riskier than ABC as XYZ has standard deviation of 6. When return from ABC is higher, return from XYZ is lower and vice versa. If an investor has either ABC or XYZ, he will stand to lose during bad performance.

The return when the investor makes investments in both the stocks can be determined by, N

$$Rp = \sum_{i=1}^{N} X_i R_i, \text{ where}$$

R_p = return on the portfolio

X_i = proportion of investment in security 1

R_i = Expected return of security 1

Suppose the investor decides two -thirds of investment in security 1 viz., ABC and one-third in security 2 namely XYZ, the return is determined as follows:

$$1 \text{ possibility} = \left(\frac{2}{3}x11\right) + \left(\frac{1}{3}x20\right) = 14$$

NOTES

II possibility $= \left(\frac{2}{3}x17\right)+\left(\frac{1}{3}x8\right) \quad = \quad 14$

The investor makes gains in both the situations even if the worst performance occurs, than by holding them individually.

The portfolio risk also gets reduced. The portfolio risk will be,

$$\sigma_p \quad = \quad \sqrt{X_1{}^2\sigma^2{}_1 + X^2{}_2\sigma^2{}_2 + 2X_1X_2(r_{12}\sigma_1\sigma_2)}$$

Where

	=	Standard deviation of portfolio
X_1	=	Proportion of stock X_1 in portfolio
X_2	=	Proportion of stock X_2 in portfolio
σ_1	=	standard deviation of stock X_1.
σ_2	=	Standard deviation of stock X_2.
r_{12}	=	Correlation coefficient of X_1 and X_2

$$= \quad \frac{\text{Covarianceof } X_{12}}{\sigma_1\sigma_2}$$

$$\text{Covariance of X12} \quad = \quad \frac{1}{N}\sum_{i=1}^{N}\left(R_1-\bar{R}_1\right)\left(R_2-\bar{R}_2\right)$$

$$= \frac{1}{2}[(11-14)(20-14)+(17-14)(8-14)]$$

$$= \frac{1}{2}[-18-18]$$

$$= \frac{-36}{2} = -18$$

$$\text{Correlation coefficient} = \frac{\text{Co variance of } X_{12}}{\sigma_1 \sigma_2}$$

$$= \frac{-18}{3x6} = -1$$

The correlation co-efficient is -1.0, which indicates that there is perfectly negative correlation between the returns of ABC and XYZ. If the correlation coefficient is 0,it implies, that the returns of the securities are independent.

$$\text{Portfolio risk} = \sigma_p = \sqrt{\left(\frac{2}{3}\right)^2 x9 + \left(\frac{1}{3}^2 x36\right) + 2x\frac{2}{3}x\frac{1}{3}(-1x3x6)}$$

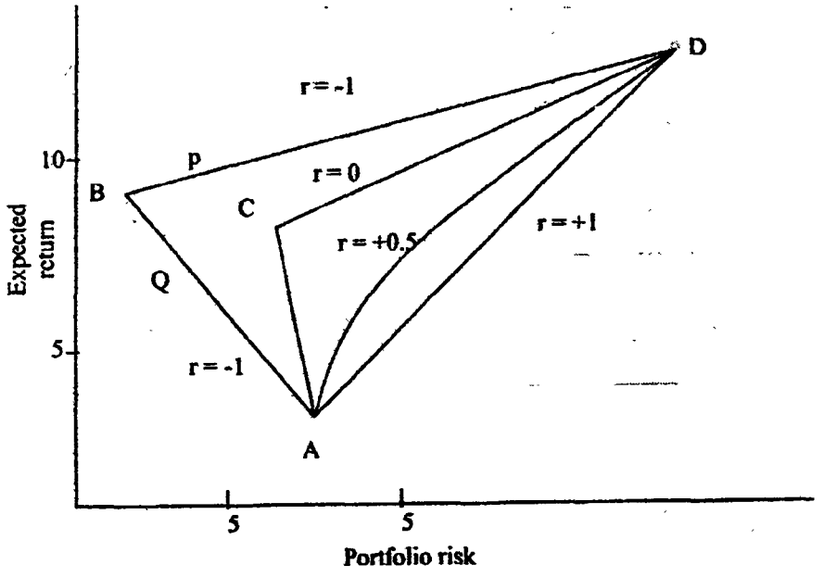
$$= \sqrt{4+4-8} = \sqrt{0}$$

Portfolio risk is zero when the securities are perfectly negatively correlatd (-1). The results can be summarized as follows:

Stock ABC (Percentage)	Stock XYZ(Percentage)	Portfolio risk(σ_p)
100	0	3
0	100	6
66.67	33.33	0

Thus, by intelligent balancing of proportion of investments in different securities, the portfolio risk can be minimized. For different values of correlation coefficient and different proportions of securities ABC and XYZ, expected returns and portfolio risks can be calculated. The results can be presented in the form of a graph a shown below.

NOTES

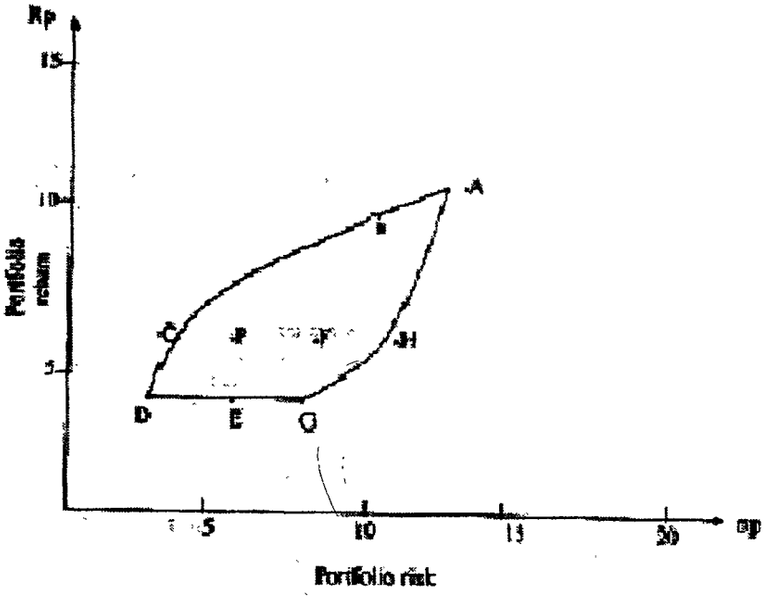


The portfolio risk(p) is shown in the X axis and portfolio return (Rp) in the Y axis. Point A represents 100 per cent investment on security X and point D represents 100 per cent holdings on Y. the straight line (AD) r=+1 shows that there is an increased portfolio risk when there is an increase in portfolio return. In the line segment ACD. rxy=0. CD contains portfolios which are superior to those along the line segment AC. According to Markowitz, all portfolios along the ACD line segment are possible. The line segment ABD (rxy=-1) shows perfect inverse correlation. Portfolios on line segment BD show increased returns. Portfolio on line segment BD shows superior returns to those on line segment AB. For instance, with the portfolio risk remaining the same, point P on BD has higher returns than point Q on AB. Thus it can be concluded that Markowitz diversification can lower the risk if the securities in the portfolio have low correlation coefficients.

6.5 DETERMINING MARKOWITZ EFFICIENT FRONTIER

The portfolios which offer the highest return at particular level of risk are known as efficient portfolios. It can be illustrated by means of the following table and the diagram

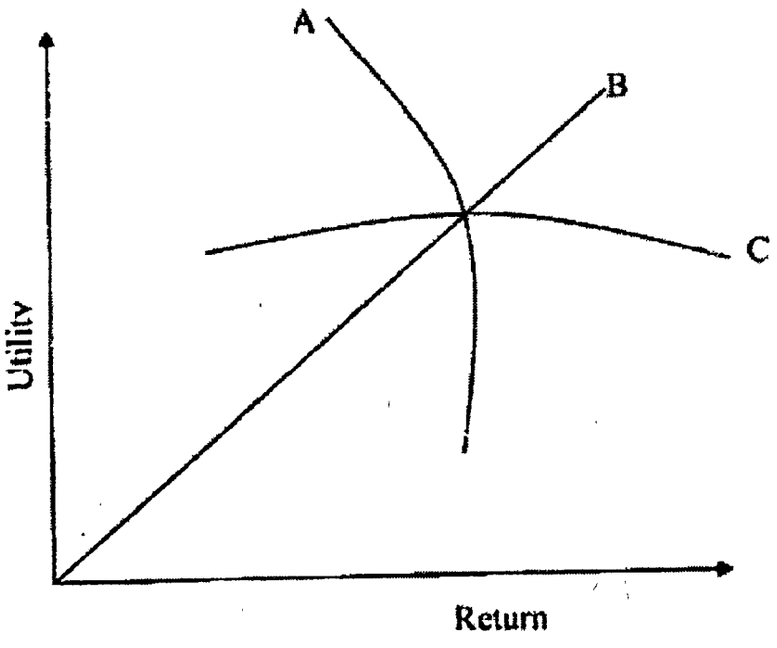
Portfolio	Expected Return (in %) (Rp)	Risk(σ_p)
A	18	13
B	15	8
C	10	2
D	8	1
E	8	4
F	10	6
G	8	6
H	10	8
P	9	4



All the portfolios fall along or with in the line ABCDEGH. Outside this perimeter, portfolios do not fall as there is no existence of expected return and risk combination. In the above diagram, B is more attractive than H, as for the same level of risk of 8, there is higher return for B (15percent) C and F have same returns of 10 percent. F has higher risk than C. D has same returns like E and G, but D is found superior to both as it has the lowest risk of all. Hence in the above diagram, A,B,C and D are efficient portfolios. ABCD line is thus considered as efficient frontier on which all attachable and efficient portfolios are plotted.

6.6 UTILITY ANALYSIS

It is essential to make utility analysis to determine the portfolio which maximizes its utility. It is the satisfaction, the investor enjoys from the returns of the portfolio. Utility increases with an increase in the return. There are three types of investors as assumed by this analysis viz., investor avoiding risk, investor who is indifferent and risk seeking investor. For instance, in a gamble costing Rs.2, winner will get Rs.4 and the loser will get nothing. The chances of occurrence of both are 50 per cent each. The expected value of investment is (0.5x4) + (0.5x0)=Rs.2. Hence it is a fair gamble. But it is rejected by the investor who avoids risk as disutility of loss is greater for him. The indifferent investor is risk neutral. Risk seeker will select such a fair gamble. According to him, the utility of investment is more than utility of non-investment. This can be illustrated by means of utility curves.



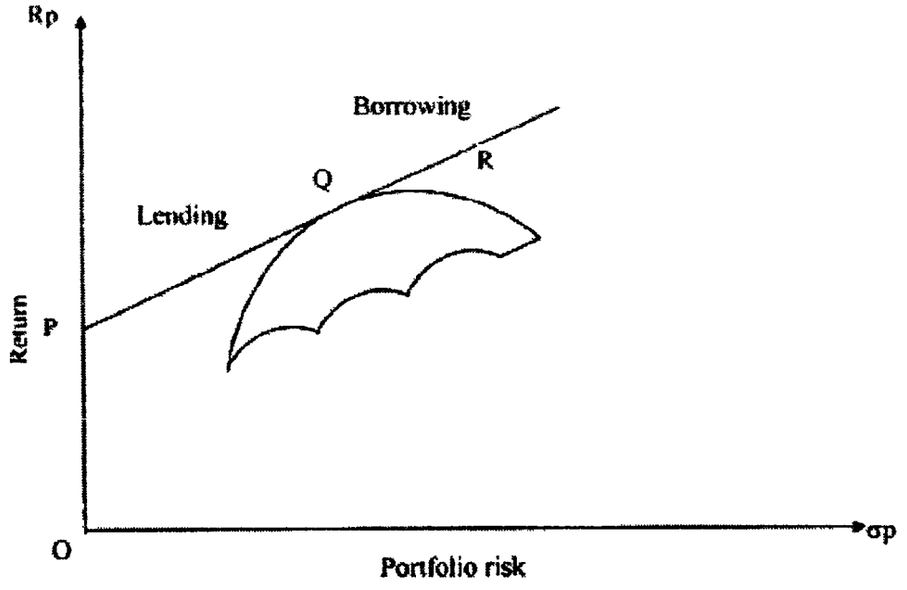
There are three utility curves viz, A,B and C. A shows upward sloping, implying increased marginal utility, obviously the risk seeker B shows constant utility, preferred by indifferent investor and C represented diminishing marginal utility. (The risk avoider)

The utility curve of risk seeker is negatively sloped and converges towards the origin. Lower the risk of the portfolio, happier will be the risk avoider. The risk seeker is willing to undertake greater risk for smaller returns.

6.7 RISK FREE ASSET

Risk free assets have no default risk and interest risk and there is full payment of principal and interest amount. The risk free asset has certainty of return and has zero standard deviation. Generally they are fixed income securities.

When the risk free asset is introduced and the investor invests a portion of his investment on risk free asset and the rest on risky assets, efficient set of portfolios will witness a change. It is assumed that investor is able to borrow money at risk free rate of interest.



In the above diagram, OP is the return with zero risk. As one moves along PQ, combinations of risky and risk less assets are found. The investor up to PQ, makes investments in both fixed income securities by lending some amount of money and risky investments with in the point PQ, that is he uses his own funds. But, if he goes beyond Q, he has to make the borrowings. So, portfolios between P and Q are lending portfolios and beyond Q are borrowing portfolios, risk free securities

Check Your Progress

I. Fill in the Blanks:

1. ..... is statistically measured by the variance or the distribution around the mean.
2. ..... includes portfolios which give more return for the same level of risk or same return with lesser level of risk.
3. In a two-stock portfolio, the minimum attainable risk and the lowest return would be ..... Portfolio.

II. Choose the correct answer:

1. Diversification reduces
(a) Inflation risk
(b) Market risk
(c) Interest rate risk
(d) Unique risk.
2. Which one of the following is not an efficient portfolio?
(a) Portfolio which gives the highest return at a particular level of risk
(b) Portfolio which gives minimum risk for given levels of return.
(c) Portfolio which gives a higher return at the same risk of lower risk.
(d) Portfolio which gives lower return as the lower risk.

fall on PQ segment, which reduces the risk more than the reductions as far as returns are concerned.

Difficulties in Applying Markowitz Model

The Markowitz Model was theoretically elegant and conceptually sound. However, its serious limitation was that it related each security to every other security in the Portfolio, demanding the sophistication and volume of work well beyond the capacity of all but a few analysts. To illustrate, a Portfolio with N assets, the number of correlation that must be calculated is N (N-1)/2. Thus for a 14-securities Portfolio, 91 correlation are need to estimate Portfolio variance. Consequently, its application remained severely limited.

Problem

Two securities have the following risk and return characteristics.

$R_x = 20$ $R_y = 18$ $\sigma_x = 15$ $\sigma_y = 18$

Determine the minimum risk portfolio for x and y

Answer

$$\text{For X} = \frac{\sigma_y}{\sigma_x + \sigma_y}$$

$$= \frac{18}{15+18} = \frac{18}{33} = 54.5\%$$

For Y = 1-.545 = .455 = 45.5%

Problem

The P and Q coporations, have the following risk and returns.

$R_p = 15\%$ $R_q = 17\%$

$\sigma_p = 25\%$ $\sigma_q = 20\%$

$r_{pq} = 0.5$

Determine minimum risk portfolio.

Answer.

$$Xp = \frac{\sigma^2_Q - r_{PQ}\sigma_P\sigma_Q}{\sigma^2_P\sigma^2_Q + 2r_{PQ}\sigma_P\sigma_Q}$$

3. Corner Portfolio is one with
(a) Lowest return and risk combination
(b) Nil return
(c) Excess return
(d) Unexplained variance
4. The systematic risk is arising due to occurrence of
(a) Micro events
(b) Macro events
(c) Both
(d) None of the above
5. Shares having betas less than 1 can be said to be
(a) Defensive
(b) Aggressive
(c) Neutral
(d) None of the above

III. State whether the following statements are True or False:

1. Diversification reduces the unsystematic risk component of the portfolio.
2. If risk free assets are added with risky assets. it would minimize risk
3. Efficient frontier consists of a large number of efficient portfolio
4. All portfolios lying on the efficient frontier are efficient but not optimal.

$$= \frac{20^2 - 0.5x25x20}{(25^2 + 20^2) - 2x0.5x25x20}$$

$$= \frac{150}{1025 - 500} = \frac{150}{525}$$

=0.2857 = 28.57%

(investment in Q) = 1-0.2857

= 0.7143 = 71.43%

6.8 KEY TERMS

- **Portfolio Management**

The Portfolio management is the investment of funds in such combination of different securities in which the total risk of the portfolio is minimized while expecting maximum return from it.

- **Portfolio return**

The expected return of Portfolio is simply the weighted average of the returns of individual securities that are comprised in the Portfolio. The weights are the fraction of the total funds invested in a particular security.

- **Portfolio Risk**

The portfolio risk has to be estimated using the variance of each individual security in the portfolio and the correlation co-efficient of each security with each of other securities.

- **Efficient Portfolio**

An efficient portfolio in one which assures the investor the highest yield for a given level of risk or lowest risk for a given level of return.

6.9 SUMMARY

Portfolio refers to collection of investment. Every investor has to carefully select and manage his portfolio. The Portfolio management is the investment of funds in such combination of different securities in which the total risk of the portfolio is minimized while expecting maximum return from it. The expected return of Portfolio is simply the weighted average of the returns of individual securities that are comprised in the Portfolio. The weights are the fraction of the total funds invested in a particular security. The portfolio risk has to be estimated using the variance of each individual

security in the portfolio and the correlation co-efficient of each security with each of other securities.

Harry Markowitz model, shortly knows as HM Model, was developed by Harry Markowitz in 1952. It analyses the various possible portfolios of a given number of securities and identifies the most efficient portfolio.

Markowitz related his model to the analysis of risk and return and their interrelationship. He employed statistical analysis for measuring risks and mathematical programmes for selecting investments for Portfolio. His framework analysis paved the way for the concept of efficient portfolio. An efficient portfolio in one which assures the investor the highest yield for a given level of risk or lowest risk for a given level of return.

6.10 ANSWERS TO CHECK YOUR PROGRESS

I. 1. Risk 2. Efficient frontier 3. Corner

II. 1.(d). 2. (d). 3. (a). 4.(b). 5.(b).

III. 1. True 2. . True. 3. True. 4. True

6.11 QUESTIONS / EXERCISES

Section - A

1. What do you mean by Portfolio management?
2. Write a note on Portfolio return
3. How do measure the risk of Portfolio?
4. Examine the role of correlation co-efficient the construction of Portfolio

Section - B

1. Explain how the efficient frontier his determine using the Markowitz approach.
2. What are the strength and weakness of the Markowitz approach?

6.12 FURTHER READINGS

1. Donald E.Fischer and Ronal J. Jordan "Security Analysis And Portfolio Management" - Prentice -Hall of India , New Delhi.
2. V.K. Bhalla "Investment Management" - S.Chand & Company Ltd., New Delhi.
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UNIT - VII SHARPE'S SINGLE INDEX MODEL

Structure

7.0 INTRODUCTION

William F.sharpe brought out a model simplifying the one advocated by Markowitz. Markowitz model relates each security to every other one in the portfolio, requiring sophistication and great volume of work. Sharpe assumed that the return on a security can be regarded as linearly related to a single index known as the market index.

According to Sharpe, the market index eliminates the need for calculating large number of co-variances between individual securities, as any movements in securities is attributed to movements in a single underlying factor measured by the market index. This is known as Single Index Model or Market Model.

7.1 UNIT OBJECTIVES

- To understand the importance of Sharpe's model over the Markowitz model
- To know the impact of market return on securities return
- To analyze the ways of building optimal Portfolio using Sharpe's model

7.2 SHARPE'S PORTFOLIO MODEL (THE SINGLE INDEX MODEL)

Prof, William Sharpe developed a simplified model involving reduced amount of data. He published his model in the article "A Simplified model for portfolio analysis" in January 1963. His work is a single index model, and is a substantially simplification of Markowitz model. Sharpe's model reduces substantially Markowitz's data and computational requirements. Sharpe, in his model, proposed a general theory of pricing of stocks and shares. Accordingly, securities not only have individual

relationships but they are also related to each other through some indices represented by business activity.

In other words, the fluctuations in the value of stock relative to that of another do not depend primarily upon the characteristics of the two securities concerned alone. These two securities represent the general business conditions. Relationship between securities occurs only through their individual relationships with the indices of business activity. This results in reduced number of covariance to be estimated in the job of portfolio analysis. So, he stressed the need for estimating only the correlation between return for a particular security and that for some market index. So, a substantial number of correlation coefficient need not be estimated.

The covariance data in the Sharpe's index model reduces from (N2 - N) / 2 under Markowitz model, to only N measures of each security relating to index.

Number of securities	Markowitz Covariances	Sharpe Index Coefficient
100	4950	100
200	19900	200
300	44850	300
400	79800	400

7.3 ASSUMPTION OF SHARPE'S SINGLE INDEX MODEL

Sharpe's single index model is based on the following assumptions:

1. Expectations of all investors with regard to return, variances and correlation among securities are identical.
2. All investors have the same-one-period horizon and their expectations are geared accordingly.
3. Transaction costs do not exist (commission and brokerage on purchase and sale)
4. There are no corporate taxes.
5. Borrowing and lending rates remain constant.

7.4 CHARACTERISTIC LINE

Market is divided into pessimists (bears-selling the stock fearing the fall in prices) and optimists (bulls buying the stocks in anticipation increase in prices). When the market moves, many securities move in the same direction, though at different rates. The relationship between returns on individual securities and returns on market portfolio is expressed with the use of a characteristic line, as shown in the following figure.

X axis shows excess return on the market portfolio, that is

Excess return as the market portfolio = $R_m - T$

Where R_m = holding period return on the market portfolio.

T = risk less rate of interest

Y axis plots excess return on the security in question. It is the difference between the return on the security during the holding period and the risk less rate of interest during the period.

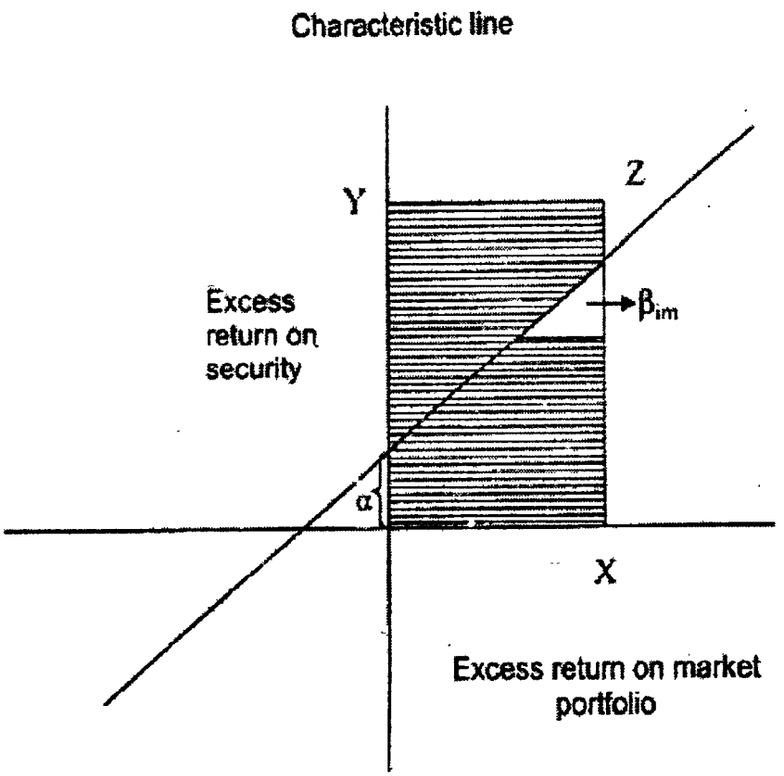
Symbolically.

Excess return on security = $R_i - T$

Where,

R_1 = holding period return on security i

T = risk less rate of interest



Market portfolio includes all securities, each in proportion to market value. The characteristic line showing the relationship between the excess return as security and excess return on market portfolio, can be written as

$$\tilde{R}_i - T = \alpha_i + \beta_{im}\left(\tilde{R}_m - T\right) + \tilde{\gamma} i$$

α_i Indicates vertical intercept and β_{im} indicates the slope of the line. The value of α_i is an excess return on the security that corresponds with an excess return of zero on the market portfolio, whereas β_{im} is the ratio of a change in the excess returns of the security to a change in market portfolio. A beta of $(\beta_{im})^2$ indicates that if the exes return of market portfolio is 1% larger then expected, the excess return of the security will be 2% larger then expected.

Aggressive securities have higher beta values (greater than one). In up markets, their prices rise at a faster rate than the average security. In down markets, they tend to fall rapidly. Defensive securities have beta values lesser than one.

The nature of residual component of unsystematic return is known as error term , which represents uncertain portion of non-market of excess return on security i.

Excess return on security,

$$\tilde{R}_i - T = \left[\beta_{im}\left(\tilde{R}_m - T\right)\right] + \left[\alpha_i + \tilde{\gamma} i\right]$$

Where $\beta_{im}(R_m - T)$ is the systematic market component of excess return and $\alpha_i + \tilde{\gamma} i$ is the non-market (unsystematic) component of excess return. The former is market related portion of excess return and the latter is the non-market portion. α_i represents expected non-market excess return, whereas $\tilde{\gamma} i$ represents deviations from this expectation.

$$\beta_{im} = \frac{\text{Cov}\left(\tilde{R} - T, \tilde{R}_m - T\right)}{\text{Var}\left(\tilde{R}_m - T\right)}$$

Where,

$\text{Cov}\left(\tilde{R} - T, \tilde{R}_m - T\right)$ is the covariance between excess return on security i and the excess return on market portfolio.

$\text{Var}\left(\tilde{R}_m - T\right)$ is the variance of excess return on the market portfolio.

The value of is the expected value of non-market component of excess return of a security.

$$\alpha_i = \text{Exp.}\left(\tilde{R}_i - T\right) - \beta\,\text{Exp.}\left(\tilde{R}_m - T\right)$$

Where,

$\text{Exp.}\left(\tilde{R}_i - T\right)$ = expected excess return on security i.

$\text{Exp.}\left(\tilde{R}_m - T\right)$ = is the expected return on market portfolio

The following table illustrates estimation of beta from the probabilistic predictions.

Event	Probability	Excess return on security (%)	Excess return on Market Portfolio (%)	(2) x (3)	(2) x (4)	Deviation of excess return on security i = (3) – 7.0	Deviation of Excess return on Market Portfolio (4) – 6.2	Weighted deviations for Market Portfolio Squard (2) x $(8)^2$	Weighted products of deviation = (2) x (7) x (8)
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**
a	0.20	17	12	3.4	2.4	10	5.8	6.73	11.6
b	0.30	8	12	2.4	3.6	1	5.8	10.09	1.74
c	0.10	12	0	1.2	0	5	-6.2	3.84	-3.1
d	0.30	-7	-5	-2.1	-1.5	-14	-11.2	37.63	47.04
e	0.10	21	17	2.1	1.7	14	10.8	11.66	15.12
				7.0	6.2			69.95	72.4

Expected excess return on security i = 7.0

Expected excess return on Market Portfolio = 6.2

Variance of excess return on Market Portfolio = 69.95

Covariance between excess return on security i and excess return on market portfolio = 72.4

Therefore β_{IM} = 72.4

69.95

= 1.035

$$\alpha_i = \text{Exp.}\left(\tilde{R}_i - T\right) - \beta\,\text{Exp.}\left(\tilde{R}_m - T\right)$$

= 7 - (1.035 x 6.2) = 0.583 Since the value of in positive, it can be onsidered that the security is under priced.

ESTIMATING NON-MARKET RISK

Event	Probability	Excess return on security (%)	Excess return on Market Portfolio (%)	Characteristic line value of excess return on Security i = 0.583 + (1.035) x (40	Deviation of non – market return (3) – (5)	Probability times non-market deviation squared (2) – $(6)^2$
(1)	(2)	(3)	(4)	(5)	(6)	(7)
A	0.20	17	12	13.003	3.997	3.195
B	0.30	8	12	13.003	-5.003	7.509
C	0.10	12	0	0.583	11.417	13.035
D	0.30	-7	-5	-5.758	-1.242	0.463
E	0.10	21	17	18.178	2.822	0.796
						24.998

Variance of $\tilde{r}_i$ = 24.998

$\sigma_r = \sqrt{24.998} = 4.999 = 5\%$

The characteristic line for a portfolio can be constructed as follows:

$$\tilde{R}_p - T = \left[\alpha_p + \tilde{r}_p\right] + \left[\beta_{pm}\left(\tilde{R}_m - T\right)\right]$$

Where,

R_p - T = excess return on portfolio P

$\alpha_p + r_p$ = non-market (unsystematic) component of portfolio P's excess return

$\beta_{pm}\left(\tilde{R}_m - T\right)$ = market systematic component of portfolio P's excess return.

$$\alpha_p = \sum_{i=1}^{N} X_i \alpha_i \text{ , where}$$

α_p = value of alpha for portfolio P

X_i = proportion of market value of portfolio P invested in security i.

α_i = value of alpha for security i.

N = number of securities in the portfolio

A portfolio's alpha value is weighted average of alpha values of its securities.

$$\beta_{pm} = \sum_{i=1}^{N} X_i \beta_{im}$$

Where,

β_{pm} = value of beta for portfolio P

Xi = proportion of market value of portfolio P invested in security i.

β_{im} = value of beta for security i.

N = number of securities in the portfolio.

Non-market risk can be determined as follows:

$$\left[S\left(\tilde{r}_p\right)\right]^2 = \sum_{i=1}^{n} X_i^2 \left[S\left(\tilde{r}_i\right)\right]^2$$

When all the securities of portfolio belong to the same industry, non-market risk is generally higher. When all the securities have beta value of one, the market component of risk remains the same, irrespective of number of securities included. When security holdings are equal in a portfolio non-market risk will be,

$$\left[S\left(\tilde{r}_p\right)\right]^2 = \sum_{i=1}^{n} \left(\frac{1}{N}\right)^2 \left[S\left(\tilde{r}\right)^2\right]^2$$

$$= \frac{1}{N}\left[\frac{1}{N}\left[S\left(\tilde{r}_1\right)^2 + S\left(\tilde{r}_2\right)^2 + \ldots\ldots\ldots\ldots + S\left(\tilde{r}_N\right)^2\right]\right]$$

Where there is a well diversified portfolio with equal holding of N securities, the non-market risks is,

$$S\left(\tilde{r}_{pl}\right)^2 = \frac{\overline{S\left(\tilde{r}_i\right)^2}}{N}$$

$\overline{S\left(\tilde{r}_i\right)^2}$ = average value of non-market risk for N securities.

When there is a security with a positive alpha and beta of 1 with as zero, it is expected to do better than market index.

Desirable characteristics

1. In a rising market, positive alpha, beta value higher than one and zero are desirable.
2. In a falling market, positive alpha, a lower beta and zero are desirable.
3. Performance of security like the market if desire, a zero alpha, beta of 1 and of zero are needed.
4. High alpha for securities is desired.

7.5 OPTIMAL PORTFOLIO

The investor very often is confronted with the problem of choice of securities and the amount of money to be invested in each security. Desirability of a security in a portfolio is decided based on excess return to beta ratio $\left(\frac{\tilde{R}_i - T}{\beta_{im}}\right)$, where $\tilde{R}_i$ is expected return on security i, T is the return on a risk less asset and is the expected change in the rate of return on security i associated with a 1 per cent change in market return. The securities have to be ranked by excess return to beta for being included in a portfolio. A cut off rate (C) is decided and securities with a higher ratio of $\tilde{R}_i - T$ are included and others are rejected.

Thus, two step procedures is needed to select the securities,

1. Determine excess return to beta for all securities and rank them.

2. Decide optimum portfolio which should consist of $\left(\frac{\tilde{R}_i - T}{\beta_{im}}\right)$ greater that C.

For a portfolio with 'i' securities, cut off point Ci is given by,

$$C_i = \frac{\sigma_m^2 \sum_{i=1}^{i} \frac{\left(\tilde{R}i - T\right)\beta_{im}}{\sigma_{ci}^2}}{1 + \sigma_m^2 \sum_{i=1}^{i} \frac{\beta^2_{im}}{\sigma_{ci}^2}}$$

Where

σ_m^2 = Vriance of market index

T = Riskless rate no interest

$\tilde{R}_i$ = Mean return

$\tilde{R}_i - T$ = Excess return

β_{im} = Beta Value

σ_{ci}^2 = Unsystematic risk

$\frac{\pi_{i-1}}{\beta_{im}}$ = Excess return over beta

Illustration : Construct optimum portfolio from the following

Security i	Mean Return $\tilde{R}_i$	Excess return $\tilde{R}_i - T$	Beta β_{im}	Unsystematic risk σ_{ci}^2	Excess return over beta $\frac{\pi_{i-1}}{\beta_{im}}$
1	16	10	1	40	10
2	18	12	1.5	25	8
3	13	7	1	20	7
4	17	11	2	10	5.5
5	12	6	1	20	6
6	7	1	0.5	10	2

T = 6%

Security (i)	$\left(\frac{\tilde{R}i-T}{\beta_{im}}\right)$	$\frac{\left(\tilde{R}i-T\right)\beta_{im}}{\sigma_{ci}^2}$	$\frac{\beta^2_{im}}{\sigma_{ci}^2}$	$\sum_{i=1}^{i}\frac{\left(\tilde{R}i-T\right)\beta_{im}}{\sigma_{ci}^2}$	$\sum_{i=1}^{i}\frac{\beta^2_{im}}{\sigma_{ci}^2}$	C
1	10	$\frac{10}{40}=0.25$	0.025	0.25	0.025	2
2	8	$\frac{12x1.5}{25}=0.72$	0.09	0.97	0.115	4.51
3	7	$\frac{7x1}{20}=0.35$	0.05	1.32	0.165	4.98
4	5.5	$\frac{11x2}{10}=2.2$	0.4	3.52	0.565	5.29
5	6	$\frac{6x1}{20}=0.3$	0.05	3.82	0.615	5.34
6	2	$\frac{1x0.5}{10}=0.05$	0.025	3.87	0.640	5.23

Take σ_m^2 (Variane of Market Index) as 10

$$C_i = \frac{\sigma_m^2 \sum_{i=1}^{i}\frac{\left(\tilde{R}i-T\right)\beta_{im}}{\sigma_{ei}^2}}{1+\sigma_m^2\sum_{i=1}^{i}\frac{\beta^2_{im}}{\sigma_{ei}^2}}$$

$$C_1 = \frac{10(0.25)}{1+10(0.025)}=2$$

$$C_2 = \frac{10(0.97)}{1+10(0.115)}=4.51$$

$$C_3 = \frac{10\chi(1.32)}{1+10(0.165)}=4.98$$

$$C_4 = \frac{10\chi(3.52)}{1+10(0.565)} = 5.29$$

$$C_5 = \frac{10\chi(3.82)}{1+10(0.615)} = 5.34$$

$$C_6 = \frac{10\chi(3.87)}{1+10(0.640)} = 5.23$$

Take the cut off rate as 5.34. By referring the table, excess return over beta (2) is lesser than cut off value for security 6. Hence, it has to b ignored in the portfolio. Securities 1 to 5 have higher excess returns over beta compared to C. Hence, they have to be selected in the optimal portfolio.

The next step is to determine the percentage of money to be invested in each security

$$X_i^o = \frac{Zi}{\sum_{i=1}^{n} Z_j}$$

where

$$Z_i = \frac{\beta im}{\sigma_{ci}^2}\left[\frac{\left(\tilde{R}_i - T\right)}{\beta_{im}} - C\right]$$

For security 1,

$$Z_1 = \frac{1}{40}(10\text{-}5.34) = 0.1169$$

$$Z_2 = \frac{1.5}{25}(8\text{-}5.34) = 0.1596$$

$$Z_3 = \frac{1}{20}(7\text{-}5.34) = 0.083$$

$$Z_4 = \frac{2}{10}(5.5\text{-}5.34) = 0.032$$

$$Z_5 = \frac{1}{20}(6\text{-}5.34) = 0.033$$

$\sum_{i=1}^{5} Z_i = 0.4245$

Dividing each security Zi, by the sum, we get,

$$Z_1 = \frac{0.1169}{0.4245} x100 = 27.54\%$$

$$Z_2 = \frac{0.1596}{0.4245} = 37.6\%$$

$$Z_3 = \frac{0.083}{0.4245} = 19.55\%$$

$$Z_4 = \frac{0.032}{0.4245} = 7.54\%$$

$$Z_5 = \frac{0.033}{0.4245} = 7.77\%$$

7.6. ILLUSTRATIONS

7.6.1 XYZ has the following derived from single index model

Portfolio	Expected Return (R)	Standard Deviation
1	7%	3%
2	10%	6%
3	12%	85
4	17%	13%
5	19%	17%

a) If the prevailing risk free rate is 5%, what is the best portfolio?

b) State the possible expected return if the standard deviation is 5%.

c) Can the company have an expected return of 10% with a standard deviation of 4%?

NOTES

a) Portfolio $\frac{(R-T)}{\sigma}$

1 $\frac{7-5}{3} = 0.67$

2 $\frac{10-5}{6} = 0.83$

3 $\frac{12-5}{8} = 0.875$

4 $\frac{17-5}{13} = 0.92$

5 $\frac{19-5}{17} = 0.82$

Portfolio 4 is the best portfolio.

b) Expected Return = 5% + 5% (0.92)

= 9.6%

c) 5 + 4% (0.92) = 8.68%

10% return is not possible.

Mr.X runs a portfolio consisting of four securities

Security	Beta Value	Standard Deviation Random error term	Projection
A	1.00	12	0.25
B	0.9	10	0.20
C	1.10	15	0.35
D	1.05	11	0.20

If the market index standard deviation is 15%, what will be the total risk of portfolio of Mr. X?

$\beta_p = \sum_{i=1}^{4} X_i \beta_i$

= 0.25 (1.00) + 0.2 (0.9) + 0.35 (1.1) + 0.2 (1.05)

$= 0.25 + 0.18 + 0.385 + 0.21 = 1.025$

The standard deviation of the portfolio is

$$= \sqrt{(1.025)^2(15)^2 + (0.25)^2(12)^2 + (0.2)^2(10)^2 + (0.35)^2 + (15)^2 + (0.2)^2(11)^2}$$

$$= \sqrt{236.39 + 9 + 4 + 27.56 + 4.84}$$

$= 16.79\%$

7.6.2 Illustration

From the following, calculate variance of portfolio.

Security	Beta Value	Expected return	Total variance	Portfolio weight
A	0.40	0.40	0.08	0.30
B	0.30	0.30	0.07	0.20
C	1.00	0.20	0.07	0.50

$\sigma_m^2 = 0.06$

Answer

Beta factor of the portfolio has to be calculated. It is the weighted average beta of three securities.

$\beta_p = X_A\beta_A + X_B\beta_B + X_C\beta_C$

$= (0.30)(0.40) + (0.20)(0.30) + (0.50)(1.00)$

$= 0.12 + 0.06 + 0.5$

$= 0.68$

Variance of the portfolio = Systematic risk + residual variance

$\sigma_p^2 = \beta_p^2\sigma_m^2 + \sigma_{cp}^2$

Variance of securities

$\sigma_i^2 =$

$\sigma_{ci}^2 = \beta^2\,\sigma_m^2 + \sigma_{ci}^2$

$\sigma_{cA}^2 = 0.08 - (0.40)2\,(0.06) = 0.0704$

$\sigma_{cB}^2 = 0.07 - (0.30)2\,(0.06) = 0.0646$

$\sigma_{cC}^2 = 0.07 - (1.00)2\,(0.06) = 0.01$

$$\sigma_p^2 = \beta_p^2 \sigma_m^2 + \sigma_{cp}^2$$

$$\sigma_p^2 = (0.68)2\ (0.06) + (0.30)2\ (0.07) + (0.20)2\ (0.06) + (0.50)2\ (0.01)$$

$$= 0.028 + 0.0063 + 0.0024 + 0.0025$$

$$= 0.0392$$

7.6.3 Illustration

For the above problem, what is the expected return as the portfolio?

$$Rp = X_A R_A + X_B R_B + X_C R_C$$

$$= (0.30)\ (0.40) + (0.2)\ (0.3) + (0.5)\ (0.2)$$

$$= 0.12 + 0.06 + 0.1$$

$$= 28$$

7.7 KEY TERMS

- **Aggressive Securities**

  Securities with Beta values greater than one are termed as aggressive securities

- **Defensive Securities**

  Securities with Beta values less than one are termed as defensive securities.

- **Single Index Model**

  According to Sharpe, the market index eliminates the need for calculating large number of co variances between individual securities, as any movements in securities is attributed to movements in a single underlying factor measured by the market index. This is known as Single Index Model or Market Model.

7.8 SUMMARY

Under the Single Index Model, the return of a security consists of two components: one related to market, and the other independent of the market. The alpha is a unique part which depends on an event which affects an individual company but not all. The beta measures how sensitive the security return is to the return of the market. If Beta value is greater than one it is termed as aggressive securities Securities with Beta values less than one are termed as defensive securities.Beta depends upon factors like change in interest rate or money supply or any such macro factor. For example, if beta is 1.5, and the market return is 8%, then the security return would be 12% (i.e., 8% X 1.5) plus.

The variable alpha is the non-market component. It denotes the return of the securities even when the market return is zero. It may be noted that both alpha and beta of a security are obtained by regression analysis of historical returns of the security and the market index. The error term, $\tilde{\gamma}_i$ represents the difference between

the actual return and the return estimated by remaining variables in the equation. This error term is not related to Rm.

The Single Index Model tries to simplify the HM Model by tremendously reducing the number of calculations required. The calculations of co variances of each security with each other security are substituted by single index with represent the relationship of each security with the market. As the model has been presented by William Sharpe, this model is also known as Sharpe Index Model.

7.9 ANSWERS TO CHECK YOUR PROGRESS

I. 1. Sharpe Mode 2. Single Index or Sharpe 3. Alpha 4. Beta

II. 1. True 2. False 3. True 4. False 5. False

7.10 QUESTIONS / EXERCISES

Section-A

1. Write a short note on Sharpe's portfolio model?
2. What do you mean by "aggressive" and "defensive" portfolio?

Section - B

1. In what respect can Sharpe's model be regarded superior to Markowitz model?

7.11 FURTHER READINGS

1. Donald E.Fischer and Ronal J. Jordan "Security Analysis And Portfolio Management" - Prentice -Hall of India , New Delhi.
2. V.K. Bhalla "Investment Management" - S.Chand & Company Ltd., New Delhi.
3. R.P. Rustagi "Investment Analysis And Portfolio Management" - Sultan Chand & sons., New Delhi.
4. Preethi Singh, "Investment Management" - Himalays Publishing House, Mumbai.
5. Punithavathy Pandian - "Security Analysis And Portfolio Management" - Vikas Publishing House.

UNIT - VIII CAPITAL ASSET PRICING MODEL

Structure

8.0 INTRODUCTION

The capital market theory is an extension of the Portfolio theory which explains how a rational investor should construct a Portfolio on the basis of risk and return of the securities. The capital market theory explains how assets should be priced in the capital markets if all the investors behave rationally. A risk-averse investor construct an efficient Portfolio (Combination of market Portfolio and risk free investments) on the basis of analysis of risk and return of the securities. Based on this, Capital Assets Pricing Model (CAPM) has been developed to show how risky assets should be priced. William Sharpe, John Lintner, and Ian Mossin have significantly contributed for the development of CAPM.

8.1 UNIT OBJECTIVES

- To understand the concept of capital asset pricing model
- To describe the importance of capital market line
- To explain the significance of security market line

8.2 MEANING OF CAPITAL ASSET PRICING MODEL (CAPM)

CAPM establishes that the required rate of return of a security must be related to its contribution to the risk of the portfolio. It stresses that only the systematic risk, the un-diversifiable risk, is relevant for the expected return of a

security. Since the diversifiable risk, i.e., the unsystematic risk can be eliminated, there is no reward for it.

8.3 ASSUMPTIONS OF CAPM

CAPM theory is based on the following assumptions.

1. The objective of an investor is to maximize utility of terminal wealth:

The investor is maximizing utility of wealth not wealth itself. Risk lover has positive marginal utility for wealth. A diminishing marginal utility is the most frequently described utility function. Given the wealth of an investor, the total utility depends on the combinations of risk and return.

2. Investors make their decisions on the basis of expected returns, standard deviations and co-variances of all pairs of securities concerned. In both modern portfolio theory and CAPM, it is assumed that portfolio variance is an appropriate measure of risk. Beta and return are directly and linearly related. Thus it can be presumed that the investor's goal is to maximize utility of terminal wealth and his decisions are based on expected risk and rates of return. Investors chose only those portfolios with the highest rate of return for their preferred level of risk.

3. Investors are assumed to have homogeneous expectations of risks and returns during the decision - making process. Investors define the risk and return differently in market portfolio. However, in CAPM, homogeneity is used to make it simple and generalized model.

4. CAPM assumes that investors buy all the securities in the portfolio at one point of time and sell them at some undefined common point in the future, however the investors who are of different types, do not behave similarly in practice.

5. Investors have free simultaneous access to information. Such information's is generally available to the holders of large portfolios.

6. The investor can lend or borrow any amount of finds at risk-free rate of interest. When a risk free asset is added to the portfolio, there is a change in the risk of market portfolio. When an investor opts for short sale of shares; the risky assets of a portfolio are balanced by short sold assets thus creating a risk-less portfolio.

7. There are no taxes, and transaction costs and restrictions on short sales. It is assumed that there must be either a risk free asset or a portfolio of short sold securities.

8. Assets are marketable and infinitely divisible. This assumption however ignores liquidity and new security issues.

8.4 CAPITAL ASSET PRICING MODEL

The CAPM attempts to explain and provide the mechanism where by investors can assess the impact of a proposed security on their portfolio's risk and return.

The total risk of a portfolio can be bifurcated into systematic and unsystematic risk. The latter is eliminated by more and more diversification. On the other hand, the systematic risk is one which cannot be eliminated and is correlated with that of the market portfolio. A portfolio is efficient if there is no unsystematic risk. Therefore, the only effect a security has on the portfolio risk is through its systematic risk. The risk of a diversified portfolio depends upon the systematic risks of the securities included in the portfolio. An investor, therefore, will be interested to know the effect which each security will have on the risk of his portfolio.

Under CAPM, it is assumed that an investor can borrow or lend any amount of money at risk free rate of interest. The risk free assets and risky assets can be mixed to achieve a desired rate of risk-return combination.

$$R_p = R_f X_f + R_m (1-X_f)$$

Where

R_p = return of the portfolio

X_f = the proportion of finds invested in risk free assets

R_f = Risk free rate of return

R_m = Return on risky assets.

$(1 - X_f)$ = proportion of funds invested in risky assets.

The above formula can be used for calculating expected returns under a) mixing risk free assets with risky assets, b) investing only in the risky assets and c) mixing the borrowing with risky assets.

8.4.1 Illustration

The borrowing and lending rate is 12% and the return from the risky assets is 18%. If an investor invests equal amounts in risky assets and in risk-free assets, his expected return of the portfolio will be

$$R_p = R_f X_f + R_m (1-X_f)$$
$$= (12 \times 0.5) + 18 (1 - 0.5)$$
$$= 6 + 9$$
$$= 15\%$$

In there is 100% investment in risky assets and zero investment in risk free assets, the return will be

$$R_p = 0 + 18\%$$
$$= 18\%$$

If there is 1.5 time investment in risky assets and -0.5 in risk free asset, the return will be

$$R_p = R_f X_f + R_m (1-X_f)$$
$$= (12 \times -0.5) + 18 \times 1.5$$
$$= -6 + 27$$
$$= 21\%$$

8.4.2 Variance of the portfolio is

$$\sigma_p^2=\sigma_f^2 x_f^2+\sigma_m^2 (1-x_f)^2 + 2cov_{fm}\, x_f (1-x_f)$$

Suppose the variance of risky asset is 10. As the variance of the risk free assets is zero, the portfolio risk depends on the portion of investment on risky asset.

Proportion in risky asset (1-xf)	Portfolio risk
0.5	5
1.0	10
1.5	15

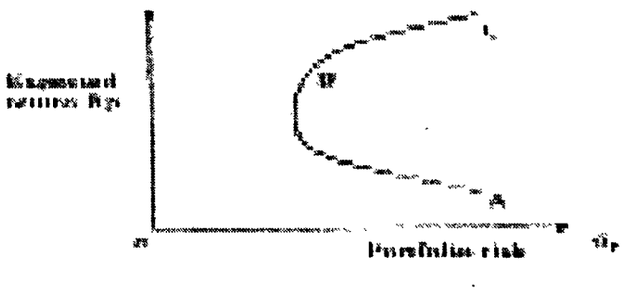
The risk is more in the borrowing portfolio (15%). The return in also the highest of the remaining two that is 21%. The risk premium is then calculated which is the difference between the risky rate of return and the risk-free rate of return, symbolically (R_p - R_f).

Portfolio Return R_p	**Risk-free Return R_f**	**Risk premium R_p-R_f**	**Portfolio Risk σ_p**	**Factor of Proportionality $\frac{(R_p-R_f)}{\sigma_p}$**
15	12	3	5	0.6
18	12	6	10	0.6
21	12	9	15	0.6

The risk-return proportionality is constant (0.6), implying that one unit of risk premium is accompanied by 0.6 unit of risk.

All investors hold only the market portfolio which consists of all stocks in the market and risk-free securities. Each asset is held in proportion to its market value to the total value of all risky assets.

CAPM :



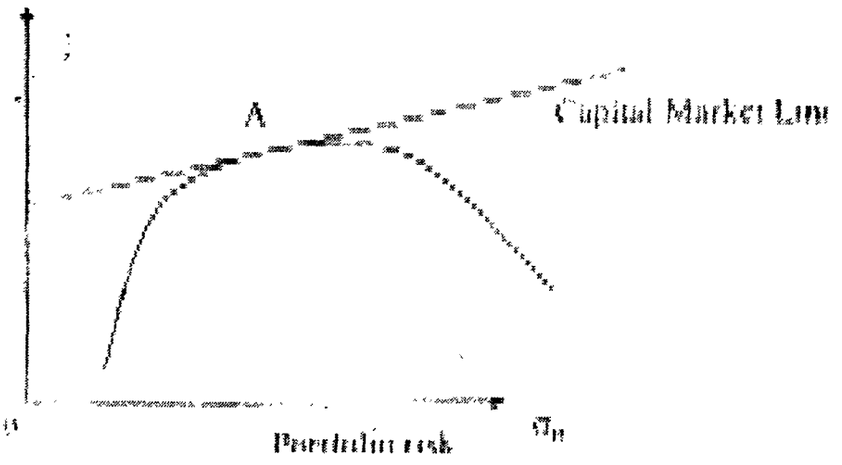
The above figure shows the efficient frontier of the investor. X axis shows the portfolio risk and Y axis shows expected return. Any point between B and C is preferable to the investor as he gets higher profits though he faces the same level of risk as between B and A. ABC indicates investor's portfolio of risky assets.

8.5 CAPITAL MARKET LINE

The Capital Market Line (CML) represents those combinations of risk-free borrowing or lending and the portfolio that yields the highest return obtainable for a given level of risk.

The CML represents the equilibrium condition that prevails in the market for portfolios consisting of risk-free and risky investments. All combinations of risky and risk-free investments are bound by the CML and in equilibrium; all investors will end up with portfolio on the CML. It says that the expected return on a portfolio is equal to the risk-free rate plus a risk premium. The risk premium is equal to the market price of risk times the quantity of risk. So, the CML shows the trade off between the expected returns and risk for efficient portfolios and the risk is measured by the standard deviation of the portfolio.

In the following figure, RfA represents all possible combinations of risk-free and risky assets. The portfolio along the line RfA is called lending portfolio, implying the investment of money in risk-free asset.



The portfolio becomes borrowing portfolio when it crosses the point A. money borrowed is invested in risky asset. The capital market line shows the desirable set of investment opportunities between risk-free and risky investments

$$E(R_P) = \frac{R_f + (R_m - R_f)}{\sigma_m} x\sigma_p$$

$E(R_p)$ = portfolio's expected rate of return

R_f = risk-free rate of return

R_m = expected return on market portfolio

σ_m = standard deviation of market portfolio

σ_p = standard deviation of portfolio.

The capital market line shows linear relationship between required rates of return for efficient portfolios and their standard deviations. The capital market line (CML) shows various portfolios and the expected rate of return of any portfolio on CML in excess of risk-free rate is the proportion to the standard deviation of market portfolio. The slope of the line shows the price of the risk which is equal to the risk premium for the market portfolio (Rm - Rf) divided by the risk or standard deviation of market portfolio.

Expected return = risk-free rate of return + (Price of risk x Amount of risk). Risk-free rate of return is the price of time whereas the price of risk is the premium amount higher and above the risk-free return.

8.5.1 Illustration:

The market portfolio has an expected return of 13 per cent and a standard deviation of return of 20 per cent. The risk free rate of return is assumed as 8 per cent. Determine expected return of portfolio which has 18 per cent standard deviation of return and does not have any unsystematic risk, as under CAPM.

$$R_i = R_f + \left[\frac{(R_m - R_f)}{\sigma_m}\right]\sigma$$

$$= 0.08 + \left[\frac{0.13 - 0.08}{0.20}\right] x\ 0.18$$

Return of the portfolio = 12.5%

8.6 SECURITY MARKET LINE

CAPM measures risk return relationship of an efficient portfolio, but it does not indicate risk - return trade off for other portfolios and individual securities. Standard deviation of a portfolio has both systematic and unsystematic risks. The systematic risk is measured by beta, which makes analysis of individual securities and portfolios to decide whether they are efficient or not.

Additional risk is there when a new security is added to the existing portfolio. The marginal contribution of additional security to the variance of the market portfolio is the covariance between security's return and the return of market portfolio. The expected return of security "C" is

$$R_i - R_f = \frac{Cov_{im}}{\sigma_m^2}[R_m - R_f]$$

Check Your Progress

I. Fill in the Blanks :

1. ..... Model assumes that all investors have identical time horizon.
2. ..... line represents the relationship between the expected return and standard deviation of the portfolio.
3. ..... line shows the liner relationship between the expected returns and betas of the securities.
4. Security market line is the graphical presentation o f .....
5. In capital market line risk premium depends on .....

II. Choose the correct answer:

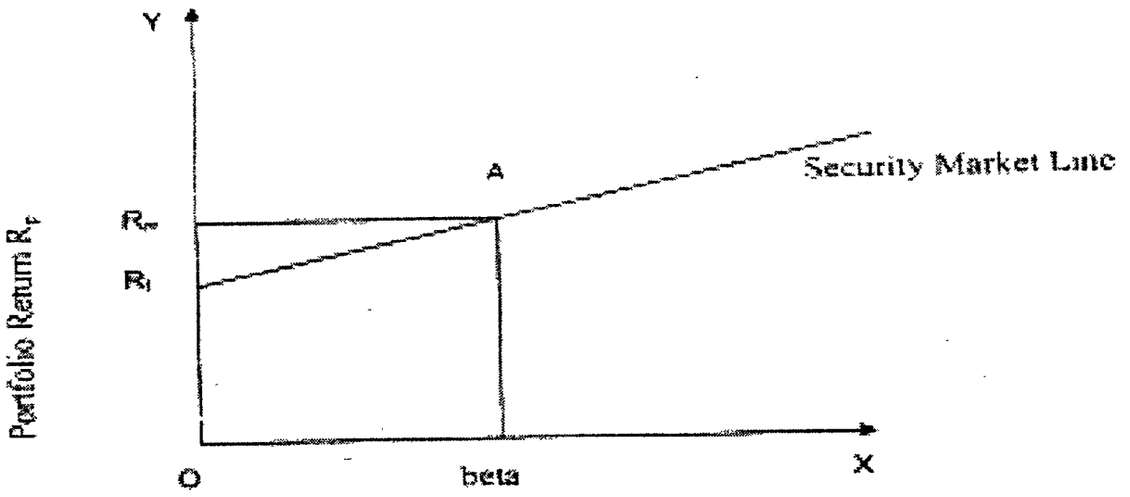
1. The stock above the security market line is.
(a) Of high risk
(b) Appropriately price
(c) Over priced
(d) Under priced
2. the security market line consider only
(a) the systematic risk
(b) borrowing
(c) borrowing and lending
(d) Independent variables.
3. Which of the following is considered a risk free asset?
(a) Equity
(b) Bond
(c) Debenture
(d) Fixed deposits with nationalized banks.

That is,

$$ER_i = R_f + \beta_i\ (ER_m - R_f)$$

Where, $\beta_i = \frac{Cov_{im}}{\sigma_m^2}$,

The beta coefficient of the equation of security market line is same as the beta of single index model. The SML line helps to determine the expected return for a given security beta. The following diagram illustrates this



The above security market line helps to determine expected returns for the securities, when betas are given.

8.6.1 Illustration

The following example can be used to illustrate this.

Assume the risk-free rate of return as 7% and the return on risky assets is 16%, determine the expected returns for A, B, and C securities.

$$ERi = R_f + \beta_i\ [ER_m - R_f]$$

NOTES

Assume beta = 1

= 7+1 [16-7]

= 7+ 1(9) = 16%

For Security A

Expected returns E(R) when beta = 1.1

= 7+1.10(16-7)

= 7+1.1 (9)

= 7+9.9

= 16.9

For Security B, When beta = 1.2

E(R) = 7 + 1.2 (16 - 7)

= 7+1.2(9)

= 7 + 10.8 = 17.8

For Security C, When beta = 0.8

E(R) = 7 + 0.8 (16 - 7)

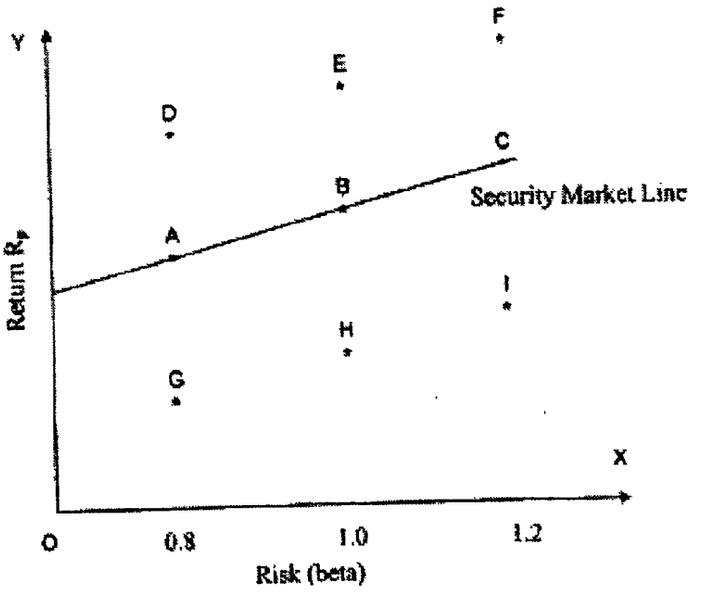
= 7+0.8(9)

= 7 + 7.2 = 14.2

When the beta value is greater than one, it will lead to aggressive securities (A and B in the example). When it is less than one, only defensive securities will result (C in the example).

8.6.2 Evaluation of Securities by SML

Security market line helps in evaluation of securities. Securities with high risk factor have higher returns. Though a few securities have same risk level, they may not have same returns. This is depicted in the following figure.



III. State whether the following statements are True of False

1. Under CAPM. there is risk free assets and there is no restriction on borrowing and lending at the risk free rate.
2. On the capital market line lies only the efficient portfolios.
3. Securities which have betas less than one are described as defensive securities. whereas securities with betas higher than one are known as aggressive securities.
4. CML and SML have same shape and convey the same ideas.
5. The CAPM helps assessing the performance of a portfolio

There are three securities viz., A, B, and C on the security market line. Securities D, A and G have same beta value of 0.8. E, B and H have same beta value of 1.0 and F, C and J have beta value of 1.2. The above figure shows that securities above SML have higher returns for the same level of risk. They are under priced, as shown by means of the formula

$$R_i = \frac{P_i - P_o + D}{P_o}$$

R_i = return,
P_i = present price of security,
P_o = purchase price of security, D = dividend.
Using the above formula, it can be found that securities G, H and J are overpriced. They are expected to earn lower returns compared to the risks. The securities on SML are properly valued and have returns in proportion to their risks.
Where in a market, perfect information is available, all securities lie on SML. When market imperfections are found, it will lead to several security market lines. If imperfections are more, the width will be lesser.

8.7 LIMITATION OF CAPM

The CAPM when applied to the portfolio analysis provides a useful technique of measuring the risk factor as well as the required rate of return of a security. It is a useful model in dealing with risk. However, it suffers from the following limitations:

1) The calculation of beta factor is very tedious as lot of information is required. The beta factor can be found by examining the security's historical returns relative to the return of the market portfolio. Further, the beta factor may or not reflect the future variability of returns. The beta factor cannot be expected to be constant over time. It must be updated frequently.

2) The assumptions of the CAPM are hypothetical and are impractical. For example, the assumption of borrowing and lending at the same rate is imaginary. In practice, the borrowing rates are higher than the lending rates.

3) The required rate of return, specified by the model can be viewed only as a rough approximation of the required rate of return.

8.8 ILLUSTRATIONS

8.8.1 Illustration

Using CAPM, calculate the appropriate required rate of return for the three following securities. Risk free rate is 7per cent and the expected rate of return for the market is 16 per cent.

Securities	Beta value
X	1.20
Y	0.85
Z	0.7

Answer

Required rate of return = Risk free rate of return + Beta (Market return - Risk free rate of return)

Security X: 7 + 1.2 (16 - 7) = 17.8%

Security B: 7 + 0.85 (16 - 7) = 14.65

Security C: 7 + 0.7 (16 - 7) = 13.3%

8.8.2 Illustration

The standard deviation of diversified portfolio securities is 0.41. The return on treasury bills is 0.12 and the market return is estimated to be 0.14 and the market standard deviation is expected to be 0.32. Calculate expected return of portfolio using CML.

Answer

Expected return = Return on Treasure bills + (Market return - return on treasury bills) x $\frac{\text{Stan dard deviation of portfolio}}{\text{Market s tan dard deviation}}$

$= 0.12+(0.14-0.12) \times \frac{0.41}{0.32}$

$= 0.12 + 0.025625$

$= 0.1456$

$= 14.56\%$

8.8.3 Illustration

Calculate beta values for (i) security A, (ii) security B and (iii) for an equally weighted portfolio of securities A and B.

Security	Correlation co-efficient of securities with the market	Standard deviation of security
A	0.6	0.28
B	0.35	0.32

Risk free of interest = 0.06, $E(R_m) = 0.11$: $\sigma_m^2 = 0.015$

Answer

$$\gamma_{xy} = \frac{C_{xy}}{\sigma_x \sigma_y} \text{ and } \beta_{im} = \frac{Cov.(R_i, R_m)}{\sigma_m^2}$$

(i) Covariance (RA, RM) = (0.6) (0.28) (0.32)
= 0.05376

$$\beta_A = \frac{0.05376}{0.015} = 3.584$$

(ii) Covariance (RB, RM) = (0.35) (0.32) (0.28)
= 0.03136

$$\beta_B = \frac{0.03136}{0.015} = 2.09$$

(iii) β of Portfolio = (0.5) (3.584) + (0.5) (2.09)

= 1.792 + 1.045
= 2.837

8.8.4 Illustration

The return on the market portfolio is 15 per cent and the return on Zero β portfolio is 9 per cent. The standard deviation of the market is 38 per cent. Assume CAPM with risk free lending without risk free borrowing, complete the following:

Security	Expected return	Standard deviation	Beta	Residual variance
X	0.21	-	-	0.0495
Y	0.27	-	-	0.0710

Answer

$$\beta_X = \frac{\text{Expected return of X} - \text{Re turn on zero } \beta \text{ Portfolio}}{\text{Re turn an market portfolio} - \text{Re turn on zero } \beta \text{ portfolio}}$$

$$= \frac{0.21 - 0.09}{0.15 - 0.09} = 2$$

$$\beta_\gamma = \frac{0.27 - 0.09}{0.15 - 0.09} = 3$$

$$\sigma^2_{(RX)} = (2)^2(0.38)^2 + 0.0495$$

$$= 0.6271$$

$$\sigma_{(RX)} = 0.79$$

$$\sigma^2_{(RY)} = (3)^2(0.38)^2 + 0.0710$$

$$= 1.3706$$

$$\sigma_{(RY)} = 1.17$$

8.9 KEY TERMS

- **Capital Asset Pricing Model (CAPM)**

The Capital Asset Pricing Model (CAPM) measures the risk of a security in relation to the portfolio. It considers the required rate of return of a security in the light of its contribution to total portfolio risk. The CAPM holds that only un-diversifiable risk is relevant to the determination of expected return on any asset.

- **Capital Market Line (CML)**

Capital market line represents those combination of risk-free borrowing, lending and the portfolio that yield the highest return obtainable for a given level of risk

- **Security Market Line (SML)**

The graphical version of CAPM is called the Security Market Line. The SML represents the relationship between the beta factor and expected return of a security.

8.10 SUMMARY

Capital Market Theory deals with the market portfolio and rate of return on that. Risk of a security can be divided into systematic and unsystematic risk. As the systematic risk is non-diversifiable, a security must have a return commensurate with systematic risk. William Sharpe has suggested that systematic risk can be measured by β factor. The β factor takes into account the covariance between security return and market return. Based on β factor, CAPM has been devised which deals with the expected rate of return of the security and fair value of the security.

The Capital Asset Pricing Model (CAPM) measures the risk of a security in relation to the portfolio. It considers the required rate of return of a security in the light of its

contribution to total portfolio risk. The CAPM holds that only un-diversifiable risk is relevant to the determination of expected return on any asset.

Capital market line represents those combination of risk-free borrowing. lending and the portfolio that yield the highest return obtainable for a given level of risk. The graphical version of CAPM is called the Security Market Line. The SML represents the relationship between the beta factor and expected return of a security.

8.11 ANSWERS TO CHECK YOUR PROGRESS

I. 1. CAPM 2. Capital market 3. Security market. 4. CAPM 5.portfolio risk

II. 1.(d) 2. (a) 3. (d)

III. True 2. True. 3. True. 4. False 5. False

8.12 QUESTION / EXERCISES

Section - A

1. Write a short note on Beta factor?
2. What is CAPM?
3. What is security market line?
4. What is capital market line?
5. What are the limitations of CAPM?

Section - B

1. Distinguish between the capital market line and security market line.
2. Develop and explain Capital Asset Pricing model.
3. Explain the CAPM. How does it help in the estimation of expected return of a security?

8.13 FURTHER READINGS

1. Donald E.Fischer and Ronal J. Jordan "Security Analysis And Portfolio Management" - Prentice -Hall of India , New Delhi.
2. V.K. Bhalla "Investment Management" - S.Chand & Company Ltd., New Delhi.
3. R.P. Rustagi "Investment Analysis And Portfolio Management" - Sultan Chand & sons., New Delhi.
4. Preethi Singh, "Investment Management" - Himalays Publishing House, Mumbai.
5. Punithavathy Pandian - "Security Analysis And Portfolio Management" Vikas Publishing House.

UNIT - IX ARBITRAGE PRICING THEORY AND FACTOR MODELS

Structure

9.0 INTRODUCTION

Arbitrage Pricing Theory (APT) is based on the assumption that investors will arbitrage away any differences in the expected return on assets that have the same risks. The basic assumption of APT is not that investors are mean-variance maximisers, but rather that returns of affected by systematic factors and the return on any asset over time is called return generating process. As the return on security is influenced by more than one factor, the analyst should identify the factors in the economy which affects the security return and estimate the sensitivities of security returns to the movements in those factors.

9.1 UNIT OBJECTIVES

- To describe the Arbitrage Pricing Theory Model
- To analyze the underlying principles of Arbitrage Pricing Theory
- To understand the impact of various factors on security return

9.2 ARBITRAGE PRICING THEORY (APT) MODEL

Arbitrage is the way of making profit by gaining advantage of differential pricing for the same security. It is achieved by selling security at a high price and the simultaneous purchase of the same security at a lower price. The investors tend to undertake this, as it is risk-free. The purchase and sale of securities reduces and finally eliminates the profit margin, thus bringing the market price to the level of equilibrium.

APT theory is advocated by Stephen Ross and it explains the nature of equilibrium in the asset pricing APT theory assumes that,

(i) The investors expectations are homogeneous.

(ii) The investors avoid risk and maximize utility.

(iii) There is perfect competition in the market and there is no cost of transaction.

According to Arbitrage Pricing Theory, an investor is interested in increasing the returns, without increasing the funds in the portfolio. He, for instance may increase his investment in security A, by reducing his investment in either B or C, thus not making any additional commitment. His aim is to earn more, keeping the risk at the same level and without making any additional investment in the portfolio. This makes the changes in different securities added up to zero. Suppose X indicates the change in the proportion,

$\Delta X_A + \Delta X_B + \Delta X_C = 0$, when the portfolio has three securities viz., A, B and C.

The factor sensitivity shows the response of a return of a security to a particular factor. The sensitiveness of the securities to any factor is the weighted average to sensitivities of the securities, using the weighted average to sensitivities of the securities, using the weightc as the changes made in the proportion. Suppose, bA, bB, and bC are the sensitivities,

$b_A \Delta X_A + b_B \Delta X_B + b_C \Delta X_C = 0$

9.3 PRINCIPLES OF ARBITRAGE PRICING THEORY

The arbitrage pricing theory has the following principles

1. The returns of a security are related to an unknown number of factors.
2. The arbitrage portfolio does not require any additional funds from the investor
3. The sensitivity of a portfolio to a factor is weighted average of the sensitivities of portfolio securities to that factor.
4. Arbitrage portfolio has a positive expected return. It is equal to the sum of the expected returns of the old and arbitrage portfolios.
5. An approximate linear relationship exists between expected returns and sensitivities, resulting in an asset pricing equation, when returns are generated by a factor.
6. Factor risk premium results in when the expected excess return on a portfolio has unit sensitivity to the factor. This is the expected return over and above the risk free rate.

The arbitrage portfolio is found to be potentially attractive when an investor is concerned with a higher return with no concern for non factor risk. As arbitrage profits are risk free, the investors are interested in taking advantage of arbitrage whenever it is found. Those investors w ho have larger resources at their disposal

can take advantage and exploit arbitrage situations. Given the opportunities, the investor will increase the expected return of his portfolio, without increasing the risk; thus forming an arbitrage portfolio.

9.4 SINGLE FACTOR MODEL

The return generating process for securities is governed by systematic factors. These factors are found in the economy of a country. These factors have to be identified and sensitivities of security returns to movements in these factors have to be determined.

This model assumes that the return generating process .for securities involves a single factor. (e.g) growth rate of economy or growth rate of Gross National Product. Under this model, the return on security is expressed by

$$\tilde{R}_i = a_i + b_i \tilde{F} + \tilde{e}_i$$

Where,

$\tilde{R}_i$ = return on security i

a_i and b_i = constants

$\tilde{F}$ = value of the factor

$\tilde{e}_i$ = security specific return.

When the security specific return is assumed to be zero, the expected return of a security is changed into

$E = a_i + b_i E_f$

Where,

E = expected return of security concerned

E_f = expected value of the factor

The standard deviation of return on security i is

$$\sigma_i = \sqrt{b_i^2 b_f^2 + \sigma_{ei}^2}$$

The characteristic line can be expressed as

$$\tilde{R} - T = \alpha_i + \beta_{im}(\tilde{R} - T) + \tilde{r}_i$$

Where α_i and β_{im} are the alpha and beta of security i respectively.

r_i = random error term with the expected value of zero.

The above equation can be written as

$$\tilde{R}_i = T + \alpha_i + \beta_{im}\left(\tilde{R} - T\right) + \tilde{r}_i$$

9.4.1 Illustration

Assume security i has $\alpha = 4\%$ and $\beta_{im} = 0.8$ determine characteristic line of the security if the riskfree rate is 8%.

$$\tilde{R}_i = 8\% + 4\% + 0.8\left[\left(\tilde{R} - 8\%\right) + \tilde{r}_i\right]$$

$$= 12\% + 0.8\tilde{R}_{im} - 6.4\% + \tilde{r}_i$$

$$= 5.6\% + 0.8\tilde{R}_{im} + \tilde{r}_i$$

In the above equation, $\tilde{F} = \tilde{R}_{im}$ as the characteristic line for security i is similar to a single factor model.

An investor may be interested in having more accurate view of security returns when it is related to a common factor viz., estimated growth rate of Gross National Product. For such an investor, F is the predicted growth rate in GNP, a; is the expected security return for security i, b; is the sensitivity of security i to the predicted growth rate in GNP.

Check Your Progress

I Fill in the blanks:

1. ..... is based on the assumption that the investors would arbitrage away any difference in the expected returns on assets that have same degree of risk.
2. The Arbitrage Pricing Theory has been developed by .....
3. Arbitrage Pricing Theory is an extension of .....
4. Arbitrage Pricing Theory assumes that stock's return depends on several ..... factors.
5. Arbitrage transaction would be ..... transaction.

II State whether the following statements are True or false:

1. As per the Arbitrage Pricing Theory the expected return of a security depends on return from risk free asset and a series of common factors that affect the expected return.
2. Beta is a measure of expected return of the security.
3. Beta and standard deviation cannot be used interchangeably.

9.5 MULTIFACTOR MODELS

A single factor model is not an ideal one as in practice there are several factors that influence returns of a security. They include rate of inflation, real interest rates, growth rate in industrial production apart from expectation about future levels of real GNP. The impact of these factors affect the returns of different securities differently.

A multifactor model takes the form of $\tilde{R} = a_i + b_{i1} + \tilde{F}_1 + b_{i2}\tilde{F}_2 + \ldots\ldots b_{im}\tilde{F}_m + \tilde{e}_i$

where, m= number of factors,

The above equation assumes that

1 expected value of each security specific is zero and

2. security specific returns are not correlated with each other and with factors as well.

A portfolio with N securities takes the following form

Return of the Portfolio Rp =

$$\sum_{i=1}^{n} X_i a_i + \tilde{F}_{im1} \sum_{i}^{n} X_i \beta_{i1} + \tilde{F}_{im2} \sum_{i=1}^{n} X_i \beta_{i2} + \ldots\ldots + \tilde{F}_{im} \sum_{i=1}^{n} X_i \beta_{im} + \sum_{i=1}^{n} X_i \tilde{r}_i$$

9.6 ILLUSTRATIONS

9.6.1 Illustration

An investor invests Rs.1,20,000 in three securities viz., A, B and C.

Security	Return ®	b	Original Weight
A	18%	0.5	0.40
B	14%	1.2	0.25
C	12%	0.6	0.35

Show that the new portfolio return is higher than the old one, by changing the proportions.

The following changes in the proportions are effected.

$\Delta X_A = 0.3$

$\Delta X_B = 0.05$

$\Delta X_C = -0.35$

For an Arbitrage Portfolio,

$\Delta X_A + \Delta X_B + \Delta X_C = 0$

0.3 + 0.05 - 0.35 = 0

The sensitivities also become zero,

$\Delta X_A b_A + \Delta X_b b_B + \Delta X_C b_C = 0$

(0.3) (0.5) + (0.05) (1.2) - (0.35) (0.6) =

The expected return of Arbitrage Portfolio,

= (0.3) (18) + (0.05) (14) - (0.35) (12)

= 5.4 + 0.7 - 4.2 = 1.9

The expected return in an arbitrage portfolio should always be greater than zero.

The investor increases his investment in securities A and B, by selling a portion of security C.

The new weights are as follows:

$X_A = 0.50; X_B = 0.27; X_C = 0.23$

The portfolio allocation of securities A,B and C is as follows:

= (1,20,000 x 0.50) + (1,20,000 x 0.27) + (1,20,000 x 0.23)

= 60,000 + 32,400 + 27,600

The sensitivity of new portfolio is

$$= (0.50)\ (0.50) + (1.2)\ (0.270) + (0.6)\ (0.23)$$

$$= 0.25 + 0.32 + 0.14 = 0.71$$

This is same as the sensitivity of the old portfolio

$$= (0.5)\ (0.4) + (1.2)\ (0.25) + (0.6)\ (0.35)$$

$$= 0.2 + 0.3 + 0.21 = 0.71$$

The old portfolio return

$$= 0.4\ (18) + 0.25\ (14) + 0.35\ (12)$$

$$= 7.20 + 3.50 + 4.20$$

$$= 14.90\%$$

New portfolio return

$$= 0.5\ (18) + 0.27\ (14) + 0.23\ (12)$$

$$= 9.0 + 3.78 + 2.76$$

$$= 15.54\%$$

Hence, there is an increase of 0.64% of return over the old portfolio, in the new portfolio. This is due to higher investment in security A and security B by selling away Security C. This ultimately results in increases demand for securities A and B, and fall in demand for C. The expected return for security C, will increase with the fall in price of C. Finally, an approximate linear relationship between expected returns and sensitivities comes into existence. There are many macro economic factors which influence the returns of securities. These include rate of inflation, growth rate of economy, spread between long term and short term interest rates, growth rate of industrial production etc.

The arbitrage model takes the form of

$$R_i = \alpha_1 + b_{i1}I_1 + b_{i2}I_2 ..... + b_{ij}I_j + e_i$$

Where, R_i = average expected return

b_{i1} = the beta co-efficient relevant to factor 1.

The following equation is derived from the above model.

$$R_i = \lambda_0 + \lambda_1 b_{i1} + \lambda_2 b_{i2} ..... + \lambda_j b_{ij}$$

Where λ_j = sensitivity of return to b_{i1}

The two factor model takes the form of

$$R_i = \lambda_0 + \lambda_1 b_{i1} + b_{i2ij}$$

In a diversified portfolio, the unsystematic risk is zero and b_{i1} and b_{i2} represent systematic risk.

9.6.2Illustration

The following illustration explains the effect of purchase and sale of securities in a diversified portfolio by the investor engaged in arbitrage.

Portfolio	Expected Return	b_{i1}	b_{i2}
A	12	1	0.4
B	13	3	0.3
C	12.5	3	-0.5

The following equations can be obtained for the expected returns

$\lambda_0 + \lambda_1 + 0.4\lambda_2 = 12$.....1

$\lambda_0 + 3\lambda_1 + 0.3\lambda_2 = 13$.....2

$\lambda_0 + 3\lambda_1 - 0.5\lambda_2 = 12.5$.....3

Solving the above equations, we get

λ_0=11.28; λ_1 = 0.47 and λ_2= 0.625

$R_i = 11.28 + 0.47\ b_{i1} + 0.625\ b_{i2}$

The expected return of the portfolio is

$$R_p = \sum_{i=1}^{N} X_i R_i$$

The risk is shown by the sensitivities of the factor

$$b_{p1} = \sum_{i=1}^{N} X_i b_{i1} \text{ and } b_{p2} = \sum_{i=1}^{N} X_i b_{i2}$$

All the portfolio constructed from portfolio A, B and C fall on the same plane described by A,B and C. We can assume that there exists a portfolio D with an expected return of 15%, bi1 = 2.33 and bi2 = 0.067. This portfolio can be compared with the portfolio E, having equal proportion of A,B and C portfolios, that is, each portfolio has a share of 33%.

The E portfolio's b_{pj} are as follows:

$$b_{p1} = \frac{1}{3}x + \frac{1}{3}x3 + \frac{1}{3}x3 = 2.33$$

$$b_{p2} = \left(0.4x\frac{1}{3}\right) + \left(0.3x\frac{1}{3}\right) + \left(-0.5x\frac{1}{3}\right) = 0.067$$

The probable expected return of portfolio E. is (The risk for E portfolio is identical to the risk of portfolio D)

$$= \frac{1}{3}x12 + \frac{1}{3}(13) + \frac{1}{3}(12.5)$$

$= 4 + 4.33 + 4.17 = 12.50$

Since portfolio E lies on the planes as described above, the return accorting to model will be

$$RE = 11.28 + 0.47\ (2.33) + 0.625\ (0.067)$$
$$= 11.28 + 1.0951 + 0.041875$$
$$= 12.42$$

The portfolios D and E have same risk, but have different returns. As D has higher returns,(15%) the investor adopts arbitrage by buying portfolio D by selling E with no additional investment, he aims at risk-less profit.

9.6.3 Illustation

Suppose, the investor sells Rs.10,000 worth portfolio E and goes for buying Rs.10,000 worth portfolio D. The resulting cash flow is shown as follows:

	Initial Cash Flow	At the end	b_{i1}	b_{i2}
Portfolio D	- Rs.10,000	11,500	+ 2.33	+ 0.067
Portfolio E	+ Rs.10,000	-11,242	-2.33	- 0.067
Arbitrage	0	258	0	0

The above table shows that there is zero investment in arbitrage portfolio, without any systematic risks (b_{i1} and b_{i2}) the earnings are Rs.258.

9.6.4 Illustration

Determine the present value of following cash flow

Year	Cash Flow
1	-3000
2	3000
3	4000
4	2000

Expected Return = $6 + 2\ b_{i1} + 5b_{i2}$, with beta value if $b_{i1} = -0.44$ and $b_{i2} = 1.4$

The required rate of return

$$E(R) =$$
$$= 6 + 2\ (-0.44) + 5\ (1.4)$$
$$= 6 - 0.88 + 7.0 = 12.12\%$$

Present value of cash flow is as follows:

$$= \frac{-3000}{(1.1212)^1} + \frac{3000}{(1.1212)^2} + \frac{4000}{(1.1212)^3} + \frac{2000}{(1.1212)^4}$$

= -2675.7 + 2386.4 + 2838.1 + 1999.97

= Rs. 4548.8

9.6.5 Illustration

Estimate the portfolio return from the following

The expected rate of return of the market is 15 per cent and the beta of the equity is 1.3. The risk free rate of interest is 10 per cent

Factor	Market Price of Risk	Sensitivity Index
Industrial production	3%	0.9
Inflation	6%	1.1
Interest Rate	4%	-0.8

Return = $\lambda_0 + \lambda_1 b_{i1} + \lambda_2 b_{i2} + \lambda_3 b_{i3}$ (λ_0 is not given)

Arbitrage pricing model takes the form of

$R_i = R_f (\lambda_1 b_{i1} + \lambda_2 b_{i2} + \lambda_3 b_{i3})(R_m - R_r)$

= 0.10 +[(0.03 x 0.9 + 0.06 (1.1) + 0.04 (-0.8)] (0.15 - 0.1)

= 0.10 + (0.027 + 0.066 - 0.032) (0.05)

= 0.1 + 0.111 = 0.211

9.6.6 Illustration

Mr. Rajesh made an investment analysis for stock X. The market price of risks and sensitivities for stock X are as follows, R1 = 5%

Factor	λ	B1 (Market Price of Risk)
Purchasing Power Risk	0.8	1.5
Interest Rate Risk	0.9	0.8
Management Risk	1.2	1.5
Market Risk	0.8	-1.6

The probability of getting returns of X is as shown below.

Return	Probability
12%	35%
15%	20%
20%	10%
10%	15%
8%	20%

State whether Mr. Rajesh can invest on stock X

Answer

The expected return on stock X as under the model

$R_i = T_o + T_1b_1 + b_{i2} + T_3b_{i3} + T_4b_{i4}$

$= 5 + (0.8)\ (1.50 + (0.9 \times 0.8) + (1.2 \times 1.5) + (0.8x - 1.6)$

$= 5 + 1.2 + 0.72 + 1.8 - 1.28 = 7.44$

Return according to the model = 7.44

The probable return = (12x0.35) + (15x0.2) + (20x0.1) + (10x0.15) + (8x0.2)

= 4.2 + 3+2 + 1.5 + 1.6

= 12. 3

Since, the probable return is more than the return according to the model, Mr. Rajesh can invest on stock X.

9.6.7 Illustration

The sensitivities of two securities and of the risk free asset of two factors are shown below

Security	b_{11}	b_{12}	Expected Return
X	0.8	0.6	16%
Y	1.5	1.2	20%
Ri	0.0	0.0	10%

(i) If Mr. Ashok has Rs. 10,000 to be invested on X and Y by selling short - Rs. 5,000 of security Y and purchasing Rs. 15, 000 of security X, determine the portfolio sensitivities to two factors.

(ii) If Ashok borrows Rs. 10,000 at risk free rate and invests along with the original amount in securities X and Y in the same proportion as in (i), determine the portfolio sensitivities to the factors. Also calculate the expected return on the portfolio.

Answer (i) Ashok position in two securities viz., X and Y are as follows.

+ 1.50 in security X and

-0.50 in security Y

The sensitivities of portfolio to the two factors are

b.prop. 1 = (1.50 x 0.8) +(-0.5) (1.5) = 1.2 - 0.75 = 0.45

bprop.2 = (1.50 x0.6) + (-0.5) (1.2) = 0.9 -0.6 = 0.3

(ii) Ashok has the following positioning two securities

$$\text{Security X} = \frac{30,000}{10,000} = 3$$

$$\text{Security Y} = \frac{10,000}{10,000} = -1$$

$$\text{Risk free Asset} = \frac{10,000}{10,000} = -1$$

b. prop.1 = (3x0.8 + (-1.0) (1.5) + (-1.07x0)

= 2.4 - 1.5-0 = 0.9

b. prop 2 = (3x0.6) +(-1) (1.2) + (-1.0) (0)

= 1.8 - 1.2 -0 = 0.6

The expected return of he portfolio is

= 3.0 x 16% + (-1.0) (20%) +(-1.0)(10%)

= 48% -20% - 10%

= 18%

9.6.8 Illustration

Two securities with the following characteristics, based on a two-factor model are given below

	Security A	Security B
Factor 1 sensitivity	1.10	0.14
Factor 2 sensitivity	2.70	1.90
Non factor risk σ_{vi}^2	20.0	17.0

The factors have co-variance of 361 and have standard deviations of 25 and 20 respectively for factors 1 and 2. Determine the standard deviations and co-variance of X and Y securities.

Answer

The variance of a security following a two factor model is

$\sigma^2 = b_{11}^2\sigma_{fi}^2 + b_{f2}^2 + 2b_{11}b_{12}Cov(F_1, F_2) + \sigma_{vi}^2$

For security σ_1^2 = [(1.1)² x (25)²]+[(2.7)²(20)²]+2(1.1)(2.7(361)+20

= 756.25 + 2916 + 2144.34 +20

= 5836.59

σ_A = 76.397

For security B σ_B^2 = [(0.14)2(25)2]+[(19)2(20)2]+2 (0.14)(1.9)(361)+17

= 12.25 + 1444 + 192.052 +17

= 1665.302

The covariance between two securities in a two factor model is

$\sigma_{ij} = b_{ij}b_{ji}\sigma^2{}_{fi} + b12\sigma_{f2}^2 + (b_{i1}b_{ji} + b_{j2}b_{j2})Cov(F_{12}F_2)$

σ_{AB} = [(1.1)(0.14)(25)2] + [(2.7) (1.9) (20)2]+ [{(1.1) (1.9) + (2.7) (0.14}(361)]

= [96.25 + 2052] + [(2.09 + 0.378) (361)]

= 2148.25 + 890.948 = 3039.2

9.7 KEY TERMS

• Arbitrage Pricing Theory

The APT is based on the assumptio0n that the investors that the arbitrage away any difference in the expected returns on assets that have same degree of risk.

9.8 SUMMARY

APT theory is advocated by Stephen Ross and it explains the nature of equilibrium in the asset pricing. APT theory assumes that, (i) The investors expectations are homogeneous. (ii) The investors avoid risk and maximize utility. (iii) There is perfect competition in the market and there is no cost of transaction. According to Arbitrage Pricing Theory, an investor is interested in increasing the returns, without increasing the funds in the portfolio. He, for instance may increase his investment in security A, by reducing his investment in either B or C, thus not making any additional commitment. His aim is to earn more, keeping the risk at the same level and without making any additional investment in the portfolio.

The return generating process for securities is governed by systematic factors. These factors are found in the economy of a country. These factors have to be identified and sensitivities of security returns to movements in these factors have to be determined.

This model assumes that the return generating process .for securities involves a single factor. (e.g) growth rate of economy or growth rate of Gross National Product.

A single factor model is not an ideal one as in practice there are several factors that influence returns of a security. They include rate of inflation, real interest rates, growth rate in industrial production apart from expectation about future levels of real GNP. The impact of these factors affect the returns of different securities differently.

9.9 ANSWERS TO CHECK YOUR PROGRESS

I. 1. Arbitrage pricing theory 2. Stephen Ross 3. CAPM
4. Macro economic 5. no risk

II. 1. True 2. False 3. True

9.10 QUESTIONS / EXERCISES

Section - A

1. What is Arbitrage Pricing Theory? How does with explain the expected return of a security?
2. What are the basic assumptions of Arbitrage Pricing Theory?
3. Describe some of the problems associated with empirically testing the Arbitrage Pricing Theory.

Section - B

4. What are the advantages and disadvantages of the APT over CAPM?
5. What do you mean by riskless arbitrage opportunity? Carefully explain why arbitrage opportunities must not exist in an efficient market.
6. Explain why you agree or disagree with the following statement: "According to the APT, the contribution of each factor to total volatility is constant over time."

9.11 FURTHER READINGS

1. Donald E.Fischer and Ronal J. Jordan "Security Analysis And Portfolio Management" - Prentice -Hall of India , New Delhi.
2. V.K. Bhalla "Investment Management" - S.Chand & Company Ltd., New Delhi.
3. R.P. Rustagi "Investment Analysis And Portfolio Management" - Sultan Chand & sons., New Delhi.
4. Preethi Singh, "Investment Management" - Himalays Publishing House, Mumbai.
5. Punithavathy Pandian - "Security Analysis And Portfolio Management" - Vikas Publishing House.
6. Avadhani, V.A. "Investment Management" -Himalaya Publishing House, Mumbai

UNIT - X PORTFOLIO EVALUATION

Structure

10.0 INTRODUCTION

A portfolio, which has various securities, has to be analysed in terms of future risks associated with all securities and returns which are expected from them. It is essential that each security has to be viewed in a portfolio context. Ultimately, the portfolio manager has to evaluate his portfolio performance relating to others. Evaluation provides a feed back, with very good results being rewarded effectively.

10.1 UNIT OBJECTIVES

- To understand the need for evaluation of portfolio
- To explain the various measures of portfolio performance evaluation
- To analyse the factors which affect the portfolio performance
- To describe various methods of formula plans

10.2 NEED FOR EVALUATION OF PORTFOLIOS

One important function of portfolio manager is to ensure that he has acted efficiently in making sound investment, using his professional skills. The evaluation of performance is a never ending process, leading to effective control of portfolio operations. The risks and returns associated with portfolio make the process of evaluation complex necessitating skilled investment. The superior past performance

must be allowed to continues both in the present and in the future, but one has to ensure that it is not mere luck that has led to good performance in the past.

The performance evaluation has to be made on a relative basis in the sense that a comparison is needed between the returns obtained by a portfolio manager through his professional skills and the returns that could have been obtained from an alternative portfolio manager. Such a comparison is essentlal as one has to spend a lot for engaging a skilled portfolio manager. Portfolio performance evaluation not only acts as a yardstick to measure the performance of portfolio manager but also to check whether the funds are deployed in proper investment.

Portfolio performance evaluation is necessary as the returns are strongly influenced by the size and timing of cash flows. The measurement gets complicated when the client decides to add or to withdraw money from the portfolio. This requires accurate determination of timing of such deposits or withdrawals.

The ability of portfolio manager in diversifying the securities in a portfolio is also tested. Non market (unsystematic) risk is eliminated in a diversified market portfolio of risky assets. As the market pays returns on the basis of systematic risk investors are interested in complete diversification of portfolio.

A shrewd portfolio manager goes for diversified portfolio of high beta stocks when the market rises and decides to have low beta stocks when there is a market decline.

While making portfolio evaluation, it is essential to take proper care of all inflows and outflows. The rates of return have to be calculated accurately. Further it has to be considered that not all investors are expected to have the desire of same rate or return and it is undesirable to have all the investors subject to the same degree of risk.

10.3 MEASURES OF PORTFOLIO PERFORMANCE EVALUATION

There are many techniques used in portfolio performance evaluation. They include

Sharpe's performance index

Treynor's Performance index

Jensen's Performance index.

10.3.1 Sharpe's Performance index

Sharpe index measures the risk premium of the portfolio in relation to the total amount of risk in the portfolio. The risk premium is the different between the average rate of return of portfolio and risk free-rate of return.

$$\text{Sharpe inde x} = \frac{\text{Porfoiloaveragereturn} - \text{Risk freerateof interest}}{\text{Stan darrd deviationo freturn of the portfolio}}$$

Symbolically,

NOTES

$$S_p = \frac{R_p - T}{\sigma_p}$$

Where S_p Sharpe's index of desirability

R_p = average return of portfolio

T = risk free rate of interest

σ_p = standard deviation of portfolio return

Sharpe's index is also denoted by

$$\frac{\text{Reward}}{\text{Total risk}} \text{ or } \frac{\text{Risk premium}}{\text{Standard deviation}}$$

The risk and return for funds A and B are as follows

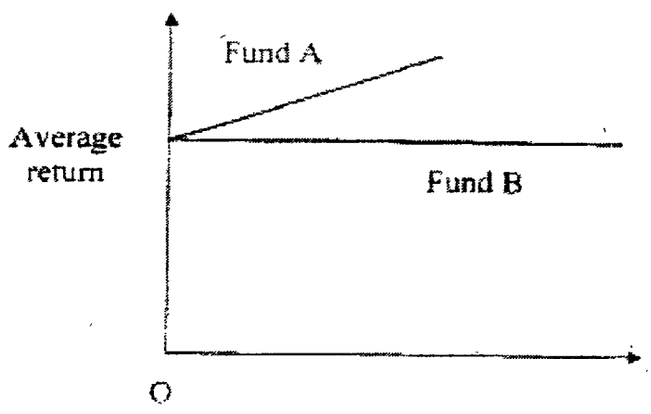
Fund	Average Annual Return	Risk-free Rate of interest	Standard deviation
A	0.078	0.05	0.083
B	0.125	0.05	0.289

Sharpe index for A = $\frac{0.078 - 0.05}{0.083} = 0.337$

Sharpe index for B = $\frac{0.125 - 0.05}{0.289} = 0.2595$

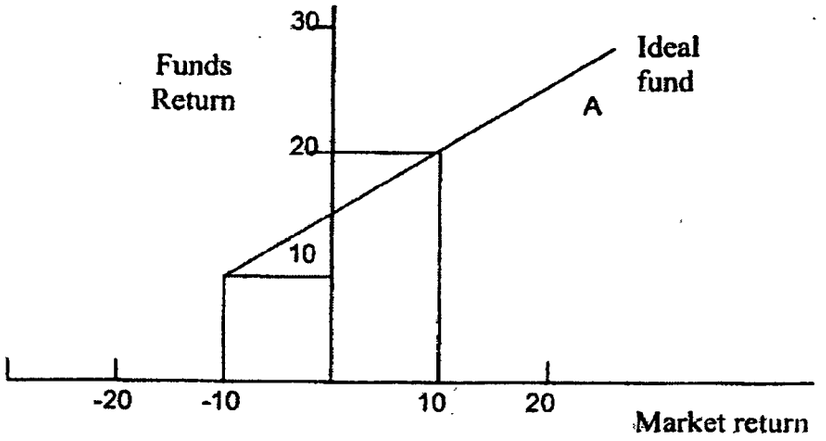
It can be inferred from the following figure that fund A ranks better than that of fund B, though the latter has higher average annual return. It is because fund A has relatively low risks to earn higher returns. Thus, sharp index helps in ranking the desirability of portfolios.

The above result can be explained by means of the following figure



10.3.2 Treynor's Performance Index

Treynor uses characteristic line to measure the performance of the fund. The characteristic line shows the relationship between the market return and the return of the fund. The return of ideal fund rises rapidly than the general market performance when the market moves upwards and the return declines slowly than the market return, when the market is on the decline. This is depicted in the following figure.



In the above figure, the relationship between the market return and the return of the fund is assumed to be linear. It can be inferred from the above figure that the fund's return increases more than the increase in the market rate of return. When the market return is 10 percent, the fund's return is 20 percent. The slope of the line reflects the volatility of the return of the fund. The sensitivity of the fund to the market performance is clearly indicated by a steep slope of the line.

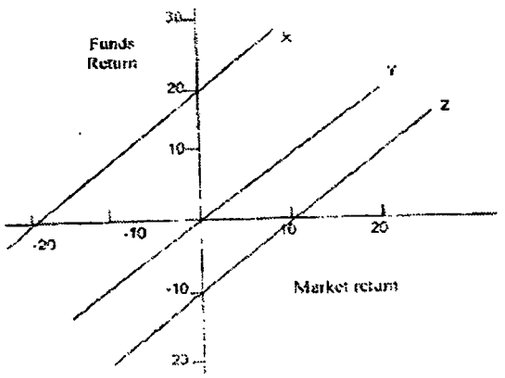
Treynor's reward to volatility ratio is defined as

$$T_p = \frac{R_p - T}{\beta_p} = \frac{reward}{volatility}$$

$$\text{That is, } T_p = \frac{\text{Portfolio average return} - \text{Risk free rate of inerest}}{\text{Beta co-efficient of portfolio}}$$

Where Tp = Treynor's reward to volatility ratio

Treynor uses characteristic line to make a comparison of several funds to decide the best one



The investor would prefer fund X, as it offers the highest return though all the three are exposed to same level of risk

The slope of the characteristic line is estimated by

$R_p = \alpha + \beta Rm + ep$, where

R_p = return of the portfolio

R_m = market return

α and β = co efficient of alpha and beta

e_p = error term

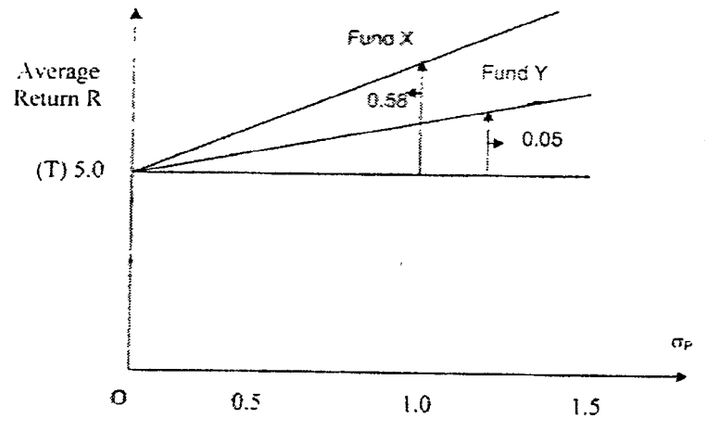
The difference between the average return and the risk-free rate of return is Treynor's risk premium of the portfolio. The risk premium depends on the systematic risk,

The performance of funds X and Y are illustrated as follows:

Fund	Average Return	Beta	Risk Premium	T
X	0.078	0.48	0.028	0.05
Y	0.125	1.487	0.075	0.05

$$T_p \text{ for Fund X} = \frac{0.078 - 0.05}{0.48} = 0.058$$

$$Tp \text{ for Fund Y} = \frac{0.125 - 0.05}{1.487} = 0.05$$



The above figure indicates that fund X is more desirable than fund Y as if has higher risk premium per unit of systematic risk (0.058).

10.3.3 Comparison of Sharpe and Treynor Measures

The sharp measure relates excess return of a portfolio to total risk. It uses the standard deviation of return as the measure of risk. Treynor relates the excess return of a portfolio to non diversifiable or systematic risk. Treynor employs beta.

The sharpe measure seeks how well a portfolio is diversified and it evaluates the portfolio manager on the basis of return performance of the portfolio.

When a portfolio is perfectly diversified, both Treynor and sharp measures give identical rankings since the total variance of the portfolio will be a systematic variance. Treynor measure offers a higher ranking to a portfolio, when it is poorly diversified, than sharp measure.

10.3.4 Jensen's Performance index

Jensen's measure is nothing but the absolute risk adjusted return measure which is also known as a measure of absolute performance. A definite standard is set and the performance of a portfolio is measured against it.

$R_p = \alpha + \beta$ (Rm-R1) where,

Rp = average return of portfolio

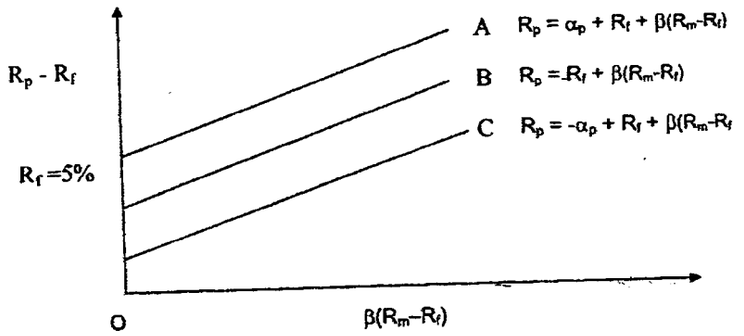
α = the intercept

β = a measure of systematic risk

R_m = average market return

R_f = risk free free of return

The return of the portfolio varies in the same proportion of β to the difference between the market return and risk-free rate of interest. The systematic risk is reflected by the value of β . When the portfolio has all market securities, the beta will be equal to one and it would be greater than one when the securities in the portfolio have higher risk element than a portfolio of all market securities.



Jensen's measure of management ability is depicted in the above figure. It can be inferred that fund's α p is equal to the risk free rate of return. If there is no risk, the portfolio's expected to earn R_f. The fund A is the indicator of professional manager's ability to increases the return by increasing Rm - R_f. The negative α p will be the result, if a professional manager has poor talents. This is shown by C in the above figure.-

Jensen considered 115 funds in his study and found out that only 39 funds possessed positive α reflecting the talents of the professional managers.

Jensen advocated two step procedure in the evaluation of a portfolio performance

1. Use the equation $R_p = R_i + \beta (R_m - R_f)$ to calculate expected return.
2. The actual is to be compared with the expected return. When the actual return in greater than the expected one, the portfolio performance is considered as better.

Example:

Portfolio	Rp	B
A	15	1.1
B	12	0.8
C	14	1.5
Market Index	12	1.0

Risk-free rate of interest is assumed to be 5%

The expected returns of three portfolios are as follows

$Rp = Rf + \beta (R_m - R_f)$

A = 5 + 1.1 (12 -5) = 12.7

B = 5 + 0.8 (12-5) = 10.6

C = 5 + 1.5 (12-55) = 15.5

The comparison of actual and expected returns helps to evaluate performance of portfolios.

Portfolio A = 15-12.7 = 2.3

Portfolio B = 12-10.6 = 1.4

Portfolio C = 14-15.5 = -1.5

Of the risk adjusted performance of three portfolios, A is considered the best, B the next best and C ranks the third.

The performance index of each portfolio, under Treynor's approach is as follows.

$$\text{Portfolio A} = \frac{R_p - R_f}{\beta} = \frac{15-5}{1.1} = 9.09$$

$$\text{Portfolio B} = \frac{12-5}{0.8} = 8.75$$

$$\text{Portfolio C} = \frac{14-5}{15} = 6$$

The same ranking of three portfolios is also obtained under Treynor's approach. Both the approaches are related, as they use beta to represent risk of a portfolio.

Treynor and Jensen measures use security market line as a benchmark. They focus on the ability of portfolio manager to generate excess returns. Treynor's index is considered as a better measure of attractiveness of a given portfolio for investment, since it recognizes the opportunity for the investors to lever excess returns.

10.3.5 Drawbacks of Measure

An investor may tend to favour low risk portfolios with biased measures of performance, when the analyst assumes that the wrong form of CAPM holds good

in the market place. This problem cannot be easily handled in the case of sharp measure though it can be corrected under Treynor and Jensen measures. The Treynor and Jensen measures however suffer from possible misspecification of market portfolio. The analyst has to use the broadest market indices, closely approximating the market portfolio.

10.3.6 Arbitrage Pricing Theory

Arbitrage pricing theory can also be used to measure the performance of portfolio. It establishes linear relationship between the factor betas and expected rates of return on securities and portfolios.

$E(R_p) = E(r_2) + \lambda_1 \beta_{1.p}\ \lambda_2\ \beta_{2p} + ...\lambda_n \beta_{n.p}$

Expected portfolio return = risk-free rate + sum of factor risk premiums

The above relationship can be used as a benchmark to measure the performance. The risk adjusted performance measure is the difference between the actual average rate of return of the portfolio and the rate of return given by the position of portfolio on the plane, taking security's rates of return on the vertical axis and unexpected percentage changes in the two factors on the two horizontal axes.

10.3.7 Portfolio Change Measure

Portfolio change measure (PCM) is another measure which evaluates manager's performance over a time period. The portfolio analyst observes changes in portfolio weights for individual securities and ensures whether there is a relationship between the changes and subsequent returns on the securities.

PCM = rit (W_{it-1}), where

r_{it} = rate of return of security I in period +

W_{it} = Percentage of manager's portfolio invested in security I at the beginning of period t.

PCM is a good indicator of performance of Portfolio managers as he tends to increase weight on the stock that provides high retun subsequently. Grinblatt and Titman used PCM to measure the performance of 155 mutual funds in between 1975 and 1984. They observed that performance was neutral in general, when the performance was measured by using the previous quarter's changes in weights. However, the performance appeared to be good when it was measured by using the previous year's weight changes.

10.4 FACTORS OF PORTFOLIO EVALUATION

While evaluating he portfolio performance the following factors must be taken into account.

10.4.1. Level or risk

The degree of risk assumed in the portfolio is an important factor. The extent of diversification of portfolio, use of margin and its extent have to be considered. Care has to be taken as losses would occur due to margin calls and sale of securities during recession.

10.4.2. Choice of securities

The appropriate selection of securities in the portfolio is a matter of concern. The investor's ability is determined by selecting the securities which have better percentage gain than market index.

10.4.3. Cyclical and market timing

Based on expectation of market savings, the investor has to adopt his portfolio with aggressive, defensive or neutral positions. He has to be versatile on technical and fundamental factors as well. His plans should be made flexible to adjust with changes in market savings.

10.4.4. Risk adjusted return

The investor has to determine risk adjusted retuns of portfolio and compare them with those experienced by market index, average of stock funds, balanced mutual funds etc.

10.5 PROBLEMS OF REVISION OF PORTFOLIO

It requires great competence and skill on the part investors in the revision of portfolio. They should possess the ability to trade in securities and earn profit. The problems in portfolio revision are as follows.

(i) Fluctuations in the equity prices may cause substantial gain or loss to an investor. It requires great competence to withstand such fluctuations.

(ii) The changes in the policy of investor may lead to the changes in the composition of portfolio. For instance, an investor may change his policy from earnings to capital appreciation. This requires revision of stocks.

(iii) When pursuing passive management, the investor is forced to by the stocks even with the smallest weights. He has to incur transaction costs to buy the same. The management warrants shrewd portfolio manager to alter the investment on the assessed expectation of future performance of the stocks.

(iv) The economic conditions of a nation largely determine the composition of portfolio and its subsequent revision. Market boom bring in development of the economy leading to increased market value of securities and recession affects the morale of investors. This really tests the competency of portfolio manger while making portfolio revision.

(v) The investor may very often lack ability of selecting undervalued issues. This requires comparison of percentage gain of the weekly purchased issues into the market performance. This has to be done consistently which is however not possible for many investors.

(vi) The timing of portfolio revision has to be decided by the investor accurately. If the revision occurs very often, transaction and analysis costs will be higher. Further, if the investor makes frequent revision, he will lose the benefits of revision.

(vii)Very often. investors cannot curb the tendency to wait and sell, expecting a steep rise in prices of stocks. Similarly they hesitate to buy when the prices are low as they anticipate that the prices will fall disastrously lower. These emotions, they fail to over come on many occasions.

10.6 FORMULA PLANS

The problems of revision can be overcome by adopting the formula plans. The formula plans provide fundamental rules and regulations for purchase and sale of securities. The amount to be spent on various types of securities is fixed either in constant or variable ratio. The formula plans include rupee cost averaging, constant rupee value, constant ratio and variable ratio plans

10.6.1. Rupee Cost averaging

Under this plan, the investors make purchase of various numbers of shares at different points of time. Let us assume that an investor has Rs. 1000 to be spent each quarter for the purchase of shares the details of which are as follows.

Quarter	Market Price	Shares Purchased	Cumulative investment	Market Value Rs	Unrealised Profit or Loss	Average Cost per share	Average market price per share
1	100	10	1000	1000	0	100	100
2	90	11	1990	1900	-90	94.76	95
3	105	9	2935	3100	165	97.83	98.33
4	100	10	3935	4300	365	98.38	98.75

The above table shows that price fell in the second quarter, prompting the investor to purchase more shares. The average cost per share is lesser than average market price per share, which is the benefit derived from rupee cost averaging plan.

10.6.2. Constant Rupees Plan

The constant rupees ensures shift of investment from stocks to bonds and vice versa, with the amount invested in the sock kept constant. When the price of stock increases the investor sells enough number of stocks to keep original mount of investment in stocks. It is illustrated in the following table.

Check Your Progress

I Fill in the blanks:

1.....diversification means selecting securities of any company in random manner.

2.....consists of basic rules and regulations for purchasing and selling investments.

3 . ... P l a n indicates that the rupee value remains constant in the stock portfolio.

4.In..... plans the proportion of funds on aggressive and defensive. Securities change according to the varying levels of security market prices.

5..... is a contract between two parties to exchange a set of cash flows over a pre-determined period of time.

6..... is the process of measuring and comparing the returns earned on a portfolio with the returns for a bench mark portfolio.

7..... is called reward to variability ratio

8. Treynor;s ratio is also called reward to ..... ratio

9. Sharpe ratio is always less than ..... ratio.

10. In the ..... ratio, the proportion between aggressive and conservative portfolio reminds constant..

Period	Market Price	Number of shares	Value of stock Portfolio	Value of Bonds	Total
1	50	100	5000	5000	10000
2	40	100	4000	5000	9000
3	40	125	5000	4000	9000
4	44	125	5500	4000	9500
5	50	125	6250	4000	10250
6	50	100	5000	5250	10250

The above table shows that the investor has Rs. 10,000 to invest and he invests 50 percent each in stocks and bonds. He bought 25 shares when the market price fell by 20 per cent in the third quarter by shifting Rs.1000 from the bond portion. In the last quarter, the price of stock increased to Rs. 50, which prompted him to sell 25 shares and increase the portion of the bond in the portfolio. Ultimately the investor stands to gain by total portfolio value appreciation.

10.6.3 Constant Ratio Plan

The investor determines the ratio between the aggressive and conservative portfolios and keeps it constant. Once the ratio is fixed, it is maintained when the market moves up and down. The constant ratio plan is automatic in the sense, it forces the manger to counter adjust his portfolio cyclically.

Under this method the investor should invest in equal proportion in bonds and shares

Therefore the initial investment of Rupees 10,000 should be invested in bonds and shares equally. When the stock portion rises or falls by **10** percent from the desired ratio the original ratio is restored.

Market Price	Value Stock Portion Rs.	Value Defensive Portion Rs.	Total Portfolio Value Rs.	Ratio of Stock portion to Defensive Portion	Portfolio Adjustment	Share in Stock Portion
50	5,000	5,000	10,000	1,00		100
48	4,800	5,000	9,000	.96		100
45	4,500	5,000	9,500	.90		100
45	4,750	4,750	9,500	1.00	Bought 5.5 Shares	105.5
40.5	4,273	4,750	9,023	.90		105.5
40.5	4,512	4,511	9,023	1.00	Bought 5.9 Shares	111.4
44.5	4,957	4,511	9,468	1.10		111.4
44.5	4,753	4,734	9,469	1.00	Sold 5.0shares	106.4
49	5,214	4,734	9,948	1.10		106.4
49	4,974	4,974	9,948	1.00	Sold 4.9shares	101.5
50	5,075	4,974	10,049	1.02		101.5

II Choose the correct answer:

1.Aggressive portfolio consists of bonds : stocks in the ratio of
(a) 50:50
(b) 40:60
(c) 70:30
(d) 60 :40

2.The common practice in the traditional approach is
(a) To evaluate entire stock market
(b) To maximize the expected return for a given level of risk
(c) To evaluate the entire financial plan of the individual.
(d) To select the portfolios.

3. An aggressive portfolio is highly suitable for
(a) retired person
(b) a widow
(c) Charitable Institution
(d) an young investor

III. State whether the following statements are True of false :

1. Treasury bills are highly liquid securities
2. Investors invest more funds in debt instruments during their early career period.
3. An investor having a portfolio with the combination of stock and bonds in the ratio of 75 :25 is risk taker.

From the above table it is clear that four adjustments where required to restore the 50:50 balance. Even though stock price dropped considerably initially but later on recovered to the original level, the portfolio made a little bit profit.

10.6.4 Variable Ratio plan

Under this method, the investor estimates a long tem trend in the price of stocks. Whenever the price of stock increases, the stocks are sold and new ratio is determined by increasing the proportion of defensive portfolio. The investor tends to modify his portfolio portions according to the price changes automatically and the investor is not emotionally affected by the changes in the price in the market. However, he investor has to analyses the merits of the stock and constructs appropriate zone and trend for the alterations of the proportions.

Under this plan the investor stately lowest the aggressive portion of the total portfolio as stock price rise, and steadily increases the aggressive portion as stock prices fall.

Market Price	Value of Stock Portion Rs.	Value of Defensive Portion Rs.	Total Portfolio Value Rs.	Stock as Percentage of total Portfolio	Portfolio Adjustment	Share in stock portion
50	5,000	5,000	10,000	50		1000
45	4,500	5,000	9,500	47		100
40	4,000	5,000	9,000	44.5	Brought	100
40	6,300	2,700	9,000	70	57.5 Shares	157.5
45	7,088	2,700	9,788	74	Sold	157.5
50	7,875	2,700	10,575	74.5	51.76 Shares	157.5
50	5,287	5,287	10,574	50		105.74

10.6.5 Swaps

Swap is nothing but a contract between two parties, to exchange a set of cash flows over a pre-determined period of time. Such an agreement will result in a party selling stocks and buying bonds, while the other sells bonds and buys stocks. Thus restrict their portfolios without transaction costs, although they have to pay swap fee to the bank which is instrumental in establishing contract between the two.

The formula plans, thus help in earning higher profits, by effective controlling of buying and selling of securities by the investor. However, they have to be applied for long period to cut down the transaction costs. Market forecasting coupled with formula plans helps an investor to get fruitful results from portfolio revision.

10.7 LIMITATIONS OF FORMULA PLANS

The following are limitations of formula plans. Firstly, formula plans offer only modest opportunity for capital gains. A fully managed fund will offer a greater potential gains, even though investors might not achieve this goal. Secondly, some formula plans do not free the investor from making value judgment as to the relative strength of the stock market. Thirdly, a formula plan by its very nature must be inflexible, thus imposing a necessary action by the investor. Investors may choose securities that do not move with the market. After all the beta characteristics of securities are not that stable. Lastly, as an effort to solve the timing problem of investing, they make no provisions for what securities should be selected for investment.

10.8 KEY TERMS

- **Sharpe's performance index:**

Sharpe's index measures the risk premium of the portfolio in relation to the total amount of risk in the portfolio.

- **Treynor's Performance Index**

Treynor uses characteristic line to measure the performance of the fund. The characteristic line shows the relationship between the market return and the return of the fund.

- **Jensen's Performance Index**

Jensen's measure is nothing but the absolute risk adjusted return measure which his also known as a measure of absolute performance

- **Formula Plans**

Formula plans provide fundamental rules and regulations for the purchase and sale of securities. The amount to be spend on various types of securities is fixed either in constant or variable ratio.

10.9 SUMMARY

A portfolio, which has various securities, has to be analysed in terms of future risks associated with all securities and returns which are expected from them. It is essential that each security has to be viewed in a portfolio context. Ultimately, the portfolio manage has to evaluate his portfolio performance relating to others. Evaluation provides a feed back, with very good results being rewarded effectively. The portfolio performance may be evaluated using

1. Sharpe's performance index 2. Treynors performance index 3. Jenson's performance index etc.

Great competence and skill are required on the part of the investor to revise the portfolio. The following problems may be encountered while revising the portfolio: Fluctuation in equity price, the changes in investor's policy, high cost of transactions inability to predict the changes in economic condition of a nation, failure to identify the under valued stocks timing the market etc.

The problem of revision of portfolio can be over come by adopting the formula plans. The formula plans provide fundamental rules and regulations for purchase and sale of securities. The formula plans include rupee cost averaging, constant rupee value, constant ratio and variable ratio plans.

10.10 ANSWERS TO CHECK YOUR PROGRESS

I. 1. simple or random 2. Formula plans. 3. Constant rupee value 4. Variable ratio 5. Swap 6. portfolio evaluation 7. Sharpe ratio 8. Volatility 9. Treynor's 10. constant

II. 1.(c) 2.(c) 3.(d)

III. True 2. False 3. True

10.11 QUESTIONS / EXERCISES

Section - A

1. Why is the portfolio revision necessary?
2. What are the problems in portfolio revision?
3. Why should the investors adopt the formula plans
4. What is rupee cost averaging?
5. How does constant rupee plan differ from constant ratio plan?

Section - B

1. Discuss the various techniques of portfolio revision.
2. "Formula plans aid the investors in overcoming his emotional involvement with the timing of purchase and sale of stock" Comment.

10.12 FURTHER READINGS

1. Donald E.Fischer and Ronal J. Jordan "Security Analysis And Portfolio Man agement" - Prentice -Hall of India , New Delhi.
2. V.K. Bhalla "Investment Management" - S.Chand & Company Ltd., New Delhi.
3. R.P. Rustagi "Investment Analysis And Portfolio Management" - Sultan Chand & sons., New Delhi.
4. Preethi Singh, "Investment Management" - Himalays Publishing House, Mumbai.
5. Punithavathy Pandian - "Security Analysis And Portfolio Management" - Vikas Publishing House
6. Avadhani, V.A. "Investment Management" -Himalaya Publishing House, Mumbai