PG CM S4-01 (DSC) (Accounting)

TWO YEAR MASTER'S DEGREE COURSE

(CBCS in Accordance with NEP 2020)

SEMESTER - IV

SECURITY ANALYSIS AND PORTFOLIO MANAGEMENT

COMMERCE

Maniram Dewan School of Management

KRISHNA KANTA HANDIQUI STATE OPEN UNIVERSITY

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MASTER IN BUSINESS ADMINISTRATION

INVESTMENT MANAGEMENT
(FINANCE & ACCOUNTING SPECIALISATION)

DETAILED SYLLABUS

UNIT 1: Conceptual Framework of Investment **Page No. : 7 – 30**

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COURSE INTRODUCTION

Investment Management provides a survey of the important areas of investments: valuation, the marketplace, fixed income instruments and markets, equity instruments and markets, derivative instruments, and a cross-section of special topics, such as international markets and mutual funds.

Investment is an important means for channelizing the savings into the development of economy. “Security Analysis and Portfolio Management course is structured into 14 units in such a manner that the learner takes a stage wise exposure to the concepts of investment management and also appreciates the instruments and the market place where the activity has to be practised.

The course has fourteen units that deal with the introductory concepts - A Conceptual Framework of Investment, The Investment Enviornmnet, Risk and Return, Fundamental Analysis, Technical Analysis , Efficient Market Theory, Valuation of Bonds, Valuation of variable Income Securities or Equity Share Valuation, Portfolio Management, Portfolio Construction, The Markowitz Model, Capital Asset Pricing Theory**,** Capital Market Theory and the Arbitrage Pricing Theory and Mutual Funds.

Each unit of the course includes some along-side boxes to help you know some of the difficult, unseen terms. Some “EXERCISES” have been included to help you apply your own thoughts. You may find some boxes marked with: “LET US KNOW”. These boxes will provide you with some additional interesting and relevant information. Again, you will get “CHECK YOUR PROGRESS” questions. These have been designed to self-check your progress of study. It will be helpful for you if you solve the problems put in these boxes immediately after you go through the sections of the units and then match your answers with “ANSWERS TO CHECK YOUR PROGRESS” given at the end of each unit. you in making your learning more active and efficient. And, at the end of each section, you will get “CHECK YOUR PROGRESS” questions. These have been designed to self-check

UNIT DISTRIBUTIONS:

This course encompusses with the following fourteen units:

UNIT 1: Conceptual Framework of Investment

UNIT 2: The Investment Enviornment

UNIT 3: Risk and Return

UNIT 4: Fundamental Analysis-I

UNIT 5: Fundamental Analysis-II

UNIT 6: Technical Analysis

UNIT 7: Efficient Market Theory

UNIT 8: Valuation of Fixed Income Securities or Valuation of Bonds

UNIT 9: Valuation of Variable Income Securities or Equity Share Valuation

UNIT 10: Portfolio Management

UNIT 11: Portfolio Construction

UNIT 12: The Markowitz Model

UNIT 13: Capital Asset Pricing Theory

UNIT 14: Capital Market Theory and the Arbitrage Pricing Theory

UNIT 1 :CONCEPTUAL FRAMEWORK OF INVESTMENT

UNIT STRUCTURE

1.1 Learning Objectives

1.2 Introduction

1.3 Investments: Meaning, types and characteristics

1.3.1 Types of Investments

1.3.2 Characteristics of Investment

1.4 Objectives of Investments

1.5 Types of Investors

1.6 Investment vs Speculation

1.7 Investment vs Gambling

1.8 Meaning of security analysis

1.9 Meaning of portfolio management

1.10 Financial Assets

1.11 Let Us Sum Up

1.12 Further Reading

1.13 Answers to Check Your Progress

1.14 Model Question

1.1 LEARNING OBJECTIVES

After going through this unit, you will be able to:

- define investments and their types
- describe meaning and objectives of portfolio management and financial assets and markets.

1.2 INTRODUCTION

Security analysis is a pre-requisite for making investments. In the present day financial markets, investment has become complicated. One makes investments for a return higher than what he can get by keeping the money in a commercial or cooperative bank or even in an investment bank.

In the finance field, it is a common knowledge that money or finance is scarce and that investors try to maximise their return. But the finance theory states that the return is higher if the risk is also higher. Return and risk go together and they have a trade off. Most of the investments are risky to some degree. The art of investment is to see that the return is maximised with the minimum of risk, which is inherent in investments. If an investor keeps his money in a bank in savings account, he/she takes the least risk, as the money is safe and he will get back when he/she wants it.

In the above discussion, we focused on the word '**Investment'.** But for making investment, we need to make security analysis. It then becomes necessary to define properly investment and security analysis at the outset. In this unit we will discuss about different types of investments, objectives of investment, security analysis and portfolio management.

1.3 INVESTMENTS: MEANING, TYPES AND CHARACTERISTICS

Financial markets have the basic function of mobilising the investments needed by corporate entities. They also act as market-places for investors who are attracted by the returns offered by the investment opportunities in the market. In this context there is a need to understand the meaning of investment and the motives of investment.

Investment may be defined as an activity that commits funds in any financial/physical form in the present with an expectation of receiving additional return in the future. The expectation brings with it a probability that the quantum of return may vary from a minimum to a maximum. This possibility of variation in the actual return is known as investment risk. Thus every investment involves a return and risk.

Investment is an activity that is undertaken by those who have savings. Savings can be defined as the excess of income over expenditure. However, all savers need not be investors. For example, an individual who sets aside some money in a box for a birthday present is a saver, but cannot be considered an investor. On the other hand, an individual who opens a savings bank account and deposits some money regularly for a birthday

present would be called an investor. The motive of savings does not make a saver an investor. However, expectations distinguish the investor from a saver. The saver who puts aside money in a box does not expect excess returns from the savings. However, the saver who opens a savings bank account expects a return from the bank and hence is differentiated as an investor. The expectation of return is hence an essential characteristic of investment.

An investor expects to earn additional monetary value from the mode of investment that could be in the form of physical/financial assets. A bank deposit is a financial asset. The purchase of gold would be a physical asset. Investment activity is recognised when an asset is purchased with an intention to earn an expected fund flow or an appreciation in value.

An individual may have purchased a house with an expectation of price appreciation and may consider it as an investment. If a bank has advanced some money to a customer, the loan can be considered as an investment for the bank. The loan instrument is expected to give back the money along with interest at a future date. The purchase of an insurance plan for its benefits such as protection against risk, tax benefits, and so on, indicates an expectation in the future and hence may be considered as an investment.

From the above examples, it can be seen that investment involves employment of funds with the aim of achieving additional income or growth in value. The essential quality of an investment is that it involves the expectation of a reward. Investment, hence, involves the commitment of resources at present that have been saved in the hope that some benefits will accrue from them in the future.

1.3.1 Types of Investments

Investments may be classified as financial investments or economic investments. In the financial sense, investment is the commitment of funds to derive future income in the form of interest, dividend, premium, pension benefits, or appreciation in the value of the initial investment. Hence, the purchase of shares, debentures,

post office savings certificates, and insurance policies are all financial investments. Such investments generate financial assets. These activities are undertaken by anyone who desires higher return and is willing to accept the risk from the financial instrument.

Economic investments are undertaken with an expectation of increasing the current economy's capital stock that consists of goods and services. Capital stock is used in the production of other goods and services desired by the society. Investment in this sense implies the expectation of formation of new and productive capital in the form of new constructions, plant and machinery, inventories, and so on. Such investments generate physical assets and also industrial activity. These activities are undertaken by corporate entities that participate in the capital market.

Financial investments and economic investments are, however, related and dependent. The money invested in financial investments is ultimately converted into physical assets. Thus, all investments result in the acquisition of some asset, either financial or physical. In this sense, markets are also closely related to each other. Hence, the perfect financial market should reflect the progress pattern of the real market since, in reality, financial markets exist only as a support to the real market.

Let us now discuss the various types of Investments:

A. Variable Income Securities:The term variable-income security refers to investments that provide their owners with a rate of return that is dynamic and determined by market forces.

B. Equity Shares: The equity shares attract the interest of many. In the early nineties, the stock market was the best and safety place for the common individual to invest. Since 1996, the share market prices have been low. This made the retail investors to turn away from the stock market .The stock market classifies shares into growth shares, income shares, defensive shares, cyclical shares and speculative shares.

1. **Growth Shares:** the stocks that have higher rate of growth than the industrial growth rate in profitability are referred to as growth

shares. For example, the list of major gainers for 1996 is dominated by software sectors stocks. The HCL and Info systems shares prices increased sharply.

2. **Income Shares:** These stocks belong to companies that have comparatively stable operations and limited growth opportunities. The bank shares and some of the fast moving consumer goods stocks such as Cadbury, Nestle and Hindustan Unilever may be termed as income shares.
3. **Defensive Shares:** Defensive stocks are relatively unaffected by the market movements. For example, a host of pharmaceutical stocks posted return in excess of 50 percent in 1998.Thepharmaceutical industry owing to its inherent nature of demand is not affected by the down turn in the economy.
4. **Cyclical Shares:** The business cycle affects the cyclical shares. The upward and downward movements of the business cycle affect the business prospects of certain companies and yield stock prices. Such shares provide low to moderate current yield. Capital gain may be highly variable. For example, the automobile sector stocks are affected by the business cycle.
5. **Speculated Shares:** shares that have lot of speculated trading in them are referred to as speculated shares. During the bull and bear phases of the market, this type of shares attracts the attention of the trades.

C. Fixed Income Securities: A fixed income security is an investment that provides a return in the form of fixed periodic payments and the eventual return of principal at maturity. Unlike a variable-income security, where payments change based on some underlying measure such as short-term interest rates, the payments of a fixed-income security are known in advance.

1. **Preference Shares:** Preference shares are shares in the equity of a company that entitle the holder to a fixed dividend

amount to be paid by the issuer. This dividend must be paid

before the company can issue any dividends to its common shareholders. Also, if the company is dissolved, the owners of preference shares are paid back before the holders of common stock. However, the holders of preference shares do not usually have any voting control over the affairs of the company, as do the holders of common stock.

2. Debentures: If a company needs funds for extension and development purpose without increasing its share capital, it can borrow from the general public by issuing certificates for a fixed period of time and at a fixed rate of interest. Such a loan certificate is called a debenture. Debentures are offered to the public for subscrip-tion in the same way as for issue of equity shares. Debenture is issued under the common seal of the company acknowledging the receipt of money.

3. Bonds: Bonds can be defined as the negotiable instrument, issued in relation to borrowing arrangement that indicates indebtedness. It is an unsecured debt instrument, in which the bond investor extends credit to the issuer, which in turn commits to repay the loan amount on the specified maturity date, along with interest throughout the life of the bond. The issuer can be the Municipal Corporation, government or company.

D. Government Securities: A government security is a bond or other type of debt obligation that is issued by a government with a promise of repayment upon the security's maturity date. Government securities are usually considered low-risk investments because they are backed by the taxing power of a government. Bonds, notes, and other debt instruments sold by a government to finance its borrowings. These are generally long-term securities with the highest market ratings.

E. Money Market Securities: The money market is an organized exchange market where participants can lend and borrow short-term, high-quality debt securities with average maturities of one year or less. The market enables governments, banks, and other large institutions to sell short-term securities to fund their short-term cash flow needs. It also allows individual investors to invest small amounts of money in a low-risk market. Some of the instruments traded in this market include treasury bills,

certificates of deposit, commercial paper, federal funds, bills of exchange, and short-term mortgage-backed securities and asset-backed securities.Several financial instruments are created for short-term lending and borrowing in the money market, they include:

1. **Treasury Bills:** Treasury bills, also known as Zero Coupon Bonds are the instrument of short term borrowing with maturity period of less than one year. This instrument is issued by Reserve Bank of India on behalf of the Central Government for fulfilling short term requirements of funds. They are issued at discount and are paid at par.
2. **Commercial Paper:** Commercial Paper (CP) is a short term unsecured promissory note with maturity period of 15 days to one year. Since it is unsecured, it is issued by the large and creditworthy companies to meet their short term fund requirements. Commercial Paper is issued at discount and redeemed at par. It is negotiable and transferable by endorsement. The funds raised through Commercial Paper can be used for fulfilling seasonal and working capital need. For example, for meeting the floatation cost at the time of issue of shares and debentures i.e. Bridge Financing.
3. **Certificate of Deposit:** Certificates of deposit are short term instruments issued by commercial banks and financial institutions to the individuals, corporations and companies. They are unsecured and negotiable. Such instruments are usually issued by banks when they have a tight liquidity position because of slow growth of bank deposits but the demand for credit is high.
4. **Commercial Bills:** Commercial bill is a bill of exchange used to finance the credit sales of firms. It is a short term, negotiable and self liquidity instrument. In case of goods sold on credit, the buyer is liable to make the payment on a specific date in future. The seller could either wait till the maturity date or can draw a bill of exchange. When this bill is accepted by the buyer it becomes a marketable instrument and is called a trade bill. If the seller wants the funds before the maturity date, he can get the bill discounted from the bank. When a commercial bank accepts a trade bill it becomes a commercial bill.

F. Non negotiable Securities: Non-negotiable describes the price of a good or security that is firmly established and cannot be adjusted, or a part of a contract or deal that is considered a requirement by one or both involved parties. Additionally, the term can relate to a good or security whose ownership is not easily transferable from one party to another.

G. Deposits: A deposit is the act of placing cash (or cash equivalents) with some entity, most commonly with a financial institution such as a bank. The deposit is a credit for the party (individual or organization) who placed it, and it may be taken back (withdrawn) in accordance with the terms agreed at time of deposit, transferred to some other party, or used for a purchase at a later date.Deposits are usually the main source of funding for banks.

1. Bank Deposits: Bank deposits consist of money placed into banking institutions for safekeeping. These deposits are made to deposit accounts such as savings accounts, checking accounts and money market accounts. The account holder has the right to withdraw deposited funds, as set forth in the terms and conditions governing the account agreement.

2. Post office Deposits: Like the bank, post office also offers fixed deposits facility land monthly income scheme. Post office monthly income scheme is popular scheme for the retired. An interest rate of 13% is paid monthly. The term of the scheme is six years, at the end of which la bonus of 10% is paid. The annualised yield to maturity works out to be 15.01% per annum. After three years, premature closure is allowed without any penalty. If the closure is after one year, a penalty of 5% is charged.

3. NBFC Deposits: Non-banking financial companies (NBFCs) are financial institutions that offer various banking services, but do not have a banking license. Generally, these institutions are not allowed to take deposits from the public, which keeps them outside the scope of traditional oversight required under banking regulations. NBFCs can offer banking services such as loans and credit facilities, retirement planning, money markets, underwriting and merger activities.

H. Tax-sheltered saving schemes : Tax-sheltered saving schemes provide significant tax benefits to those who participate in them. The most important tax-sheltered saving schemes in India are-

- Public Provident Fund Scheme
- National Saving Scheme
- National Saving Certificate

1. Public Provident Fund Scheme : The Public Provident Fund is a savings-cum-tax-saving instrument in India, introduced by the National Savings Institute of the Ministry of Finance in 1968. The aim of the scheme is to mobilize small savings by offering an investment with reasonable returns combined with income tax benefits.The scheme is fully guaranteed by the Central Government. Balance in PPF account is not subject to attachment under any order or decree of court. However, Income Tax & other Government authorities can attach the account for recovering tax dues

2. National Saving Scheme: NSS is mostly viewed upon as a tax-saving instrument. It combines growth in money (capital appreciation) with cuts in tax outgo, albeit at a lower rate. NSS is not meant for earning regular income. It serves primarily as an instrument to reduce tax liability. Since the NSS has a fixed rate of return, it cannot provide adequate safeguards against high inflation rates. It is a savings plan that also offers tax benefits, and it cannot be pledged as security to any bank for availing a loan. income is assured at the specified rate of interest. Since the NSS has the backing of the GOI, this is a risk-free avenue of investment.

3. National Savings Certificate : The National Savings Certificate is a fixed income investment scheme that you can open with any post office. A Government of India initiative, it is a savings bond that encourages subscribers (mainly small to mid-income investors) to invest while saving on income tax. In this article, we cover the following info about NSC. Individuals mainly use NSC for small and medium investments as well as for tax-saving purposes. A fixed income instrument like Public Provident Fund and Post Office FDs, this scheme too is a secure and low-risk product. You can buy it from the nearest post office in your name, for a minor or with another adult as a joint account. They come with 2 fixed maturity periods – 5 years and 10 years. There is no maximum limit on the purchase of NSCs, but investments of up to Rs 1.5 lakhs in the scheme can earn a tax break

under Section 80C of the Income Tax Act. The certificates earn a fixed interest, which is currently at the rate of7.6% per annum. They add this interest back to the investment and compound it annually. Many pledge these certificates for taking loans from banks.

I. Life insurance: Life insurance is a form of insurance in which a person makes regular payments to an insurance company, in return for a sum of money to be paid to them after a period of time, or to their family if they die. A life insurance policy is a contract with an insurance company. In exchange for premium payments, the insurance company provides a lump-sum payment, known as a death benefit, to beneficiaries upon the insured's death. Typically, life insurance is chosen based on the needs and goals of the owner. Term life insurance generally provides protection for a set period of time, while permanent insurance, such as whole and universal life, provides lifetime coverage. It's important to note that death benefits from all types of life insurance are generally income tax-free.

J. Mutual Funds: Mutual funds are the most popular investment types for the everyday investor. A mutual fund is an investment security that enables investors to pool their money together into one professionally managed investment. Mutual funds can invest in stocks, bonds, cash or a combination of those assets. The underlying security types, called *holdings*, combine to form one mutual fund, also called a *portfolio*. In simpler terms, mutual funds are like baskets. Each basket holds certain types of stocks, bonds or a blend of stocks and bonds to combine for one mutual fund portfolio.There are several different types of mutual funds you should be aware of:

- **Closed-End Mutual Funds:** Closed-end mutual funds issue a fixed number of shares to the investing public and usually trade on the major exchanges just like corporate stocks. Closed-end funds often invest in a particular sector, a specific industry, or a certain country.
- **Open-End Mutual Funds:** Open-end mutual funds stand ready to issue and redeem shares on a continuous basis. Shareholders buy the shares at net asset value (NAV) and can redeem them at the current market price.

• **Load Funds:** The term "load" refers to the sales charge paid by an investor who purchases shares in a mutual fund. When the sales charge is imposed at the time of purchase, this is known as a front-end load. Conversely, back-end loads represent charges that are assessed when the investor eventually sells the fund.

K. Real Assets: Real assets are physical assets that have value due to their substance and properties. Real assets include precious metals, commodities, real estate, agricultural land, machinery and oil. They are appropriate for inclusion in most diversified portfolios because of their relatively low correlation with financial assets such as stocks and bonds.



CHECK YOUR PROGRESS

Q1: Define Investment

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Q2: What is Variable Income Securities

.....

.....

Q3: Define Mutual Fund

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.....

1.3.2 Characteristics of investment

The features of economic and financial investments can be summarised in terms of ***return, risk, safety, and liquidity.***

1. Return: All investments are characterised by the expectation of a return. In fact, investments are made with the primary objective of deriving a return. The expectation of a return may be from income (yield) as well as through capital appreciation. Capital appreciation is the difference between the sale price and the purchase price of the investment. The dividend or interest from the investment is the

yield. Different types of investments promise different rates of return. The expectation of return from an investment depends upon the nature of investment, maturity period, market demand, and so on.

The purpose for which the investment is put to use influences, to a large extent, the expectation of return of the investors. Investment in high growth potential sectors would certainly increase such expectations.

The longer the maturity period, the longer is the duration for which the investor parts with the value of the investment. Hence, the investor would expect a higher return from such investments.

2. Risk: Risk is inherent in any investment. Risk may relate to loss of capital, delay in repayment of capital, non-payment of interest, or variability of returns. While some investments such as government securities and bank deposits are almost without risk, others are more risky. The risk of an investment is determined by the investment's maturity period repayment capacity, nature of return commitment, and so on.

The longer the maturity period, greater is the risk. When the expected time in which the investment has to be returned is a long duration, the uncertainty surrounding the return flow from the investment increases. This uncertainty leads to a higher risk level for the investment with longer maturity rather than on an investment with shorter maturity.

3. Safety: The safety of investment is identified with the certainty of return of capital without loss of money or time. Safety is another feature that an investor desires from investments. Every investor expects to get back the initial capital on maturity without loss and without delay. Investment safety is gauged through the reputation established by the borrower of funds. A highly reputed and successful corporate entity assures the investors of their initial capital. For example, investment is considered safe especially when it is made in securities issued by the government of a developed nation.

4. Liquidity: An investment that is easily saleable or marketable

without loss of money and without loss of time is said to possess the characteristic of liquidity. Some investments such as deposits in unknown corporate entities, bank deposits, post office deposits, national savings certificate, and so on are not marketable. There is no well-established trading mechanism that helps the investors of these instruments to subsequently buy/sell them frequently from a market. Investment instruments such as preference shares and debentures (listed on a stock exchange) are marketable. The extent of trading, however, depends on the demand and supply of such instruments in the market for the investors. Equity shares of companies listed on recognised stock exchanges are easily marketable. A well-developed secondary market for securities increases the liquidity of the instruments traded therein.

An investor tends to prefer maximisation of expected return, minimisation of risk, safety of funds, and liquidity of investments.

1.4 OBJECTIVES OF INVESTMENT

A prudent and consistent saving habit lets income earners to set aside a certain amount of current income for future consumption. Savings kept as cash do not result in an incremental return. Hence, savings are invested in assets with the desired risk-return characteristics. The main objective of an investment process is to minimise risk while simultaneously maximising the expected returns from the investment and assuring safety and liquidity of the invested assets.

Investors look for growth/increase in current wealth through investment opportunities. Given an investment environment, an investor's preference will be for investment opportunities that give the highest return. Investors desire to earn as large returns as possible but with the minimum of risk. Risk can also be stated as the probability that the actual return realised from an investment may be different from the expected return. Financial assets can be grouped into different classes of risk based on the return. Government securities constitute the low risk category as there is very little deviation from expectations and hence are riskless. Shares of corporate

entities would form the high-risk category of financial assets as their returns depend on many uncontrollable factors.

An investor would be prepared to assume a higher risk only if the expected return is proportionately higher. Hence, there is a trade-off between risk and return.

The objective of safety and liquidity helps an investor to design a retirement plan. This is done to substantiate an investor's earnings beyond the employment tenure. With this in mind, the investor sets aside a part of the current income in growth/income-yielding assets that would give an assured return after a period of time.

Savings kept as idle cash do not become investments since it loses its value over time due to rise in prices. This rise in prices, or inflation, invariably erodes the value of money. Investments are, hence, made with the objective to provide a hedge or protection against inflation over the investment duration. This time value concept necessitates investors to choose asset types that will enable them to retain at least the cash value held at present over a future period. In effect, the real rate of return would be negative if the investment cannot earn a higher return than the inflation rate. For example, if inflation is at an average annual rate of 4 per cent, then the expected return from an investment should be above 4 per cent to help savings funds to flow into investment avenues. The objective of investment hence can be stated as giving an expected return from the asset that is higher than the prevalent inflation rate in the economy.

The third objective of investment is the utilisation of tax incentive schemes offered by the government. In order to foster investment habits, many economies offer incentives in the form of tax-saving schemes. Tax rates are applicable for a fiscal year; therefore, to cut down on immediate tax expenditures as investor would invest in tax-saving investment schemes offered by the government. This objective of the investor to reduce present tax payments and hence invest in tax-saving schemes can be considered as a short-term investment objective. Tax-saving schemes also offer a marginal return to the investors. Based on the tax policies of the country, investment criteria could solely depend on this factor also.

1.5 TYPES OF INVESTORS

Investors can be classified on the basis of their risk bearing capacity. Investors in the financial market have different attitudes towards risk and hence varying levels of risk-bearing capacity. Some investors are risk averse, while some may have an affinity for risk. The risk bearing capacity of an investor is a function of personal, economic, environmental, and situational factors such as income, family size, expenditure pattern, and age. A person with a higher income is assumed to have a higher risk-bearing capacity. Thus investor can be classified as risk seekers, risk avoiders, or risk bearers. A risk seeker is capable of assuming a higher risk while a risk avoider choose instruments that do not show much variation in returns. Risk bearers fall in between these two categories. They assume moderate levels of risk.

Investors can also be classified on the basis of groups as individuals or institutions. Individual investors operate alongside institutional investors in the investment market. However, their characteristics are different. Individual investors in any financial market are large in number, but in terms of value of investment they are comparatively smaller. Institutional investors, on the other hand, are organisations with surplus funds beyond immediate business needs or organisation whose business objective is investment. Mutual funds, investment companies, banking and non-banking companies, insurance corporations, and so on are organisations with large surplus funds to be invested in various profitable avenues. While these institutional investors are fewer in number compared to individual investors, their resources are much larger. Institutional investors engage professional fund managers to carry out extensive analysis. Institutional investors and individual investors combine to make the investment market dynamic.

1.6 INVESTMENT VS. SPECULATION

Investment and speculation both involve the purchase of assets such as shares and securities, with an expectation of return. However, investment can be distinguished from speculation by risk bearing capacity, return expectations, and duration of trade.

The capacity to bear risk distinguishes an investor from a speculator. An investor prefers low risk investments, whereas a speculator is prepared to take higher risks for higher returns. Speculation focuses more on returns than safety, thereby encouraging frequent trading without any intention of owning the investment.

The speculator's motive is to achieve profits through price change, that is, capital gains are more important than the direct income from an investment. Thus, speculation is associated with buying low and selling high with the hope of making large capital gains. Investors are careful while selecting securities for trading. Investments, in most instances, expect an income in addition to the capital gains that may accrue when the securities are traded in the market.

Investment is long term in nature. An investor commits funds for a longer period in the expectation of holding period gains. However, a speculator trades frequently; hence, the holding period of securities is very short.

The identification of these distinctions helps to define the role of the investor and the speculator in the market. The investor can be said to be interested in a good rate of return on a consistent basis over a relatively longer duration. For this purpose the investor computes the real worth of the security before investing in it. The speculator seeks very large returns from the market quickly. For a speculator, market expectations and price movements are the main factors influencing a buy or sell decision. Speculation, thus, is more risky than investment.

In any stock exchange, there are two main categories of speculators called the bulls and bears. A bull buys shares in the expectation of selling them at a higher price. When there is a bullish tendency in the market, share prices tend to go up since the demand for the shares is high. A bear sells shares in the expectation of a fall in price with the intention of buying the shares at a lower price at a future date. These bearish tendencies result in a fall in the price of shares.

A share market needs both investment and speculative activities. Speculative activity adds to the market liquidity. A wider distribution of shareholders makes it necessary for a market to exist.

1.7 INVESTMENT VS GAMBLING

Investment can also to be distinguished from gambling. Examples of gambling are horse race, card games, lotteries, and so on. Gambling involves high risk not only for high returns but also for the associated excitement. Gambling is unplanned and unscientific, without the knowledge of the nature of the risk involved. It is surrounded by uncertainty and a gambling decision is taken on unfounded market tips and rumours. In gambling, artificial and unnecessary risks are created for increasing the returns.

Investment is an attempt to carefully plan, evaluate, and allocate funds to various investment outlets that offer safety of principal and expected returns over a long period of time. Hence, gambling is quite the opposite of investment even though the stock market has been euphemistically referred to as a "gambling den".

1.8 MEANING OF SECURITY ANALYSIS

Investment is commitment of funds in the expectation of some positive rate of return. These funds are to be used by another party, user of fund, for productive activity. It can be giving an advance or loan or contributing to the equity (ownership capital) or debt capital of a corporate or non-corporate business unit. In other words, investment means conversion of cash or money into a monetary asset or a claim on future money for a higher return in long term. This return is for saving, parting with saving or liquidity and lastly for taking a risk involving the uncertainty about the actual return, time of waiting and cost of getting back funds, safety of funds, and risk of the variability of the return.

Investment in capital market is made in various financial instruments, which are all claims on money. These instruments may be of various categories with different characteristics. These are all called securities in the market parlance. In a legal sense also, the Securities Contracts Regulation Act, (1956) has defined the security as inclusive of shares, scrips, stocks, bonds, debentures or any other marketable securities of a like nature or of any debentures of a company or body corporate, the Government and

Derivative:
Derivative is the security which derives its value from the underlying asset.

semi-Government body etc. It includes all rights and interests in them including warrants, and loyalty coupons etc., issued by any of the bodies, organisations or the Government. The ***derivatives*** of securities and ***Security Index*** are also included as securities in the above definition in 1998.

In the strict sense of the word, a security is an instrument of promissory note or a method of borrowing or lending or a source of contributing to the funds needed by a corporate body or non-corporate body. Private security for example is also a security as it is a promissory note of an individual or firm and gives rise to a claim on money. But such private securities or even securities of private companies or promissory notes of individuals, partnerships or firms to the extent that their marketability is poor or nil, are not part of the capital market and do not constitute part of the security analysis. In nutshell, securities are financial instruments that have been created to represent a legal obligation to pay a sum in future in return for the current receipt of value. Securities thus represent the cash equivalent received from another person.

Definition of Security Analysis: For making proper investment involving both risk and return, the investor has to make a study of the alternative avenues of investment– their risk and return characteristics and make proper projection or expectation of the risk and return of the alternative investments under consideration. He has to tune the expectations to his preferences of the risk and return for making a proper investment choice. The process of analysing the individual securities and the market as a whole and estimating the risk and return expected from each of the investments with a view to identifying undervalued securities for buying and overvalued securities for selling is both an art and a science and this is what is called security analysis.

Security Analysis in both traditional sense and modern sense involves the projection of future dividend, or earnings flows, forecast of the share price in the future and estimating the ***intrinsic value*** of a security based on the forecast of earnings or dividends. Thus, security analysis in traditional sense is essentially an analysis of the fundamental value of a share and its

forecast for the future through the calculation of its intrinsic worth of the share.

Modern security analysis relies on the fundamental analysis of the security, leading to its intrinsic worth and also risk-return analysis depending on the variability of the returns, ***covariance***, safety of funds and the projections of the future returns. If the security analysis is based on fundamental factors of the company, then the forecast of the share price has to take into account inevitably the trends and the scenario in the economy, in the industry to which the company belongs and finally the strengths and weaknesses of the company itself- its management, promoters' track record, financial results, projections of expansion, diversification, tax planning etc. all these studies are only a part of the total security analysis that the investor should aim at.

1.9 MEANING OF PORTFOLIO MANAGEMENT

A combination of such securities with different risk-return characteristics will constitute the portfolio of the investor. Thus, a portfolio is a combination of various assets and/or instruments of investments. The combination may have different features of risk and return, separate from those of the components. The portfolio is also built up out of the wealth or income of the investor over a period of time, with a view to suit his risk or return preferences to that of the portfolio that he holds. The portfolio analysis is thus an analysis of the risk-return characteristics of individual securities in the portfolio and changes that may take place in combination with other securities due to interaction among themselves and impact of each one of them on others.

As referred earlier, portfolios are combinations of assets held by the investors. These combinations may be of various asset classes like equity and debt and of different issuers like Government bonds and corporate debt or of various instruments like ***discount bonds, warrants, debentures*** and ***Blue chip equity*** or scrip of emerging blue chip companies.

The traditional Portfolio Theory aims at the selection of such securities

that would fit in well with the asset preferences, needs and choices of the investor. Thus, a retired executive invests in fixed income securities for a regular and fixed return. A business executive or a young aggressive investor on the other hand invests in new and growing companies and in risky ventures.

In risk return analysis, the attitudes and preferences of investors are taken into account as also their risk-return trade off stemming from the analysis of individual securities. The return on portfolio is a weighted average of returns of the individual stocks; and the weights are proportional to each stock's percentage in the total portfolio. Besides the stocks when put together in a basket may not give a total risk which is the mathematical equivalent of total of risks of all the individual stocks, due to the simple reason that the risks of some stocks may be compensated by the risks of other stocks or vice versa. The risks of some stocks can also be accentuated by those of others in the portfolio. The modern portfolio theory states that the combined risk of a portfolio may be greater or lesser than the sum of the risks of the components of individual securities.

Portfolio analysis includes selection of securities, portfolio construction, revision of portfolio, evaluation and monitoring of the performance of the portfolio.

1.10 FINANCIAL ASSETS

Conducive economic environment attracts investment, which in turn influences the development of the economy. One of the essential criteria for the assessment of economic development is the quality and quantity of assets in a nation at a specific time. There are two broad types of assets: (1) real assets, (2) financial assets. Real assets comprise the physical and intangible items available to a society. Physical assets are used to generate activity and result in positive or negative contribution to the owner of the asset. Intangible assets also result in a positive or negative contribution to the owner, but are different in that they do not have a physical shape or form. Besides real assets, the economy is supported by another group of

assets called financial assets. The major component of the financial assets is cash, also called money. Financial assets help the physical assets to generate activity. Some examples of financial assets besides cash are deposits, debt instruments, shares, and foreign currency reserves.

Assets in any economy can thus be broadly grouped into physical, financial, and tangible assets, based on their distinct characteristics. Physical assets can be classified into fixed assets and working capital assets, based on the length of their life. Fixed assets, such as land, building, machinery and other infrastructure facilities, are utilised by the society over a long period of time when compared with working capital assets. Movable/circulating capital assets are produced and consumed by the society within a financial year. Examples of movable/ circulating capital assets include materials, merchandise, durable goods, jewellery (gold), and similar items. Intangible assets are goodwill, patents, copyrights, and royalties.

In a macro sense, financial assets are regulated by the government of a country. Financial assets smoothen the trade and transaction of an economy and give the society a standard measure of valuation. Money or cash is the basic financial asset created by the government of an economy. The extent of flow of this financial asset has to be regulated in a country for the demand for and supply of funds to match the macro level, financial assets also represent the current/ future value of physical and intangible assets. The current/future value of financial assets depends on the current/ future return expectations from these financial instruments. All the financial assets in an economy represent a real asset either in the present context or in the context of the future. Their dependence on real assets requires the financial assets to be valued differently. The distinctive value determination of financial instruments also requires a specific market to patronise them.

Financial assets have specific properties that distinguish them from physical and intangible assets. These properties are monetary value, divisibility, convertibility, reversibility, liquidity, and cash flow.

CHECK YOUR PROGRESS



Q4: Define Security Analysis

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Q5: Define Portfolio Analysis

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1.11 LET US SUM UP

In this unit we have discussed the following points:

- l investment is commitment of funds in the expectation of some positive rate of return.
- l investment in capital market is made in various financial instruments, which are all claims on money.
- l investors can be classified on the basis of their risk bearing capacity.
- l the features of economic and financial investments can be summarised in terms of ***return, risk, safety, and liquidity.***
- l the main objective of an investment process is to minimise risk while simultaneously maximising the expected returns from the investment.
- l he portfolio analysis is an analysis of the risk-return characteristics of individual securities in the portfolio



1.12 FURTHER READING

- M. Ranganathan and R. Madhumathi(2011); *Investment Analysis and Portfolio Management*, Pearson Education, New Delhi.
- Punithavathy Pandian(2016) *Security Analysis and Portfolio Management,* Vikas Publishing House Pvt. Ltd., New Delhi.
- Bharti V. Phathak(2014; *Indian Financial System,* Pearson Education, Delhi.
- Donald E. Fischer and Ronald J. Jordon(2011); *Security Analysis and Portfolio Management,* PHI.
- Prasanna Chandra(2010);*Investment Analysis and Portfolio Management,* TMH, Delhi.



1.13 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q No.1: Investment may be defined as an activity that commits funds in any financial/physical form in the present with an expectation of receiving additional return in the future.

Ans to Q No.2: The term variable-income security refers to investments that provide their owners with a rate of return that is dynamic and determined by market forces.

Ans to Q No.3:A mutual fund is an investment security that enables investors to pool their money together into one professionally managed investment. Mutual funds can invest in stocks, bonds, cash or a combination of those assets.

Ans to Q No.4: Security Analysis in both traditional sense and modern sense involves the projection of future dividend, or earnings flows, forecast of the share price in the future and estimating the intrinsic value of a security based on the forecast of earnings or dividends.

Ans to Q No.5: The portfolio analysis is thus an analysis of the risk-return

characteristics of individual securities in the portfolio and changes that may take place in combination with other securities due to interaction among themselves and impact of each one of them on others.



1.14 MODEL QUESTIONS

Q 1: What do you understand by the term 'security analysis'? What is its objective?

Q 2: Define investment. What are the characteristics of investment?

Q 3: What are the motives/objectives for investment?

Q 4: Distinguish between investment and speculation.

Q 5: Distinguish between investment and gambling.

Q 6: What do you understand by the term Portfolio Management?

Q 7: How can you distinguish the different types of investors based on the risk bearing capacity of the investors?

Q 8: Classify the different categories of Financial Assets.

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UNIT 2 : THE INVESTMENT ENVIRONMENT

UNIT STRUCTURE

2.1 Learning Objectives

2.2 Introduction

2.3 Securities Markets

2.4 National Markets

2.5 International Markets

2.6 Capital Market

2.7 Debt Market

2.8 Equity Market

2.9 Primary Market

2.10 Secondary Market

2.11 Spot Market

2.12 Derivative market

2.13 Let Us Sum Up

2.14 Further Reading

2.15 Answers to Check Your Progress

2.16 Model Questions

2.1 LEARNING OBJECTIVES

After going through this lesson the learner will be able to:

- know the concept of security markets
- describe the different types of Financial Markets like Capital Markets,Debt Market,Equity Markets, Primary Markets, Secondary Markets,spot Market and Derivative Markets

2.2 INTRODUCTION

In the previous unit we discussed about the meaning of investment, its types and characteristics. In this unit we will get a fair idea about security markets, its meaning and types.

You might have come across news like the BSE Sensex has lost around 2500 points whereas NSE Nifty has dipped near 700 points. These are phenomenon of securities market. Securities market plays a very important role in mobilising countries savings. It transfers fund from the hands of savers to the investors and ensure its productive uses. A vibrant security market is precondition for economic development.

In this unit we will discuss various securities market.

2.3 SECURITIES MARKETS

Securities are financial instruments that have been created to represent a legal obligation to pay a sum in future in return for the current receipt of value. Securities thus represent the cash or cash equivalent received from another person. The creation of a security is situation and need specific, and many innovative instruments have been floated in the market. The existence of such financial instruments is, however, within the legal regulations governing the market in which they are floated. The securities market, hence, is place-sensitive. The immediate classification of the securities market can be in terms of national boundaries due to the legal environment. The securities market can be subdivided into national and international markets. However, with technological innovations, international agreements and standards, the line distinguishing a national from an international market is fast disappearing.

2.4 NATIONAL MARKETS

National markets are markets within the boundary of a nation. National markets cater to the financial requirements of the local players. Players from foreign countries are permitted to bring their financial instruments into the national market, subject to their following the rules and regulations imposed by the nation. There are vast differences in the rules and regulations of the securities market among nations. Each nation has a regulatory authority under whose scrutiny financial instruments are exchanged in that country. The regulatory authority imposes the overall procedure and guidelines

to be followed by the players in the national market. National markets sometimes make a difference between pure domestic players and the participation of international players. Hence, there can be a further subdivision of the national market into a domestic segment and a foreign segment.

2.5 INTERNATIONAL MARKETS

International markets are usually referred to as offshore markets. Certain national markets, due to their policy regulations, do not discriminate between the securities issued in its country vis-à-vis other countries. A precise example of an international market is the Euromarket, where the representation of several countries is viewed together. A firm in any one member nation in the European subcontinent could list its securities simultaneously in other countries of the European Union. For example, firm with its headquarters in France, could simultaneously trade its securities in France, Spain, and Germany. This concept of opening the national market to other group countries came to be known as international market.

Domestic Segment

The domestic market caters exclusively to firms registered in a country. The country's regulatory authority controls the domestic market. In India, the Reserve Bank of India along with the Securities Exchange Board of India (SEBI) regulates the functioning of the money market and the capital market, the two types of markets within the umbrella of the domestic market. Based on the economic performance of the country, the domestic markets are also called advanced markets and emerging markets. Advanced markets are usually markets in nations that are economically sound and have also progressed technologically. The US and UK markets are termed as advanced markets. Emerging markets are those in developing nations whose economic progress is forward looking. The Indian market is termed as an emerging market. The domestic markets can be further subdivided into money market and capital market.



CHECK YOUR PROGRESS

Q1: Define Securities

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Q2: Define Domestic Market

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2.6 CAPITAL MARKET

Capital markets exchange both long-term fixed claim securities and residual/equity claim securities. The main economic role of a capital market is to match players who have excess funds to players who are in need of funds. Capital markets also provide liquidity to financial instruments. In this exchange process, there is a valuation of the instruments done by the market for the specific risk assumed by the investors.

Risk is prevalent in the capital market since the market valuation process is subject to change. For example, deviation in return is one type of risk prevalent in the instruments traded in the capital market. Besides, the instruments could also have economic risk, liquidity risk, default risk, trading risk, and so on. There are two forms of returns from instruments. One is the claim on the instrument; the other form of return is due to trade. The claim on the instrument could be fixed or residual. The return through claim is either nil or positive. While fixed claim instruments hardly show any variation in returns, residual claim instruments display fluctuating returns thus exposing the holders to greater risk.

The capital gain/loss in buying/selling the security is the trade return from the security. Given the risk-return characteristic of the capital market, the expectations of the market participants play a major role in the market price determination of the securities traded. This risk-return characteristic of the instruments necessitates a subdivision of the capital market into debt market and equity market.

Structure of Indian Capital Market with Diagram

The capital market is classified into two categories. They are the Primary market (New Issues Market) and the Secondary market (Old (Existing) Issues Market). This classification is done on the basis of the nature of the instrument brought in the market. However on the basis of the types of institutions involved in capital market, it can be classified into various categories such as the Government Securities market or Gilt-edged market, Industrial Securities market, Development Financial Institutions (DFIs) and Financial intermediaries.

The primary market helps to raise fresh capital in the market. In the secondary market, the buying and selling (trading) of capital market instruments takes place. The following chart will help us in understanding the organizational structure of the Indian Capital market.

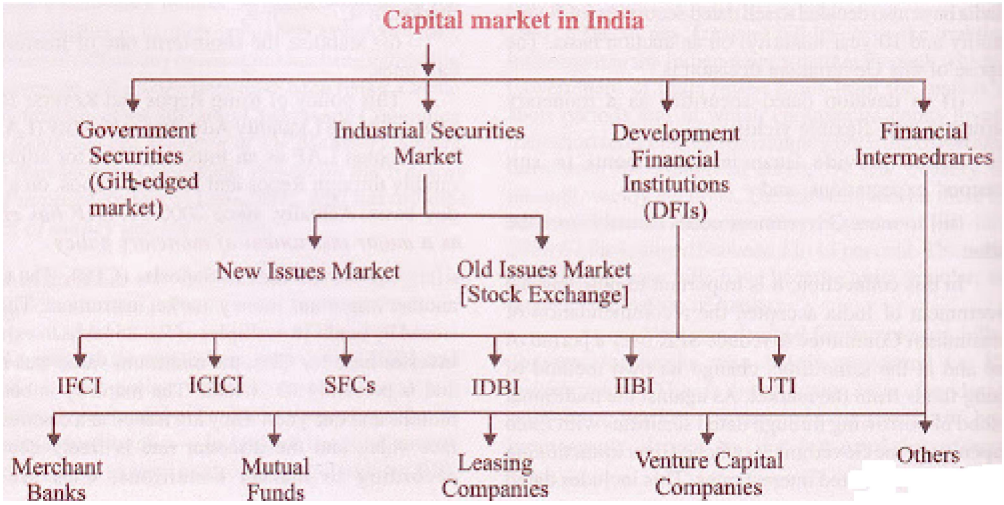


Fig 2.2 Structure of Indian capital Market

Source: http://kalyan-city.blogspot.com/2010/09

Let us now discuss the above types in the following ways:

- **Government Securities Market** : This is also known as the Gilt-edged market. This refers to the market for government and semi-government securities backed by the Reserve Bank of India (RBI).

- **Industrial Securities Market** : This is a market for industrial securities i.e. market for shares and debentures of the existing and new corporate firms. Buying and selling of such instruments take place in this market. This market is further classified into two types such as the New Issues Market (Primary) and the Old (Existing) Issues Market (secondary). In primary market fresh capital is raised by companies by issuing new shares, bonds, units of mutual funds and debentures. However in the secondary market already existing i.e old shares and debentures are traded. This trading takes place through the registered stock exchanges. In India we have three prominent stock exchanges. They are the Bombay Stock Exchange (BSE), the National Stock Exchange (NSE) and Over The Counter Exchange of India (OTCEI).
- **Development Financial Institutions (DFIs)** : This is yet another important segment of Indian capital market. This comprises various financial institutions. These can be special purpose institutions like IFCI, ICICI, SFCs, IDBI, IIBI, UTI, etc. These financial institutions provide long term finance for those purposes for which they are set up.
- **Financial Intermediaries** : The fourth important segment of the Indian capital market is the financial intermediaries. This comprises various merchant banking institutions, mutual funds, leasing finance companies, venture capital companies and other financial institutions.

Functions and Sgnificance of Capital Market

Capital market plays a very important role in economic development of a nation. It performs various important functions .Some of the functions and significance of capital market are discussed below:

i. Link between Savers and Investors: The capital market functions as a link between savers and investors. It plays an important role in mobilizing the savings and diverting them in productive investment. In this way, capital market plays a vital role in transferring the financial resources from surplus and wasteful areas to deficit and productive areas, thus increasing the productivity and prosperity of the country.

ii. Encouragement to Saving: With the development of capital, market, the banking and non-banking institutions provide facilities, which encourage people to save more. In the less - developed countries, in the absence of a capital market, there are very little savings and those who save often invest their savings in unproductive and wasteful directions and conspicuous consumption.

iii. Encouragement to Investment: The capital market facilitates lending to the businessmen and the government and thus encourages investment. It provides facilities through banks and nonbanking financial institutions. Various financial asset s, e.g., shares, securities, bonds, etc., induce savers to lend to the government or invest in industry. With the development of financial institutions, capital becomes more mobile, interest rate falls and investment increases.

iv. Promotes Economic Growth: The capital market not only reflects the general condition of the economy, but also smoot hens and accelerates the process of economic growth. Various institutions of the capital market, like nonbank financial intermediaries, allocate the resources rationally in accordance with the development needs of the country. The proper allocation of resources results in the expansion of trade and industry in both public and private sectors, thus promoting balanced economic growth in the country.

2.7 DEBT MARKET

Financial instruments that have a fixed income claim and have a maturity of more than one year are traded in the debt market. Debentures or bonds are examples of debt instruments in the capital market.

Debt instruments may have several distinguishing features. They can be secured or unsecured debt. A secured debt has assets to fall back on while an unsecured debt is subject to more risk. Since an unsecured debt does not have an asset backing, the repayment risk is more. Mortgaged debt refers to a mortgage lien on a group of assets or on a specific asset

category. Such a debt is also a secured debt.

Debt can also be categorised as redeemable debt or irredeemable debt. Based on the redemption (repayment) characteristic, it will be stated at the time of issue itself whether the debt will be repaid at maturity. Unless otherwise stated, all debt is usually redeemable debt. Irredeemable debt is a rollover debt, is renewed after maturity. Debt can also be classified as convertible debt or non-convertible debt. Convertible debt implies that the original debt instrument would be converted into another financial instrument at the time of maturity. A non-convertible debt is repaid at the end of the maturity period.

Based on the type of claim on the instrument, debt can be classified as regular interest debt, flexi debt, and zero coupon debt. A debt will bear a fixed claim, which is usually the interest payment made by the issuer to the debt holder. The nominal fixed percentage of interest is specified at the time of issue and the instruments. A flexi debt has the characteristic of changing its interest rate with the prevailing economic environment. The flexible debt is usually associated with inter-bank offer rates. For example, LIBOR (London Inter-bank Offer Rate) is a popular base rate for flexi debt instruments. A zero coupon debt, on the other hand, does not pay regular interest, but issues a document at an offer price and repays the document with value additions that compensates for the regular income through the duration of debt. The debt market distinguishes fresh issues from the subsequent trading of the securities and hence can be further subdivided into primary and secondary markets.

2.8 THE EQUITY MARKET

Equity instruments bestow ownership on the holder of the security. Equity hence implies ownership rights in the corporate entity that has issued the instruments to the public. The claim of the owners of these instruments is residual in nature, that is the owners will have a claim in the distribution of profits and not a fixed interest as in the case of debt instruments. The distribution of dividend out of the profits after payment to debt holders will be decided in the general body meeting of the corporate entity. Accordingly, the

corporate will announce the dividend rates. Dividends can be annual or quarterly or extraordinary. Sometimes equity owners also claim additional returns from the firm in the form of bonus shares. Dividend can be distributed either in the form of cash or as new shares.

Equity instruments can also be of several types. The most distinguishable types of equity are preference equity and common/ or ordinary equity. Preference equity has a preferential claim over dividend payment and/or payment of face value at the time of liquidation (closure) of a corporate. Sometimes a preferential equity may also have a claim for a minimum percentage of dividends when the corporate declares dividend. Common equity instruments do not have such preferential rights. The equity market is also subdivided into the primary market and secondary market.



CHECK YOUR PROGRESS

Q3: Define Capital Markets

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Q4: Define Government Securities Market

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Q5: Define Financial Intermediaries

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2.9 THE PRIMARY MARKET

The primary market is the doorway for corporate enterprises to enter the capital market. The issues of new securities are offered to the public through the primary market. The issue is thus an open public offer to sell the securities. The sale is made at a value predetermined by the firm issuing the security. Sometimes a road show is conducted to feel the pulse of the public in fixing the value for a security. The securities have a face value,

which is the denomination in which it is divided. For instance, an instrument could have a face value of Re 1, Rs. 5, Rs. 10, or Rs. 100 in India. This denomination determines the number of units of the security that are offered to the public. The price at which the security is offered to the public is the offer price of the instrument. This price could be equal to or greater or lesser than the face value. When the offer price is greater than the face value, the offer is said to be at a premium. When the offer price is less than the face value, the offer is at a discount. When the two prices are equal, the offer is at par.

Several intermediaries have sprung up to help corporate entities to offer their debt and equity instruments to the public. Merchant bankers and underwriters are the major intermediaries who help to match the fund requirement of corporate entities with the surplus fund position of public. The public is represented by both individual investors and institutional investors. Sometimes, when the market is dominated by institutions, the market is said to be institutionalised. Once the offer process of the securities to the public is complete, the securities are listed in the markets. The corporate then has to comply with the specific regulations of each local market in which its securities are listed.

2.10 SECONDARY MARKET

The secondary market refers to the exchange of securities that have been listed through the primary market. The price at which it is traded in the capital market is the market price of the instrument. It is the secondary market that offers tradability to the financial instruments. The number of financial instruments participating in the secondary market hence, cannot exceed the number of financial instruments recorded through the primary market. The secondary market also comes under the regulatory authorities of the market and the main role of the regulator in the secondary market is to safeguard the interest of players in the market. Both individuals and institutions can take part in the secondary market. Brokers and depositories are the main intermediaries in this market, who transact business on behalf

of the investors. The brokers can appoint a network of sub-brokers to mobilise investors participation in the market. Depositories help in scripless trading by holding investor accounts in electronic media.

Over a period of time, the secondary market has grown in size and in terms of efficiency. The secondary market may be further sub-divided into the spot market and derivative market.

2.11 THE SPOT MARKET

Spot market denotes the current trading price of financial instruments. In the context of time, the spot market may range between one day, two days, or a week. The transactions in the spot market are settled immediately, that is, on the immediate settlement date. Each market specifies the type of settlement to be made— a rolling settlement or a fixed day settlement. The rolling settlement, according to the specific exchange, will be T+1, T+3, or T+5. A T+1 rolling settlement indicates that trading entered on day T will be settled for cash on day T + 1. On the other hand, the fixed day settlement will be on a specific day of a week, say the working Thursday or Friday of a week.

2.12 THE DERIVATIVE MARKET

Unlike the spot market, the derivative market is a futures market. Trade takes place here with the intention to settle it at a later date. The derivative market has forward, futures, options, or other derivative instruments trading. Forward trade helps in the exchange of instruments in the future at prices or rates determined in the present. Forward contracts involve an obligation and are legally binding on the parties who have entered into a forward agreement. However, forward contracts have the disadvantage of inflexibility of timing. They are conducted on a one-to-one basis between parties who initially entered into the agreement. A forward contact cannot be surrendered or liquidated as easily as the other derivative instruments.

A future contract is an agreement by one participant to either buy or sell a financial instrument at a predetermined date in the future at a

predetermined price. The basic function of the futures trade is to enable the market participants to hedge against the risk of adverse price movement/ volatility in the market. A contract to buy, say, 100 shares of Ranbaxy Laboratories three months later, at Rs. 859.97 per share is a futures contract. The price at which the financial instrument is transferred at a later date (in this case, Rs. 859.97) is called the futures price. The time stated in the contract in which the contract will be enforced (three months hence) is called the delivery date/expiry date. Futures contacts are derivatives since they are based on financial instruments that are traded in the capital market.

Options are the other forms of derivatives that give the holder of the contract the choice to buy or sell a financial asset. Options can take the form of equity options or index options. Equity options such as Infosys call options may have a strike price of Rs. 700 at a premium of Rs. 15 with the expiry date of one month. The premium is the amount that is given to the writer of the contract for giving the buyer the right to sell the Infosys share at the future date for the agreed price.

Derivative instruments are called so because these financial instruments derive their value from the price of the underlying asset. These instruments are traded in a physical stock exchange through brokers. Derivative instruments are used to a large extent to reduce the risk in the underlying asset price.



CHECK YOUR PROGRESS

Q6: Define Secondary Markets

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Q7: Define Spot Market

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2.13 LET US SUM UP

In this unit we have discussed the following points:

- Financial markets can be classified on the basis of the nature of instruments exchanged in the economy.
- The instruments can be broadly divided into claim instruments and currency instruments. Claim instruments are subdivided into those that are fixed claims and those instruments that get a residual or equity claim.
- In addition to knowing the basic principles of investments, an investor is also required to know the operations of securities market.
- Different types of securities are traded in the market and they are broadly classified into debt and equity instruments.
- securities are bought and sold through a set of intermediaries, which include brokers, stock exchanges, etc.
- All stock market intermediaries are regulated by the SEBI to ensure orderly functioning of the market.
- Securities markets can be seen as primary and secondary.



2.14 FURTHER READING

- M. Ranganathan and R. Madhumathi(2005); *Investment Analysis and Portfolio Management,* Pearson Education, New Delhi.
- Punithavathy Pandian(2012); *Security Analysis and Portfolio Management,* Vikas Publishing House Pvt. Ltd., New Delhi.
- Bharti V. Phathak (2014); *Indian Financial System,* Pearson Education, Delhi.
- Donald E. Fischer and Ronald J. Jordon (2002): *Security Analysis and Portfolio Management*, Pearson Education India.

- Prasanna Chandra(2017); *Investment Analysis and Portfolio Management,* McGraw Hill Education, Delhi.



2.15 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q No.1: Securities are financial instruments that have been created to represent a legal obligation to pay a sum in future in return for the current receipt of value.

Ans to Q No.2: The domestic market caters exclusively to firms registered in a country. The country's regulatory authority controls the domestic market.

Ans to Q No.3: Capital markets exchange both long-term fixed claim securities and residual/equity claim securities. The main economic role of a capital market is to match players who have excess funds to players who are in need of funds.

Ans to Q No.4: Government Securities Market is also known as the Gilt-edged market. This refers to the market for government and semi-government securities backed by the Reserve Bank of India (RBI).

Ans to Q No.5: Financial Intermediaries comprises various merchant banking institutions, mutual funds, leasing finance companies, venture capital companies and other financial institutions

Ans to Q No.6: The secondary market refers to the exchange of securities that have been listed through the primary market.It is the secondary market that offers tradability to the financial instruments.

Ans to Q No.7: Spot market denotes the current trading price of financial instruments.



2.16 MODEL QUESTIONS

Q 1: Describe the characteristics of the securities market.

Q 2: Distinguish between the National and the International Markets.

Q 3: Distinguish between the Money Market and the Capital Markets.

Q 4: Distinguish between the Debt Market and the Equity Market.

Q 5: Distinguish between the Primary Market and the Secondary Market.

Q 6: Distinguish between the Spot Market and the Derivative Market.

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UNIT 3: RISK AND RETURN

UNIT STRUCTURE

3.1 Learning Objectives

3.2 Introduction

3.3 Concept of Investment Risk

3.4 Evolution of Risk Connotations

3.5 Types of Investment Risk

3.6 Returns on financial assets

- 3.6.1 Components of return
- 3.6.2 Calculation of average returns - P.O.

3.7 Risk in holding securities

- 3.7.1 Systematic risk
- 3.7.2 Unsystematic Risk

3.8 Risk measurement

3.9 Let Us Sum Up

3.10 Further Reading

3.11 Answers to Check Your Progress

3.12 Model Questions

3.1 LEARNING OBJECTIVES

After going through this unit, you will be able to:

- explain the concept of risk and genesis of total investment risk
- outline the distinction between 'systematic' and 'unsystematic' risk
- identify the factors that specially affect risk in investment in equity shares.
- Describe meaning, components and computation of return and risk.

3.2 INTRODUCTION

In this Unit, the concept of risk is discussed in detail because no investment decision can be taken without understanding the risk associated with the investment. In this unit we will discuss on the investment risks and

its various types. The concept of investment risk describes the likelihood of potential losses when you're making an investment. Risk is the general likelihood of losing the original investment, and investments are exposed to various types of risks throughout the lifecycle of the investment. Some of the most common types of investment risks are market risk, liquidity risk, credit risk, and inflation risk. At the end of this unit , we will get a fair idea about returns on financial assets,Components of return, Calculation of average returns, Risk in holding securities, Systematic risk,Unsystematic Risk and Risk measurement

3.3 CONCEPT OF INVESTMENT RISK

The importance of risk in investment decision can be appreciated if we ask the investors why they invest one part of their savings in bonds and the other part in equity. If risk is not a relevant factor in investment decision, investor should bet all their savings only in equity stocks, which offer on average higher return than debt instruments. Investors not only like return but they also dislike risk. Many investors may be willing to take some amount of risk since it is the only way to earn higher return but they need compensation for taking such additional risk. Thus, investment decision not only requires an estimation of return but also an assessment of risk to find whether the return from a risky asset is adequate for the risk assumed by the investors.

Investment risk can be defined as the probability or likelihood of occurrence of losses relative to the expected return on any particular investment.

The word ‘risk’ is common vocabulary and is widely used in the world of investments. In normal life, the term risk often means a negative outcome. If you say that it is risky to drive vehicle in a particular road, you actually mean that driving in that road may cause an accident. However, the term risk in investments has a different meaning. It not only refers to a scope of negative occurrence but also implies the chance of positive return. For example, we mentioned in Unit 1 that investment in stocks is riskier than

investments in bond.

Investment is employing money in different instruments or assets in the present, with the expectation of a positive rate of return in the future. In other words investment is the sacrifice in the present in the expectation of a future gain. The future returns are expected to compensate the time the investors hold the asset, expected rate of inflation and uncertainty of the future. The emphasis has been given mostly on the financial assets and it is also extended to physical and real assets. Investment management is the process of administering the employment of money in financial and other instruments in the present, with the expectation of a positive rate of return in the future.

It doesn't mean that investments in stocks will yield a negative return or it will be lower than bond return. It simply means that investments in stocks may offer a high return or also a huge loss. Risk captures variation in expected return and such uncertainty of return is invest in risky investments, the expected return needs to be higher. When such higher expected return is used for discounting the future cash flows, the security value moves downward. This way you can see a link between risk and return. We will discuss more on this relationship as we move further on this topic.

Since investment decisions are made based on the expected future outcome, we can broadly classify our understanding and knowledge on future into *four categories.* At one extreme, we have certain knowledge. If an investor invests in government security, it is almost certain that the government pays interest and principal on the due date. Only in extreme conditions, the government may fail to honour the commitment. At the other extreme, we have no idea on the future and we can call this as our ignorance. Suppose a company comes out with a public issue stating that they will take up a research to develop a process that will *convert* iron into gold. Many of us may not be able to judge the outcome because we may not have any idea on the feasibility. No rational investment decision is feasible when we are ignorant of possible outcome.

The third one is a situation where we know the possible outcomes and its range. Suppose we are able to estimate that India Cement's earning

will grow by 30% if the economy does well and will decline by 10% if the economy fails. If we don't know anything beyond that, then the situation is called as uncertain. It is again difficult to take a rational investment decision in a situation of uncertainty. If we are able to know the probability of the economy doing well or failing, then the situation is called risky. In other words, a situation pertaining to future is considered as risky If we know the range of outcome and its probability distribution. For example, in the above India Cement's case, if we know the probability of economy doing well next year is 70% and the probability of economy failing is 30%, then we can estimate the India Cement's earnings in a better way. Under this condition, the earnings of India Cements will increase by 30% with 70% probability and decline by 10% with 30% probability.

Two elements in the concept of risk as applied to the world of investment and finance deserve attention. **One,** risk in the investment sense is associated with return. A person buys a financial asset with expectations of a return. The investment decision would be premised on an 'expected return', which may or may not actually be realized. The chance of an `unexpected' or 'adverse' return would be the risk carried by an investment decision. For example, you buy a share at Rs.370 expecting a dividend of Rs. 6 per share in the coming year and expecting the price to rise to Rs.450 in a year's time. You are basing your decision to buy on a return of

$$\frac{(450-370)+6.0}{370} = 23.2\ percent.$$

Now, the price may rise only to Rs. 380 in which case the actual return downs to a mere 4.2 percent, if the company comes out with a dividend of Rs. 6 per share on a Rs. 10 equity share. Should the dividend be pruned to Rs. 4 per share, the return would further fall to 3.3 per cent. The **other** point to be stressed about investment risk is that it is generally considered synonymous with uncertainty. The investor is most of the time dealing with uncertainty and yet figuring out his subjective probabilities for the expected return.

3.4 EVOLUTION OF RISK CONNOTATIONS

In the early years of the present century, analysts used financial statement data for evaluating the risk of securities of a company. The broad indicators used by them were the amount of debt employed by the firm. Their rule was: 'the higher the amount of debt the greater the riskiness of security and Graham, Dodd and Cottle, who are considered pioneers of 'security analysis' as a discipline laid emphasis on 'margin of safety' as a measure of risk in the 1962 edition of their monumental work titled 'Security Analysis'. They were of the view that security analysis must calculate the 'intrinsic value' of a security independent of its market price. According to them, 'intrinsic value of a security would be a security analyst's own judgement based on its earning power and financial characteristics and without reference to its market price. The difference between 'intrinsic value' and 'market price' was called the 'margin of safety' and the rule used for assessment of risk was 'the higher the margin of safety, the lower the risk.'

Graham and Dodd not only concentrated on the individual security but also recognized the importance of its contribution to the risk of a well-diversified portfolio. It must, however, be mentioned that what brought the concepts of risk for a portfolio and a security under a clearer focus was the work of Markowitz and the later development of the capital asset pricing model (CAPM). You will know more about these developments in the area of investment risk in units later on.

Several measures, other than the standard deviation discussed in the preceding section, have been used to measure risk viz., range, semi-variance, and mean absolute deviation. But standard deviation has been accepted in general because its knowledge permits probability statements for most types of distributions. William Sharpe observes as follows in support of the measure: "The standard deviation of a portfolio's return can be determined from (among other things) the standard deviations of the returns of its component securities, no matter what the distribution is. No other relationship of comparable simplicity exists for most other variability measures." (See: W. Sharpe, Investments, IInd ed. 1981, p.121). You may

note that the risk of a portfolio is not just the mathematical addition of the risk of each of the individual securities that comprise. You may further note that where the portfolio is well diversified, portfolio risk would be less than this mathematical total.

You would have also come across a statement in this unit that the standard deviation measures the total risk of an investment. The later developments, in the theory of investment risk decompose this 'total' into several of its components. And this can be done in two ways. One, dividing total risk into systematic and unsystematic risk and two, dividing total risk into parts such that each of which has an origin in some causal force. Obviously, the first part of the decomposition exercise is broad and has relation to the market. The second part of the exercise relates to the factors or causes which produce risk in investments.

The division of total risk into 'systematic' and 'unsystematic' or 'non -systematic' owes its origin to developments in the area of portfolio theory. Sources of risk that cause variability of returns may be perceived as belonging to two general classes-those that are pervasive and affect all securities though in varying degrees e.g., inflation, interest rates, market sentiment, etc., and those that are specific to a particular security e.g., financial risk and business risk. When variability of returns moves with the market, it is recognized as 'systematic'. Firms cannot eliminate such a risk and they are of major concern to the investor. For example, when prices rise, all firms would be affected in terms of their costs and realizations, which in turn would affect variability of returns. This will be a market phenomenon and would tend to stay for all. The investor would demand compensation for this risk component in figuring out his expected rate of return. On the other hand, when variability of returns occurs because of firm-specific factors like the failure to obtain a prestigious overseas contract, or a higher exposure to the risk of default in payment of interest charges and debt obligations, the risk is termed 'non-systematic'. Since this part of risk can be reduced through a diversified portfolio, it is not considered while computing the expected or required rate of return.

The two components of total risk are additive and hence total risk is equal to Systematic risk *plus* Non-systematic risk. Systematic risk is normally measured by comparing the stock's performance vis-a-vis market's performance under different conditions. For example, in a good period, if the stock appreciates more than other stocks in the market and in a bad period, it depreciates more than other stocks in the market, the systematic risk of the stock is more than the market risk. The systematic risk of the market (normally widespread market index like BSE-100 or NSE -50 index) is equal to 1 and systematic risk of all stocks is expressed in terms of systematic risk of market index. This is done by measuring a value called 'beta'. The beta of the stock is equal to beta of the regression coefficient when stock's of returns are regressed on return of market - index. If the beta of stock is 1.50, then the stock is expected to show a price increase of 1.5 times of stock returns in a good period. At the same time, if the market declines by some percentage in a bad period, the stock is. expected to decline 1.5 times more than market's negative return.

For illustrative purpose, the weekly price and return data BSE-100 index, Hindustan Lever, Infosys and Reliance Industries are given in Appendix-1 of this Unit for a period of six months (July, 2000 to June, 2001). Using the return data and regression, the beta values of the three individual stocks are computed. As expected Hindustan Lever's beta shows the lowest value and is 0.49. The stock is less volatile during the period. The market as a whole (measured through BSE-100 index) has reported a net loss of 32% during the six months period, whereas HLL has suffered a net loss of 27.60% during the same period. A week-to-week comparison shows that HLL suffered less or posted profit when the market was reporting loss during the week. On the other hand, Reliance Industries reported a gain of 8.30% against the market loss of 32%. Again a week to week comparison shows the Reliance Industries weekly return are closely moving in line with BSE -100 and hence got a beta value of 0.96, which is close to market's beta of 1. Infosys showed wide variation during the period. Against a market loss of 32%, Infosys reported a net loss of 54.79% and also showed *high* volatility in the returns. The beta of 1.82 reflected the volatility. Thus, the systematic risk of HLL is the lowest

and Infosys is highest whereas Reliance Industries has shown a moderate systematic risk. The unsystematic risk of the stock is equal to total risk less systematic risk. It is computed as follows:

Unsystematic Risk = Variance of the stock - [Beta^2 x Variance of the Market Index]

Sometime, the unsystematic risk is expressed as a standard deviation. For the three illustrative stocks, the systematic and unsystematic measures are as follows:

	BSE-100	HLL	Infosys	Reliance
Total Risk (variance)	0.0024	0.0029	0.0111	0.0037
Beta	1.0000	-0.0444	-0.8528	-0.1588
Systematic Risk (variance)	0.00024	0.0011	0.0043	0.0023
Unsystematic Risk (variance)	0	0.0017	0.0069	0.0014
Unsystematic Risk (SD)	0	4.13%	8.28%	3.73%

3.5 TYPES OF INVESTMENT RISK

Investment risks can be divided into two broad categories, namely systematic and unsystematic risks.

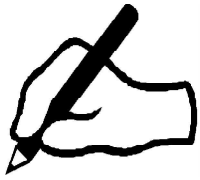
Systematic Risk: Systematic risk is the type of risk that is not under your control and affects a large number of assets. Any new law that the government passes or any new regulatory announcement that affects your investments falls under systematic risk.

Unsystematic Risk: On the other hand, unsystematic risk affects a very small category of assets. It is also called "specific risk". For example, the price of a specific stock may get affected due to a fire at the company's manufacturing plant.

Let us look at some of the other types of risks associated with investments.

1. Interest Rate Risk: Often government through RBI uses interest rates to push the economy forward or cool down the heated economy. Interest rate risk arises from variations in such rates, which cause changes in market prices. It can be seen that a rise in market interest rates causes a decline in market prices of securities and vice versa. There are different ways through

which the interest rate affects the securities return. It affects the expected or required rate of return because investors always compare risk-free return with the expected return of an investment. An increase in interest rate will cause an increase in expected or required rate of return of other investments.



Example 3.1

Assume a 14% secured non-convertible debenture of Rs. 200 for five years. As long as the market interest rate remains at 14%, the value of debenture will be equal to Rs. 200. Suppose the interest rate in the market increases to 20%, it affects the prices of debenture because an investor, who is willing to buy the debenture would expect a return of 20% and hence discount the cash flows at 20%.

Solution

Year-end	Cash Flow (Rs.)	Present Value at 20%
1	28	23.33
2	28	19.44
3	28	16.20
4	28	13.50
5	228	91.63
	Total	164.11

The debenture price will decline from Rs. 200 to 164.11.

Interest rate risk affects largely the securities with longer duration. For instance, if there is another non- convertible debenture with 10 year maturity, its price would decline to Rs. 149.69 from Rs. 200 if the interest rate increases from 14% to 20%. The workings are as follows:

Year-end	Cash Flow (Rs.)	Present Value at 20%
1	28	23.33
2	28	19.44
3	28	16.20
4	28	13.50
5	28	11.25
6	28	9.38

7	28	7.81
8	28	6.51
9	28	5.43
10	228	36.82
	Total	149.69

Now let us know, how the interest rate risk affects stock price? Since stocks have no maturity, the interest rate changes affect the stock prices more than bonds. Secondly, increase in interest rates also reduces the profit of the companies and hence securities prices are negatively affected. It can now be stated that the market prices (or present values) of securities would be inversely related both to market interest rates (or yield to maturity) and duration. You will recognize that the interest rate risk is the price fluctuation risk, which the investor is likely to face when interest rates change.

With a view to avoid the interest rate and duration risk, the investor, may like to invest in short-term securities. Rather than buying a 5-year debenture, he may buy a one-year security every time the earlier one-year security matures. This strategy, though successful in reducing the interest rate or the price fluctuation, would possibly expose the investor to another risk. Even the coupon rates in successive short-term securities may vary and the range of variation may be wide too. For instance, during the last few years, interest rates are constantly coming down and bank and financial institutions like IDBI and IFCI have reduced their interest rates. What the investor would now encounter is the 'coupon rate risk'. It will be the constant endeavour of investor to weigh between the interest rate risk and the coupon rate risk while keeping funds invested over his holding period.

You would have noticed in our discussion of financial instruments in Unit 1 that interest payments on bonds and debentures are contractual payments and the company can be sued for default. Cumulative preference dividends must also be paid to avoid trouble from preference shareholders. Equity dividends can always be skipped if the company is in deep financial trouble and a dividend payment would hasten insolvency. In such a situation the cash dividend yield will be much more risky than the coupon yield on debentures.

2. Market Risk: We have observed that the market moves upward at some point of time and then moves downward at some other point of time. Such movements may happen despite the good or bad performance of the companies. Often, company management and its employees will be puzzled why the market is behaving like this. Finance Ministers and economic advisors have gone on record stating that they don't understand the behavior of the market when it takes a beating after the presentation of budget. Irrespective of our understanding, the reality is the market move in one of the two directions (upward or downward) and once such trend starts, it exists for a time. There are several reasons behind such movements. Changes in economy or expectation about the future of the economy may cause such widespread movement. Company specific news may also cause such movement and if the company is a major one like Reliance or Infosys or Hindustan Lever, a positive or negative development may generally affect several other stocks in the market. Similarly, a shock in the U.S. market will have an impact on domestic stock prices.

Investors' psychology will also often contribute to the market risk. For instance, negative news may create a panic in the market and everyone would like to sell the stock without any buyer in the market. In this process, the market will decline more than the desired level. Market risk is demonstrated by the increased variability of investor returns due to alternating bouts to bull and bear phases. Efforts to minimize this component of total investment risk require a fair anticipation of a particular phase. This needs an understanding of the basic cause for the two market phases.

It has been found that business cycles are a major determinant of the timing and extent of the bull and bear market phases. This would suggest that the ups and downs in securities markets would follow the cycle of expansion and recession in the economy. A bear market triggers pessimism and price falls on an extensive scale. There is empirical evidence, which suggests that it is difficult for investors to avoid losing in bear markets. Of course, there could be exceptions.

The question of protection against market risk naturally arises. Investors can protect their portfolios by withdrawing invested funds before

the onset of the bear market. A simple rule to follow would be: 'buy just before the security prices rise in a bull market and sell just before the onset of the bear market', that is, buy low and sell high. This is called good investment timing but often difficult to practice.

Market risk as pointed out earlier is also classified as systematic and non-systematic. When combinations of systematic forces cause the majority of shares to rise during a bull market and fall during a bear market, a situation called systematic market risk is created. As already noted, a minority of securities would be negatively correlated to the prevailing market trend. These unsystematic securities face diversifiable market risk. For example, firms granted a valuable patent of obtaining a profitable additional market share might find its share prices rising even when overall gloom prevails in the market. Such unsystematic price fluctuations are diversifiable and the securities facing them can be combined with some other shares so that the resulting diversified portfolio offsets the non-systematic losses by gains from other -systematic securities.

3. Inflation Risk: Inflation risk is the variability in the total purchasing power of an asset. It arises from the rising general price level. The interest rate on bonds and debentures and dividend rates on equity and preference shares are stated in money terms and if the general price level rises during some future period, the buying power of the cash interest/dividend income is likely to be received for that period would decline. And if the rate of inflation is equal to the money rate of return, the investor does not add anything to his existing wealth since he obtains a zero rate of return.

Many investors believe that if the market prices of their financial assets increase, they are financially better off in spite of inflation. Their argument is 'after all money is increasing'. This is nothing but 'money illusion'. Consider, for instance, a situation when the market price of a security you are holding, doubles and the general price level increases four-fold. Would you say that you are richer simply because your command over money doubles by selling the security? True, you get more money than what you had earlier but you can buy less with that money. You can't dismiss the fact that your command over goods and services (which is the eventual objective of all investment

decisions) has declined due to a four-fold rise in prices in general.

The money illusion is partly rectified by obtaining real rates of return (interest/dividend cash income + capital gains) that is equivalent to the inflation-adjusted monetary or nominal rates of return. If the real rate of return is denoted by R_r, inflation rate by q, coupon rate by 'r' and nominal rate of return by R, then:

$$R_r = \frac{1.0 + r}{1.0 + q} \qquad -1$$

For example, a Rs.500 debenture earns a coupon rate of 15% per annum. Inflation rate expected in the coming one-year period is 12%. Then the real rate of return would be :

$$R_r = 1.121.15 - 1 = 1.027 - 1 = .02.7 \, or \, 2.7\%$$

You may notice the drastic fall in the real rate of return to 2.27% from the coupon rate of 15% due to inflation rate of 12%.

Again, an equity share of Rs. 10 promises a dividend of 20% and you expect the price of the share to rise from the current level of Rs.60 to Rs. 80 in a year's time. Inflation during the next year is estimated at 14%. The real rate of return would be :

$$\text{Nominal rate } \{R\} = \frac{(Rs.80 - Rs.60) + 2.0}{Rs.60} = 36.7\%$$

$$= \frac{1 + .367}{1 + 1.4} - 1 = \frac{1.367}{1.14} - 1$$

Real rate of Return (R_r) = 1.199 - 1 = .199 or 19.9%

The above examples clearly highlight the effects of purchasing power risk on the wealth and returns of an investor.

A question is sometimes asked about negative real rates of returns, that is, a situation where the inflation rate exceeds the nominal rate. Should an investor stop investing in such situations? The answer would depend on what other alternatives the investor would have in the event of not investing. If the money withheld from investment is kept as idle cash with zero nominal return then investing even with negative real returns, may be advisable because, as shown in the example below, non-investment would yield a larger negative real return than investing. And even though normal investment

objectives would be to earn positive real rates, in abnormal situations like the one stated above, the objective would be to reduce the negative real rate of return.

Assume that a security is expected to yield a nominal rate of return of 12% and the rate of inflation is expected to be 15%. We have now to work out the choices of the investor, further assuming that if he does not invest, his cash will have to remain idle.

Now, if our hypothetical investor decides to invest his real rate of return would be :

$$R_r = \frac{1+r}{1+q} - 1 = \frac{1.12}{1.15} - 1 = .974 - 1.0 = -0.026$$

It works out to a negative 2.6% return. Should the investor decide to keep idle cash, the real rate of return would be :

$$R_r = \frac{1+0.0}{1+15\%} - 1 = \frac{1.0}{1.15} - 1$$

=.869 - 1.0 = - 0.131

It would be better to have a negative return of 2.6 than to end with a negative return of 13.1% by keeping cash idle.

You have seen that the purchasing power risk arises even if the market prices of assets rise. Likewise, this risk may emerge even if the asset prices do not fluctuate. The reason for these relationships is that the purchasing power risk arises from fluctuations in the purchasing power of real income and/or real price of assets and not from fluctuations in buying power of their nominal income and/or nominal prices.

It has already been stated that investment assets are real assets like land, real estate, gold, diamonds and financial or monetary assets like shares, bonds, and debentures. It has been observed that prices of real assets move with inflation and are positively correlated with it. In contrast, prices of monetary assets are relatively rigid and are negatively correlated with inflation. In consequence, real assets do not lose purchasing power, as do the monetary assets in periods of inflation. In other words, real assets are good inflation hedges but monetary assets are not. Hence, monetary assets cannot form part of a portfolio, which already has got a high degree

of purchasing power risk. Such a portfolio can be diversified with real assets.

4. Default Risk: The default risk arises from a deterioration of financial strength of the company that issues securities. Holders of such securities have to experience greater variability of returns when financial strength begins to worsen. Since the basic parameter is 'financial health', default risk is also known as financial risk.

If not handled properly, the default episodes of a firm may as well finally end up in bankruptcy. This would, however, not be quite a swift process and one may notice warning signals before the final disaster strikes. For example, a company may begin stopping payment of its bills, accumulate arrears of cumulative preference dividends and accrued interest on loans, default on debenture interest, incur persistent losses, slash the equity dividend, and finally skip it, and so on. In more objective terms, adverse movements in financial ratios like the current ratio, the acid- test ratio, the cash to operating expense ratio, the net-worth to total assets ratio and so on can be put on the watch. The point is that bankruptcy will not be a bolt from the blue except when an act of nature destroys all assets, which are not insured.

Firms operating in the financial services sector like CRISIL, CARE and ICRA undertake an ongoing exercise to provide quality-ratings to the debt instruments of issuing companies. They are at present being solicited in India by companies who want to raise funds from the capital market. In Western countries, the rating programme is a voluntary and continual exercise performed by eminent firms like Standard & Poor and Merin Lynch etc. Ratings as given by these agencies are a significant aid to the investor in estimating the probabilities of default in a particular debt issue.

When the first sign of a weakening financial health of a firm is noticed, market price of its security react and take a deep dip. The price decline will be equal to the estimated loss when the company goes into bankruptcy. The immediate target groups would be lenders and loan creditors but ultimately even shareholders would suffer. In fact, if the worst happens, losses of equity holders could be total and they may end up with share prices nearly dropping to zero. Also, even at such abysmally low levels,

there may not be any takers.

As with other risk factors, there may be diversifiable and non-diversifiable components of default risk. Thus, tight credit conditions created by Reserve Bank of India would push up interest rates and financially weak companies may not be able to borrow. Similarly, a recession may curtail order position of the firms and firms that are already weak may start defaulting when their sales and income decline. These are examples of systematic forces that affect all firms simultaneously and systematically push them towards default. You should note that these are extraordinary circumstances and would push up the normal default rate of firms. The systematic element in default risk is more harmful to the investor than the diversifiable risk. The latter can be anticipated and managed. For example, a government security can be added to the portfolio unless securities exposed to normal default risk themselves are yielding an average return that is very much in excess of the default-free securities.

5. Business Risk: Firms operate in an environment, which often changes and such changes causes variation in expected income. For example, a change in government policy on fertilizer subsidy may affect a group of companies in the fertilizer industry. Similarly, an action by a competitor, domestic or from outside may also affect other companies. While the above changes in the environment are caused by certain entities, there are several factors, which change the operating environment but can't be attributed to anyone. For instance, many firms are exposed to business cycle and the income of such firms significantly differs from period to period. Companies in steel, auto and shipping industries are exposed to such business cycles. It is difficult to assess whether the business risk is systematic or non-systematic. A diversified portfolio consisting of securities of several industries can diversify such business risk to a great extent. On the other hand, portfolios with few stocks or stock drawn from select industries would be exposed to such business risk if all sectors of the portfolio were affected by changes in the environment.

6. Financial Risk: Financial risk arises when the firm uses debt in its capital structure. Debt brings fixed liability and hence increases the variability

of income available to the equity shareholders. Use of debt is not always bad. It will increase the profitability when the company performs well and equity holders get a return more than what is available otherwise. Debt creates problem in bad times because of the fixed liability. If the company fails to meet the debt obligation, the managers need to spend a lot of time in convincing the lenders to accept delayed payment and in meanwhile loose valuable managerial time. Default easily spread bad words about the company and the company faces problem from several fronts. It may not be able to get credit from suppliers and some of the good workers may leave the company. Customers will also prefer companies with sound financials to avoid uncertainty in supply.

The impact of financial risk upto a limit is restricted only to the equity holders. But too much of debt creates problems even to existing debt security holders unless the debt is fully secured. Even in such cases, it is difficult to take charge of the assets and sell it to meet their liability in view of lengthy legal process.

7. Management Risk: Management risk is that part of total variability of return which is caused by managerial decisions in firms where owners are not managers. However qualified and capable the management team, there are chances for judgmental errors and wrong decisions. Owners-investors are rightly aggrieved when executives are paid high salaries and perks and are allowed ego-bolstering non-income consumption like luxury cars, lavishly furnished offices and yet they plunge the firm in severe difficulties by their inept decisions.

Management errors are the main reasons, which give rise to management risk component of total investor risk. The errors are so numerous that it is difficult to either list them or even to classify them. Nevertheless, some potential areas of management errors can be highlighted. The one great blunder that management might commit is to ignore product obsolescence. In fact, adequate expenditure must be made on R & D and alternative products are promoted before the life cycle of existing ones comes to an end. Single product firms will be more exposed to this risk than firms with diversified product lines. Another risk is the

dependence of a firm on a single large customer. Management must adequately diversify customer groups. Many firms supplying military equipment have been found caught up in deep financial distress when the Government announces cuts in military spending. Many software companies are also facing this problem and making effort to diversify customers as well as country exposure. Yet one more area of management errors could be the wrong handling of a correct decision when it is subjected to unfair criticism and is even fought out in a court. For example, an automobile manufacturer develops a fuel-efficient small car much ahead of times. Some ardent consumer protection group brings a lawsuit on the grounds of user-safety being threatened. The firm then announces abandonment of the product, forcing investors to bear the loss of investments and lost revenues in future. You should note that these cases are only illustrative and the list may go to an infinite number of factors.

8. Liquidity Risk: Liquidity risk of securities results from the inability of a seller to dispose them off except by offering price discounts and commissions. It is easy to rank assets according to liquidity. The currency unit of a country is immediately saleable at par and no discount, etc., need be given. Government securities and blue chip shares are the next highly liquid group of assets. Debt securities and equity shares of some small and less known companies are less liquid or even illiquid. Lack of liquidity forces investors to sell the securities at a price below to the existing price, particularly when the quantity to be sold is large. Investors must consider the liquidity risk factor while selecting securities.



CHECK YOUR PROGRESS

Q1: Define Investment Risk

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Q2: Define Systematic Risk

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Q3: Define Unsystematic Risk

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Q4: Define Inlation Risk

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3.6 RETURNS ON FINANCIAL ASSETS

People want to maximize expected returns subject to their tolerance for risk. Return is the principal reward in the investment process, and it provides the basis to investors in comparing alternative investments. Measuring historical returns allows investors to assess how well they have done, and it plays a part in the estimation of future, unknown returns.

We often use two terms regarding return from investments, realized return and expected return. *Realized return* is after the fact return-return that was earned (or could have been earned). Realized return is history. For example, a deposit of Rs. 5,00,000 in the Punjab National Bank on January 1 in a certificate of deposit at a stated annual interest rate of 5 percent will be worth Rs. 525000 one year later. The realized return for the year is Rs. 25000 or 5 percent.

Expected return is the return from an asset that investors anticipate they will earn over some future period. It is a predicted return, and it may or may not occur.

3.6.1 COMPONENTS OF RETURN

Return on a financial asset, generally, consists of two components. The principal component of return is the periodic income on the investment, either in the form of interest or dividends. The second component is the change in the price of the asset—commonly called the capital gain or loss. This element of return is the difference between the purchase price and the price at which the asset can be or is sold. The price change may bring a gain or a loss as it may be in any side.

The income from an investment consists of one or more cash payments made at specified intervals of time. Interest payments on most bonds are paid either semi-annually or yearly, whereas dividends on common stocks are usually paid on yearly basis. The distinguishing feature of these payments is that they are paid in cash by the issuer to the holder of the asset.

We often use the term yield to express return. Yield refers to the income component in relation to some price for a security. For our purposes, the price that is relevant is the purchase price of the security. The yield on a Rs. 1,000 par value, 6 per cent coupon bond purchased for Rs. 950 is 6.31 per cent (Rs. 1,000 par value, 6 percent coupon bond purchased for Rs. 950 is 6.31 percent (Rs. 60/Rs. 950). However, we need to remember that yield is not, for most purposes, the proper measure of return from a security. The capital gain or loss must also be considered.

Equation 2.1 is a conceptual statement for total return.

Total return = Income + Price change (+/-) …(3.1)

Note that either component of return can be zero for a given security over any given time period. A bond purchased for Rs. 800 and held to maturity provides both type of income: interest payments and a price change. The purchase of a non-dividend-paying stock that is sold four months later produces either a capital gain or a capital loss, but no income.

Thus, a measure of return must consider both dividend/ interest income and price change. Returns over time or from different securities can be measured and compared using the total return concept. The total return for a given holding period relates all the cash flows received by an investor during any designated time period to the amount of money invested in the asset. Total return is defined as

$$\text{Total return} = \frac{\text{Cash payments received} + \text{Price change over the period}}{\text{Purchase price of the asset}} \times 100$$

$$r = \frac{(P_{t-1} - P_{t-1}) + D}{P_{t-1}}$$

where, r = total return, P_t = price of an asset at time (t), P_{t-1} = price of an asset at time (t-1), D = dividend or interest income in simple terms.

Example: Jindal Steels share's price on June 10, 2004 is Rs. 900 (P_{t-1}) and the price on June 9, 2005 (P_t), is Rs. 950. Dividend received is Rs. 76 (D). Determine the rate of return.

Solution :

$$r = \frac{(P_{t-1} - P_{t-1}) + D}{P_{t-1}} \times 100$$

$$= \frac{(950 - 900) + 76}{900} \times 100$$

$$= \frac{50 + 76}{900} \times 100$$

$$= \frac{126}{900} \times 100$$

= 14%

3.6.2 CALCULATION OF AVERAGE RETURNS

The total return is an acceptable measure of return for a specified period of time. But we also need statistics to describe a series of returns. For example, investing in a particular stock for ten years or a different stock in each of ten years could result in 10 total returns, which must be described mathematically.

There are two generally used methods of calculating the average return, namely, the arithmetic average and geometric average. The statistics familiar to most people is the arithmetic average. The arithmetic average, customarily designated by the symbol $\overline{X} = \frac{\sum X}{n}$ or the sum of each of the values being considered divided by the total number of values.

For example, the return of stock A for four quarters is as follows: Quarter-I = 10%; Quarter-II = 8%; Quarter-III = -4%; and Quarter IV = 20%. The average return is

$$= \frac{10 + 8 + (-4) + 20}{4} = 8.5\%$$

The arithmetic average return is appropriate as a measure of the central tendency of a number of returns calculated for a particular time, such as a year. However, when percentage changes in value over time are involved, the arithmetic mean of these changes can be misleading. For example, suppose an investor purchased a stock in Year 1 for Rs. 50 and it rose to Rs. 100 by year-end. This is a 100 percent return [(100-50)/50]. Then the stock went from Rs. 100 at the start of Year 2 to Rs. 50 at the end of that year. The return for year 2 is –50 percent [(50-100)/100)]. The arithmetic average return is 25 percent [(+100–50)/2)]. But, realistically, if an investor bought a stock for Rs. 50 and held it two years and it was still at Rs. 50, clearly there is no return at all.

From the above it is obvious that an analyst should use a different average to describe accurately the true rate of return over multiple periods. The geometric average return measures compound, cumulative returns over time. It is used in investments to reflect the realized change in wealth over multiple periods.

The geometric average is defined as the nth root of the product resulting from multiplying a series of returns together, as in Equation 3.2.

$$G = [(1 + r_1)(1 + r_2).....(1 + r_n)]^{1/n} - 1 \ldots \text{(3.2)}$$

where, r = total return, n = number of periods.

Return relative: On adding 1.0 to each return (r), we shall get a return relative. If the return for a period is 10 percent (.10), then the return relative is 1.10. The investor has received Rs. 1.10 relative to each Rs. 1 invested. If the return for a period is –15 percent (-.15) then the return relative is .85 (1-.15). Return relatives are used in

calculating geometric average returns because negative total returns cannot be used in the math.

For our stock that started at Rs. 50, rose to Rs. 100, and then dropped to Rs. 50 over a two-year period, the geometric return would be calculated as follows:

Return relative, Year 1 = 1.00 + 1.00 = 2.00

Year 2 = -.50 + 1.00 = .50

Geometric average (G) =

Here, we also need to note that the geometric average rate of return would be lower than the arithmetic average rate of return because it reflects compounding rather than simple averaging.

3.7 RISK IN HOLDING SECURITIES

Risk is generally associated with the possibility that realized returns of securities will be less than the returns that were expected. The source of such risk is the failure of dividends (interest) and/or the security's price to materialize as expected.

There are numerous forces that contribute to variations in return—price or dividend (interest). These forces are termed as elements of risk. Some factors are external to the firm and cannot be controlled. These factors affect large numbers of securities. *In investments, those forces that are uncontrollable, external, and broad in their effect are called sources of systematic risk.* Other forces are internal to the firm and are controllable to a large degree. The controllable, internal factors somewhat peculiar to industries and/or firms are referred to as sources of *unsystematic risk*.

That portion of total variability in return caused by factors affecting the prices of all securities is known as systematic risk. Economic, political, and sociological changes are sources of systematic risk. Their effect is to cause prices of nearly all individual common stocks and/or all individual bonds to move together in the same manner. For example, if the economy is moving toward inflation and corporate profits shift upward, stock prices

may rise across a broad front. Nearly all stocks listed on the National Stock Exchange (NSE) move in the same direction as the S & *P* Nifty index of NSE. Studies have shown that on the average, 50 percent of the variation in a stock's price can be explained by variation in the market index.

Conversely, the portion of total risk that is unique to a firm or industry is called unsystematic risk. Factors such as management capability, consumer preferences, and labour strikes cause unsystematic variability of returns in a firm. Unsystematic factors are largely independent of factors affecting securities markets in general. Because these factors affect one firm, they must be examined for each firm.

3.7.1 SYSTEMATIC RISK

As discussed, the main constituents of systematic risk include- market risk, interest rate risk and purchasing power risk.

Market Risk: The price of a stock may fluctuate widely within a short span of time even though earnings remain unchanged. The causes of this phenomenon are varied, but it is mainly due to a change in investors' attitudes towards equities in general, or toward certain types or groups of securities in particular. Variability in return on most common stocks that is due to basic sweeping changes in investor expectations is referred to as market risk.

The reaction of investors to tangible as well as intangible events causes market risk. Expectations of lower corporate profits in general may cause the larger body of common stocks to fall in price. Investors are expressing their judgement that too much is being paid for earnings in the light of anticipated events. The basis for the reaction is a set of real, tangible events– political, social, or economic.

Intangible events are related to market psychology. Market risk is usually touched off by a reaction to real events, but the emotional unstability of investors acting collectively leads to a snowballing overreaction. The initial decline in the market can cause

the fear ofloss to grip investors, and a kind of herd instinct builds as all investors make for the exit. These reactions to reactions frequently culminate in excessive selling, pushing prices down far out of line with fundamental value. With a trigger mechanism such as the threat of war, or an oil shortage, virtually all stocks are adversely affected.

Interest-rate risk: The risk of variations in future market values and the size of income, caused by fluctuations in the general level of interest rates is referred to as interest-rate risk. The basic cause of interest-rate risk lies in the fact that, as the rate of interest paid on Indian government securities rises or falls, the rates of return demanded on alternative investment vehicles, such as stocks and bonds issued in the private sector, rise or fall. In other words, as the cost of money changes for risk-free securities, the cost of money to risk-prone issuers will also change.

People normally regard government securities like treasury bills risk-free. The interest rates demanded on these securities are thought to approximate the “pure” rate of interest, or the cost of hiring money at no risk. Interest rates on gilts shift with changes in the supply and demand for government securities. For example, a large operating deficit experienced by the Indian government will require financing. Issuance of added amounts of Indian government securities will increase the available supply. Potential buyers of this new supply may be induced to buy only if interest rates are somewhat higher than those currently prevailing on outstanding issues. If rates on gilts advance from, say, 8 percent to 8¼ percent, investors holding outstanding issues that yield 8 percent will notice a decline in the price of their securities. Because the 8 percent rate is fixed by contract on these “old” gilts, a potential buyer would be able to realize the competitive 8¼ percent rate only if the current holder “marked down” the price. As the rate on guilts advances, they become relatively more attractive and other securities become less attractive. Consequently, bond purchasers will buy governments instead of

corporates. This will cause the price of corporates to fall and the rate on corporates to rise. Rising corporate bond rates will eventually cause preferred and inturn common stock prices to adjust downward as the chain reaction is felt throughout the system of security yields. Thus the direct effect of increases in the level of interest rates is to cause security prices to fall across a wide span of investment vehicles.

Also there are indirect effects on common stocks. First, lower or higher interest rates make the purchase of stocks on margin (using borrowed funds) more or less attractive. Higher interest rates, for example, may lead to lower stock prices because of a diminished demand for equities by speculators who use margin. Second, many firms, such as public utilities finance their operations quite heavily with borrowed funds. Others, such as financial institutions, are principally in the business of lending money. Advancing interest rates can bring higher earnings to lending institutions whose principal revenue source is interest received on loans. For these firms, higher earnings could lead to increased dividends and stock prices.

Purchasing-power risk: Purchasing-power risk refers to the uncertainty of the purchasing power of the money to be received. In simple terms, purchasing-power risk is the impact of inflation or deflation on an investment. When we think of investment as the postponement of consumption, we can see that when a person purchases a stock, he has foregone the opportunity to buy some goods or service for as long as he owns the stock. If, during the holding period, prices on desired goods and services rise, the investor actually loses purchasing power. Rising prices on goods and services are normally associated with what is referred to as inflation. Falling prices on goods and services are termed deflation. Both inflation and deflation are covered in the all-encompassing term purchasing-power risk. Generally, purchasing-power risk has come to be identified with inflation (rising prices); the incidence of declining

prices in most countries has been slight. The anticipated purchasing power changes manifest themselves on both bond and stocks.

3.7.2 UNSYSTEMATIC RISK

Market, purchasing-power, and interest-rate risks are the principal sources of systematic risk in securities; but we should also consider another important category of security risks— unsystematic risks. The portion of total risk that is unique or peculiar to a firm or an industry, above and beyond that affecting securities markets in general is called unsystematic risk. Factors such as management capability, consumer preferences, and labour strikes can cause unsystematic variability of returns for a company's stock.

Examples of unsystematic risks

Business risk: Business risk relates to the variability of the sales, income, profits etc., which in turn depend on the market conditions for the product mix, input supplies, strength of competitors, etc. The business risk is sometimes external to the company due to changes in government policy or strategies of competitors or unforeseen market conditions. They may be internal due to fall in production, labour problems, raw material problems or inadequate supply of electricity etc. The internal business risk leads to fall in revenues and in profit of the company, but can be corrected by certain changes in the company's policies.

Financial Risk: This relates to the method of financing, adopted by the company; high leverage leading to larger debt servicing problems or short-term liquidity problems due to bad debts, delayed receivables and fall in current assets or rise in current liabilities. These problems could no doubt be solved, but they may lead to fluctuations in earnings, profits and dividends to share holders. Sometimes, if the company runs into losses or reduced profits, these may lead to fall in returns to investors or negative returns. Proper financial planning and other financial adjustments can be used to

correct this risk and as such it is controllable.

Default or insolvency risk: The borrower or issuer of securities may become insolvent or may default, or delay the payments due, such as interest instalments or principal repayments. The borrower's credit rating might have fallen suddenly and he became default prone and in its extreme form it may lead to insolvency or bankruptcies. In such cases, the investor may get no return or negative returns. An investment in a healthy company's share might turn out to be a waste paper, if within a short span, by the deliberate mistakes of Management or acts of God, the company became sick and its share price tumbled below its face value.

Other Risks

Besides the above described risks, there are many more risks, which can be listed, but in actual practice, they may vary in form, size and effect.

Some of such identifiable risks are the Political Risks, Management Risks and Liquidity Risks etc. Political risk may occur due to the changes in the government, or its policy shown in fiscal or budgetary aspects, changes in tax rates, imposition of controls or administrative regulations etc. Management risks arise due to errors or inefficiencies of management, causing losses to the company. Marketability liquidity risks involve loss of liquidity or loss of value in conversions from one asset to another say, from stocks to bonds, or vice versa. Such risks may arise due to some features of securities, such as callability; or lack of sinking fund or Debenture Redemption Reserve fund, for repayment of principal or due to conversion terms, attached to the security, which may go adverse to the investor.

All the above types of risks are of varying degrees, resulting in uncertainty or variability of return, loss of income, and capital losses, or erosion of real value of income and wealth of the investor. Normally the higher the risk taken, the higher is the return.

3.8 RISK MEASUREMENT

Understanding the nature and types of risk is not adequate unless the investor or analyst is capable of measuring it in some quantitative terms. The quantitative expression of the risk of a stock would make it comparable with other stocks. However, the risk measurements cannot be considered fully accurate as it is caused by multiplicity of factors such as social, political, economic and managerial aspects.

Risk is measured by the variability of returns. The statistical tool often used to measure risk is the standard deviation. We know, standard deviation is a measure of the values of the variables around its mean or it is the square root of the sum of the squared deviations from the mean divided by the number of observations. This can be illustrated with an example.



Example 3.2

The following information is given about two companies Rani Limited and Raja Limited. Compute standard deviation of the returns of their shares

Rani Limited			**Raja Limited**		
Returns (r_i)	**Probabilities** (P_i)	**$P_i r_i$**	**Returns** (r_i)	**Probabilities** (P_i)	**$P_i r_i$**
5	0.10	0.50	5	0.05	0.25
7	0.20	1.40	7	0.15	1.05
9	0.30	2.70	9	0.20	1.80
11	0.25	2.75	10	0.40	4.00
13	0.15	1.95	11	0.20	2.20
$\sum$ (r) = 9.30			**$\sum$ (r) = 9.30**		

We may note from the above information the expected returns (means) are same in case of both the companies. The return of the Rani Ltd. ranges between 5 percent and 13 percent while that of Raja Ltd. ranges between 5 percent and 11 percent. The standard deviation and variance may be calculated as follows:

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

$$Variance(\sigma^2) = \sum_{i-1}^{n} P\{r_i - E(r)\}^2$$

Rani Limited			Raja Limited		
$r_i - E(r)$	$[r_i - E(r)]^2$	$P[r_i - E(r)]^2$	$r_i - E(r)$	$[r_i - E(r)]^2$	$P[r_i - E(r)]^2$
-4.3	18.49	1.849	-4.3	18.49	0.925
-2.3	5.29	1.058	-2.3	5.29	0.794
-0.3	0.09	0.027	-0.3	0.09	0.018
1.7	2.89	0.723	0.7	0.49	0.196
3.7	13.69	2.054	1.7	2.89	0.578
		5.7105			2.51

For Rani Ltd.

$$\sigma = \sqrt{\sum P\{r_i - E(r)\}^2}$$

σ = 5.7105

= 2.39

For Raja Ltd.

$$= \sqrt{\sum P\{r_i - E(r)\}^2}$$

= 2.51

= 1.58

The expected returns for both the companies under consideration are same (i.e. 9.3%). But the variations in expected returns are different. The returns of Raja Ltd. are more stable than that of Rani Ltd. Hence, the share of the former is safer than the latter company.

The standard deviation is an absolute measure, which can be applied when the mean is the same. But the *coefficient of variation* is the relative measure of the degree of uncertainty.



Example 3.3

Torrent and company estimates the probability and the expected returns as returns for the five observations as follows:

Probability	0.1	0.2	0.4	0.2	0.1
Possible return	10%	5%	20%	35%	50%

(a) What are the expected values of return and standard deviation?

Ans. Expected return equation is:

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

=.10 × 0.1 + 0.05 × 0.2 +*R* 0.2 × 0.4 + 0.35 × 0.2 + 0.5 × 0.1

= 0.01 + 0.01 + 0.08 + 0.07 + 0.05

= 22%

$$\sigma = \sqrt{\sum_{i=1}^{N} P(R_i - R)^2 P_i}$$

where = 22 from the above

= $[(.10 - .22)_2 \times 0.1 + (0.05 - .22)_2 \times 0.2 + (.20 - .22)_2 \times 0.4 + (.35 -$ .22)2 × 0.2 + (.50 - .22)2 × 0.1

=.00144 + .00578 + .00016 + .00338 + .00784 = .01860

$\sigma = \sqrt{0.0186} = 0.1364 - 13.64\%$

The concepts of variance, standard deviation, covariance and beta coefficients etc., are also used to explain the measure of risk. In the context of portfolio of assets, or investment in any assets risk is inherent in all such dealings. This risk primarily arises first out of parting of your funds or loss of liquidity. Money lent or parted is always having an element of risk. This element is the same as the concept of total risk.



CHECK YOUR PROGRESS

Q5: Define Financial Risk

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Q6: How Risk is measured

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3.9 LET US SUM UP

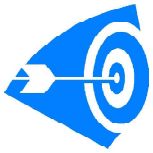
In this unit we have discussed the following points:

- Considerations of risk are vital for investments.
- An intelligent investor would want to make his journey as smooth as possible. He would attempt to anticipate the kind of risks she is likely to face and also the vast number of factors that probably produce these risks.
- The two -step procedure that an investor follows in accomplishment of the objective is to get some specific insights into the total investment risk and then to familiarize with , various elements and factors that sum up to such total risk.
- For estimating the total risk, the investor uses past experience and modifies it appropriately for the expected changes, in the future and then develops a subjective probability distribution of possible returns from the proposed investment.
- The 'mean' gives the expected value and 'variance' or 'standard deviation' gives the variability or the measure of risk.
- When it comes to specifying the factors influencing total risk, one may group them into two broad classes, viz., factors, which produce non-diversifiable or systematic risk and factors which cause non-systematic or diversifiable risk.



3.10 FURTHER READING

1) B.F. King, "*Market and Industry Factors in Stock Price Behaviour*", Journal of Business (January 1996), pp. 139-90.
2) M. Ranganathan and R. Madhumathi(2005), *Investment Analysis and Portfolio Management*, Pearson Education, New Delhi.
3) Punithavathy Pandian(2012), *Security Analysis and Portfolio Management*, Vikas Publishing House Pvt. Ltd., New Delhi.
4) Bharti V. Phathak(2014), *Indian Financial System,* Pearson Education, Delhi.
5) Donald E. Fischer and Ronald J. Jordon (2018), *Security Analysis and Portfolio Management,* PHI.
6) Prasanna Chandra(2014) *Investment Analysis and Portfolio Management,* TMH, Delhi.



3.11 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q No.1: Investment risk can be defined as the probability or likelihood of occurrence of losses relative to the expected return on any particular investment.

Ans to Q No.2: Systematic risk is the type of risk that is not under your control and affects a large number of assets. Any new law that the government passes or any new regulatory announcement that affects your investments falls under systematic risk.

Ans to Q NO.3: Unsystematic risk affects a very small category of assets. It is also called "specific risk". For example, the price of a specific stock may get affected due to a fire at the company's manufacturing plant.

Ans to Q No.4: Inflation risk is the variability in the total purchasing power of an asset. It arises from the rising general price level. The interest rate on bonds and debentures and dividend rates on equity and preference shares

are stated in money terms and if the general price level rises during some future period, the buying power of the cash interest/dividend income is likely to be received for that period would decline.

Ans to Qno.5: Financial Risk relates to the method of financing, adopted by the company; high leverage leading to larger debt servicing problems or short-term liquidity problems due to bad debts, delayed receivables and fall in current assets or rise in current liabilities.

Ans to QNo.6: Risk is measured by the variability of returns. The statistical tool often used to measure risk is the standard deviation.



3.12 MODEL QUESTIONS

Q 1: How would you assess the return of financial assets? Explain with illustrations.

Q 2: Which average-Arithmetic mean or Geometric mean should be used for calculating average return on securities?

Q 3: Define risk and distinguish between systematic and unsystematic risk.

Q 4: Of those risks normally associated with the holding of securities,

(a) What three risks are commonly classified as systematic in nature?

(b) What risks are most prevalent in holding common stocks?

Q 5: What are the statistical tools used to measure the risk of the securities return? Explain.

Q 6: Discuss the principal sources of systematic and unsystematic risk.

Q 7: Give an example using probabilities where two securities have equal expected returns but unequal variances or risk in returns.

Q 8: Cite recent examples of political, social, or economic events (market risk) that have excited

(a) The stock market, and

(b) Stocks in a specific industry, to surge ahead or plummet sharply.

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UNIT 4 : FUNDAMENTAL ANALYSIS - I

UNIT STRUCTURE

4.1 Learning Objectives

4.2 Introduction

4.3 Economic Analysis

4.3.1 Macro Economic Factors

4.4 Industry Analysis

4.4.1 Industry Life Cycle Analysis

4.4.2 Classification of Industry

4.4.3 Characteristics of an Industry Analysis

4.4.4 Profit Potential of Industries: Porter Model

4.5 Techniques for Evaluating Relevant Industry Factors

4.6 Let Us Sum Up

4.7 Further Reading

4.8 Answer to Check Your Progress

4.9 Model Questions

4.1 LEARNING OBJECTIVES

After going through this unit, you will be to:

- discuss about economic analysis
- explain the Industry Analysis
- outline the Classification of Industry
- discuss the characteristics of an Industry Analysis
- explain abouit profit Potential of Industries: Porter Model
- discuss the techniques for evaluating relevant industry factors

4.2 INTRODUCTION

The objective of this lesson is to make students to learn about the fundamental aspects affecting stock's values such as economic out-look and market conditions. Security analysis is the basis for rational investment decisions. If a security's estimated value is above its market price, the

security analyst will recommend buying the stock. If the estimated value is below the market price, the security should be sold before its price drops. However, the values of the securities are continuously changing as news about the securities becomes known. The search for the security pricing involves the use of fundamental analysis. Under fundamental analysis, the security analysts studies the fundamental facts affecting a stock's values, such as company's earnings, their management, the economic outlook, the firm's competition, market conditions etc.

Fundamental analysis is primarily concerned with determining the intrinsic value or the true value of a security. For determining the security's intrinsic value the details of all major factors (GNP, industry sales, firm sales and expense etc) is collected or an estimates of earnings per share may be multiplied by a justified or normal prices earnings ratio. After making this determination, the intrinsic value is compared with the security's current market price. If the market price is substantially greater than the intrinsic value the security is said to be overpriced. If the market price is substantially less than the intrinsic value, the security is said to be under priced. However, fundamental analysis comprises:

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

Here, in this lesson Economic and Industry analysis are explained in detail and the company analysis is discussed in the next lesson.

4.3 ECONOMIC ANALYSIS

For the security analyst or investor, the anticipated economic environment, and therefore the economic forecast, is important for making decisions concerning both the timings of an investment and the relative investment desirability among the various industries in the economy. The key for the analyst is that overall economic activities manifest itself in the behaviour of the stocks in general. That is, the success of the economy will ultimately include the success of the overall market. For studying the

Economic Analysis, the Macro Economic Factors and the Forecasting Techniques are studied in following paragraphs.

4.3.1 MACRO ECONOMIC FACTORS

The macro economy is the study of all the firms that operates in economic environment. The key variables to describe the state of economy are explained as below:

- ***Growth rate of Gross Domestic Product (GDP):*** GDP is a measure of the total production of final goods and services in the economy during a year. It is indicator of economic growth. It consists of personal consumption expenditure, gross private domestic investment, government expenditure on goods and services and net export of goods and services. The firm estimates of GDP growth rate are available with a time lag of one or two years. The expected rate of growth of GDP will be 7.3 percent in year 2015-16. Generally, GDP growth rate ranges from 6-8 percent. The growth rate of economy points out the prospects for the industrial sector and the returns investors can expect from investment in shares. The higher the growth rate of GDP, other things being equal, the more favorable it is for stock market.
- ***Savings and investment:*** Growth of an economy requires proper amount of investments which in turn is dependent upon amount of domestic savings. The amount of savings is favorably related to investment in a country. The level of investment in the economy and the proportion of investment in capital market is major area of concern for investment analysts. The level of investment in the economy is equal to: Domestic savings + inflow of foreign capital - investment made abroad.

  The Stock Market is an important channel to mobilize savings, from the individuals who have excess of it, to the individual or corporate, who have deficit of it. Savings are

distributed over various assets like equity shares, bonds, small savings schemes, bank deposits, mutual fund units, real estates, bullion etc. The demand for corporate securities has an important bearing on stock prices movements. Greater the allocation of equity in investment, favorable impact it have on stock prices.

- ***Industry Growth rate:*** The GDP growth rate represents the average of the growth rate of agricultural sector, industrial sector and the service sector. The contribution of industry sector in GDP in the year 2014-15 is 6.75 percent approximately. Publicly listed company play a major role in the industrial sector. The stock market analysts focus on the overall growth of different industries contributing in economic development. The higher the growth rate of the industrial sector, other things being equal, the more favourable it is for the stock market.
- ***Price level and Inflation:*** If the inflation rate increases, then the growth rate would be very little. The increasingly inflation rate significantly affect the demand of consumer product industry. The inflation rate in the Indian economy has been around 7 percent till 1990s. In recent years, the inflation rate ranges from 4-5 percent (2015). The industry which have a weak market and come under the purview of price control policy of the government may lose the market, like sugar industry. On the other hand the industry which enjoy a strong market for their product and which do not come under purview of price control may benefit from inflation. If there is a mild level of inflation, it is good to the stock market but high rate of inflation is harmful to the stock market.
- ***Agriculture and monsoons:*** Agriculture is directly and indirectly linked with the industries. Hence increase or decrease in agricultural production has a significant impact on the industrial production and corporate performance. Companies using agricultural raw materials as inputs or supplying inputs

to agriculture are directly affected by change in agriculture production. For example- Sugar, Cotton, Textile and Food processing industries depend upon agriculture for raw material. Fertilizer and insecticides industries are supplying inputs to agriculture. A good monsoon leads to higher demand for inputs and results in bumper crops. This would lead to buoyancy in stock market. If the monsoon is bad, agriculture production suffers and cast a shadow on the share market.

- ***Interest Rate:*** Interest rates vary with maturity, default risk, inflation rate, productivity of capital etc. The interest rate on money market instruments like Treasury Bills are low, long term government securities carry slightly higher interest rate and interest rate on corporate debenture is still higher. With the deregulation interest rates are softened, which were quite high in regulated environment. Interest rate affects the cost of financing to the firms. A decrease in interest rate implies lower cost of finance for firms and more profitability and it finally leads to decline in discount rate applied by the equity investors, both of which have a favourable impact on stock prices. At lower interest rates, more money at cheap cost is available to the persons who do business with borrowed money, this leads to speculation and rise in price of share.
- ***Government budget and deficit:*** Government plays an important role in the growth of any economy. The government prepares a central budget which provides complete information on revenue, expenditure and deficit of the government for a given period. Government revenue come from various direct and indirect taxes and government made expenditure on various developmental activities. The excess of expenditure over revenue leads to budget deficit. For financing the deficit the government goes for external and internal borrowings. Thus, the deficit budget may lead to high rate of inflation and adversely affects the cost of production and surplus budget may results

in deflation. Hence, balanced budget is highly favourable to the stock market.

- ***The tax structure:*** The business community eagerly awaits the government announcements regarding the tax policy in March every year. The type of tax exemption has impact on the profitability of the industries. Concession and incentives given to certain industry encourages investment in that industry and have favourable impact on stock market.
- ***Balance of payment, forex reserves and exchange rate:*** Balance of payment is the record of all the receipts and payment of a country with the rest of the world. This difference in receipt and payment may be surplus or deficit. Balance of payment is a measure of strength of rupee on external account. The surplus balance of payment augments forex reserves of the country and has a favourable impact on the exchange rates; on the other hand if deficit increases, the forex reserve depletes and has an adverse impact on the exchange rates. The industries involved in export and import are considerably affected by changes in foreign exchange rates. The volatility in foreign exchange rates affects the investment of foreign institutional investors in Indian Stock Market. Thus, favourable balance of payment renders favourable impact on stock market.
- ***Infrastructural facilities and arrangements:*** Infrastructure facilities and arrangements play an important role in growth of industry and agriculture sector. A wide network of communication system, regular supply or power, a well developed transportation system (railways, transportation, road network, inland waterways, port facilities, air links and telecommunication system) boost the industrial production and improves the growth of the economy. Banking and financial sector should be sound enough to provide adequate support to industry and agriculture. The government has liberalized its

policy regarding the communication, transport and power sector for foreign investment. Thus, good infrastructure facilities affect the stock market favourable.

- ***Demographic factors:*** The demographic data details about the population by age, occupation, literacy and geographic location. These factors are studied to forecast the demand for the consumer goods. The data related to population indicates the availability of work force. The cheap labour force in India has encouraged many multinationals to start their ventures. Population, by providing labour and demand for products, affects the industry and stock market.
- ***Sentiments:*** The sentiments of consumers and business can have an important bearing on economic performance. Higher consumer confidence leads to higher expenditure and higher business confidence leads to greater business investments. All this ultimately leads to economic growth. Thus, sentiments influence consumption and investment decisions and have a bearing on the aggregate demand for goods and services.



CHECK YOUR PROGRESS

Q1: Write any three key variables to describe the state of economy

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Q2: Define Balance of Payments

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4.4 INDUSTRY ANALYSIS

The mediocre firm in the growth industry usually out performs the best stocks in a stagnant industry. Therefore, it is worthwhile for a security analyst to pinpoint growth industry, which has good investment prospects.

The past performance of an industry is not a good predictor of the future- if one look very far into the future. Therefore, it is important to study industry analysis. For an industry analyst- industry life cycle analysis, characteristics and classification of industry is important. All these aspects are enlightened in following sections:

4.4.1 INDUSTRY LIFE CYCLE ANALYSIS

Many industrial economists believe that the development of almost every industry may be analyzed in terms of following stages (Figure 4.1):

1. ***Pioneering stage*:** During this stage, the technology and product is relatively new. The prospective demand for the product is promising in this industry. The demand for the product attracts many producers to produce the particular product. This lead to severe competition and only fittest companies survive in this stage. The producers try to develop brand name, differentiate the product and create a product image. This would lead to non-price competition too. The severe competition often leads to change of position of the firms in terms of market share and profit.
2. ***Rapid growth stage*:** This stage starts with the appearance of surviving firms from the pioneering stage. The companies that beat the competition grow strongly in sales, market share and financial performance. The improved technology of production leads to low cost and good quality of products. Companies with rapid growth in this stage, declare dividends during this stage. It is always adisable to invest in these companies.
3. ***Maturity and stabilization stage:*** After enjoying above-average growth, the industry now enters in maturity and stabilization stage. The symptoms of technology obsolescence may appear. To keep going, technological innovation in the

production process should be introduced. A close monitoring at industries events are necessary at this stage.

4. ***Decline stage*:** The industry enters the growth stage with satiation of demand, encroachment of new products, and change in consumer preferences. At this stage the earnings of the industry are started declining. In this stage the growth of industry is low even in boom period and decline at a higher rate during recession. It is always advisable not to invest in the share of low growth industry.

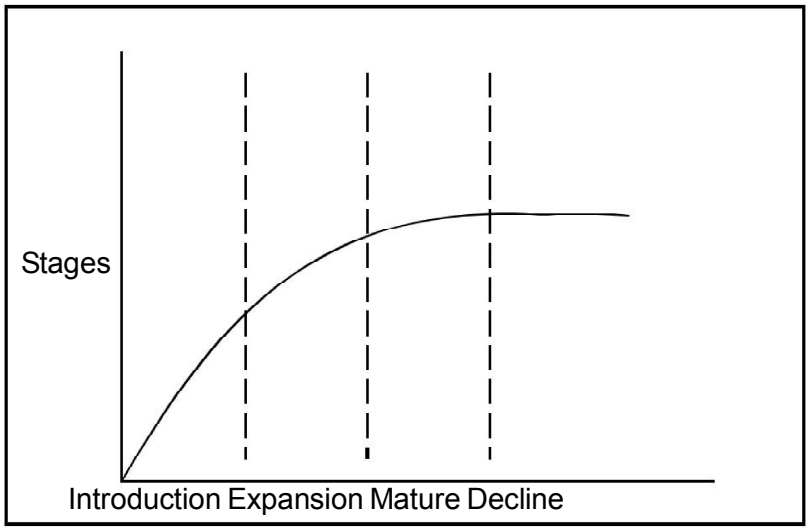


Figure: 4.1 Industry Life Cycle

4.4.2 CLASSIFICATION OF INDUSTRY

Industry means a group of productive or profit making enterprises or organizations that have a similar technically substitute goods, services or source of income. Besides Standard Industry Classification (SIC), industries can be classified on the basis of products and business cycle i.e. classified according to their reactions to the different phases of the business cycle. These are classified as follows:

1. ***Growth Industries:*** These industries have special features of high rate of earnings and growth in expansion, independent

of the business cycle. The expansion of the industry mainly depends on the technological change or an innovative way of doing or selling something. For example-in present scenario the information technology sector have higher growth rate. There is some growth in electronics, computers, cellular phones, engineering, petro-chemicals, telecommunication, energy etc.

2. ***Cyclical Industries:*** The growth and profitability of the industry move along with the business cycle. These are those industries which are most likely to benefit from a period of economic prosperity and most likely to suffer from a period of economic recession. These especially include consumer goods and durables whose purchase can be postponed until persona; financial or general business conditions improve. For example- Fast Moving Consumer Goods (FMCG) commands a good market in the boom period and demand for them slackens during the recession.
3. ***Defensive Industries:*** Defensive industries are those, such as the food processing industry, which hurt least in the period of economic downswing. For example- the industries selling necessities of consumers withstands recession and depression. The stock of defensive industries can be held by the investor for income earning purpose. Consumer nondurable and services, which in large part are the items necessary for existence, such as food and shelter, are products of defensive industry.
4. ***Cyclical-growth Industries:*** These possess characteristics of both a cyclical industry and a growth industry. For example, the automobile industry experiences period of stagnation, decline but they grow tremendously. The change in technology and introduction of new models help the automobile industry to resume their growing path.

4.4.3 CHARACTERISTICS OF AN INDUSTRY ANALYSIS

In an industry analysis, the following key characteristics should be considered by the analyst. These are explained as below:

1. Post sales and Earnings performance: The two important factors which play an important role in the success of the security investment are sales and earnings. The historical performance of sales and earnings should be given due consideration, to know how the industry have reacted in the past. With the knowledge and understanding of the reasons of the past behaviour, the investor can assess the relative magnitude of performance in future. The cost structure of an industry is also an important factor to look into. The higher the cost component, the higher the sales volume necessary to achieve the firm's break-even point, and vice-versa.

2. Nature of Competition: The numbers of the firms in the industry and the market share of the top firms in the industry should be analyzed. One way to determine competitive conditions is to observe whether any barriers to entry exist. The demand of particular product, its profitability and price of concerned company scrip's also determine the nature of competition. The investor before investing in the scrip of a company should analyze the market share of the particular company's product and should compare it with other companies. If too many firms are present in the organized sector, the competition would be severe. This will lead to a decline in price of the product.

3. Raw Material and Inputs: Here, we have to look into the industries, which are dependent upon imports of scarce raw material, competition from other companies and industries, barriers to entry of a new company, protection from foreign competition, import and export restriction etc. An industry which has a limited supply of materials domestically and where imports are restricted will have dim growth prospects. Labour is also an input and industries with

labour problems may have difficulties of growth.

4. Attitude of Government towards Industry: It is important for the analyst or prospective investor to consider the probable role government will play in industry. Will it provide financial support or otherwise? Or it will restrain the industry's development through restrictive legislation and legal enforcement? The government policy with regard to granting of clearance, installed capacity and reservation of the products for small industry etc. are also factors to be considered for industry analysis.

5. Management: An industry with many problems may be well managed, if the promoters and the management are efficient. The management likes Tatas, Birlas, Ambanies etc. who have a reputation, built up their companies on strong foundations. The management has to be assessed in terms of their capabilities, popularity, honesty and integrity. In case of new industries no track record is available and thus, investors have to carefully assess the project reports and the assessment of financial institutions in this regard. A good management also ensures that the future expansion plans are put on sound basis.

6. Labour Conditions and Other Industrial Problems: The labour scenario in a particular industry is of great importance. If we are dealing with a labour intensive production process or a very mechanized capital intensive process where labour performs crucial operations, the possibility of strike looms as an important factor to be reckoned with. Certain industries with problems of marketing like high storage costs, high transport costs etc leads to poor growth potential and investors have to careful in investing in such companies.

7. Nature of Product Line: The position of the industry in the life cycle of its growth- initial stage, high growth stage and maturing stage are to be noted. It is also necessary to know the industries with a high growth potential like computers, electronics, chemicals, diamonds etc., and whether the industry is in the priority sector of

the key industry group or capital goods or consumer goods groups. The importance attached by the government in their policy and of the Planning Commission in their assessment of these industries is to be studied.

8. Capacity Installed and Utilized: The demand for industrial products in the economy is estimated by the Planning Commission and the Government and the units are given licensed capacity on the basis of these estimates. If the demand is rising as expected and market is good for the products, the utilization of capacity will be higher, leading to bright prospects and higher profitability. If the quality of the product is poor, competition is high and there are other constraints to the availability of inputs and there are labour problems, then the capacity utilization will be low and profitability will be poor.

9. Industry Share Price Relative to Industry Earnings: While making investment the current price of securities in the industry, their risk and returns they promise is considered. If the price is very high relative to future earnings growth, the investment in these securities is not wise. Conversely, if future prospects are dim but prices are low relative to fairly level future patterns of earnings, the stocks in this industry might be an attractive investment.

10. Research and Development: For any industry to survive in the national and international markets, product and production process have to be technically competitive. This depends upon the research and development in the particular industry. Proper research and development activities help in obtaining economic of scale and new market for product. While making investment in any industry the percentage of expenditure made on research and development should also be considered.

11. Pollution Standards: These are very high and restricted in the industrial sector. These differ from industry to industry, for example, in leather, chemical and pharmaceutical industries the industrial effluents are more.

4.4.4 PROFIT POTENTIAL OF INDUSTRIES: PORTER MODEL

Michael Porter has argued that the profit potential of an industry depends on the combined strength of the following five components as explained below. Figure:4.2 depicts the forces that drive competition and determine industry profit potential. These are:

i. **Threat of New Entrants:** New entrants add capacity, inflate costs, push prices down and reduce profitability. Hence, if an industry face threat of new entrants, its profit potential would be limited. The threat from new entrants is low if the entry barriers confer an advantage on existing firms and deter new entrants. Entry barriers are high when:

The new entrants have to invest substantial resources to enter the industry.

Economics of scale are enjoyed by the industry.

- The government policy limits or even prevents new entrants.
- Existing firms control the distribution channels, benefit from product differentiation in the form of brand image and customer loyalty, and enjoy some kind of proprietary experience curve.

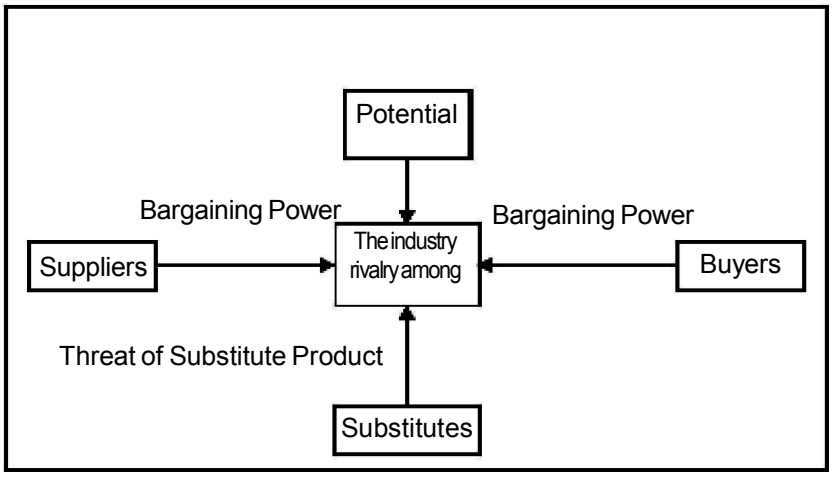


Figure: 4.2 Forces Driving Industry Competition

ii. **Rivalry among the Existing Firms:** Firms in an industry compete on the basis of price, quality, promotion service, warranties etc. If the rivalry between the firms in an industry is

strong, competitive moves and countermoves dampen the average profitability of the industry. The intensity of rivalry in an industry tends to be high when:

- The number of competitors in the industry is large.
- At least a few firms are relatively balanced and capable of engaging in a sustained competitive battle.
- The industry growth is sluggish, prodding firms to strive for a higher market share.
- The industry confronts high exit barriers.
- The industry's product is regarded as a commodity or near-commodity, stimulating strong price and service competition.

iii. **Pressure from Substitute Products:** All the firms in an industry face competition from industries producing substitute products. The substitute goods may limit the profit potential of the industry by imposing a ceiling on the prices that can be charged by the firms in the industry. The threat from substitute products is high when:

- The price-performance trade off offered by the substitute products is attractive.
- The switching costs for prospective buyers are minimal.
- The substitute products are being produced by industries earning superior profits.

iv. **Bargaining Power of Buyers:** Buyer is a competitive force. They can bargain for price cut, ask for superior quality and better services and induce rivalry among competitors. If they are powerful, they can depress the profitability of the supplier industry. The bargaining power of a buyer group is high when:

- Its purchases are large relative to the sales of the seller.
- Its switching costs are low.
- It poses a strong threat of backward integration.

v. **Bargaining Power of Suppliers:** Suppliers, like buyers, can exert a competitive force in an industry as they ca raise prices,

lower quality and curtail the range of free services they provide. Powerful suppliers can hurt the profitability of the buyer industry. Suppliers have strong bargaining power when:

- Few suppliers dominate and the supplier group is more concentrated than the buyer group.
- There are hardly any viable substitutes for the products supplied.
- The switching costs for the buyers are high.
- Suppliers do present a real threat of forward integration.

4.5 TECHNIQUES FOR EVALUATING RELEVANT INDUSTRY FACTORS

The techniques (long term and short term) for evaluating industry factors are explained in the following sections. These are:

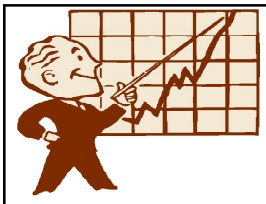
1. **End-Use and Regression Analysis:** End-use analysis for product demand analysis refers to a process whereby the analyst attempts to diagnose the factors that determine the demand for output of the industry. In a single product firm, units demanded multiplied by price will equal sales revenue. The analyst frequently forecast the factors like disposable income, per capita consumption, price elasticity of demand etc. that influence the demand of the product. For studying the relationship between various variables simple linear regression analysis and correlation analysis is used.

   Industry sales against time, industry sales against macro economic variables like gross national product, personal income disposable income and industry earnings over time may be regressed. When two or more independent variables are better able to explain variability in the dependent variables, the multiple regression analysis is used.

2. **Input-Output Analysis:** It is a way of getting inside demand analysis or end use analysis. It reflects the flow of goods and services through the economy including intermediate steps in

the production process as goods proceed from raw material stage to final consumption stage. Thus input-output analysis observes patterns of consumption at all stages in order to direct any changing patterns or trends that might indicate the growth or decline on industries. This technique is more appropriate for an intermediate or long term forecast than for short term forecast.

3. **Growth Rate:** The growth rate of different industry should be forecasted by considering historical data. Once the growth rate is estimated, future values of earnings or sales may be forecast. Since the growth rate is such an important factor in determining the stock prices, not only its size but its duration must be estimated. Sometimes, patents expire, competition with in an industry becomes more aggressive because foreign firms begin to compete, economically depressed periods occur or other factors cause growth rate to drop.



CHECK YOUR PROGRESS

Q3: Define the stages of industry life cycle

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Q4: Define Industry

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Q5: Define Defensive industries

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Q6: Write forces that drive competition and determine industry profit potential

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4.6 LET US SUM UP

In this unit we have discussed the following points:

- Fundamental analysis is primarily concerned with determining the intrinsic value or the true value of a security.
- Fundamental analysis is primarily concerned with determining the intrinsic value or the true value of a security.
- Fundamental analysis comprises-Economic Analysis, Industry Analysis, Company Analysis.
- For an industry analyst- industry life cycle analysis, characteristics and classification of industry is important.
- The two important factors which play an important role in the success of the security investment are sales and earnings.
- Michael Porter has argued that the profit potential of an industry depends on the combined strength of five components.



4.7 FURTHER READING

1) Donald E. Fischer and Ronald J. Jordan,*Security Analysis and Portfolio Management* ,Prentice-Hall, Inc.

2) Prasanna Chandra(2017),*Security Analysis and Portfolio Management,*Tata McGraw-Hill.

3) Punithavathy Pandian(2012), *Security Analysis and Portfolio Management,* Vikas Publication.

4) V.A. Avadhani, *Security Analysis and Portfolio Management*, Himalyana Publication.



4.8 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q No.1: The three key variables to describe the state of economy are:

a. Growth rate of Gross Domestic Product (GDP):

b. Savings and investment:

c. Industry Growth rate

Ans to Q No.2: Balance of payment is the record of all the receipts and payment of a country with the rest of the world.

Ans to Q No.3: The stages of industry life cycle are:Pioneering stage,Rapid growth stage, Maturity and stabilization stage and Decline stage.

Ans to Q No.4: Industry means a group of productive or profit making enterprises or organizations that have a similar technically substitute goods, services or source of income.

Ans to Q No.5: Defensive industries are those, such as the food processing industry, which hurt least in the period of economic downswing.

Ans to Q No.6: The forces that drive competition and determine industry profit potential are:Threat of New Entrants,Rivalry among the Existing Firms,Pressure from Substitute Products,Bargaining Power of Buyers and Bargaining Power of Sellers.



4.9 MODEL QUESTIONS

1. Define Fundamental Analysis. What is the importance of economic variables in such analysis?
2. Do you think that knowing the current status of economy is useful in analyzing stock market movements? Id so, explain.

3. Why industry analysis is is important in security valuation? Bring out the important considerations in industry analysis.
4. What are the important points to be considered in industry analysis?
5. Discuss the techniques of evaluating industry and economic factors.
6. What is industry life cycle? Bring out its relevance in security analysis.
7. How would you classify shares into growth, cyclical and defensive? Name some stock in each group and explain.

*** ***** ***

UNIT 5 : FUNDAMENTAL ANALYSIS: II

UNIT STRUCTURE

5.1 Learning Objective

5.2 Introduction

5.3 Comapny Analysis: An Introduction

5.4 Methods of analysing companies

5.5 Company Analysis: The Study of Financials Statements

5.6 Let Us Sum Up

5.7 Further Reading

5.8 Answers to Check Your Progress

5.9 Model Questions

5.1 LEARNING OBJECTIVES

After going through this unit, you will be able to:

- discuss methods of analysing companies
- explain the quantitative and qualitative methods
- discuss the financial statement
- describe fundamental aspects related to companies that affect stock's values.

5.2 INTRODUCTION

In the previous lunit "Fundamental Analysis-I" we have discussed about Economic Analysis and Industry Analysis and now in this unit "Fundamental Analysis-II" light is thrown on company analysis.

We will discuss the methods of analysing companies,the quantitative and qualitative methods and describe fundamental aspects related to companies that affect stock's values.

5.3 COMPANY ANALYSIS: AN INTRODUCTION

In the company analysis the investment analyst collect all the information related to the company and evaluates the present and future value of the

stock. In this analysis, all the factors affecting the earnings of a particular company are considered. The risk and return associated with the purchase of a stock is analyzed to take a better investment decisions. The valuation process depends upon the investor ability to elicit information from the relationship and inter-relationship among the company related variables. Up-to-date information is required on the status and trends in the economy, particular industries and firms. Success in investing will be largely dependent on:

Discovering new and credible information rapidly and in more details then others do. This depends upon the analyst ability to develop a system that couples original thoughts and unique ways of forming expectations about the prospects for individual company. For this purpose various public and private sources of information are analyzed.

Applying superior judgement so as to ascertain the relevance of information to the decision at hand. Judgement depends upon one's knowledge and experiences. By applying various tools of analysis to the data, the investor formulates expectations and judgement about the alternatives available to him.

For company analysis, the internal and external information need to be studied. *Internal information* consists of data and events made public by firms concerning their operations. The principle information sources generated internally by a firm are its financial statements. *External sources* of information are those generated independently outside the company. They provide supplement to internal sources. A good analyst must train himself to understand the kind of flexibility permitted in accounting and the effect of this flexibility on his interpretation of what he sees. For company analysis, the factors that need to be considered and the methods of analyzing financial statement of the company are highlighted in following lines.

5.4 METHODS OF ANALYSING COMPANIES

Fundamental analysis is the method of analyzing companies based on factors that affect their intrinsic value. There are two sides to this method:

the quantitative and the qualitative. The *quantitative side* involves looking at factors that can be measured numerically, such as the company's assets, liabilities, cash flow, revenue and price-to-earnings ratio. The limitation of quantitative analysis, however, is that it does not capture the company's aspects or risks unmeasurable by a number - things like the value of an executive or the risks a company faces with legal issues. The analysis of these things is the other side of fundamental analysis: the *qualitative side or non-number side*. Although relatively more difficult to analyze, the qualitative factors are an important part of a company. Since they are not measured by a number, they more represent an either negative or positive force affecting the company.

But some of these qualitative factors will have more of an effect, and determining the extent of these effects is what is so challenging. To start, identify a set of qualitative factors and then decide which of these factors add value to the company, and which of these factors decrease value. Then determine their relative importance. The qualities one analyzes can be categorized as having a positive effect, negative effect or minimal effect. The best way to incorporate qualitative analysis into evaluation of a company is to do it once you have done the quantitative analysis. The conclusion come to on the qualitative side can put quantitative analysis into better perspective. If when looking at the company numbers one saw good reason to buy/invest in the company, but then found many negative qualities, he may want to think twice about buying/investing.

The conclusions of qualitative analysis either reconfirm or raise questions about the conclusions of quantitative analysis. Fundamental analysis is not as simple as looking at numbers and computing ratios; it is also important to look at influences and qualities that do not have a number value. The present and future values are affected by the following factors (Fig: 5.1).

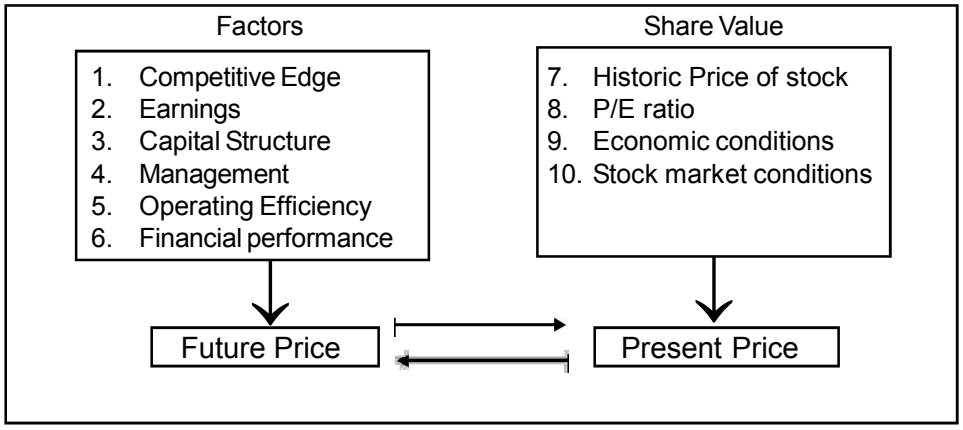


Fig: 5.1 Factors affecting present and future values of Stock

(A) Competitive Edge: Many industries in India are composed of hundreds of individuals companies. The large companies are successful in meeting the competition and some companies rise to the position of eminence and dominance. The companies who have obtain the leadership position; have proven his ability to withstand competition and to have a sizable share in the market. The competitiveness of the company can be studied with the help of:

a. *Market share*: The market share of the company helps to determine a company's relative position with in the industry. If the market share is high, the company would be able to meet the competition successfully. The size of the company should also be considered while analyzing the market share, because the smaller companies may find it difficult to survive in the future.

b. *Growth of annual sales*: Investor generally prefers to study the growth in sales because the larger size companies may be able to withstand the business cycle rather than the company of smaller size. The rapid growth keeps the investor in better position as growth in sales is followed by growth in profit. The growth in sales of the company is analyzed both in rupee terms and in physical terms.

c. *Stability of annual sales*: If a firm has stable sales revenue, other things being remaining constant, will have more stable earnings. Wide variation in sales leads to variation in capacity

utilization, financial planning and dividends. This affects the company's position and investor's decision to invest.

(B) Earnings: The earning of the company should also be analyzed along with the sales level. The income of the company is generated through the operating (in service industry like banks- interest on loans and investment) and non-operating income (ant company, rentals from lease, dividends from securities). The investor should analyze the sources of income properly. The investor should be well aware with the fact that the earnings of the company may vary due to following reasons:

a. Change in sales.

b. Change in costs.

c. Depreciation method adopted.

d. Inventory accounting method.

e. Wages, salaries and fringe benefits.

f. Income tax and other taxes.

(C) Capital Structure: Capital structure is combination of owned capital and debt capital which enables to maximize the value of the firm. Under this, we determine the proportion in which the capital should be raised from the different securities. The capital structure decisions are related with the mutual proportion of the long term sources of capital. The owned capital includes share capital

i. *Preference shares*: Preference shares are those shares which have preferential rights regarding the payment of dividend and repayment of capital over the equity shareholders. At present many companies resort to preference shares. The preference shares induct some degree of leverage in finance. The leverage effect of the preference shares is comparatively lesser than that the debt because the preference shares dividend are not tax deductible. If the portion of preference share in the capital is large, it tends to create instability in the earnings of equity shares when the earnings of the company fluctuate.

ii. *Debt*: It is an important source of finance as it has the specific benefit of low cost of capital because interest is tax deductible. The leverage effect of debt is highly advantageous to the equity shareholders. The limits of debt depend upon the firm's earning capacity and its fixed assets.

(D) Management: The basic objective of the company is to attain the stated objectives of the company for the good of the equity holders, the public and employees. If the objectives of the company are achieved, investor will have a profit. Good management results in high profit to investors. Management is responsible for planning, organizing, actuating and controlling the activities of the company. The good management depends upon the qualities of the manager.

(E) Operating Efficiency: The operating efficiency of the company directly affects the earnings capacity of a company. An expanding company that maintains high operating efficiency with a low break even point earns more than the company with high break even point. If a firm has stable operating ratio, the revenues also would be stable. Efficient use of fixed assets with raw materials, labour and management would lead to more income from sales. This leads to internal fund generation for the expansion of the firm.

(F) Financial Performance:

a. *Balance Sheet*: The level, trends, and stability of earnings are powerful forces in the determination of security prices. Balance sheet shows the assets, liabilities and owner's equity in a company. It is the analyst's primary source of information on the financial strength of a company. Accounting principles dictate the basis for assigning values to assets. Liability values are set by contracts. When assets are reduced by liabilities, the book value of share holder's equity can be ascertained. The book value differs from current value in the market place, since market value is dependent upon the earnings power of assets and not their cost of values in the accounts.

b. *Profit and Loss account*: It is also called as income statement. It

expresses the results of financial operations during an accounting year i.e. with the help of this statement we can find out how much profit or loss has taken place from the operation of the business during a period of time. It also helps to ascertain how the changes in the owner's interest in a given period has taken place due to business operations.

Last of all, for analyzing the financial position of any company following factors need to be considered for evaluating present situation and prospects of company. The questions that need to be answered for company analysis are:

- *Availability and Cost of Inputs*: Is the company well placed with respect to the availability of basic raw materials, power, fuel and other production inputs? What are the costs advantages/disadvantages of the company vis-à-vis its competitors?
- *Order Position*: What is the order position of the company? How many months or years of production does it represent? Is the order position improving or deteriorating?
- *Regulatory Framework*: What is the licensing policy applicable to the industry to which the firm belongs? Are there any price and/or distribution controls applicable to the company? If so, what are their implications for profitability?
- *Technological and Production Capabilities*: What is the technological competence of the firm? What is the state of its plant and machinery? Does the company have unutilized capacity to exploit favourable market developments?
- *Marketing and Distribution*: What is the image of the company in the marketplace? How strong is the loyalty of its customers/clients? What is the reach of the distribution network?
- *Finance and Accounting*: What are the internal accruals? How much access the companies have to external financing? What are the products in the portfolio of the company? How competitive is the position of the company in these products?
- *Human Resource and Personnel*: How competent and skilled is the

workplace of the company? Is the company over-staffed or under-staffed? What is the extent of employee turnover and absenteeism? What is the level of employee motivation and morale?

All information relating to these factors may be available from the annual reports and from the published sources also. The first hand information is also available from the official sources of the company.

5.5 COMPANY ANALYSIS : THE STUDY OF FINANCIAL STATEMENT

Financial statement means a statement or document which explains necessary financial information. Financial statements express the financial position of a business at the end of accounting period (Balance Sheet) and result of its operations performed during the year (Profit and Loss Account). In order to determine whether the financial or operational performance of company is satisfactory or not, the financial data are analyzed. Different methods are used for this purpose. The main techniques of financial analysis are:

1. Comparative Financial Statements
2. Trend Analysis
3. Common Size Statement
4. Fund Flow Statement
5. Cash Flow Statement
6. Ratio Analysis

Let us discuss these techniques of financial analysis in the following ways:

1. **Comparative Financial Statements :** In comparative financial statement, the financial statements of two periods are kept by side so that they can be compared. By preparing comparative statement the nature and quantum of change in different items can be calculated and it also helps in future estimates. By comparing with the data of the previous years it can be ascertained what type of changes in the different items of

current year have taken place and future trends of business can be estimated.

2. **Trend Analysis :** In order to compare the financial statements of various years trend percentages are significant. Trend analysis helps in future forecast of various items on the basis of the data of previous years. Under this method one year is taken as base year and on its basis the ratios in percentage for other years are calculated. From the study of these ratios the changes in that item are examined and trend is estimated. Sometimes sales may be increasing continuously and the inventories may also be rising. This would indicate the loss of market share of a particular company's product. Likewise sales may have an increasing trend but profit may remain the same. Here the investor has to look into the cost and management efficiency of the company.
3. **Common Size Statement :** Common size financial statements are such statements in which items of the financial statements are converted in percentage on the basis of common base. In common size Income Statement, net sales may be considered as 100 percent. Other items are converted as its proportion. Similarly, for the Balance sheet items total assets or total liabilities may be taken as 100 percent and proportion of other items to this total can be calculated in percentage.
4. **Fund Flow Statement :** Income Statement or Profit or Loss Account helps in ascertainment of profit or loss for a fixed period. Balance Sheet shows the financial position of business on a particular date at the close of year. Income statement does not fully explain funds from operations of business because various non-fund items are shown in Profit or Loss Account. Balance Sheet shows only static financial position of business and financial changes occurred during a year can't be known from the financial statement of a particular date.

Thus, Fund Flow Statement is prepared to find out financial changes between two dates. It is a technique of analyzing financial statements. With the help of this statement, the amount of change in the funds of a business between two dates and reasons thereof can be ascertained. The investor could see clearly the amount of funds generated or lost in operations. These reveal the real picture of the financial position of the company.

5. **Cash Flow Statement :** The investor is interested in knowing the cash inflow and outflow of the enterprise. The cash flow statement expresses the reasons of change in cash balances of company between two dates. It provides a summary of stocks of cash and uses of cash in the organization. It shows the cash inflows and outflows. Inflows (sources) of cash result from cash profit earned by the organization, issue of shares and debentures for cash, borrowings, sale of assets or investments, etc. The outflows (uses) of cash results from purchase of assets, investment redemption of debentures or preferences shares, repayment of loans, payment of tax, dividend, interest etc. With the help of cash flow statement the investor can review the cash movement over an operating cycle. The factors responsible for the reduction of cash balances in spite of increase in profits or vice versa can be found out.

6. **Ratio Analysis :** Ratio is a relationship between two figures expressed mathematically. It is quantitative relationship between two items for the purpose of comparison. Ratio analysis is a technique of analyzing financial statements. It helps in estimating financial soundness or weakness. Ratios present the relationships between items presented in profit and loss account and balance sheet. It summaries the data for easy understanding, comparison and interpretation. Normally, ratios are grouped into five categories. These ratios serve the

different purpose for different parties; like the trade creditors are interested in the liquidity ratios as these represent the company's liquidity position, whereas investors are interested to know the company's long term solvency, earnings growth and future profitability and these are represented by the leverage and profitability ratios. The four types of ratios are given below:

a. Liquidity ratios
b. Leverage ratios
c. Turnover ratios
d. Profitability ratios
e. Valuation ratios.

Let us discuss these ratios in the following ways:

a. Liquidity Ratios: Liquidity rations means ability of the company to pay the short term debts in time. These ratios are calculated to analyze the short term financial position and short term financial solvency of firm. Commercial banks and short term creditors are interested in such analysis. The important liquidity ratios are (a) Current Ratio, (b) Quick or acid-test ratio (c) Cash ratio, (d) Net Working Capital ratio.

i. Current ratio: It is calculated by dividing current assets by current liabilities. Current assets include cash, current investments, debtors, inventories (Stocks), loans, advances and pre-paid expenses. Current liabilities represent liabilities that are expected to mature in the next twelve months and comprise of (i) Loans, secured or unsecured and (ii) Current liabilities and provisions.

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

ii. Quick ratio*:* In interpreting current ratio, the components of current assets are not taken into consideration. The quick ratio is found out by dividing quick assets by current liabilities.

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

iii. Cash Ratio: It gives the amount of cash available in terms of liquidity. The ratio is calculated by dividing cash and marketable securities by current liabilities.

$$\text{Cash Ratio} = \frac{\text{Cash} + \text{Marketable Securities}}{\text{Current Liabilities}}$$

iv. Net Working Capital Ratio: The difference between current assets and current liabilities excluding short term bank borrowing is called net working capital.

$$\text{Net Working Capital Ratio} = \frac{\text{Net Working Capital}}{\text{Total Assets}}$$

b. Leverage ratios: A company has long-term creditors like debenture holders, financial institutions, who are interested to know the company's long-term financial strength. In general, everybody is concerned with long-term debts, because these commit the company to paying interest, and eventually the principal, over the long run. Moreover as creditors' claims must be satisfied before earnings can be distributed to shareholders, present and prospective shareholders pay close attention to the degree of indebtedness and ability to repay debts.

This long-term financial strength can be judged by using leverage ratios.There are mainly two types of leverage ratios: one measures the degree of indebtedness and the other measures the ability to service debts.The degree of indebtedness measures the amount of debt relative to other significant balance sheet amounts. This is commonly measured by the **Debt-Equity ratio** and **Debt ratio**.

The second type of debt measure, the ability to service debts, assesses a company's ability to make the contractual payments required on a scheduled basis over the life of a debt. The company's ability to pay certain fixed charges is measured using coverage ratios. The most common coverage ratio is the **Interest Coverage ratio**.

(i) Debt-Equity Ratio: This ratio can be calculated by dividing total

debt by net worth.

$$\text{Debt - Equity Ratio} = \frac{\text{Total Debt (TD)}}{\text{Net Worth (NW)}}$$

Total debt includes short-term as well as long-term debt. Net worth includes equity capital and reserves and surplus. A simple variant of the debt-equity ratio is calculated by the following formula:

$$\text{Debt - Equity Ratio (D/E)} = \frac{\text{Long Total Debt}}{\text{Equity Capital}}$$

(ii) Debt Ratio: This ratio is calculated by dividing total debt (TD) by capital employed (CE). Total debt includes short and long-term borrowings from financial institutions, debentures/bonds, bank borrowings, public deposits and any other interest-bearing loan. Capital employed includes Net fixed assets (NFA) and net current assets (NCA). Net current assets are current assets (CA) less current liabilities (CL) excluding interest-bearing short-term debt for working capital.

$$\text{Debt Ratio} = \frac{\text{Total Debt (TD)}}{\text{Capital employed (CE)}}$$

The debt-equity and debt ratio show how excellently debt financing has been used in the business. A high ratio for both the case means that claims of creditors are greater than those of owners. A high level of debt introduces inflexibility in the firm's operations due to the interferences from creditors. But a low debt-equity ratio implies a greater claim of owners than creditors. From the point of view of creditors, it represents a satisfactory situation since a high proportion of equity provides a larger margin of safety for them. Together with the level of indebtedness, the company's capacity to bear interest needs to be measured.

(iii) Interest Coverage Ratio: The interest coverage ratio, measures the company's ability to make contractual interest payments. The higher the value of this ratio, the better is the ability of the company to fulfil its interest obligations. It is

calculated by dividing Profit before Interest and Taxes by Interest amount.

$$\text{Interest Coverage Ratio} = \frac{\text{Profit before Interest and Taxes}}{\text{Interest}}$$

c. Turnover Ratio: Activity or turnover ratios measure the speed with which accounts are converted into sales or cash. These ratios are employed to evaluate the efficiency with which a company manages and utilises its assets. These ratios involve a relationship between sales and assets. The common Activity or Turnover ratios are :

(i) Inventory Turnover Ratio: This ratio shows how rapidly the inventory is turning into cash or receivables through sales. It measures the activity, or liquidity, of a firm's inventory. It is calculated by dividing the cost of goods sold by sales. If the cost of goods sold figure is not available to outside analyst then it is computed by taking sales figure instead of cost of goods sold.

$$\text{Inventory turnover} = \frac{\text{Cost of goods sold}}{\text{Inventory}}$$

Or

$$\text{Inventory turnover} = \frac{\text{Sales}}{\text{Inventory}}$$

Generally, a high inventory turnover is indicative of good inventory management i.e. products being manufactured are sold at a fast rate. A low inventory turnover implies excessive inventory levels than warranted by production and sales activities. This ratio needs to be compared with the current ratio to judge a company's liquidity position.

(ii) Debtors (Accounts Receivable) Turnover: A company sells goods for cash and credit. When the company extends credits to its customers, debtors (accounts receivables) are created

in the company's accounts. Debtors are convertible into cash over a short period, hence are included in current assets. This ratio has to be compared together with the other liquidity ratios to assess the liquidity position of the company. It is calculated by dividing credit sales by accounts receivables or debtors amount.

$$\text{Debtors turnover} = \frac{\text{Credit sales}}{\text{Debtors}}$$

This turnover ratio indicates the number of times receivables are turnover each year. The higher the value of this ratio, the more efficient is the management of credit.

(iii) Total Asset Turnover Ratio: This ratio indicates the efficiency with which the company uses its assets to generate sales. Generally, the higher a company's total assets turnover, the more efficiently its assets have been used. It is calculated by dividing sales by total assets. This measure is probably of greater interest to management as it indicates whether the company's operations have been financially efficient.

$$\text{Total assets turnover} = \frac{\text{Sales}}{\text{Total assets}}$$

Some analyst exclude intangible assets like goodwill, patents etc, while computing total assets turnover. Similarly, fictitious assets, accumulated losses or deferred expenditures may also be excluded for calculating total asset turnover ratio.

(iv) Fixed Asset Turnover Ratio: Sometimes, analyst wants to measure the efficiency only with respect to fixed assets. This ratio measures sales per rupee of investment in fixed assets. A high ratio indicates a high degree of efficiency in asset utilisation and a low ratio reflects inefficient use of assets. However, while interpreting this ratio, one has to examine the quality of the asset, as old and substantially depreciated fixed assets would tend to show a high turnover ratio.

$$\text{Fixed assets turnover} = \frac{\text{Sales}}{\text{Fixed assets}}$$

d. Profitability Ratios: Profitability ratios measure the capability of a company to survive and grow over a long period of time. As a group, these measures evaluate the company's earnings with respect to a given level of sales, a certain level of assets, the owners' investment, or share value. Management of the company, creditors, owners are all interested in the profitability of the company. Creditors are interested in getting back their interest and repayment of principal in time. Owners want to know the required rate of return on their investment. These can be evaluated by the profitability ratios. Usually two types of profitability ratios are calculated: (a) profitability in relation to sales and (b) profitability in relation to investment. The popular ratios of the first group are the **Gross profit margin**, **Net profit margin** and **Operating ratio**. The common ratios for the second group are **Return on Investment**, **Return on Equity**, **Earnings per share** and **Price-Earnings Ratio**.

(i) Gross Profit Margin: The gross profit margin measures the percentage of each sales remaining after the company has paid for its goods.

$$\text{Gross Profit Margin} = \frac{\text{Gross Profit}}{\text{Sales}}$$

(ii) Net Profit Margin: Net profit is obtained when operating expenses, interest and taxes are subtracted from the gross profit.

$$\text{Net Profit Margin} = \frac{\text{Profit after tax}}{\text{Sales}}$$

(iii) Operating Expense Ratio:The operating expense ratio explains the changes in the profit margin ratio.

$$\text{Operating expense ratio} = \frac{\text{Operating expense}}{\text{Sales}}$$

(iv) Return on Investment:The Return on Investment also called as Return on Asset, measures the company's overall effectiveness in generating profits with its available assets.

$$\text{Return on Investment} = \frac{\text{Profit after tax}}{\text{Total assets}}$$

(v) Return on Equity: The return on equity examines the profitability of owners' investment. This ratio measures the return earned on the owners' investment.

$$\text{Return on Equity} = \frac{\text{Profit after tax}}{\text{Net worth}}$$

Or

$$\text{Return on Equity} - \frac{\text{Profit after tax}}{\text{Equity capital}}$$

e. Valuation Ratio: A valuation ratio is a measure of how cheap or expensive a security (or business) is compared to some measure of profit or value.The following are some of the types of valuation ratio :

(i) Earnings per Share:The earnings per share represent the number of rupees earned on behalf of each outstanding equity share. It is computed by dividing the profit after taxes by the total number of equity shares.

$$\text{EPS} = \frac{\text{Profit after tax}}{\text{Number of share outstanding}}$$

(ii) Price/Earnings (P/E) ratio: The P/E ratio measures the amount investors are wiling to pay for each rupee of the company's earnings.This ratio indicates the degree of confidence that investors have in the company's future performance. The higher the P/E ratio, the greater is the investors' confidence. It is calculated by dividing market price by EPS.

$$\text{P/E} = \frac{\text{Market Price}}{\text{EPS}}$$



CHECK YOUR PROGRESS

Q 1: What do you mean by ratio analysis?

.....

.....

Q 2: Fill in the blanks with appropriate words:

a) Liquidity ratio represents the company's ..... position.

b) Earnings growth and future profitability are represented by the ..... and ..... ratios.

Q 3: What are the different types of ratios?

.....

.....

Q4: discuss these techniques of financial analysis

.....

.....



5.6 LET US SUM UP

In this unit we have discussed the following points:

- The competitive edge of the company could be measured with the help of company market share, growth and stability of its annual sales.
- The financial statement of the company reveals the needed information to the investor to make investment decision.
- Analysis of the financial statistics must be supplemented with an appraisal, mostly of a qualitative nature, of the company present situation and prospects.
- Ratio analysis is a widely used tool of financial analysis.

- It is defined as the systematic use of ratio to interpret the financial statements so that the strengths and weaknesses of a company, as well as its historical performance and current financial condition, can be determined.
- Ratios make the related information comparable as these are relative figures reflecting the relationship between related variables.
- Ratios can be compared by using trend analysis, inter- company comparison and comparison with standards or industry average.
- Ratios are broadly categorised into four groups: liquidity ratios, leverage ratios, turnover ratios and profitability ratios.
- Liquidity ratios measure the company's ability to meet current obligations, whereas the leverage ratios measure the proportion of outsiders' capital in financing the company's assets.
- Activity ratios reflect the company's efficiency in utilising its assets in generating sales, whereas the profitability ratios measure the overall performance of the company by determining the effectiveness of the company in generating profit.



5.7 FURTHER READING

- Donald E. Fischer and Ronald J. Jordan(2016); *Security Analysis and Portfolio Management* , Prentice-Hall, Inc.
- Personna Chandra(2016); *Security Analysis and Portfolio Management*, Tata McGraw-Hill.
- Punithavathy Pandian(2013); *Security Analysis and Portfolio Management,* Vikas Publication.

5.8 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q No 1: In financial analysis, a ratio is used as a benchmark for evaluating the financial position and performance of a firm. Ratios help to summarize large quantities of financial data and to make qualitative judgment about the firm's financial performance.

Ans to Q No 2: (I) Liquidity, (ii) leverage and profitability ratios.

Ans to Q No 3: Liquidity ratios, Leverage ratios, Turnover ratios, Profitability ratios

Ans to Q No 4: The main techniques of financial analysis are:

1. Comparative Financial Statements
2. Trend Analysis
3. Common Size Statement
4. Fund Flow Statement
5. Cash Flow Statement
6. Ratio Analysis

5.9 MODEL QUESTIONS

1. What is meant by company analysis.
2. What do you mean by ratio analysis? Explain with example.
3. What are different types of ratios? Explain them briefly.
4. What are the methods adopted to analyse the financial statements of a company?
5. Why is it important to understand competitive position of the product of the company in purchasing the shares of the company?
6. How is the competitive position of a company within an industry determined?
7. How does ratio analysis reflect the financial health of a company?

*** ***** ***

UNIT 6: TECHNICAL ANALYSIS

UNIT STRUCTURE

6.1 Learning Objectives

6.2 Introduction

6.3 Meaning of Technical Analysis

6.4 Tools of Technical Analysis

- 6.4.1 Dow Theory
- 6.4.2 Support and Resistance Level
- 6.4.3 Volume of Trade
- 6.4.4 Breadth of the market
- 6.4.5 Short Selling
- 6.4.6 Odd Lot Trading
- 6.4.7 Moving Average
- 6.4.8 Relative Strength Analysis
- 6.4.9 Charts

6.5 Technical Analysis and Fundamental Analysis

6.6 Evaluation of Technical Analysis

6.7 Let Us Sum Up

6.8 Further Reading

6.9 Answers to check your progress

6.10 Model Questions

6.1 LEARNING OBJECTIVES

After going through this unit, you will be able to:

- define technical analysis to predict price behaviour of securities
- describe the techniques of technical analysis
- evaluate technical analysis.

6.2 INTRODUCTION

The technical approach is the oldest approach to equity investment dating back to the late 19th century. It continues to flourish in modern times as well. In the previous unit we discussed about the Fundamental Analysis,

i this unit we will discuss the aspects of Technical Analysis.Technical analysis is a methodology that makes buy and sell decisions using market statistics. It primarily involves studying charts showing the trading history and statistics for whatever security is being analyzed.

At the end of this unit we will get a fair idea about the various tools like Dow Theory, Volume of Trade,Support and Resistance Level, Breadth of the market, Short Selling, Odd Lot Trading, Moving Average, Relative Strength Analysis and Charts.Also we will discuss the evaluation of Technical Analysis.

6.3 MEANING OF TECHNICAL ANALYSIS

Technical analysis involves a study of market-generated data like prices and volumes to determine the future direction of price movement of securities.Technical analysis is a trading discipline employed to evaluate investments and identify trading opportunities by analyzing statistical trends gathered from trading activity, such as price movement and volume. Unlike fundamental analysts, who attempt to evaluate a security's intrinsic value, technical analysts focus on patterns of price movements, trading signals and various other analytical charting tools to evaluate a security's strength or weakness.

To perform technical analysis, investors start with charts that show the price and trading volume history of a particular security or index as well as host of other statistical measures such as moving averages, maximums and minimums, and percentage changes.The idea is to use the charts to identify trends and changes in those trends.

Thus, Technical analysis is applicable to stocks, indices, commodities, futures or any tradable instrument where the price is influenced by the forces of supply and demand. It is the forecasting of future financial price movements based on an examination of past price movements. Like weather forecasting, technical analysis does not result in absolute predictions about the future. Instead, technical analysis can help investors anticipate what is “likely” to happen to prices over time. Technical analysis uses a wide variety of charts that show price over time.

Technical analysis involves a study of market-generated data like prices

and volumes to determine the future direction of price movement. It is a process of identifying trend reversal at an earlier stage to formulate the buying and selling strategy. With the help of several indicators, the relationship between price – volume and supply-demand is analyzed for the overall market and individual stocks.

Assumptions

The basic premises, on which technical analysis is formulated, are as follows:

1. The market value of the scrip is determined by the interaction of demand and supply.
2. Supply and demand is governed by numerous factors, both rational and irrational. These factors include economic variables relied by the fundamental analysis as well as opinions, moods and guesses.
3. The market discounts everything. The price of the security quoted represents the hope, fears and inside information received by the market players. Insider information regarding the issuance of bonus shares and right issues may support the prices. The loss of earnings and information regarding the forthcoming labor problem may result in fall in price. These factors may cause a shift in demand and supply, changing the direction of trends.
4. The market always moves in the trends except for minor deviations.
5. It is known fact that history repeats itself. It is true to stock market also. In the rising market, investors' psychology has upbeats and they purchase the shares in great volumes driving the prices higher. At the same time in the down trend, they may be very eager to get out of the market by selling them and thus plunging the share price further. The market technicians assume that past prices predict the future.

   As the market always moves in trends, analysis of past market data can be used to predict future price behavior.

As an approach to investment analysis, technical analysis is radically different from fundamental analysis. The basic differences are –

1. While the fundamental analysis believes that the market is 90 percent logical and 10percent psychological, the technical analysis assumes

that the market is 90 percent psychological and 10 percent logical.

2. Like fundamental analysis, technical analysis does not evaluate the large number of fundamental factors relating to the company, the industry and the economy but in it, the internal market data is analyzed with the help of charts and graphs.
3. Technical analysis mainly seeks to predict short-term price movement appealing the short-term traders where fundamental analysis tries to establish long-term values. Hence, it appeals to long tern investors.
4. The technical analysis is based on the premise that the history repeats itself. Therefore, the technical analysis answers the question “What had happened in the market” while on the basis of potentialities of market fundamental analysis answers the question, “What will happen in the market”.

6.4 TOOLS OF TECHNICAL ANALYSIS

Generally used technical tools to analyze the market data are as follows:

6.4.1 Dow Theory

Originally proposed in the late nineteenth century by Charles H Dow, the editor of Wall Street Journal, the Dow theory is perhaps the oldest and best-known theory of technical analysis. Dow developed this theory on the basis of certain hypothesis, which are as follows:

a) No single individual or buyer or buyer can influence the major trends in the market. However, an individual investor can affect the daily price movement by buying or selling huge quantum of particular scrip.

b) The market discounts everything. Even natural calamities such as earth quake, plague and fire also get quickly discounted in the market. The world trade center blast affected the share market for a short while and then the market returned back to normalcy.

c) The theory is not infallible and it is not a tool to beat the market but provides a way to understand the market.

Explanation of the Theory

Dow described stock prices as moving in trends analogous to the movement of water. He postulated three types of price movements over time: (1) major trends that are like tide in ocean, (2) intermediate trends that resemble waves, and (3) short run movements that are like ripples. Followers of the Dow theory hope to detect the direction of the major price trend (tide) known as primary trend, recognizing the intermediate movements (waves) or secondary trends that may occasionally move in the opposite direction. They recognize that a primary trend does not go straight up, but rather includes small price declines as some investors decide to take profits. It means share prices don't rise or fall in a straight t manner. Every rise or fall in price experiences a counter move. If a share price is increasing, the counter move will be a fall in price and vice-versa. The share prices move in a zigzag manner. The trend lines are straight lines drawn connecting either the top or bottoms of the share price movement. To draw a trend line, the analyst should have at least two tops or bottoms. The following figure shows the trend line.

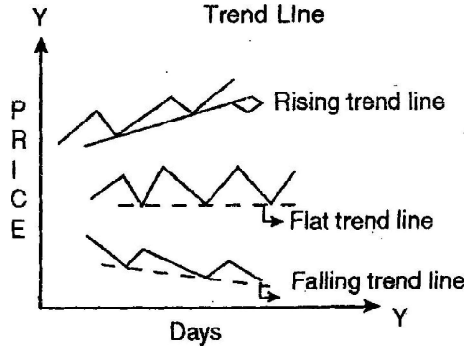


Fig 6.1

Primary Trend

The price trend may be either increasing or decreasing. When the market exhibits the increasing trend, it is called bull market. The bull market shows three clear-cut peaks. Each peak is higher than

the previous peak and this price rise is accompanied by heavy trading volume. Here, each profit taking reversal that is followed by an increased new peak has a trough above the prior trough, with relatively light trading volume during the reversals, indicating that there is limited interest in profit taking at these levels. And the phases leading to the three peaks are revival, improvement in corporate profit and speculation. The revival period encourages more and more investors to buy scrips, their expectations about the future being high. In the second phase, increased profits of corporate would result in further price rise. In the third phase, prices advance due to inflation and speculation. The figure 5.2 shows the three phases of bull market.

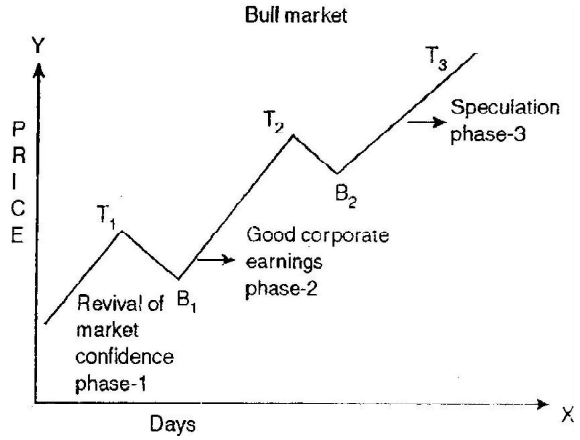


Fig 6.2

The reverse trend is true with the bear market. Here, first phase starts with the abandonment of hopes. The chances of prices moving back to the previous high level seemed to be low. This would result in the sale of shares. In the second phase, companies are reporting lower profits and dividends. This would lead to selling pressure. The final phase is characterized by the distress selling of shares. During the bear phase of 1996, in the Bombay Stock Exchange more than 2/3 of the stocks were inactive. Most of the scrips were sold below their par values. The figure 3 shows the phases of bear market where the tops and troughs are lower than previous ones.

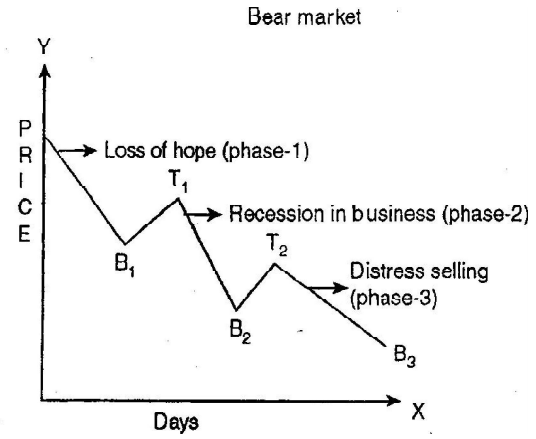


Fig 6.3

Secondary Trend

The secondary trend moves against the main trends and leads to the correction. In the bull market, the secondary trend would result in the fall of about 33-66 percent of the earlier rise. In the bear market, the secondary trend carries the price upward and corrects the main trend. Compared to the time taken for the primary trend, secondary trend is swift and quicker. The figure 6.4 shows the secondary trend.

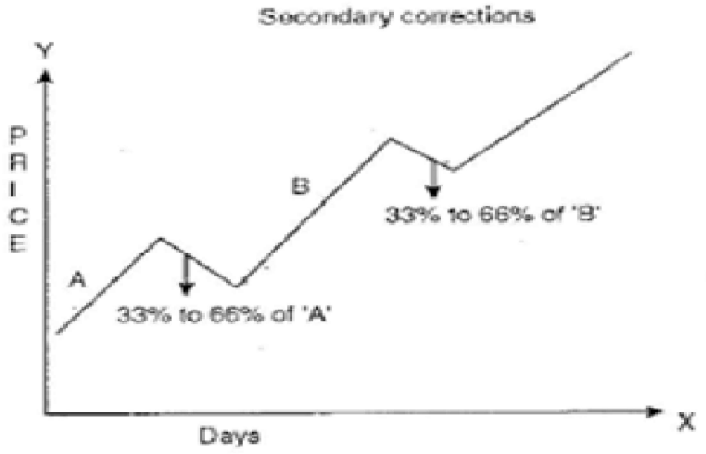


Fig 6.4

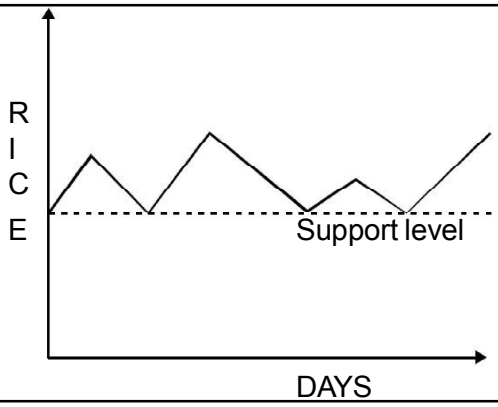
Minor Trends

Minor trends are just like the ripples in the market. They are simply the daily price fluctuations. Minor trend tries to correct the secondary price movement. It is better for the investor to concentrate on the primary or secondary trends than on the minor trends.

6.4.2 Support and Resistance Level

A support level is the price range at which technician would expect a substantial increase in the demand for a stock. Generally, a support level will develop after a stock has enjoyed a meaningful price increase and the stock has begun to experience profit taking. When the price reaches this support price, demand surges and price and volume begin to increase again. A resistance level is the price range at which the technician would expect an increase in the supply of stock and any price increase to reverse abruptly. A resistance level tends to develop after a stock has experienced a steady decline from a higher price level. It is reasoned that the decline in the price leads some investors who acquired the stock at a higher price to look for an opportunity to sell it near their break even points. Therefore, the supply of stocks owned by these investors is overhanging the market. When the price rebounds to the target price set by these investors, this overhanging supply of stock comes to the market and dramatically reverses the price increase on heavy volume.

This can be explained with an example. Suppose a scrip price hovers around Rs 100 for some weeks, and then it may rise and reach Rs 210. At this point, the price starts to fall. The scrip keeps on falling back to around its original price Rs 100 and then again starts to rise. In this case, Rs 100 is the support level. At this point, the scrip is cheap and investors buy it and demand makes the price move upward. Whereas Rs 210 becomes the resistance level, the price is high and there would be selling pressure resulting in the decline of the price. The support and resistance level is shown in the figure 6.5.



6.4.3 Volume of Trade

Dow gave special emphasis to volume. Technical analysts use volume as an excellent method of confirming the trend. Therefore, the analyst looks for a price increase on heavy volume relative to the stock's normal trading volume as an indication of bullish activity. Conversely, a price decline with heavy volume is bearish. A generally bullish pattern would be when price increase are accompanied by heavy volume and the small price increase reversals occur with the light trading volume, indicating limited interest in selling and taking profits and vice-versa.

6.4.4 Breadth of the market

The breadth of the market is the term often used to study the advances and declines that have occurred in the stock market. Advances mean the number of shares whose prices have increased from the previous day's trading. Decline indicates the number of shares whose prices have fallen from the previous day's trading. This is easy to plot and watch indicator because data are available in all business dailies. The net difference between the number of stocks advanced and declined during the same period is the breadth of market. A cumulative index of net differences measures the net breadth. An illustrative calculation of the breadth of the market is shown in Table below:

Table 6.1: Breadth of the Market

Day	Advances	Declines	Net Advances or declines	Breadth of the market
Tuesday	630	527	103	103
Wednesday	690	475	215	318
Thursday	746	424	322	640
Friday	492	630	-138	502
Monday	366	701	-335	167
Tuesday	404	698	-294	-127

To analyze the breadth of the market, it is compared with one or two market indices. Ordinarily, the breadth of the market is expected to move in tandem with market indices. However, if there is a divergence between the two, the technical analysts believe that it signals something. It means, if the market index is moving upwards whereas the breadth of the market is moving downwards, it indicates that the market is likely to turn bearish. Likewise, if the market index is moving downwards but the breadth of the market is moving upwards, then it signals that the market may turn bullish.

6.4.5 Short Selling

Short selling refers to the selling of shares that you don't have. The short sellers are those who sell now in the hope of purchasing at a lower price in the future to make a profit. A short seller behaves in this way because he feels that the price of the stock will fall. And it is must for short sellers to cover their positions, i.e. the purchase of shares. This buying activity increases the potential demand for the stock. Therefore, rising short sales foretell future demand for the security and increase the future prices.

Monthly short selling for the month can be compared with average daily volume for the preceding month. This ratio shows, how many days of trading it would take to use up total short sales. If the ratio is less than one, market is said to be weak or overbought

and a decline can be expected. The value between 1 and 1.5 shows neutral conditions of the market. Values above 1.5 indicate bullish trend and if it is above 2 the market is said to be oversold. At market tops, short selling is high and at market bottoms short selling is low.

6.4.6 Odd Lot Trading

Small investors quite often buy an odd lot (i.e. non tradable lot) and such buyers and sellers are known as odd lotters. If we relate odd lot purchases to odd lot sales, we get an odd lot index. The increase in odd lot purchase results in an increase in the index. Relatively more selling leads to fall in the index. It is generally considered that the professional investor is more informed and stronger than the odd lotters and they are less sensible to price change than retail investor. When the professional investors dominate the market, the stock market is technically strong. If the odd lotters dominate the market, the market is considered to be technically weak. The notion behind is that odd lot purchase is concentrated at the top of the market cycle and selling at the bottom. High odd lot purchase forecasts fall in the market price and low purchases/sales ratios are presumed to occur toward the end of bear market or at the beginning of bull market.

6.4.7 Moving Average

The market indices don't rise or fall in straight line. The upward and downward movements are interrupted by counter moves. The underlying trends can be studied by smoothening the data. To smooth the data, moving average is used. The word moving means the body of data moves ahead to include the recent observation. If it is the five-day moving average, on the six day the body of data moves to include the sixth day observation eliminating the first day observation. A five-day moving average of daily closing prices is calculated as follows:

Trading Day	Closing price	Sum of five most recent closing prices	Moving Average for 5 days
1	25		
2	26		
3	25.5		
4	24.5		
5	26	127	25.4
6	26	128	25.6
7	26.5	128.5	25.7
8	26.5	129.5	29.9
9	26	131	26
10	27	132	26.4

The moving averages are used to study the movement of the market as well as the individual security prices. These moving averages are used along with the price of a stock. The stock prices may intersect the moving average at a particular point and give the buy and sell signal.

The Moving Average Analysis recommends buying a stock when

a) Stock prices line rises through the moving average line when graph of the moving average line is flattening out.

b) Stock price line falls below the moving average line, which is rising.

c) Stock price line, which is above the moving average line, falls but begins to rise again before reaching the moving average line.

Moving Average Analysis recommends selling a stock when

a) Stock price lines falls through the moving average line when graph of the moving average line is flattening out.

b) Stock prices line rise above the moving average line, which is falling.

c) Stock price line, which is below the moving average line, rises but begins to fall again before reaching the moving average line.

The buy and sell signals initiated by a moving average trading system vary with the length of time over which the moving average is calculated.

Index and Stock Price Moving Average

Individual stock price is compared with the stock market indices. The moving average of the stock and the index are plotted in the same sheet and trends are compared. If NSE or BSE index is above stock's roving average line the particular stock has bullish trend. The price may increase above the market average. If the Sensex or Nifty is below the stock's moving average, the bearish market can be expected for the particular stock.

If the moving average of the stock penetrates the stock market index from above, it generates sell signal. Unfavorable market condition prevails for the particular scrip. If the stock line pushes up through the market average, it is a buy signal.

Stock Price And Stock Prices' Moving Average

Buy and sell signals are provided by the moving averages. Moving averages are used along with the price of the scrip. The stock price ma intersects the moving average at a particular point. Downward penetration of the rising average indicates the possibility of a further fall. Hence sell signal is generated in the figure Upward penetration of a falling average would indicate the possibility of the further rise and gives the buy signal. As the average indicates the underlying trend, its violation may signal trend reversal that is shown in Figure 6.6.

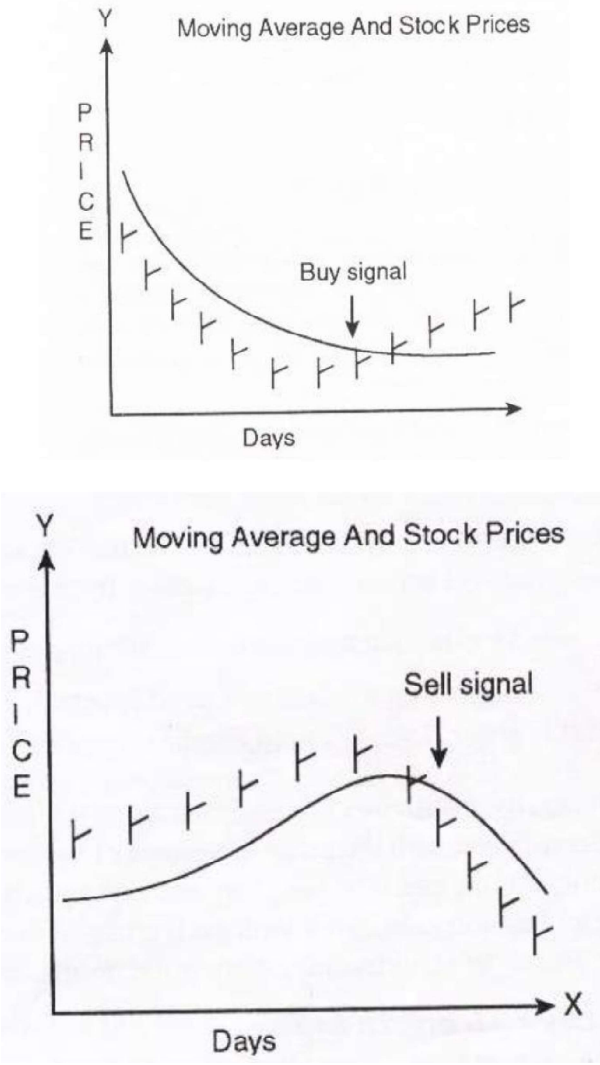
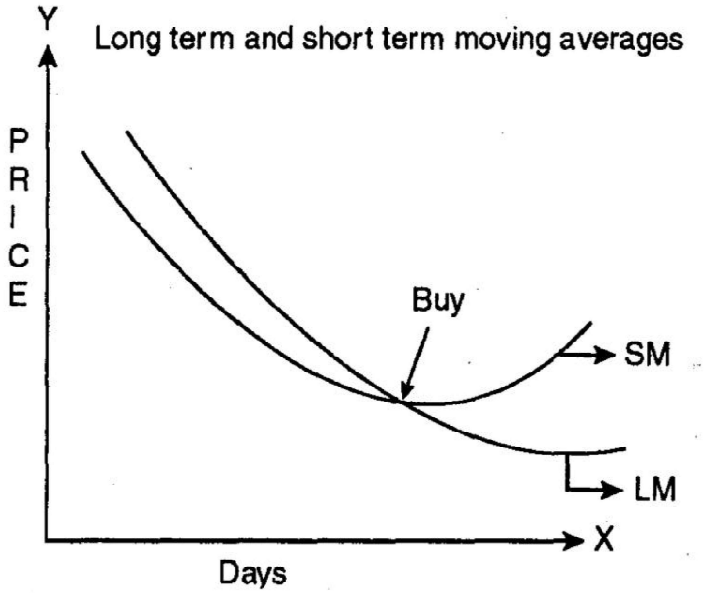


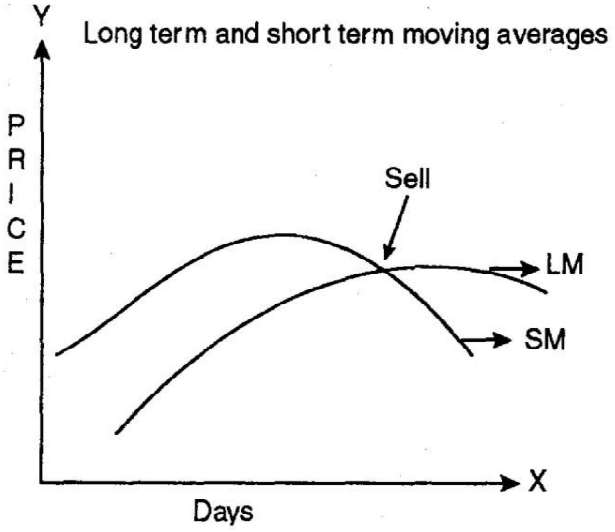
Fig: 6.6

Comparison of the Two Moving Averages

When long term and short term moving averages are drawn, the intersection of two moving averages generates buy or sell signal. When the scrip price is falling and if the short term average intersects the long term moving average from above and falls below it, the sell signal is generated.

If the scrip price is rising, the short term average would be above the long term average. The short term average intersects the long term average from below indicating a further rise in price, gives a buy signal. The sell and buy signals are given in figures 6.7.





But, if the short term average move above the long term average and the long term average is falling, investor should treat intersection with suspicion. The short term movement may not hold long.

Hence, the investor should wait for the long term average to turn up before buying the scrip. Similarly, if the short term average moves below the long term average before the long term average has flattened out or before it reverses its direction, the investor should wait for the fall in the long term average for reversal of direction before moving out of the scrip.

Oscillators

Oscillators indicate the market momentum or scrip momentum. Oscillator shows the share price movement across a reference point from one extreme to another. The momentum indicates:

a. Overbought and oversold conditions of the scrip or the market.

b. Signaling the possible trend reversal.

c. Rise or decline in the momentum.

Generally, oscillators are analyzed along with the price chart. Oscillators indicate trend reversals that have to be confirmed with the price movement of the scrip. Changes in the price should be correlated to changes in the momentum, and then only buy and sell signals can be generated. Actions have to be taken only when the price and momentum agree with each other. With the daily, weekly or monthly closing prices oscillators are built. For short term trading, daily price oscillators are useful.

Relative Strength Index (RSI)

Relative strength index (RSI) RSI was developed by Wells Wilder. It is an oscillator used to identify the inherent technical strength and weakness of a particular scrip or market. RSI can be calculated for scrip by adopting the following formula.

$$\text{RSI} = 100 - \frac{100}{\text{I} + RS}$$

The RSI can be calculated for any number of days depending on the wish of the technical analyst and the tune frame of trading adopted in a particular stock market. RSI is calculated for 5, 7, 9 and 14 days. If the time l period taken for calculation is more, the possibility of getting wrong signals is reduced. Reactionary or L1 rise or fall in the price of the scrip is foretold by the RSI.

The broad rule is, if the RSI crosses seventy there may be downturn and it is time to sell. If the RSI falls below thirty it is time to

pick up the scrip. The figure show the buy and sell signals of a RSI chart.

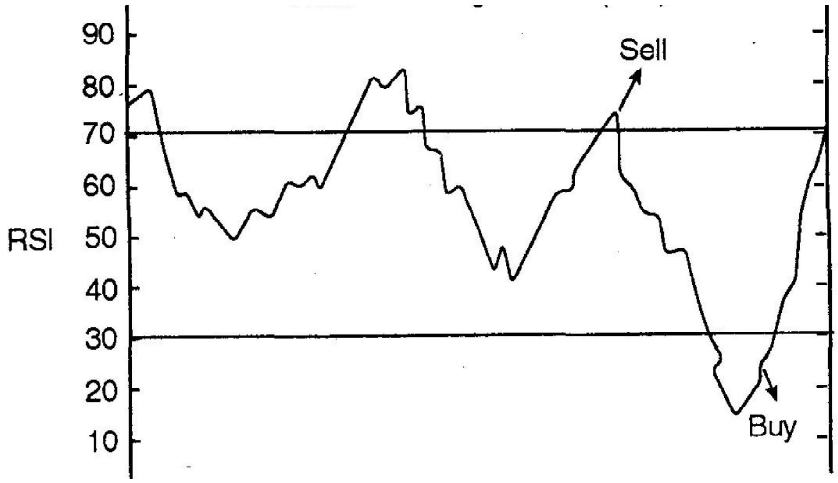


Fig 6.8

If the share price is falling and RSI is rising, a divergence is said to have occurred. Divergence indicates the turning point of the market. If the RSI is rising in the overbought zone, it would indicate the downfall of the price. If RSI falls in the overbought zone, it gives a clear signal of 'sell'. The term 'overbought' describes the price level at which momentum can no longer be maintained and the price has to go down. This condition occurs after a sharp rise in price during a period of heavy buying. When the RSI is in the oversold region, it generates the buy signal. The term oversold is used to describe a security or market that has declined to an unreasonably low level. This condition is characterized by an increase in sales and excess of net declines.

Rate of Change (ROC)

Rate of change indicator or the ROC measures the rate of change between the current price and the price 'n' number of days in the past. ROC helps to find out the overbought and oversold positions in a scrip. It is also useful in identifying the trend reversal. Closing prices are used to calculate the ROC. Daily closing prices are used for the daily ROC and weekly closing prices for weekly ROC. Calculation of ROC for 12 week or 12 month is most popular.

Procedure

Procedure ROC can be calculated by t methods. In the first method, current closing price is expressed as a percentage of the twelve days or weeks in past. Suppose the price of AB company's share is 12 and price twelve days ago was 10 then the ROC is obtained by using the equation: 12/10 x 100 120%. In the second method, the percentage variation between the current price and the price twelve days in the past is calculated. It is nothing but 12/10 x 100—100 = 20%. By this method both positive and negative values can be arrived.

Roc Graph

ROC graph ROC can be plotted in a graph, x-axis representing days or months and y-axis the values ofROC. If the first method is adopted, ROC oscillates across the hundred lines. If the second method is used, theROC oscillates around the zero line.

Calculation of 7 Day ROC for ACC

Date	Price	ROC – I Method (in per cent)	ROC – II Method (in per cent)
Aug 1999 20	235.20	-	-
21	232.8	-	-
24	236.65	-	-
25	234.20	-	-
26	231.70	-	-
27	244.75	-	-
28	257.95	-	-
31	254.90	108.38	8.38
Sep-1	249.85	107.30	7.30
2	244.60	103.36	3.36
3	234.05	99.94	-.06
4	234.25	101.10	1.10
7	235.80	96.34	-3.66
8	232.70	90.21	-9.79

$$ROC = \frac{\text{Today's Price}}{\text{Price 'n' days back} \times 100}$$

$$ROC = \frac{\text{Today's Price}}{\text{Price 'n' days back} \times 100 - 100}$$

The main advantage of ROC is the identification of overbought and oversold region. The historic high and low values of the ROC should be identified at first to locate the overbought and oversold region. If the scrip's values, the scrip is in the overbought region n4:fall in the value can be anticipated. Likewise, if the scrip's ROC reaches the historic low value, the scrip is m the oversold region, a rise in the scrip's price can be anticipated. Investor can sell the scrip in the overbought region and buy it in the orsold region. The figure 6.9 shows the overbought and the oversold region.

ROC-Overbought and Oversold Zones

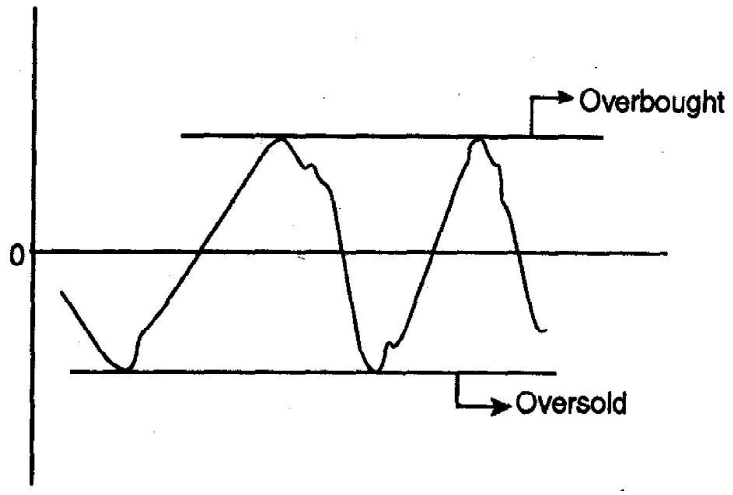


Fig: 6.9

6.4.8 Relative Strength Analysis

Relative Strength analysis is based on the assumption that prices of some securities rise rapidly during the bull phase but fall slowly during the bear phase in relation to the market as a whole..Relative Strength analysis is a oscillator used to identify the

inherent technical strength and weakness of a particular stock or market. It is based on the assumption that prices of some securities rise rapidly during the bull phase but fall slowly during the bear phase in relation to the market as a whole. Put differently, such securities possess greater relative strength and hence outperform the market.Investing in securities that have shown relative strength in past, an investor can earn higher returns because the relative strength of a security continues for some time.

Technical analysts measure relative strength in different ways. One way to measure Relative Strength is to calculate rates of return and classify those securities with historically high average return as securities with high relative strength. Another way, which is most frequently used, is to observe certain ratios to detect relative strength in a security or an industry. For example, consider the data for ABC corporation. A hypothetical growth firm in the electronic industry shown in the table below.

Relative Strength Data for ABC Corp.

Year	Price of A*	Price of IA**	Price of MA***	P_A/P_{IA}	P_A/P_{MA}	P_{IA}/P_{MA}
2011	30	17	210	1.78	.144	.081
2012	36	18	250	2	.144	.072
2013	72	20	285	3.6	.253	.070

***=Average price of ABC Corp., **= Industry Average Price, ***= Market Average Price**

From 2011 to 2012, ABC did slightly well than most of the firms in the industry as its price grew relatively more than the industry average (from 1.78 to 2). Moreover, from 2011to 2012, the electronic industry showed weakness relative to all industrial stock as the ratio declined from .081 to .072. From 2011 to 2012, ABC showed no increased strength relative to its market average as the ratio is constant at .144. But from 2012 to 2013, ABC showed considerable strength relative both to its industry and the market. Therefore, the

technical analyst would select certain industries and firms, which demonstrated relative strength to be the most promising investment opportunities.



CHECK YOUR PROGRESS

Q1: Define Technical analysis

.....

.....

Q2: Write the assumptions on which technical analysis is formulated

.....

.....

Q3: Define breadth of the market

.....

.....

Q4: Define Short selling

.....

.....

6.4.9 Charts

Charts are the valuable and easiest tools in the technical analysis. The graphic presentation of the data helps the investor to find out the trend of the price without any difficulty. A large number of charts are used to analyze the trend of the market.

The charts also have the following uses

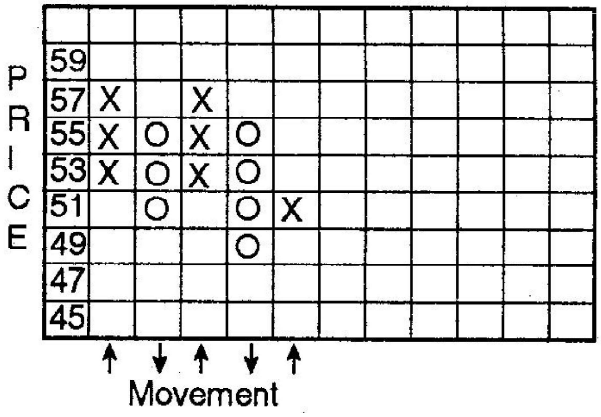
- Spots the current trend for buying and selling.
- Indicates the probable future action of the market by projection
- Shows the past historic movement
- Indicates the important areas of support and resistance.

The charts do not lie but interpretation differs from analyst to analyst according to their skills and experience. A leading technician, James Dines said, “Charts are like fire or electricity they are brilliant tools if intelligently controlled and handled but dangerous to a novice”.

Point and Figure Charts

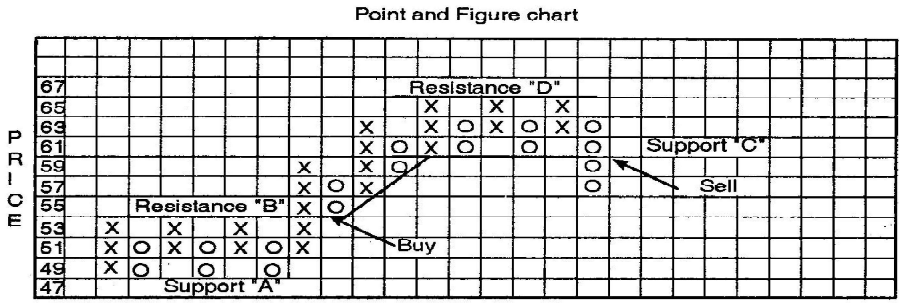
Technical analyst to predict the extent and direction of the price movement of a particular stock or the stock market indices uses point and figure charts. This PF charts are of one-dimensional and there is no indication of time or volume. The price changes in relation to previous prices are shown. The change of price direction can be interpreted. The charts are drawn in the ruled paper. The following figure shows the P and F chart.

Point and Figure chart



The prices are given in the left of the figure as shown. The numbers represent the price of the stock at 2 point interval. The interval of price changes can be 1,2,3,5 or 10 points.

It depends on the analyst's preference further; it depends upon the stock price movement. Higher points are chosen for high priced stocks and vice versa. Only whole number prices are entered. In figure, the initial price 53 was entered in column 1 a X. The next mark X will be made only if the stock moves up to 55. As long as the price moves up, the Xs a drawn in the vertical column. Here the stock price has moved to 57. When the stock price declines by two points or more the chartist records the change by placing the 'o' in the next column. Then the movements are interpreted. The trend reversals can be spotted easily. The figure shows the trend reversals in the point and figure chart.



As long as the price moves between points A and B, there is little indication of price rise. As the price raj.is 1an 4 evel, it generates a buy signal. The market may turn out to be bullish. Likewise, when the price pierces the down the support level C indicates that the stock should be sold and the market may turn out to be bearish.

In spite of the simplicity in thawing the PF charts, they have some inherent disadvantages also.

1. They do not show the intra- day price movement.
2. Whole numbers are only taken into consideration. This may result in the loss of information regarding U minor fluctuations.
3. Volum is not mentioned in the chart. Volume and trend of transactions are an important guide to make investment decision. In a bull market, price rise is accompanied by high volume of trading. The bear market is related to low volume of trading.

Bar Charts

The bar chart is the simplest and most commonly used tool of a technical analyst. To build a bar a dot is entered to represent the highest price at which the stock is traded on that day, week or month. Then another dot is entered to indicate the lowest price on that particular date.

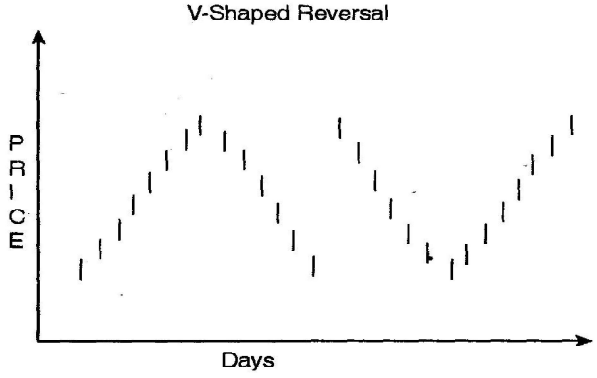
A line is drawn to connect both the points a horizontal nub is drawn to mark the closing price. Line charts are used to indicate the price movements. The line chart is a simplification of the bar chart. Here a line is drawn to connect the successive closing prices.

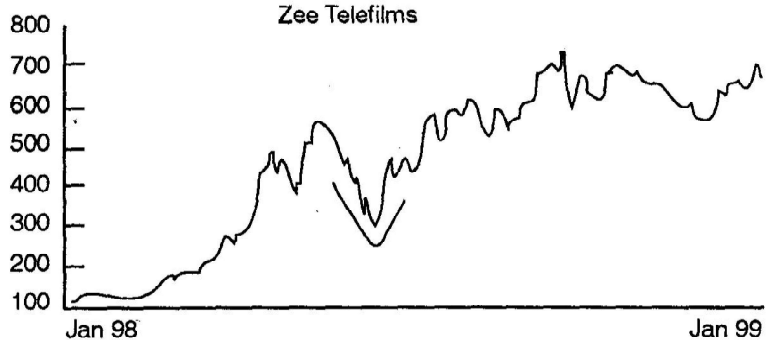
Chart Patterns

Charts reveal certain patterns that are of predictive value.

Chart patterns are used as a supplement to other information and confirmation of signals provided by trend lines. Some of the most widely used and easily recognizable chart patterns are discussed here.

V Formation The name itself indicates that in the 'V' formation there is a long sharp decline and a fast reversal. The 'V' pattern occurs mostly in popular stocks where the market interest changes quickly from hope to fear and vice-versa. In the case of inverted 'A' the rise occurs first and declines. There are extended 'V's.
In it, the bottom or top moves more slowly over a broader area.





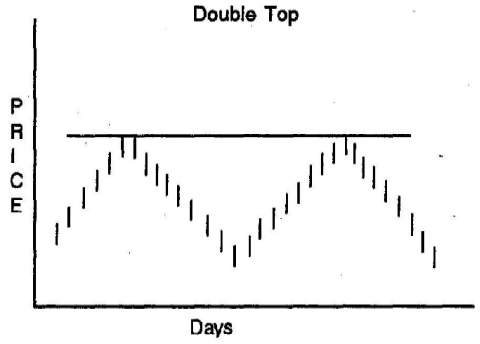
Tops and Bottoms

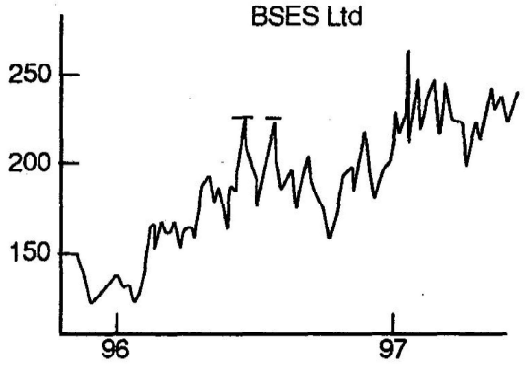
Top and bottom formation is interesting to watch but what is more important, is the middle portion of it. The investor has to buy after up trend has started and exit before the top is reached. Generally tops and bottoms are formed at the beginning or end of the new trends. The reversal from the tops and bottoms indicate sell and buy signals.

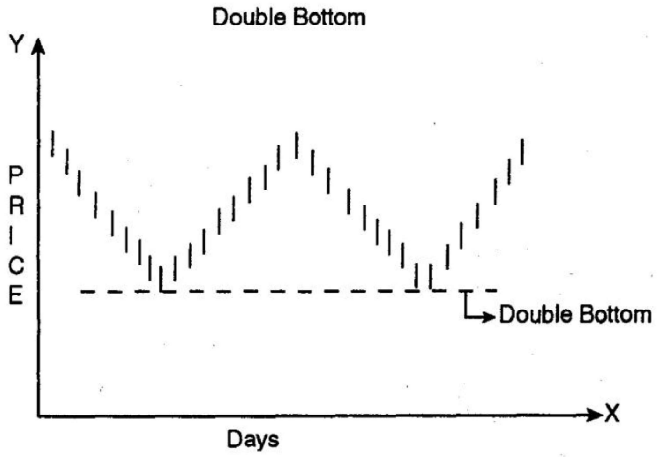
Double Top and Bottom

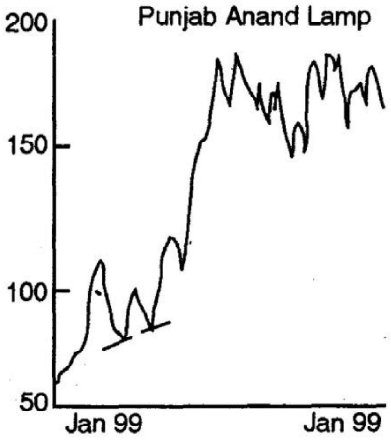
This type of formation signals the end of one trend and the beginning of another. If the double top is formed when a stock price rises to a certain level, falls rapidly, again rises to the same height or more, and turns down. Its pattern resembles the letter 'M'. The double top may indicate the onset of the bear market. But the results should be confirmed with volume and trend.

In a double bottom, the price of the stock falls to a certain level and increase with diminishing activity. Then it falls again to the same or to a lower price and turns up to a higher level. The double bottom resembles the letter 'W'. Technical analysts view double bottom as a sign for bull market. The double top and bottom figures are given below with illustrations.









Head and Shoulders

This pattern is easy to identify and the signal generated by this pattern is considered to be reliable. In the head and shoulder pattern there are three rallies resembling the left shoulder, a head and a right shoulder A neckline is drawn connecting the lows of the tops. When the stock price cuts the neckline from above, it signals the bear market.

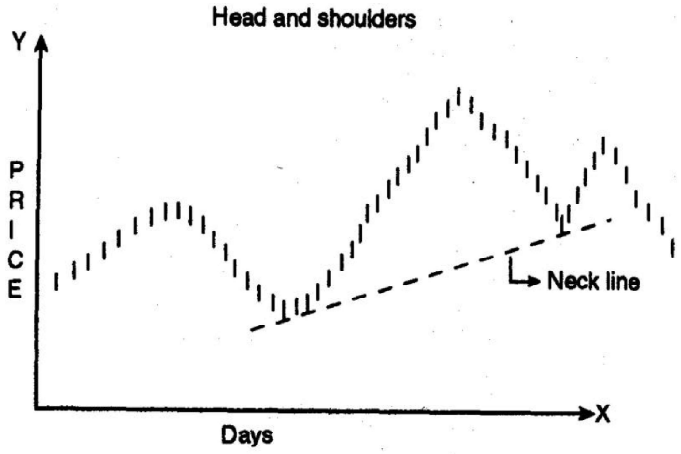
The upward movement of the price for some duration creates the left shoulder At the top of the left shoulder people who bought during the uptrend begin to sell resulting in a dip.

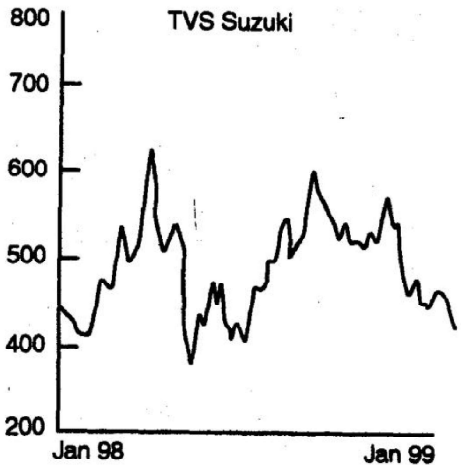
Near the bottom there would be reaction and people who have not bought in the first up trend start buying at relatively low

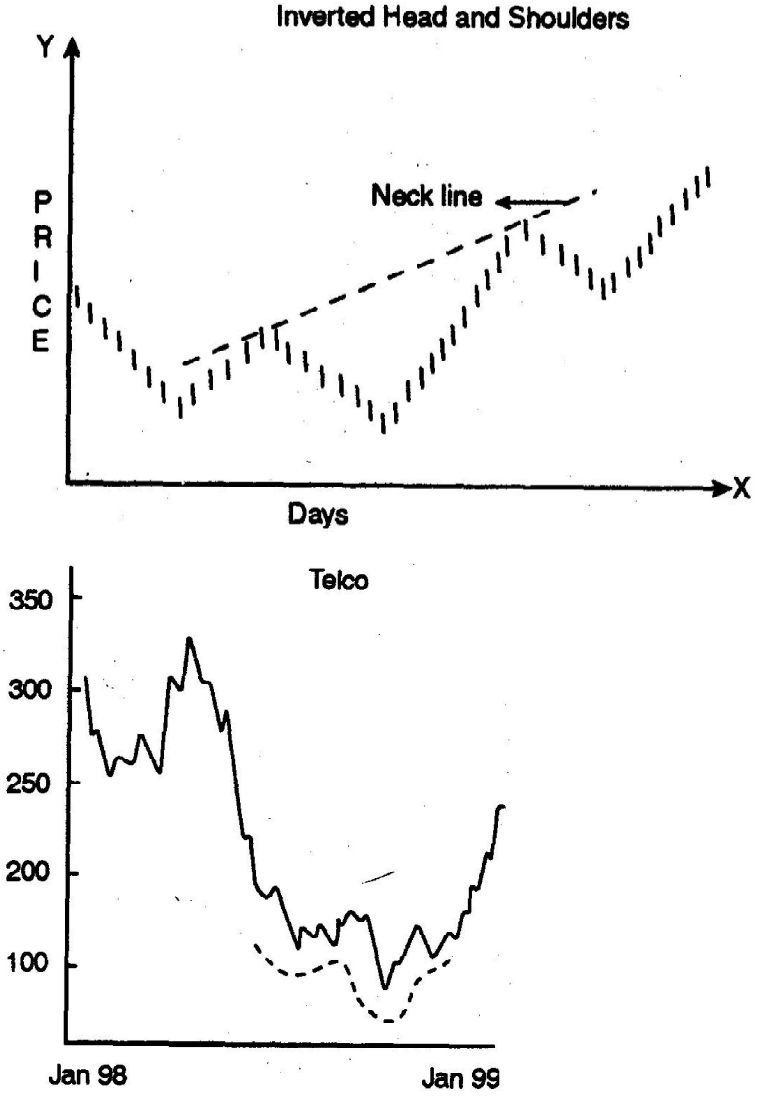
prices thus pushing the price upward. The alternating forces of demand and supply create new ups and lows. The following figures explain the head and shoulders pattern.

Inverted Head and Shoulders

Here the reverse of the previous pattern holds true. The price of stock's falls and rises that makes a inverted right shoulder. As the process of fall and rise in price continues the head and left shoulders are created. Connecting the tops of the inverted head and shoulders gives the neckline. When the price pierces the neckline from below it indicates the end of bear market and the beginning of the bull market. These patterns have to be confirmed with the volume and trend of the market.







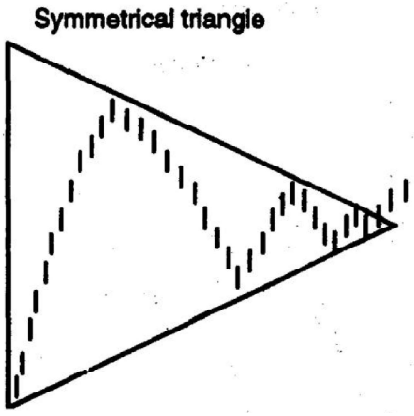
Triangles

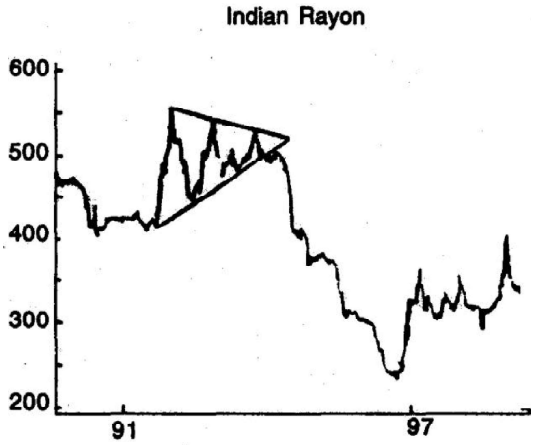
The triangle formation is easy to identify and popular in technical analysis. The triangles are of symmetrical, ascending, descending and inverted.

Symmetrical Triangle

This pattern is made up of series of fluctuations, each fluctuation smaller than the previous one. '1bps do not attain the height of the previous tops. Likewise bottoms are higher than the previous bottoms. Connecting the lower tops that are slanting downward forms a symmetrical triangle. Connecting the rising bottom, which is slanting upward, becomes the lower trend line. It is not

easy to predict the breakaway either way. The symmetrical triangle does not have any bias towards the bull and bear operators. It indicates the slow down or temporary halt in the direction of the original trend. A probability of the original trend to continue after the completion of the triangle is always there.

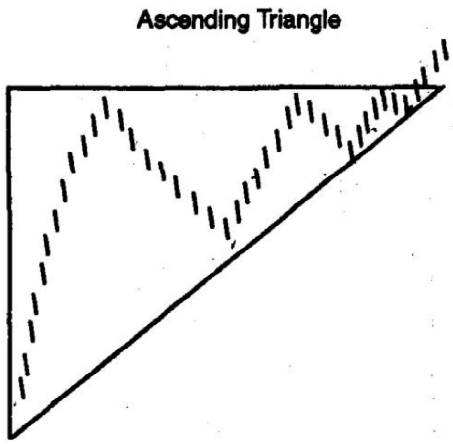


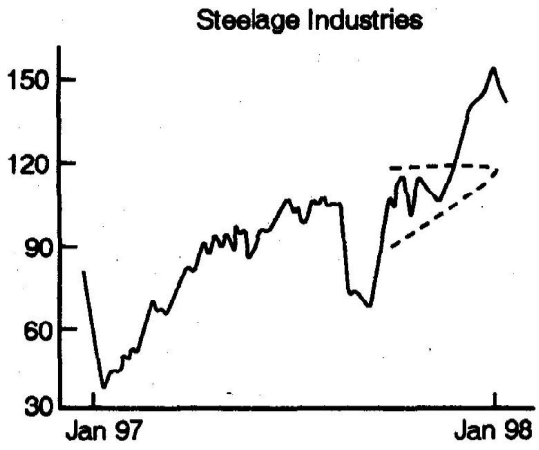


Ascending Triangle

The upper trend line is almost a horizontal trend line connecting the tops arid the lower trend line is a rising trend line connecting the rising bottoms. When the demand for the scrip overcomes the supply for it, then there will be a break out.

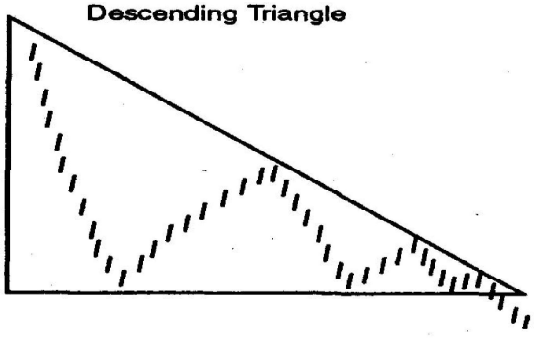
The break will be in favor of the bullish trend. This pattern is generally spotted during an up move and the probability of the upward move is high here.

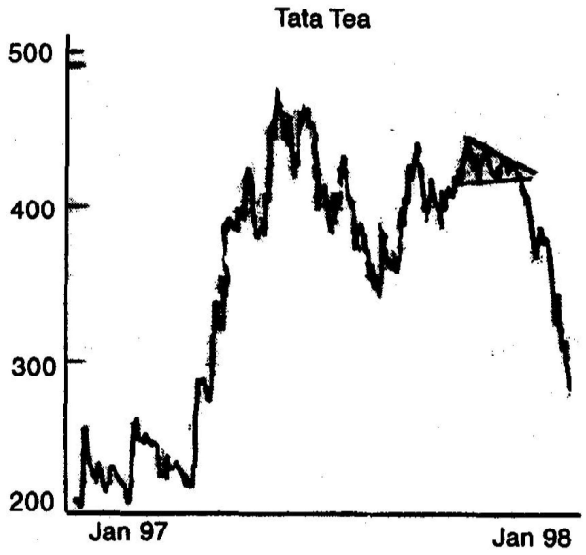




Descending Triangle

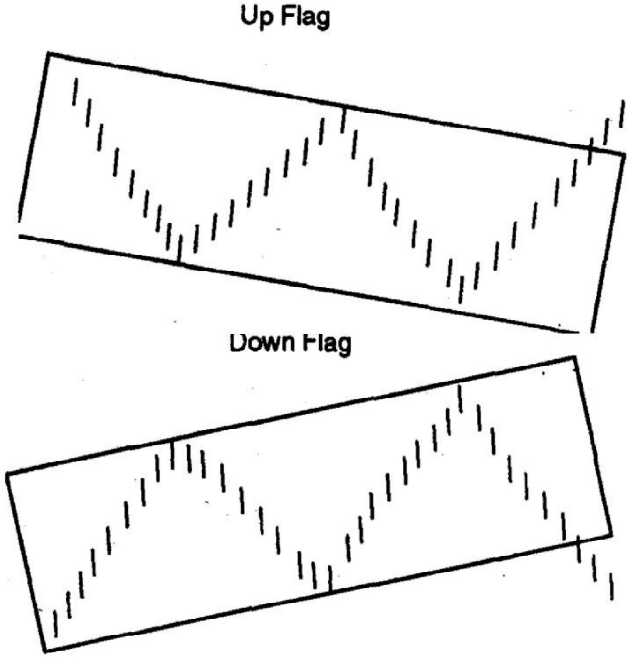
Connecting the lower tops forms the upper trend line. The upper trend line would be a falling one. The lower trend line would be almost horizontal connecting the bottoms. The lower line indicates the support level. The possibility for a downward breakout is high in this pattern. The pattern indicates that the bear operators are more powerful than the bull operators. This pattern is seen during the trend.



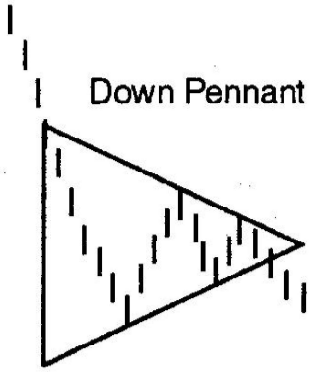


Flags

Flag pattern is commonly seen on the price charts. These patterns emerge either before a fall or rise in the value of the scrip These patterns show the market corrections of the over bought or oversold situations. The time taken to form these patterns is quick. Each rally and setback may last only three to four days. If the pattern is wider it may take three weeks to complete the pattern.

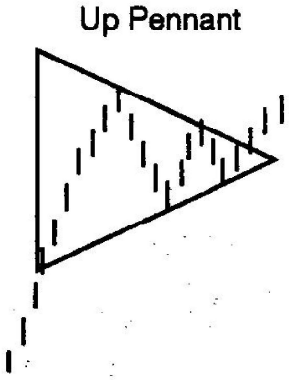


A flag resembles a parallelogram. A bullish flag is formed by two trend lines that stoop downwards. The break Out would occur on the upper side of the trend line. In a bearish flag both the trend lines would be stooping upwards. The breakout occurs in the downward trend line.



Pennant

Pennant looks like a symmetrical triangle. Here also there is bullish and bearish pennant. In the bullish pennant, the lower tops form the upper trend line. The lower trend line connects the rising bottoms. The bullish trend occurs when the value of scrip moves above the upward trend line. Likewise in the bearish pennant, upward trend line is falling and the lower trend line is rising.



6.5 TECHNICAL ANALYSIS AND FUNDAMENTAL ANALYSIS

1. Fundamental analysts' analyses the stock based on the specific goals of the investors. They study the financial strength of corporate, growth of sales, earnings and profitability. They also

take into account the general industry and economic conditions.

2. The technical analysts mainly focus the attention on the past history of prices. Generally technical analysts choose to study two basic market data-price and volume.
3. The fundamental analysts estimate the intrinsic value of the shares and purchase them when they are undervalued. They dispose the shares when they are overpriced and earn profits. They try to find out the long term value of share Compared to fundamental analysts, technical analysts mainly predict the short term price movement rather than long term movement. They are not committed to buy and hold policy.
4. Fundamentalists are of the opinion that supply and demand for stocks depend on the underlying factors. The forecasts of supply and demand depend on various factors.

   Technicians opine that they can forecast supply and demand by studying the prices and volume of trading.

   In both the approaches supply and demand factors are considered to be critical. Business, economic, social and political concern affects the supply and demand for securities. These underlying factors in the form of supply and demand come together in the securities' market to determine security prices.

6.6 EVALUATION OF TECHNICAL ANALYSIS

Technical analysis appears to be a high controversial approach to security analysis. The analysts offer arguments as well as disarguments for this alternative of security analysis. Among them, few are as follows:

Arguments

1. Under the influence of crowd psychology, trends persist for quite some time. Tools of technical analysis that help in identifying these trends early are helpful in investment decision-making.
2. Shifts in demand and supply are gradual rather than instantaneous.

Technical analysis helps in detecting these shifts rather early and hence provides clues to future price movements,

3. Fundamental information about a company is absorbed and assimilated by the market over the period of time. Hence, the price movement tends to continue in more or less in the same direction till the information is fully assimilated in the market.
4. Charts provide a picture of what has happened in the past and hence give a sense of volatility that can be expected from the stock. Further, the information on trading volume, which is ordinarily provided at the bottom of a bar chart, gives a fair idea of the extent of public interest in the stock.

Disagreements

1. Most technical analysts are not able to offer convincing explanations for the tools employed by them.
2. Empirical evidence in support of the random walk hypothesis casts its shadow over the usefulness of technical analysis.
3. By the time an up trend or downtrend may have been signaled by the technical analysis, may already have taken place.
4. Ultimately, technical analysis must be a self-defeating proposition. As more and more people employ it, the value of such analysis tends to decline.
5. There is a great deal of ambiguity in the identification of configurations as well as trend lines and channels on the charts. The same chart can be interpreted differently.

Despite these limitations, technical analysis is very popular. It is only in the rational, efficient and well ordered market where technical analysis has no use. But given the imperfections, inefficiencies and irrationalities that characterize real markets, technical analysis can be helpful. Hence, it can be concluded that technical analysis may be used, albeit to a limited extent, in conjunction with fundamental analysis to guide investment decision-making, as it is supplementary to fundamental analysis rather than substitute for it.



6.7 LET US SUM UP

In this unit we have discussed the following points:

- As an approach to investment analysis, technical analysis is radically different from fundamental analysis.
- Technical analysis doesn't evaluate a large number of factors relating to the company, the industry and the economy. Instead they analyzed market-generated data like prices and volumes to determine the direction of price movement.
- Technical analysts use a variety of tools to predict the market. Among them, important are Dow Theory, charts, moving average, short selling, odd lot theory, Relative strength analysis, volume of trade, breadth of the market etc.
- Technical analysis appears to be highly controversial approach to security analysis having severe critics. In a rational, well-ordered and efficient market, technical analysis is a worthless exercise.



6.8 FURTHER READING

1. Fischer and Jordon(1995), *Security Analysis and Portfolio Management,* PHI; 6 edition.
2. Fuller and Farrell(1987) *Modern Investments and Security Analysis* ,McGraw-Hill Education
3. Prasanna Chandra.(2017), *Investment Analysis and Portfolio Management* ,McGraw Hill Education; Fifth edition



6.9 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q1: Technical analysis is a trading discipline employed to evaluate investments and identify trading opportunities by ana-

lyzing statistical trends gathered from trading activity, such as price movement and volume.

Ans to Q2: Assumptions on which technical analysis is formulated, are as follows:

1. The market value of the scrip is determined by the interaction of demand and supply.
2. Supply and demand is governed by numerous factors, both rational and irrational. These factors include economic variables relied by the fundamental analysis as well as opinions, moods and guesses.

Ans to Q3: The breadth of the market is the term often used to study the advances and declines that have occurred in the stock market.

Ans to Q4: Short selling refers to the selling of shares that you don't have. The short sellers are those who sell now in the hope of purchasing at a lower price in the future to make a profit.



6.10 MODEL QUESTIONS

1. Technical analysts believe that one can use past price changes to predict future price changes. How do they justify this belief?
2. Discuss the Dow theory and its three components. Which component is most important?
3. Discuss the Various Charting Techniques under Technical Analysis.
4. Discuss the Moving Average , RoC and RSI
5. Write short notes on
   Short Selling
   Relative Strength Analysis
   Odd Lot Theory.

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UNIT 7 : EFFICIENT MARKET THEORY

UNIT STRUCTURE

7.1 Learning Objectives

7.2 Introduction

7.3 Concepts of Efficient Market Theory

7.4 Assumptions of Efficient Market Theory

7.5 Random Walk Theory

7.6 Forms of Efficient Market Theory

- 7.6.1 Weak form of EMH
- 7.6.2 Semistrong form of EMH
- 7.6.3 Strong form of EMH

7.7 EFFICIENT MARKET HYPOTHESIS AND MUTUAL FUND PERFORMANCE

7.8 Let Us Sum Up

7.9 Further Reading

7.10 Answers to Check Your Progress

7.11 Model Questions

7.1 LEARNING OBJECTIVES

After going through this unit, you will be able to :

- discuss briefly fundamental analysis and technical analysis
- explain random walk model
- describe efficient market hypothesis.

7.2 INTRODUCTION

In this unit we are going to discuss the various aspects related to efficient market theory.We will discuss random walk theory, efficient market hypothesis and mutual fund performance. The efficient market theory states that fluctuations in price of a share are random and do not follow a regular pattern. Hence, the amount paid for a stock or security and the return when discounted based on the amount of risk it involves will give a Net Present

value equal to Zero (NPV=0), i.e. there is no way to beat an effective market consistently. This is because all current and relevant information is already reflected in the share price.

7.3 CONCEPTS OF EFFICIENT MARKET THEORY

Efficient Market Theory is also known as the Efficient Market Hypothesis.Let us discuss the following terms in connection with the thoery:

- **Market Efficiency:** An efficient market is a market that provides fair return to its investors.thi sis possible only when the market is able to quickly and accurately reflect the expectations of the investors in share prices.

  It can be divided into two types: *Operational Efficiency* and *Informational Efficiency*. Operational efficiency of a market is determined on the basis of time taken to execute an order and number of bad deliveries. Whereas, informational efficiency in market is determined on the basis of swiftness and accuracy of the market to adjust itself in reaction to new information like economic report, company analysis, political agendas, government policies etc.
- **Liquidity Traders:** Traders who do not buy or sell shares on the basis of research and analysis but on the basis of their individual fortune and liquidity traders.
- **Informational Traders:** Traders who buy and sell shares on the basis on through research and analysis of the market are informational traders. They usually invest on the basis of differences in intrinsic value and market value of a security.

7.4 ASSUMPTIONS OF EFFICIENT MARKET THEORY

The following are some of the assumptions of efficient market theory:

- There are large number of buyer and sellers for security.
- All the investors act rationally with the motive of making profit.
- New information arises randomly and is available to all market participants for free.
- Prices of securities respond quickly to newly available information and



reflect all available information

CHECK YOUR PROGRESS

Q1: Who is a Liquidity Trader

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Q2: Who is a Informational Traders

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7.5 RANDOM WALK THEORY

Random walk theory poses a question- Can a series of historical stock prices or rates of return be an aid in predicting future stock prices or rates of return?

The empirical evidence in the random-walk literature existed before the theory was established. That is to say, empirical results were discovered first, and then an attempt was made to develop a theory that could possibly explain the results. After these initial occurrences, more results and more theory were uncovered. This has led then to a diversity of theories, which are generically called the random-walk theory (Eugene F. Fama, 1970). A good deal of confusion resulted from the diversity of the literature; and only recently has there been some clarification of the proliferation of empirical results and theories. Our purpose here is to discuss briefly the substantive differences among these theories.

Misconceptions of the Random Walk Model

Our generalisation of the random-walk model, then, says that previous price changes or changes in return are useless in predicting future price or return changes. That is, if we attempt to predict future prices in absolute terms using only historical price-change information, we will not be successful.

Note that random walk says nothing more than that successive price

changes are independent. This independence implies that prices at any time will on the average reflect the intrinsic value of the security. (Often one will find this intrinsic worth referred to as the present value of the stock's price, or its equilibrium value). Furthermore, if a stock's price deviates from its intrinsic value because, among other things, different investors evaluate the available information differently or have different insights into future prospects of the firm, professional investors and astute non-professionals will seize upon the short-term of random deviations from the intrinsic value, and through their active buying and selling of the stock in question will force the price back to its equilibrium position.

It is unfortunate that so many misconceptions of the random-walk model exist. It is, in point of fact, a very simple statement.

The random-walk model says nothing about relative price movements-that is, about selecting securities that may or may not perform better than other securities. It says nothing about decomposing price movements into such factors as market, industry, or firm factors. Certainly, it is entirely possible to detect trends in stock prices after one has removed the general market influences or other influences; however, this is no way would refute the random-walk model, for after these influences have been removed, we will in fact be dealing with relative prices and not with absolute prices, which lie at the heart of the random-walk hypothesis. Furthermore, these 'trends' provide no basis for forecasting the future.

In addition, it should be reemphasized that the empirical results came first, to be followed by theory to explain the results; therefore, discussions about a competitive market, or instantaneous adjustments to new information, or knowledgeable market participants, or easy access to markets, are all in reality not part of the random-walk model, but rather possible explanations of the results we find when performing our empirical investigations.

Also, there seems to be a misunderstanding by many to the effect that believing in random walk means that one must also believe that analyzing stocks, and consequently stock prices, is a useless exercise, for if indeed stock prices are random, there is no reason for them to go up or

down over any period of time. This is very wrong. The random-walk hypothesis is entirely consistent with an upward or downward movement in price, for as we shall see, the hypothesis supports fundamental analysis and certainly does not attack it.

7.6 FORMS OF EFFICIENT MARKET THEORY

In 1970, Fama classified efficient market hypothesis in three categories according to the level of information reflected in market prices.The EMH exists in various forms: weak, semi-strong and strong, which addresses the inclusion of non-public information in market prices.

This theory contends that since markets are efficient and current prices reflect all information, attempts to outperform the market are essentially a game of chance rather than one of skill. The weak form of EMH assumes that current stock prices fully reflect all currently available security market information. It contends that past price and volume data have no relationship with the future direction of security prices. It concludes that excess returns cannot be achieved using technical analysis. The semi-strong form of EMH assumes that current stock prices adjust rapidly to the release of all new public information. It contends that security prices have factored in available market and non-market public information. It concludes that excess returns cannot be achieved using fundamental analysis. The strong form of EMH assumes that current stock prices fully reflect all public and private information. It contends that market, non-market and inside information is all factored into security prices and that no one has monopolistic access to

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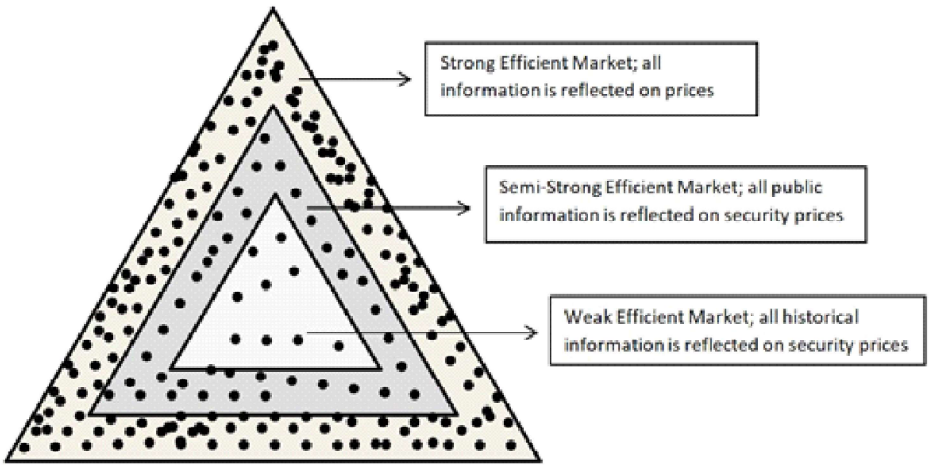


Fig 7.1: Forms of Efficient Market Hypothesis (EMH)
Source: http/bbamantra.com/efficient-market-theory-forms-concepts

Let us now discuss these forms in detail in the following subsections:

7.6.1 Weak form of EMH

The weak form efficiency is also popularly known as 'random-walk'. In weak form of market efficiency stock prices reflect by all available trading information which can be derived from the market data such as past price, trading volume etc, so nobody can use information related to past price to identify the undervalued security and make a big profit by them, It implies that no one should be able to outperform the market using something that "everybody else knows". If the markets are efficient in weak from, technical trading rules cannot be used to make profit on a consistent basis. This form of market efficiency is called weak-efficiency because the security prices are the most publicly and easily accessible pieces of information. Although number of empirical studies support weak form of efficient market but there are still numbers of financial researchers are studying the past stock price series and trading volume data in

attempt to generate profit. In short weak form of efficient market implies that:

- Stock prices quickly incorporate all past price information which can be derived by trading data (i.e. past prices, volume, short interest).
- Everyone knows the past price movement of market, therefore nobody can outperform the market on a consistent basis using some trading strategy based on past price trends (as done by technical analysts).
- Prices follow a "random walk" or more precisely an 'exponential random walk'.

7.6.2 Semi-Strong Form of EMH

In semi-strong form all publicly available information are incorporated into current stock prices. Publicly available information includes past price information plus company's annual reports (such as financial reports, balance sheet and profit and loss account), company's announcement, macro economic factors such as (inflation, unemployment etc) and others. Some information (to the extent anticipated in advance) is discounted even before the event is announced and some before the event took place. Such matters like earnings reports, bonus, and rights affect the market even in anticipation before the formal announcements. Semi-strong form implied that share prices adjust to publicly available new information very rapidly and in an unbiased fashion, such that no one should be able to outperform the market using something that "everybody else knows". This indicates that a company's financial statements are of no help in forecasting future price movements and securing high investment returns. Evidences of empirical studies (most of them are based on event-study methodology) broadly support this form of efficiency. Implications of Semi-Strong form are as follow:

- Market prices incorporate all publicly available information.

- Publicly available information is easily reachable for everybody so no investor can use it to device the strategy which could outperform the market on a consistent basis.
- Share prices adjust to publicly available new information very rapidly and in an unbiased fashion, such that no excess returns can be earned by trading on that information.
- Neither technical analyst nor fundamental analyst will be able to help the investors to outperform in the market

However, the following factors can impede the market-efficiency in its strong form:

- Information may be relatively difficult and costly to obtain.
- Information may be asymmetrically distributed; some investors may have access to information but others may not have.
- It may be difficult to segregate the information from noise.
- It may be difficult to interpret and to understand the exact implication of information.

7.6.3 Strong Form of EMH

In strong form of efficiency stock prices quickly reflect all types of information which include public information plus companies inside or private information. Thus, it is the combination of public and private information that is incorporated into current prices. This form implies that even companies management can not make profit from inside information; they cannot take

advantage of inside affairs or important decision or strategies to beat the market. According to strong-form market efficiency, inside information is also already incorporated into stock prices, the common rational behind this is unbiased market anticipation that already react in to market before companies strategic decision. Strong form of efficiency is hard to believe in practice except where rules and regulations of law are fully ignored. Studies (Reilly & Brown, 2008) that examined the result of the corporate insiders and stock exchange specialists do not support the strong form of efficient

market hypothesis. Empirical evidence has been mixed, but has generally not supported strong forms of the efficient-market hypothesis

Implications of strong form of efficiency is-

- Market prices incorporate all public and private information.
- Nobody can gain abnormal return even those who have inside information.
- This type of market is very hard to believe.



CHECK YOUR PROGRESS

Q1: What is Weak form of EMF

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Q2: What id Strong form of EMF

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.....

7.7 THE EFFICIENT-MARKET HYPOTHESIS AND MUTUAL-FUND PERFORMANCE

It has often been said that large investors such as mutual funds perform better in the market than the small investor does because they have access to better information. Therefore, it would be interesting to observe if mutual funds earned above-average returns, where these are defined as returns in excess of those that can be earned by a simple buy-and-hold strategy. The results of such an investigation would have interesting implications for the efficient-market hypothesis.

Researchers have found that mutual funds do not seem to be able to earn greater net returns (after sales expenses) than those that can be earned by investing randomly in a large group of securities and holding them. Furthermore, these studies indicate, mutual funds are not even able to earn

gross returns (before sales expenses) superior to those of the native buy-and-hold strategy. These results occur not only because of the difficulty in applying fundamental analysis in a consistently superior manner to a large number of securities in an efficient market but also because of portfolio overdiversification and its attendant problems- two of which are high book-keeping and administrative costs to monitor the investments, and purchases of securities with less favourable risk-return characteristics. Therefore, it would seem that the mutual-fund studies lend some credence to the efficient-market hypothesis.



7.8 LET US SUM UP

In this unit we have discussed the following points:

- There are three broad theories concerning stock price movements.
- The fundamentalists believe that by analyzing key economic and financial variables, they can estimate the intrinsic worth of the security and then determine what investment action to take.
- The technical or chartist school maintains that fundamental analysis is unnecessary; all that has to be done is to study historical price patterns and then decide how current price behaviour fits into these.
- The random-walk school has demonstrated to its own satisfaction through empirical tests that successive price changes over short periods, such as a day, a week, or a month, are independent.
- If the markets are truly efficient, then the fundamentalist will be successful only when (1) he has inside information, or (2) he has superior ability to analyze publicly available information and gain insight into the future of the firm, and (3) he uses (1) and/or (2) to reach long-term buy-and-hold investment decisions.
- The empirical evidence in support of the random-walk hypothesis rests primarily on statistical tests, such as runs tests, correlation analysis, and filter tests.

- Random walk model says that successive price changes are independent i.e. previous price changes or changes in return are useless in predicting future price or return changes.
- There are three forms of EMH: Weak form of efficient-market hypothesis says that the current prices of stocks fully reflect all the information that is contained in the historical sequence of prices.



7.9 FURTHER READING

1) Security Analysis and Portfolio Management, S. Kevin, Prentice Hall India Learning Private Limited

2) nvestment Analysis and Portfolio Management, Prasanna Chandra, Mc Graw Hill India



7.10 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q1: Liquidity Traders are traders who do not buy or sell shares on the basis of research and analysis but on the basis of their individual fortune and liquidity traders.

Ans to Q2: Informational Traders are traders who buy and sell shares on the basis on through research and analysis of the market are informational traders. They usually invest on the basis of differences in intrinsic value and market value of a security.

Ans to Q3: The weak form of EMH assumes that current stock prices fully reflect all currently available security market information.

Ans to Q4: In strong form of efficiency stock prices quickly reflect all types of information which include public information plus companies inside or private information.



7.11 MODEL QUESTIONS

1. How do technicians and random-walk advocates differ in their view of the stock market?
2. Describe briefly the tests of weak form, semi-strong and strong form of efficient market hypothesis.
3. What is the connection between the efficient-market hypothesis and the studies of mutual-fund performance?
4. Explain the implications of the serial-correlation tests for

a. the random-walk theory,

b. technical analysis, and

c. fundamental analysis.

5. What sequence of events might bring about an 'efficient market'?
6. Does the random-walk theory suggest that security price levels are random? Explain.
7. How is technical analysis generally regarded in the academic literature? Wh y? What do technical analysts have to say about this.16) Maurice Joy and Charles P. Jones, "Earnings Reports and Market Efficiencies: An Analysis of Contrary Evidence", Journal of Financial Research 2, No. 1 (Spring 1979), pp. 51-63.

17) Turan, M.S. and Bodla, B.S. (2004), Risk and Rewards of Equity Investments: A Study of Select Asian Stock Markets, Excel Book, New Delhi.

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UNIT 8 : VALUATION OF BONDS

UNIT STRUCTURE

8.1 Learning Objectives

8.2 Introduction

8.3 Bond valuation-Terminology

8.3.1 The Time Value Concept

8.3.2 The Present Value

8.4 The Bond Valuation Model

8.5 Bond Yield

8.6 Price-Yield Relationship

8.7 Bond market

8.8 The term structure of interest rate (yield curve)

8.9 Riding the yield curve

8.10 Duration and Immunisation

8.11 Let Us Sum Up

8.12 Further Reading

8.13 Answers to Check Your Progress

8.14 Model Questions

8.1 LEARNING OBJECTIVES

After going through this unit,you will be able to :

- discuss the main characteristics of fixed income instruments.
- describe the time value concept
- discuss basic discounted cash flow valuation model and its application to bonds.

8.2 INTRODUCTION

In the previous unit, we have discussed about 'Efficient Market Hypothesis'. In this unit we rae going to discuss about Bond valuation-Terminology, Valuation model, Bond return, Price-yield relationshi, Bond market and Immunisation. A long-term debt instrument (a legal contract) in

which a borrower agrees to make payments of principal and interest, on specific dates, to the holders of the bond.

Assets can be real or financial; securities like shares and bonds are called financial assets while physical assets like plant and machinery are called real assets. The concepts of return and risk, as the determinants of value, are as fundamental and valid to the valuation of securities as to that of physical assets.

Let us now discuss the concept oin the following ways:

8.3 VALUATION OF BONDS:TERMINOLOGY

Let us first discuss about the terms.

Bond: A long-term debt instrument (a legal contract) in which a borrower agrees to make payments of principal and interest, on specific dates, to the holders of the bond. A bond or debenture is a debt instrument issued by the government or a government agency or a business enterprise.Table 8.1 describes briefly the variety of debt instruments in the Indian market.

Table 8.1. Debt Instruments

Type	Typical features
Central Government Securities	Medium- to long-term bonds issued by RBI on behalf of GOI. Coupon payments are semi-annual.
State Government Securities	Medium- to long-term bonds issued by RBI on behalf of the state government. Coupon payments are semi-annual.
Government-Guaranteed Bonds	Medium- to long-term bonds issued by government agencies and guaranteed by the central government or a state government. Coupon payments are semi-annual.
PSU Bonds	Medium- to long-term bonds issued by public sector companies in which the central or state government has an equity stake of 51 per cent or more.

Corporate Debentures	Short-to medium-term debt issued by private and public sector companies.
Money Market Instruments	Debt instruments like Treasury Bills (issued by GOI), Commercial Paper (issued by corporates) and Certificates of deposits (issued by banks and financial institutions) that have a maturity of less than a year.

Types of Bonds: Bonds with Maturity,Pure Discount Bonds and Bond Yields

Concept of Value : The value can be classified as below:

Book Value- Book value per share is determined as net worth divided by the number of shares outstanding. Book value reflects historical cost, rather than value.

Replacement Value- Replacement value is the amount that a company would be required to spend if it were to replace its existing assets in the current condition.

Liquidation Value- Liquidation value is the amount that a company could realise if it sold its assets, after having terminated its business.

Going Concern Value- Going concern value is the amount that a company could realise if it sold its business as an operating business.

Market Value- Market value of an asset or security is the current price at which the asset or the security is being sold or bought in the market.

In order to understand the valuation of bonds, we need to be also familiar with certain bond-related terms:

Par Value- It is the value stated on the face of the bond. It represents the amount the firm borrows and promises to repay at the time of maturity. Usually the par or face value of bonds issued by business firms is Rs. 100. Sometimes it can be Rs. 1000.

Coupon Rate and Interest- A bond carries a specific interest rate which is called the coupon rate. The interest payable to the bond holder is simply par value of the bond × coupon rate. Most bonds pay interest semi-annually. For example, a GOI security which has a par value of Rs. 1000 and a coupon rate of 11 per cent pays an interest of Rs. 55 every six months.

Maturity Period- Typically, bonds have a maturity period of 1-10 years; sometimes they have a longer maturity. At the time of maturity the par (face) value plus perhaps a nominal premium is payable to the bondholder.

8.3.1 The Time Value Concept

The time value concept of money is that the rupee received today is more valuable than a rupee received tomorrow. The investor will postpone current consumption only if he could earn more future consumption opportunities through investment. Individuals generally prefer current consumption to future consumption. If there is inflation in the economy, a rupee today will represent more purchasing power than a rupee at a future date.

Interest is the rent paid to the owners to part their money. The interest that the borrower pays to the lender causes the money to have a future value different from its present value. The time value of money makes the rupee invested today grow more than a rupee in the future. To quantify this concept mathematically compounding and discounting principles are used.

The one period future time value of money is given by the equation: *Future Value = Present Value (1 + interest rate).* If hundred rupees are put in a savings bank account in a bank for one year, the future value of money will be:

Future Value = Rs. 100 (1.0 + 6%)

100 × 1.06 = Rs. 106.

If the deposited money is allowed to cumulate for more than one time, the period exponent is added to the previous equation.

Future Value = (Present Value) $(1 + \text{Interest Rate})^{t}$

t- the number of time periods the deposited money accumulates as interest. Suppose Rs. 100 is put for two years at the 6% rate of interest, money will grow to be Rs. 112.36.

Future Value = Present value $(1 + \text{interest rate})^2$

$= 100 (1 + 0.06)^2$

= 100 (1.1236)

= 112.36.

To find out the values in a simple manner, the compound sum of Re. 1 at the end of a period FVIF1,/K, n and compound sum of an annuity of Re. 1 per period FVIFA tables are given in the appendix 1 and 2 of the book on- Financial Management for MBA second semester.

8.3.2 The Present Value

The present value of money can be found simply by reversing the earlier equation.

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

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

Here, the discounting principle is used. Today's worth of Rs. 100 to be received after a year at 10 per cent interest would be:

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

$$= \text{Rs.}\frac{100}{1+0.10} = \frac{100}{1.1} = \text{Rs. } 90.90$$

The multiple period of present value equation takes into account of the multiple periods.

$$\text{Present value} = \frac{\text{Future value}}{(1+\text{interest rate})^{t}}$$



CHECK YOUR PROGRESS

Q1: Define Bond.

.....

.....

Q2: Define Book Value

.....

.....

Q3: What is Time Value Concept

.....

.....

8.4 THE BOND VALUATION MODEL

The value of a bond- or any asset, real or financial- is equal to the present value of the cash flows expected from it. Hence, determining the value of a bond requires:

- An estimate of expected cash flows
- An estimate of the required return.

To simplify the analysis of bond valuation we will make the following assumptions:

- The coupon interest rate is fixed for the term of the bond.
- The coupon payments are made every year and the next coupon payment is receivable exactly a year from now.
- The bond will be redeemed at par on maturity.

Given these assumptions, the cash flow for a non-callable bond comprises an annuity of a fixed coupon interest payable annually and the principal amount payable at maturity. Hence the value of a bond is:

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

Where P = Present value (in rupees)

n = number of years

C = annual coupon payment (in rupees)

r = periodic required return

M = maturity value

t = time period when the payment is received.

Since the stream of semi-annual coupon payments is an ordinary annuity, we can apply the formula for the present value of an ordinary annuity. Hence the bond value is given by the formula:

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

To illustrate how to compute the value of a bond, consider a 10-year, 12 per cent coupon bond with a par value of Rs. 1000. Let us assume that the required yield on this bond is 13 per cent. The cash flows for this bond are as follows:

- 10 annual coupon payments of Rs. 120.
- Rs. 1000 principal repayment 10 years from now.

The value of the bond is:

$$P = 120 \times PVIFA_{(13\%, 10\ yr)} + 1{,}000 \times PVIF_{(13\%, 10yr)}$$

$$120 \times 5.426 + 1000 \times 0.295$$

$$651.1 + 295 = \text{Rs. } 946.1$$

Bond values with semi-annual interest

Most bonds pay interest semi-annually. To value such bonds, we have to work with a unit period of six months, and not one year. This means that the bond valuation equation has to be modified along the following lines:

- The annual interest payment, C, must be divided by 2 to obtain the semi-annual interest payment.
- The number of years to maturity must be multiplied by two to get the number of half-yearly periods.
- The discount rate has to be divided by two to get the discount rate applicable to half-yearly periods.

With the above modifications, the basic bond valuation becomes:

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

$$P = C/2 * PVIFA_{(r/2,\ 2n)} + M * (PVIF)_{(r/2,\ 2n)}$$

Where P = value of the bond

C/2 = semi-annual interest payment

r/2 = discount rate applicable to a half-year period

M = maturity value

2n = maturity period expressed in terms of half-yearly periods.



Excercise 8.1:

Consider a 8-year, 12 per cent coupon bond with a par value of Rs. 100 on which interest16 is payable semi-annually. The $\sum$ C/26 ++ 100M required return on this bond is 14 per(1cent+r/2).t^t (1+ r/2)$16^{2n}_{t=1}$ (1.07) (1.07)

Solution.

Applying Eq. 10.2, the value of the bond is:

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

P = 6 ($PVIFA_{7\%,\ 16\ yr}$) + 100 ($PVIF_{7\%,\ 16\ yr}$)

Rs. 6 (9.447) + Rs. 100 (0.388) = Rs. 95.5.

Excercise 8.2: At an annual rate of compounding of 9%, how long does it take for a given sum to become double and triple its original value?

Solution.

$P_t = P_0 (1 + r)^n$

When the n value is not given it can be solved by using log ln:

n ln (1 + r) = ln P_t

n ln (1 + 0.09) = ln 2

n. ln 0.0862 = ln 0.6931

n = 8.04 years

To triple

n ln (1 + 09) = ln 3

n. ln 0.0862 = ln 1.0986

= 12.74 years



Excercise 8.3:

Of the following which amount is worth more at 16 per cent; Rs. 1000 today or Rs. 2100 after five years.

Solution.

The present worth of Rs. 2100

$$= \frac{2100}{(1+r)^n}$$

$$= \frac{2100}{(1+0.16)^5}$$

2100 × 0.476 = 999.60

The present worth of Rs. 2100 is Rs. 999.60 which is less than Rs. 1,000. Hence Rs. 2100 after five years is not worthful.

8.5 BOND YIELD

Bond yield is the return an investor realizes on a bond. The bond yield can be defined in different ways. Setting the bond yield equal to its coupon rate is the simplest definition. The current yield is a function of the bond's price and its coupon or interest payment, which will be more accurate than the coupon yield if the price of the bond is different than its face value. More complex calculations of a bond's yield will account for the time value of money and compounding interest payments.

The bond yield is the annualized return of the bond. Thus, bond yield will depend on the purchase price of the bond, its stated interest rate — which is equal to the annual payments by the issuer to the bondholder divided by the par value of the bond — plus the amount paid at maturity. Let us discuss the bond yields in following ways:

- **The current yield** - The current yield is the coupon payment as a percentage of current market prices. Because bonds trade in the secondary market, they may sell for less or more than par value, which will yield an interest rate that is different from the nominal yield, called the current yield, or current return. Since the price of bonds moves in the opposite direction of interest rates, bond prices decrease when interest rates increase, and vice versa.

$$\text{Current yield} = \frac{\text{Annual coupon payment}}{\text{Current market price}}$$

With this measure the investors can find out the rate of cashflow from their investments every year. The current yield differs from the coupon rate, since the market price differs from the face value of the bond. When the bond's face value and market price are same, the coupon rate and the current yield would be the same. For example, when the coupon payment is 8% for Rs. 100 bond with the same market price, the current yield is 8%. If the current market price is Rs. 80 then the current yield would be 10%.

- **Yield to Maturity (YTM)**

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

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

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

Understanding this, is crucial for better investment decisions. For example, if an 11 per cent coupon paying bond with four years to mature has a TYM, of say 13 per cent it would be realised only if two conditions are met: One, the bond is held till maturity (for four years), and two, the interest received from the bond is reinvested for the rest of the period at 13 per cent. Otherwise actual or realised rate of return of the investor will be different from the expected return.

In the above example, if coupon receipts are re-invested at say, 10 per cent for the rest of the period then the realised rate of return will be less than the YTM. Conversely, if the coupon receipts are reinvested at 14 per cent, the realised rate of return will be higher than the YTM.

Any difference in the re-investment rate will cause a difference between the actual return and the YTM. In this sense, the YTM is only a

measure of yield. It cannot be regarded as a measure of return from a coupon-paying bond.

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

To find out the yield to maturity the present value technique is adopted. The formula is,

$$\text{Pr esent value} = \frac{\text{Coupon}_1}{(1+y)^1} + \frac{\text{Coupon}_2}{(1+y)^2} + \ldots + \frac{(\text{Coupon}_n + \text{face value})}{(1+y)^n}$$

Y = The yield to maturity.

Excercise 8.5: A four-year bond with the 7% coupon rate and maturity value of Rs. 1000 is currently selling at Rs. 905. What is its yield to maturity?

Solution. Since all the three values are known out of the four values, it can be found out by using trial and error procedure. Let us try ten per cent.

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

The yield to maturity is 10 per cent

The approximate yield to maturity can be found out by using the following formula too.

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

Y = Yield to maturity

C = Coupon interest

P or D = Premium or discount

P_O = Present value

F = Face value

In the case of previous sum

$$= \frac{70 + (95/4)}{(905 + 1000)/2} = \frac{93.75}{952.5} = 0.098$$

Y = 9.8%

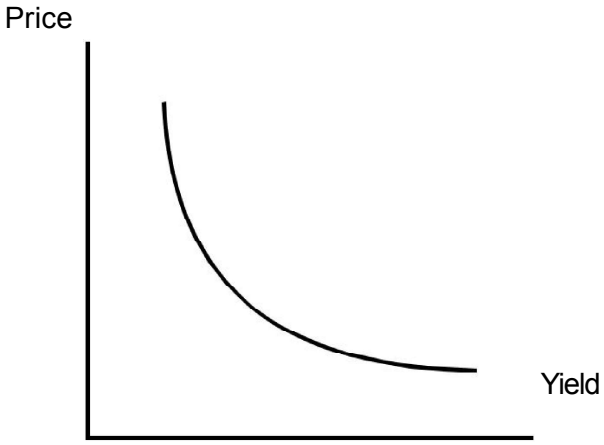
Yield to maturity(YTM)= 9.8%.

8.6 PRICE-YIELD RELATIONSHIP

A basic property of a bond is that its price varies inversely with yield.

The reason is simple. As the required yield increases, the present value of the cash flow decreases; hence the price decreases. Conversely, when the required yield decreases, the present value of the cash flow increases; hence the price increases. The graph of the price-yield relationship for any callable bond has a convex shape as shown in Fig 8.1

Fig 8.1. Price-yield relationship

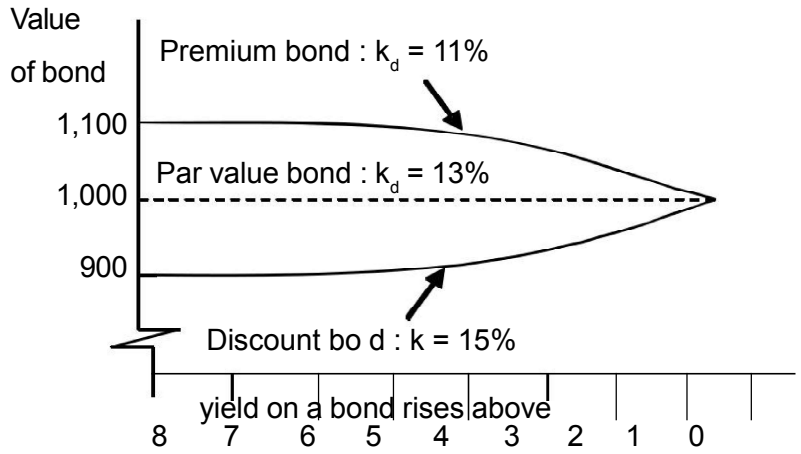


Relationship between bond price and time

Bond prices, generally, change with time as the price of a bond must equal its par value at maturity (assuming that there is no risk of default). For example, a bond that is redeemable for Rs. 1000 (which is its par value) after 5 years when it matures, will have a price of Rs. 1000 at maturity, no matter what the current price is. If its current price is, say, Rs. 1100, it is said to be a premium bond. If the required yield does not change between now and the maturity date, the premium will decline over time as shown by curve A in Fig 8.2. On the other hand, if the bond has a current price of say

Rs. 900, it is said to be a discount bond. The discount too will disappear over time as shown by curve B in Fig 8.2. Only when the current price is equal to par value-in such a case the bond is said to be a par bond-there is no change in price as time passes, assuming that the required yield does not change between now and the maturity date. This is shown by the dashed line in Fig 8.2.

Fig 8.2: Price changes with time



Relationship between coupon rate, required yield, and price

As yields change in the marketplace, prices of bonds change to reflect the new required yield. When the required its coupon rate, the bond sells at a discount. When the required yield

Years to maturity on a bond equals its coupon rate, the bond sells at par. When the required yield on a bond falls below its coupon rate, the bond sells at a premium. We can summarise the relationship between coupon rate, required yield, and price as follows:

Coupon Rate < Required Yield **<=>** Price < Par (Discount bond)

Coupon Rate = Required Yield **<=>** Price = Par

Coupon Rate > Required Yield **<=>** Price > Par (Premium bond)

Realised Yield to Maturity(YTM)

The YTM calculation assumes that the cash flows received through the life of a bond are reinvested at a rate equal to the yield to maturity. This assumption may not be valid as reinvestment rate/s applicable to future

cash flows may be different. It is necessary to define the future reinvestment rates and figure out the realised yield to maturity. How this is done may be illustrated by an example.

For example,consider a Rs. 1000 par value bond, carrying an interest rate of 15 per cent (payable annually) and maturing after 5 years. The present market price of this bond is Rs. 850. The reinvestment rate applicable to the future cash flows of this bond is 16 per cent. The future value of the benefits receivable from this bond, calculated in Exhibit 10.3 works out to Rs. 2032. The realised yield to maturity is the value of r* in the following equation.

Present market price $(1 + r^*)^5$ = Future value

$$850\ (1 + r^*)^5 = 2032$$

$$(1 + r^*)^5 = 2032/850 = 2.391$$

$$1 + r = (2.391)^{1/5}$$

$$r^* = 0.19 \text{ or } 19\%.$$

Table 8.3. Future value of benefits

	0	1	2	3	4	5
● Investment	850					
● Annual interest		150	150	150	150	150
● Re-investment period (in years)		4	3	2	1	0
● Compound factor (at 16%)		1.81	1.56	1.35	1.16	1.00
● Future value of intermediate cash flows		271.5	234.0	202.5	174.0	150.0
● Maturity value						1000
● Total future value	= 271.5 + 234.0 + 202.5 + 174.0 + 150.0 + 1000 = 2032					

8.7 BOND MARKET

Bonds are bought and sold in large quantities. Most trading in bonds, however, takes place over the counter. This means that the transactions

are privately negotiated and they do not take place through the process of matching of orders on an organised exchange. This is a characteristic of bond markets all over the world, not just in India. Because the bond market is largely over the counter, it lacks transparency. A financial market is transparent if you can easily observe its prices and volumes.

The National Stock Exchange has a Wholesale Debt Market (WDM) segment. The WDM segment is a market for high value transactions in government securities, PSU bonds, commercial papers, and other debt instruments. The quotations of this segment mostly reflect over-the-counter transactions that are privately negotiated over the phone or computer and registered with the exchange for reporting purposes.

8.8 THE TERM STRUCTURE OF INTEREST RATE (YIELD CURVE)

The bond portfolio manager is often concerned with two aspects of interest rates; the level of interest rate and the term structure of interest rate. The relationship between the yield and time or years to maturity is called term structure. The term structure is also known as yield curve. In analysing the effect of maturity on yield all other influences are held constant. Usually pure discount instruments are selected to eliminate the effect of coupon payments. The bonds chosen do not have early redemption features. The maturity dates are different but the risks, tax liabilities and redemption possibilities are similar.

The general reception is that the curve will be upward moving up to a point then it becomes flat. This is indicated in the following Figure 8.5.

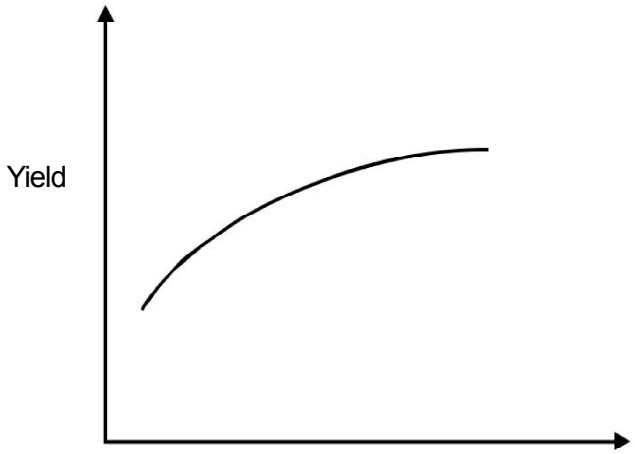


Fig. 8.5. Rising yield curve

There are at least three competing theories that attempt to explain the term structure of the interest rates viz., the expectation theory, liquidity preference theory and preferred habitat or segment theory.

Expectation theory- The theory was developed by J.. Hicks (1939), F. Lutz (1940) and B. Malkiel (1966). According to the expectation theory, the shape of the curve can be explained by the expectations of the investors about the future interest rates. If the short term rates are expected to be relatively low in the future, then the long term rate will be below the short term rate.

There are three reasons for the investors to anticipate the fall in the interest rate.

- Anticipation of the fall in the inflation rate and reduction in the inflation premium.
- Anticipation of balanced budget or cut in the fiscal deficit.
- Anticipation of recession in the economy, and a fall in the demand for funds by the private corporate.

The long term rates will exceed the current short term rates if there is an expectation that the market rates would be higher in the future. Thus the yield curve depends upon the expectations of the investors.

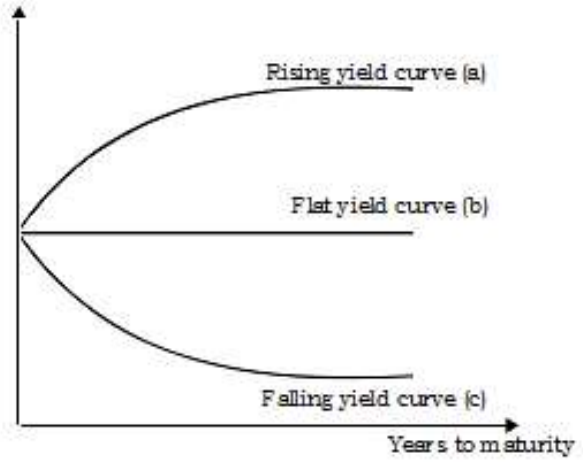


Fig. 8.6

A rising yield curve (a) indicates that the investors' expectation of a continuous rise in interest rate. The flat yield curve (b) means that the investors expect the interest rate to remain constant. The declining yield curve (c) shows that the investor expects the interest rate to decline.

Liquidity preference theory- Keynes' liquidity preference theory as advocated by J.R. Hicks (1939) accepts that expectations influence the shape of the yield curve. In a world of uncertainty, it would be more desirable for the investors to invest in short term bonds than on long term bonds because of their liquidity property. If no premium exists for holding the long term instruments, investors would prefer to hold short term bonds to minimise the possible variation in the nominal value of their portfolio.

The exponents of the liquidity preference theory believe that the investors prefer short term rather than long term. Hence they must be motivated to buy the long term bonds or lengthen the investment horizon. The bond issuing corporate or contributor pay premium to motivate the investors to buy. This liquidity premium theory indicates that in years time the forward rates are actually higher than the projected interest rate.

Sementation theory- Critics of the expectation theory, such as, J. Culbertson (1957) and F.V. Modigliani and R. Sutch (1966) pointed out that the liquidity preferences cannot be the main consideration for all classes of investors. In their view insurance companies, pension funds and even retired persons prefer the long term rather than short term securities to avoid the

possible fluctuations in the interest rate. This can be explained in detail.

Life insurance companies offer insurance policies that do not require any payment for a long time. For example, an insurance policy issued to a 25 year old individual may involve another 20 or more years before the company has to make a payment. Premium payments are fixed by the expected future rate of interest. If the insurance company invests the funds in a long term bond, the interest the bond would earn is certain and if the earned interest rate is higher than the promised interest rate, the company stands to gain and its risk is also reduced. If it invests in one year bonds, the risk of re-investment is there and if there is a fall in the market interest rate, the insurance company stands to lose and it would be difficult for the company to meet its obligation. This leads the insurance companies to prefer the long term bonds rather than short term bonds.

On the other hand, commercial banks and corporates may prefer liquidity to meet their short term requirements and therefore, they prefer short-term issues. Supply and demand for fund are segmented in sub markets because of the preferred habitats of the individuals. Thus the yield is determined by the demand and supply of the funds.

8.9 RIDING THE YIELD CURVE

When the long term coupon rates are higher than the short term rates, the yield curve would have an upward sloping shape. Bond portfolio manager tries to exploit this to his advantage and tries to increase the yield by purchasing the long term bonds. This strategy is known as riding the yield curve. When the long term bond approaches to maturity, the interest rate may get closer to the short term bond but, there would be capital gain. The bond portfolio manager may maintain the long term bond to utilise the capital gains as the bond moves to maturity date and “rides down the yield curve” to the lower interest rate, which will be appropriate when it becomes shorter term bond. Riding the yield curve would be successful only if the market interest rate does not rise. Sometimes the market interest rate may increase or short term end of the yield curve may slope upwards causing capital losses to the bond portfolio manager. To manage the situation

efficiently the bond portfolio manager should be continuously watchful about the shape of the yield curve and the shifts that occur in the market interest rates.

8.10 DURATION AND IMMUNISATION

Duration

Duration measures the time structure of a bond and the bond's interest rate risk. The time structure ways. The common way to state is how many years until the bond matures and the principal money is paid back. This is known as asset time to maturity or its years to maturity. The other way is to measure the average time until all interest coupons and the principal is recovered. This is called Macaulay's duration. Duration is defined as the weighted average of time periods to maturity, weights being present values of the cash flow in each time period. The formula for duration is,

$$D = \frac{\frac{C_1}{(1+r)}}{P_0} x1 + \frac{\frac{C_1}{(1+r)^1}}{P_0} x2 + \ldots\ldots\ldots \frac{\frac{C_1}{(1+r)^t}}{P_0} xT$$

This can be summarised as

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

D = Duration

C = Cash flow

R = Current yield to maturity

T = Number of Years

PV (C) = Present value of the Cash flow

P = Sum of the present values of cash flow.



Excercise 8.9.

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

Solution.

$$D=\frac{\frac{C_1}{(1+r)}}{P_0}x1+\frac{\frac{C_1}{(1+r)^2}}{P_0}x2+\frac{\frac{C_1}{(1+r)^3}}{P_0}x3+\frac{\frac{C_1}{(1+r)^4}}{P_0}x4$$

C_4 includes principal repayment

Bond 'A' with 7% coupon rate.

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

Bond 'B' with 8% coupon rate.

Year	Cash flow Ct	$\frac{1}{(1+r)^t}$	PV × CT	$\frac{\frac{C_t}{(1+r)^t}}{P_0}$	$\frac{\frac{C_t}{(1+r)^t}}{P_0} \times t$
1.	80	0.943	75.44	0.0706	0.0706
2.	80	0.890	71.200	0.0666	0.1332
3.	80	0.8396	67.168	0.0628	0.1884
4.	1080	0.7921	855.468	0.8000	3.2000
		P_0 = Rs. 1069.276		D = 3.5922	

Example	'A' Bond	'B' Bond
Face value	Rs. 1000.00	Rs. 1000.00
Coupon rate	7%	8%
Years to maturity	4.0	4.0
Macaulay's duration	3.631 Years	3.592 Years

From the above Excercise 8.9, it is clear that the bond with larger coupon payments has a shorter duration compared to the bond with low coupon rate.

General Rule

1. Larger the coupon rate, lower the duration and less volatile the bond price.
2. Longer the term to maturity, the longer the duration and more volatile the bone.
3. Higher the yield to maturity, lower the bond duration and bond volatility, and vice versa.
4. In a zero coupon bond, the bond's term to maturity and duration are the same. The zero coupon bond makes only one balloon payment to repay the principal and interest on the maturity date.

Importance of Duration- The concept of duration is important because it provides more meaningful measure of the length of a bond, helpful in evolving immunisation strategies for portfolio management and measures the sensitivity of the bond price to changes in the interest rate.

Duration and Price Changes- The price of the bond changes according to the interest rate. Bond's price changes are commonly called bond volatility. Duration analysis helps to find out the bond price changes as the yield to maturity changes. The relationship between the duration of a bond and its price volatility for a change in the market interest rate is given by the following formula.

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

MD = Modified duration

BP = Basis point is 0.01 of 1% (1% = 100).

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

Where

D = Duration

R = Market Yield

P = Interest payment per year (usually two)

Immunisation:

Immunisation is a technique that makes the bond portfolio holder to be relatively certain about the promised stream of cash flows. The bond interest rate risk arises from the changes in the market interest rate. The market rate affects the coupon rate and the price of the bond. In the immunisation process, the coupon rate risk and the price risk can be made to offset each other. Whenever there is an increase in the market interest rate, the prices of the bonds fall. At the same time the newly issued bonds offer higher interest rate. The coupon can be reinvested in the bonds offering higher interest rate and losses that occur due to the fall in the price of bond can be offset and the portfolio is said to be immunized.

Let us now solve sum excercise which are as follow:



Excercise 8.4:

Determine the price of Rs. 1,000 zero coupon bond with yield to maturity of 18 per cent and 10 years to maturity. What is YTM of this bond if its price is Rs. 220 ?

Solution.

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

$$= \frac{1{,}000}{(1+0.18)^{10}} = \frac{1{,}000}{5.2338}$$

Rs. 191.07

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

$$\left(\frac{\text{Rs. } 1000}{\text{Rs. } 220}\right)^{1/r} - 1 = \text{YTM}$$

$(4.55)^{0.1} - 1 = \text{YTM}$

$1.163 - 1 = 0.163$

$\text{YTM} = 16.3\%$

Illustration 8.5. Arvind considers Rs. 1000 par value bond bearing a coupon rate of 11% that matures after 5 years. He wants a minimum yield to maturity of 15%. The bond is currently sold at Rs. 870. Should he buy the bond ?

Solution.

$$Po = \frac{Coupon}{(1+Y)} + ... + \frac{Coupon + Face\ value}{(1+Y)^5}$$

(or)

P_0 = (Coupon) (PVIFA, n) + (Principal amount) (PVIF/k,n)

P_0 = 110 (PVIFA 15%, 5 years) + 1000 (PVIF/15%, 5 yrs)

110 (3.352) + 1000 (0.497)

368.7 + 497 = 865.7.

At Arvind's anticipated minimum yield of 15% the price should be Rs. 865.70 but the market price is higher. Hence, he should not buy.

Illustration 7A.6. Anand owns Rs. 1,000 face value bond with five years to maturity. The bond has an annual coupon of Rs. 75. The bond is currently priced at Rs. 970. Given an appropriate discount rate of 10%, should Anand hold or sell the bond?

Solution.

P_0 = Coupon (PVIFA k, n) + Principal amount (PVIF k, n)

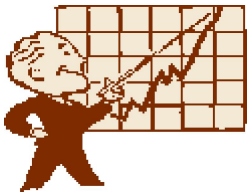
75 (PVIFA 10%, 5 yrs) + 1000 (PVIF 10%, 5 yrs)

75 × 3.7908 + 1000 (0.6209)

Rs. 284.31 + 620.9

Rs. 905.21.

The market price Rs. 970 is higher than the estimated price Rs. 905.2. It is better for Anand to sell the bond.



CHECK YOUR PROGRESS

Q1: Define Current Yield

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.....

Q2: Define Term Structure

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8.11 LET US SUM UP

In this unit we have discussed the following points :-

- Bonds, do have risk. Changes that occur in the market interest rate affect the value of the bond. It is known as interest rate risk. Other than this, there are default risk, marketability risk and callability risk.

  Holding period return

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

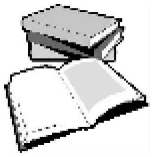
- Yield to maturity is the single discount factor that makes the present value of future cash flows from a bond equal to current price of the bond.

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

- Bond value theorem states that market price affects the yield and vice versa. This leads to convexity in the yield curve.
- The relationship between the yield and time to maturity is the term structure of interest rate. The term structure of interest rate is explained by expectation theory, liquidity theory and segmentation theory.
- When the long term coupon rate is higher than the short term rate, the bond portfolio manager may switch over from short term bond to long term bond and earn capital gains. This is known as riding the yield curve.
- Duration is a measure of the average time until all interest coupons and the principal amount is recovered.

  $$D = \left[\sum_{t=1}^{T} \frac{Pv(C_t)}{P_o} \times t \right]$$

- Immunisation is the technique adopted to make the cashflows from holding the bond relatively certain. On the basis of duration immunisation can be done.



8.12 FURTHER READING

- M. Ranganathan and R. Madhumathi: Investment Analysis and Portfolio Management, Pearson Education, New Delhi.
- Punithavathy Pandian: Security Analysis and Portfolio Management, Vikas Publishing House Pvt. Ltd., New Delhi.
- Bharti V. Phathak: Indian Financial System, Pearson Education, Delhi.
- Donald E. Fischer and Ronald J. Jordon: Security Analysis and Portfolio Management, PHI.
- Prasanna Chandra: Investment Analysis and Portfolio Management, TMH, Delhi.



8.13 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q1: A bond is a debt instrument issued by the government or a government agency or a business enterprise.

Ans to Q2: Book value per share is determined as net worth divided by the number of shares outstanding. Book value reflects historical cost, rather than value.

Ans to Q3: The time value concept of money is that the rupee re ceived today is more valuable than a rupee received to morrow.

Ans to Q4: The current yield is the coupon payment as a percentage of current market prices. Because bonds trade in the secondary market, they may sell for less or more than par value, which will yield an interest rate that is different from the nominal yield, called the current yield,

Ans to Q5: The relationship between the yield and time or years to maturity is called term structure.



8.14 MODEL QUESTIONS

1. How would you assess the present value of a bond? Explain the various bond value theorems with examples.
2. Discuss the term structure of the interest rate? How do theories explain the term structure of the interest rate?
3. What is meant by duration? Explain the relationship between duration and price change.
4. How would you immunise the bond portfolio using the immunisation technique?
5. Find out the yield to maturity on a 8 per cent 5 year bond selling at Rs. 105?
6. Determine the present value of the bond with a face value of Rs. 1000, coupon rate of Rs. 90, a maturity period of 10 years for the expected yield to maturity of 8 per cent.
   (ii) If N is equal to 7 years in the above example, determine the present value of the bond. Discuss the effect of the maturity period on the value of the bond.
7. Bond A and B have similar characters except the maturity period. Both the bonds carry 9 per cent coupon rate with the face value of Rs. 10,000. The yield to maturity is 9%. If the yield to maturity is to rise to 11% what will be the respective percentage price change in bond A with 7 years to maturity and B with 10 years to maturity?
8. A bond with the face value of Rs. 1000 pays a coupon rate of 9 per cent. The maturity period is 9 years (a) Find out the approximate yield to maturity (b) current yield and the nominal interest rate.
9. Determine the yield to maturity if a zero coupon bond with a face value of Rs. 1000 is sold at Rs. 300. The maturity period is 10 years.
10. Prem is considering the purchase of a bond currently selling at Rs. 878.50 the bond has four years to maturity, face value of Rs. 1,000 and 8% coupon rate. The next annual interest payment is due after one year from today. The required rate of return is 10%.

a. Calculate the intrinsic value (Present value) of the bond. Should Prem buy the bond?

b. Calculate the yield to maturity of the bond.

11. What is the value of a Rs. 1,000 bond that paying 5 per cent annual coupon rate in semiannual payments over 5 years until it matures if its yield to maturity is 7 per cent?

12. Determine Macaulay's duration of a bond that has a face value of Rs. 1,000 with 10 per cent annual coupon rate and 3 years term to maturity. The bond's yield to maturity is 12 per cent.

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UNIT 9: VALUATION OF VARIABLE INCOME SECURITIES OR EQUITY SHARE VALUATION

UNIT STRUCTURE

9.1 Learning Objectives

9.2 Introduction

9.3 Basic Concepts

9.4 Share valuation

- 9.4.1 Earnings valuation
- 9.4.2 Cash flow valuation
- 9.4.3 Asset valuation
- 9.4.4 Dividend-Discount model

9.5 Let Us Sum Up

9.6 Further Reading

9.7 Answers To Check Your Progress

9.8 Model Questions

9.1 OBJECTIVES

After going through this unit, you will be able to :

- learn valuations of equity instruments
- discuss their interpretation and applicability of valuation in the stock market.
- analyse share valuation through the most often used methods such as earnings valuation, cash flow valuation, book valuation and dividend valuation.

9.2 INTRODUCTION

In this unit we are going to discuss about the share valuation, Earnings valuation, Cash flow valuation, Asset valuation and Dividend-Discount model.

Let us now discuss these concepts in the following sections.

9.3 BASIC CONCEPTS

Equity shares are floated in the market at face value, or at a premium or at a discount. Only companies with a track record or companies floated by other firms/companies with a track record are allowed to charge a premium. The premium is normally arrived at after detailed discussions with the merchant bankers. This is the first exercise involving the valuation of share by the company itself.

After allotment of shares to the shareholders, the company may distribute its surplus profits as returns to investors. The returns to equity shareholders are in the form of distribution of business profits. This is termed as declaration of dividends. Dividends are declared only out of the profits of the company. Dividends are paid in the form of cash and are called cash dividends. When shares are issued additionally to the existing investors in the form of returns, they are called bonus shares. These decisions are taken in the annual general meeting of the shareholders. The announcement of dividend is followed by the book closure dates, when the register of shareholders maintained by the company is closed till the distribution of dividends. The shareholders whose names appear on the register on the date are entitled to receive the dividend payment. Cash dividend payments reduce the cash balance of the company while bonus share payments reduce the reserve position of the company.

Thus, the dividends are a direct benefit from the company to its owners. It is an income stream to the owners of equity capital. Many expectations surround the company's quarterly announcement periods in terms of the dividend declared by the corporate enterprises to its shareholders. The payment of dividend itself is expected to influence the share price of the company. To the extent that cash goes out of the company, the book value of the company stands reduced and it is theoretically expected to lower the market price of the share. This is based on the argument that future expectations are exchanged for current benefits from the company in the form of dividends.

While bonus shares do not reduce the cash flow of the company, they increase the future obligations of the company to pay extra dividend in the future. Bonus shares result in an increase in the number of existing shares. Hence, the company has to pay dividend on its newly issued bonus shares in addition to its existing number of shares. These bonus shares are different from stock splits. Stock splits simply imply a reduction in the face value of the instrument with an increase in the quantity of stock. A stock split does not increase the value of current equity capital. Bonus shares, on the other hand, increase the value of equity capital to the company.

All these exercises by the company call for a renewed valuation of the shares traded in the secondary market. Hence, investment evaluation begins with the computation of the value of securities.

9.4 SHARE VALUATION

Share valuation is the process of assigning a rupee value to a specific share. An ideal share valuation technique would assign an accurate value to all shares. Share valuation is a complex topic and no single valuation model can truly predict the intrinsic value of a share. Likewise, no valuation model can predict with certainty how the price of a share will vary in the future. However, valuation models can provide a basis to compare the relative merits of two different shares.

Common ways for equity valuations could be classified into the following categories:

1. Earnings valuation
2. Cash flow valuation
3. Asset valuation
4. Dividend-discount model

Let us discuss categories in the follwoing sections:



CHECK YOUR PROGRESS

Q1: What is Stock Splits

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Q2: Write the ways for equity valuations.

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9.4.1 Earnings Valuation

Earnings (net income or net profit) is the money left after a company meets all its expenditure. To allow for comparisons across companies and time, the measure of earnings is stated as earnings per share (EPS). This figure is arrived at by dividing the earnings by the total number of shares outstanding.

Thus, if a company has one crore shares outstanding and has earned Rs. 2 crore in the past 12 months, it has an EPS of Rs. 2.00.

Rs. 20,000,000/10,000,000 shares = Rs. 2.00 earnings per share

EPS alone would not be able to measure if a company's share in the market is undervalued or overalued. Another measure used to arrive at investment valuation is the Price/Earnings (P/E) ratio that relates the market price of a share with its earnings per share. The P/E ratio divides the share price by the EPS of the last four quarters. For example, if a company is currently trading at Rs. 150 per share with a EPS of Rs. 5 per share, it would have a P/E of 30.

The P/E ratio or multiplier has been used most often to make an investment decision. A high P/E multiplier implies that the market has overvalued the security and a low P/E multiplier gives the

impression that the market has undervalued the security. When the P/E multiple is low, it implies that the earnings per share is comparatively higher than the prevailing market price. Hence, the conclusion that the company has been 'undervalued' by the market. Assume a P/E multiplier of 1.0. The implication is that the earnings per share is equal to the prevalent market price. While market price is an expectation of the future worth of the firm, the earnings per share is the current results of the firm. Hence, the notion that the firm has been 'undervalued' by the market. On the other hand, a high P/E ratio would imply that the market is 'overvaluing' the security for a given level of earnings.

Asian paints had a P/E ratio of 25.3 on July 26, 2005. The market price as on that date was Rs. 457.65 and the earnings per share was Rs. 18.1. Zee Telefilms, had a consistent P/E multiplier. ICICI Bank, had a price of Rs. 509.25 and PE ratio of 18.8 on the same date. The interpretation of 'overvaluation' will hold good when the market is expected to adjust towards the real worth of the company. A consistent high ratio, on the other hand, implies that the future returns expectations from the company is consistently good and that the high P/E ratio need not necessarily indicate a 'overvalued' position for the company.

The forward P/E valuation is another technique that is based on the assumption that prices adjust to future P/E multipliers. The assumption is that shares typically trade at a constant P/E and therefore the 'future' value of a share can be calculated by comparing the current P/E with the future P/E (as predicated using analysts' estimated earnings for that year).

The forecasted market price is calculated as [Price* (P/E, current)/ (P/E, future)]. For example, if current market price is Rs. 20, current P/E is 4 and forecasted P/E is 2.5, the forecast price is Rs. 32 $\left(\frac{20 \times 4}{2.5}\right)$. This valuation technique cannot be applied to shares with negative current or future earnings.

The forward P/E ratio is most often used in comparison with the current rate of growth in earnings per share. This is based on the assumption that for a growth company, in a fairly valued situation, the price/earnings ratio ought to be equal to the rate of EPS growth. When the growth rate is not in tune with P/E multiplier, then P/E multiplier can be modified to include the growth ratio.

Assume, for example, that a company's P/E ratio is 15; earnings growth rate of 13 per cent -14 per cent would substantiate the fair valuation of the share in the market price. This can be incorporated in the P/E growth ratio (PEG). The PEG considers the annualised rate of growth and compares this with the current share price. Since it is future growth that makes a company valuable to the investors in the market, the earnings growth is expected to depict the valuation of a company better than the historical earnings per share. If a company is expected to grow at 10 per cent a year over the next two years and has a current P/E multiple of 15, the PEG will be computed as 15/10 = 1.5. The interpretation of PEG is that the market price is worth 0.5 times more than what it really is worth, since the assumption is that the P/E multiplier ought to be equal to the earnings growth rate.

A PEG of 1.0 suggests that a company is fairly valued. That is, in the previous example, if the P/E multiplier is 15 and the earnings growth rate is also 15, then PEG is equal to (15/15) 1.0. Here the company is evaluated as priced correctly by the market. If the company in the above example had a P/E of 15 but was expected to grow at 20 per cent a year, it would have a PEG of (15/20), 0.75. This means the shares are selling for 75 per cent of their real value. This leads to the conclusion that the shares are 'underpriced' in the market.

The PEG measure is useful only for positive growth companies. When the companies are not experiencing a growth opportunity or there is a short spell of negative performance due to various factors, the PEG will not be the right measure to use to

assess the valuation of shares.

The forward P/E and growth ratio (FPEG) can be used for valuing companies with an expected long-term performance. Rather than looking at the current historical price earning multiplier, the measure considers the price earnings multiplier forecast by analysts. This is compared with the expected earnings growth rate to evaluate the fair price of the shares. Assuming the analysts' expectation of the P/E multiplier of a company is 20 and the earnings growth is expected to be 25 per cent over the next five years, the FPEG is computed as 20/5 = 0.8. The interpretation of this number is similar to the interpretation of PEG, that is, the company is evaluated in the market at only 80 per cent of its realistic price. This will be an indicator of 'underpricing' of shares in the market. Similarly, a company that has an expected P/E multiplier of 20 and the growth in earnings in the next five years of 10 per cent will have a FPEG of (20/10) =2.0. This indicates an 'overpricing' of the share by the market by double its fair value.

Although the PEG and FPEG are helpful, they both operate on the assumption that the P/E should equal the EPS rate of growth. In the real market, the assumptions behind the earnings valuation methods need not necessarily hold good. A modification to the P/E multiplier approach is to determine the relationship between the company's P/ E and the average P/E of the stock index. This is called as the price-earnings relative. Price-earnings relative is given by the following formula:

P/E relative = (share P/E) / (Index P/E)

This formula estimates the shares' P/E movement along with the index P/E. A P/E relative of 1.5 implies that the share is sold in the market 1.5 times that of the index price/earnings.

However, these earnings multipliers become inapplicable when the earnings are negative. Negative earnings cannot be used for valuation of shares. However, when negative earnings occur, appropriate alternative estimates may be used for valuation. The

substitute measures would depend on the cause for negative earnings.

There are a number of reasons for a company to have negative earnings. Some of the reasons for negative earnings can be listed as follows:

- Cyclical nature of industry
- Unforeseeable circumstances
- Poor management
- Persistent negative earnings
- High leverage cost

Earnings Forecast

Earnings can be forecast through the forecasts of the rates resulting in the earnings. The variables that can be considered for forecasting earnings can be the future return on assets, expected financial cost (interest cost), the forecasted leverage position (debt equity ratio), and the future tax obligation of the company. The formula for forecasting the earnings could be stated as follows:

Forecasted earnings (value) = (1-t)x[ROA + (ROA-I)x(D/E)]xE

Where,

ROA = Forecasted return on assets

I = Future interest rate

D = Total expected long term debt

E = Expected equity capital

t = Expected tax rate

Alternatively, a forecast of sales and projected profit margin can be made to compute the forecasted earnings. The sales forecast would depend on the market share of the estimated industry sales forecast. The profit margin forecast will depend on the operational and financial expenses of the company. From this information earnings can be forecast using the following formula:

Forecasted Sales = Industry Sales Target x Company's Expected Share in Industry Sales

Forecasted Earnings = Forecasted Sales x Projected Profit

Margin

The third method of forecasting earnings is to identify the individual variables constituting the earnings determination and forecast each of these variables separately. This will involve the forecast of the fixed and variable components of the operational expenses and the financial expense. This method is most applicable when the fixed and variable components of the cost structure of a company do not vary drastically with that of the average industry cost figures.

Consider a company with a high fixed cost relative to that of the industry average. The company will be able to make a positive return only when the projected sales dramatically exceeds this high cost.

The company's total cost far exceeds the industry total cost. Given a sales level and variable cost level, a company whose fixed costs are above the industry average will be able to reach a profit figure at a comparatively higher level of activity. Similarly, any company that is able to minimise its fixed costs will have a better position in terms of profitability than the industry average. Hence the need to forecast the individual variables that constitute profit rather than the overall return on assets.

9.4.2 Cash Flows Valuation

Cash flows indicate the net of inflows less outflows from operations. Cash flows differ from book profits reported by companies since accounting profits identify expenses that are non-cash items such as depreciation. Cash flows can also be used in the valuation of shares. It is used for valuing public and private companies by investment bankers. Cash flow is normally defined as earnings before depreciation, interest, taxes, and other amortisation expenses (EBDIT). There are also valuation methods that use free cash flows. Free cash flows is the money earned from operations that a business can use without any constraints. Free

cash flows are computed as cash from operations less capital expenditures, which are invested in property, plant and machinery and so on.

EBDIT is relevant since interest income and expense, as well as taxes, are all ignored because cash flow is designed to focus on the operating business and not secondary costs or profits. Taxes especially depend on the legal rules and regulation of a given year and hence can cause dramatic fluctuations in earning power. The company makes tax provisions in the year in which the profits accrue while the real tax payments will be made the following year. This is likely to overstate/ understate the profit of the current year.

Depreciation and amortisation, are called non-cash charges, as the company is not actually spending any money on them. Rather, depreciation is an accounting allocation for tax purposes that allows companies to save on capital expenditures as plant and equipment age by the year or their use deteriorates in value as time goes by. Amortisation is writing off a capital expenses from current year profit. Such amortised expenses are also the setting aside of profit rather than involving real cash outflows. Considering that they are not actual cash expenditures, rather than accounting profits, cash profits will indicate the real strength of the company while evaluating its worth in the market.

Cash flow is most commonly used to value industries that involve tremendous initial project (capital) expenditures and hence have large amortisation burdens. These companies take a longer time to recoup their initial investments and hence tend to report negative earnings for years due to the huge capital expense, even though their cash flow has actually grown in these years.

The most common valuation application of EBDIT is the discounted cash flow method, where the forecast of cash flows over a period fo time are made and these are discounted for their present worth.

The formula for computing the value of the firm will be

$$v = \sum_{i=1}^{n} \frac{C}{(1+d)^t}$$

Where C_i = cash flows forecast for year i

d = expected rate of return

n = number of years for which forecasts have been made.

This can be easily computed using software applications such as the spreadsheet. The following table illustrates the computation of the value of firm based on cash flow expectations.

Year	**Expected cash flows (Rs. In crore)**	**Discounted cash flows (Discount rate 12%) (Formula)**	**Discounted cash flows (Discount Rate 12%)**
1	200	= B2/(1.12)^A2	178.57143
2	254	= B3/(1.12)^A3	202.48724
3	236	= B4/(1.12)^A4	167.98014
4	280	= B5/(1.12)^A5	177.94506
5	310	= B6/(1.12)^A6	175.90233
6	324	= B7/(1.12)^A8	164.14848
7	356	= B8/(1.12)^A8	161.03632
8	368	= B9/(1.12)^A9	148.62903
9	375	= B 10/(1.12)^A10	135.22876
10	420	= B11/(1.12)^A11	135.22876
11	451	= B12/(1.12)^A12	129.65172
12	473	= B13/(1.12)^A13	121.40732
13	492	= B14/(1.12)^A14	112.7537
14	520	= B15/(1.12)^A15	106.4023
15	534	= B16/(1.12)^A16	97.5598
16	567	= B17/(1.12)^A17	92.4899
17	591	= B18/(1.12)^A18	86.0758
18	612	= B19/(1.12)^A19	79.5842
19	634	= B20/(1.12)^A20	73.6116
20	657	= B21/(1.12)^A21	68.1090
Cash flows		= SUM (C2:C21)	2614.8032
No. of shares (in crore)		200	200
Value per share		= (C23/C24)	13.0740

Buying a company with good cash flows can yield a lot of benefits to an investor. Cash can fund product development and strategic acquisitions and can be used to meet operational and financial expenditures.

Cash forecasts are made for a limited time duration. However, the shares are valued for their ability to produce an indefinite stream of cash flows. This is referred to as the terminal value of shares. Terminal value usually refers to the value of the company (or equity) at the end of a high growth period. When an indefinite duration of growth is considered, it is normal to assume that a stable growth will follow the high growth. This stable growth rate is expected to remain constant. With this assumption, the terminal value computation can be given by the following formula:

Terminal value in year

n = Cash flow in year $(n + 1)/(d – g)$

Where,

'd' is the discount rate of the cash flows

'g' is the stable growth rate

This approach also requires the assumption that growth is constant forever, and that the cost of capital (discount rate) will not change over time.

A stable growth rate is one that can be sustained forever. Since no company, in the long term, can grow faster than the economy that it operates in, a stable growth rate cannot be greater than the growth rate of the economy.

This stable growth rate cannot be greater than the discount rate either because of the risk-free rate that is implied in the discount rate. This invariably means that the discount rate has to be fixed after considering the inflation rate, economic growth rate, time value, and so on.

Price to cash flow ratio can also be used as a valuation model. Cash flow multiplier is computed as: market price/cash flow per share. For example, if the current market price is Rs. 60 and cash

flow per share is Rs. 20, the cash flow multiplier would be 3. If the forecasted cash flow per share is Rs. 23, then the market value can be estimated as (23 × 3)= Rs. 69.

Economic value added (EVA) is another modification of cash flow that considers the cost of capital and the incremental return above that cost.

Assuming the after tax return from operations is 18% and the cost of capital is 10%, the incremental return for the company would be 8% (18 – 10). If the face value of the investment in the company is Rs. 100 per share, the economic value added per share will be Rs. 8. If the current market price of the share is Rs. 200, then the EVA multiplier will be (200/8) 25. EVA multiple can then be used to identify the under pricing or over pricing of a share in the market.



CHECK YOUR PROGRESS

Q3: What is Earning.

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Q2: How are earning forecasted.

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9.4.3 ASSET VALUATION

Expectation of earnings, and cash flows alone may not be able to identify the correct value of a company. This is because the intangibles such as brand names give credentials for a business. In view of this, investors have begun to consider the valuation of equity through the company's assets.

Asset valuation is an accounting convention that includes a company's liquid assets such as cash, immovable assets such as

real estate, as well as intangible assets. This is an overall measure of how much liquidation value a company has if all of its assets were sold off. All types of assets, irrespective of whether those assets are office buildings, desks, inventory in the form of products for sale or raw materials and so on are considered for valuation.

Asset valuation gives the exact book value of the company. Book value is the value of a company that can be found on the balance sheet. A company's total asset value is divided by the current number of shares outstanding to calculate the book value per share. This can also be found through the following method- the value of the total assets of a company less the long-term debt obligations divided by the current number of share outstanding.

The formulas for computing the book value of the share are given below:

Book value = Equity worth (capital including reserves belonging to shareholders)/Number of outstanding shares

Book value = (Total assets – Long-term debt)/Number of outstanding shares

Book value is a simple valuation model. If the investor can buy the shares from the market at a value closer to the book value, it is most valuable to the investor since it is like gaining the assets of the company at cost. However, the extent of revaluation reserve that has been created in the books of the company may distract the true value of assets. The revaluation reserve need not necessarily reflect the true book value of the company; on the other hand, it might be depicting the market price of the assets better.

Book value, however, may not correctly depict the company value, since most companies use different accounting methods. Further, the adjustment to the historical figures in terms of economic inflation or deflation of the asset book values are not incorporated in these value estimations. The book values are also subject to adjustments depending on the tax framework within which the company falls and the consequences relating to the company's tax

planning measures. But, with increased corporate governance practices, the book value concept is becoming more relevant to the investor for valuation purposes.

Another useful measure of asset valuation is the price to book ratio. This ratio is arrived at by relating the current market price of the share to the book value per share. The intention is to compare the prevailing market price with the book value per share and identify if the shares are undervalued or overvalued in the market. The computation of price to book ratio is computed as follows:

Price to book value ratio = Market price/Book value per share.

The undervaluation of shares will be established when the price to book ratio is relatively low. A high price to book ratio, on the other hand, implies that the shares are sold at a price not supported by its asset value in the market.

For example, if a company has total assets less long-term liabilities as Rs. 43950 crores and the number of outstanding shares at 2,000 crores, the book value per share will be (43950/2000) = Rs. 21.975. If the market price is quoted at Rs. 84, the Price to Book multiplier will be (84/21.975) 3.82.

Another use of asset valuation is through the return on equity, (ROE). Return on equity is a measure of how much earnings a company generates in four quarters compared to its shareholder's equity. For instance, if a company earned Rs. 2 crores in the preceding year and has a shareholder's equity of Rs. 10 crores, then the ROE is 20 per cent. Investors might use ROE as a filter to select companies that can generate large profits with a relatively small amount as capital investment. The nature of ROE, however, depends on the type of industry the company belongs to. The ROE figures of trading companies are expected to be comparatively higher than that of heavy manufacturing concerns since trading companies need not necessarily require constant capital expenditure.

The book value computation that includes within its fold the valuation of intangible assets such as brands and patents, are viewed

positively by investors. Investors view brands as valuable and they are assumed to increase the expected future profits of the company. Brands also tend to have a strong market potential since customers prefer a brand exclusively for its name and sometimes, brands convey more meaning than the product quality. Specific value is given to brands that have recently established unshakable credentials. Companies also spend a lot of money on building brands in their product portfolios. Some companies build the brand name around their company name; this has a direct impact on the valuation by companies build the brand name around their company name; this has a direct impact on the valuation by investors. Companies such as Colgate, Intel, Nestle, and Bata have built their company names into brands that give them an incredible edge over their competitors in the market. Intangibles can also sometimes mean that a company's shares can trade at a premium to its historical growth rate. Thus, a company with large profit margins, a dominant market share, consistent performance can trade at a slightly higher multiple than its growth rate would otherwise suggest.

A company can sometimes be worth more in reality than when viewed individually in terms of all the assets in its Balance Sheet. Many times, human resource strength is an intangible that is built inside the organisation and neither the company nor the shareholders give a uniform quantification to such strengths. The book valuation process of a company is hence the exercise of a few investment bankers and consultants who get to know the intricate details of the company. Rather than attempting to make a book valuation of the company individually, investors can rely on such sources to assess the undervaluation or overvaluation of shares in the market.

9.4.4 DIVIDEND DISCOUNT MODEL

The dividend discount model (DDM) is a quantitative method used for predicting the price of a company's stock based on the

theory that its present day price is worth the sum of all of its future dividend payments, when discounted back to their present value. It attempts to calculate the fair value of a stock irrespective of the prevailing market conditions, and takes into consideration the dividend payout factors and the market expected returns. If the value obtained from the DDM is higher than the current trading price of shares, then the stock is undervalued and qualifies for a buy, and vice versa.

In other words, it is used to value stocks based on the net present value of the future dividends. The equation most widely used is called the Gordon growth model (GGM), the Gordon Growth Model, which uses next year's estimated dividend (D), the company's cost of equity capital (r), and the estimated future dividend growth rate (g).

$$Price = \frac{D}{r - g}$$

Let us take an example.

Example 9.1:

Let's assume that a certain stock is expected to pay a $2.00 dividend next year, and its dividend has historically grown by 4% per year, so it's fair to assume this same growth rate going forward. And we'll say that my desired rate of return is 10%. Using these input values, we can calculate the stock's value (to me) using the dividend discount model as:

$$Price = \frac{\$2.00}{1.10 - 1.04} = \$33.33$$

Therefore, according to the dividend discount model, I should pay about $33.33 for the stock based on my required rate of return. If the stock were trading for say, $40, an investor using this model may consider the stock to be overvalued, while a price of $25 might make it look like a buying opportunity.

Some examples of regular dividend paying companies are McDonalds, Procter & Gamble, Kimberly Clark, PepsiCo, 3M, CocaCola, Johnson & Johnson, AT&T, Walmart etc. We can use Dividend Discount Model to value these companies.

There are 3 models used in the dividend discount model:

1. zero-growth, which assumes that all dividends paid by a stock remain the same;
2. constant-growth model, which assumes that dividends grow by a specific percent annually;
3. variable-growth model, which typically divides growth into 3 phases: a fast initial phase, then a slower transition phase that ultimately ends with a lower rate that is sustainable over a long period.

Let us discuss this model in the following ways:

1. Zero-growth model : Zero-growth model assumes that the dividend always stays the same i.e. there is no growth in dividends. Therefore, the stock price would be equal to the annual dividends divided by the required rate of return.

Stock's Intrinsic Value = Annual Dividends / Required Rate of Return

This is basically the same formula used to calculate the Present Value of Perpetuity, and can be used to price preferred stock, which pays a dividend that is a specified percentage of its par value. A stock based on the zero-growth model can still change in price if the required rate changes when perceived risk changes, for instance.

Example 9.2

If a preferred share of stock pays dividends of $1.80 per year, and the required rate of return for the stock is 8%, then what is its intrinsic value?

Sol: Here we use the dividend discount model formula for zero growth dividend,

Dividend Discount Model Formula = Intrinsic Value = Annual Dividends / Required Rate of Return

Intrinsic Value = $1.80/0.08 = $22.50.

2. Constant Growth Model

One of the most popular dividend discount models assumes that the dividend per share grows at a constant rate (g). The value of a share, under this assumption, is:

$$P_0 = \frac{D_1}{(1+r)} + \frac{D_1(1+g)}{(1+r)^2} + \ldots \frac{D_1(1+g)^n}{(1+r)^{n+1}} + \ldots$$

Applying the formula for the sum of a geometric progression, the above expression simplifies to:

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

Example 9.3: Ramesh Engineering Limited is expected to grow at the rate of 6 per cent per annum. The dividend expected on Ramesh's equity share a year hence is Rs. 2.00. What price will you put on it if your required rate of return for this share is 14 per cent?

$$P_0 = \frac{2.00}{0.14 - 0.06} \quad = \text{Rs. } 25.00$$

3. Variable-Growth Model

Variable Growth rate Dividend Discount Model or DDM Model is much closer to reality as compared to the other two types of dividend dicount model. This model solves the problems related to unsteady dividends by assuming that the company will experience different growth phases.

Variable growth rates can take different forms, you can even assume that the growth rates are different for each year. However, the most common form is one that assumes 3 different rates of growth:

a. an initial high rate of growth,

b. a transition to slower growth, and

c. lastly, a sustainable, steady rate of growth.

Variable Growth

Model further can be classified as under:

i. *Two stage Dividend Discount Model DDM:* This model is designed to value the equity in a firm, with two stages of growth, an initial period of higher growth and a subsequent period of stable growth. Two-stage Dividend Discount Model is best suited for firms paying residual cash in dividends while having moderate growth. For instance, it is more reasonable to assume that a firm growing at 12% in the high growth period will see its growth rate drops to 6% afterwards.

Assumptions of this model:

a. Higher growth rate is expected the first period.

b. This higher growth rate will drop at the end of the first period to a stable growth rate.

c. The dividend payout ratio is consistent with the expected growth rate.

ii. Three stage Dividend Discount Model DDM: One improvement that we can make to the two-stage DDM Model is to allow the growth rate to change slowly rather than instantaneously.

The three-stage Dividend Discount Model or DDM Model is given by:

First phase: there is a constant dividend growth (g1) or with no dividend

Second phase: there is a gradual dividend decline to the final level

Third phase: there is a constant dividend growth again (g3), i.e. the growth company opportunities are over.

The logic that we applied to two-stage model can be applied to

$$V_0 = \sum_{t=1}^{T} \frac{D_0(1+g_1)^t}{(1+k)^t} + \sum_{t=T+1}^{N} \frac{D_t}{(1+k)^t} + \frac{D_{N+1}}{(k-g_3)(1+k)^N}$$



9.5 LET US SUM UP

In this unit we have discussed the following points:

- Equity shares carry with them ownership rights. They give voting rights to the holders. They have a face value (in monetary terms) at the time of issue and are evaluated at their market value when they are listed on a stock exchange.
- Equity valuation is a complex procedure since there is no consistent definition regarding what constitutes the intrinsic value of a share.
- Different valuation approaches and models with different assumptions and implications are available to investors to assess the true worth of a share. These include earnings approach, cash flow approach and dividend discount approach.
- An investor can choose the appropriate procedure of valuation for shares and make profits from the stock market.
- Asset valuation is an accounting convention that includes a company's liquid assets such as cash, immovable assets such as real estate, as well as intangible assets.



9.6 FURTHER READING

- M. Ranganathan and R. Madhumathi: Investment Analysis and Portfolio Management, Pearson Education, New Delhi.
- Punithavathy Pandian: Security Analysis and Portfolio Management, Vikas Publishing House Pvt. Ltd., New Delhi.
- Bharti V. Phathak: Indian Financial System, Pearson Education, Delhi.
- Donald E. Fischer and Ronald J. Jordon: Security Analysis and Portfolio Management, PHI.
- Prasanna Chandra: Investment Analysis and Portfolio Management, TMH, Delhi.



9.7 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q1: Stock splits simply imply a reduction in the face value of the instrument with an increase in the quantity of stock.

Ans to Q2: Common ways for equity valuations could be classified into the following categories:

1. Earnings valuation
2. Cash flow valuation
3. Asset valuation
4. Dividend-discount model

Ans to Q3: Earnings (net income or net profit) is the money left after a company meets all its expenditure.

Ans to Q4: Earnings can be forecast through the forecasts of the rates resulting in the earnings.



9.8 MODEL QUESTIONS

1. Discuss the assumptions and implications of earnings approach to equity valuation.
2. What are the quantitative models of equity valuation? What are their limitations?
3. Explain zero-growth model, constant-growth model, and variable-growth model dividend discount model.

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UNIT 10 : PORTFOLIO MANAGEMENT

UNIT STRUCTURE

10.1 Learning Objective

10.2 Introduction

10.3 Inputs to Portfolio Management

- 10.3.1 Return and Risk Characteristics of Individual Assets
- 10.3.2 Expected Return and Risk of a Portfolio
- 10.3.3 Diversification of Risk

10.4 Portfolio Analysis and Selection

- 10.4.1 Correlation between Securities and its Impact on Portfolio Risk
- 10.4.2 Portfolio Selection

10.5 Let Us Sum Up

10.6 Further Reading

10.7 Answers to Check Your Progress

10.8 Model Questions

10.1 LEARNING OBJECTIVES

After going through this unit, tyou will be able to:

- explain and illustrate the concepts and measures of return and risk as they apply to individual assets as well as portfolio of assets
- highlight the concept of diversification of risk
- discuss the portfolio selection problem and the process.

10.1 INTRODUCTION

In this unit we are going to discuss about Portfolio Management: Return and Risk Characteristics of Individual Assets,Expected Return and Risk of a Portfolio and Diversification of Risk.

We will also discuss Portfolio Analysis and Selection, Portfolio Risk Selection Problem and election of Optimal Portfolio

In this unit, we will discuss more about how one should go about in

constructing a portfolio that suits specific objectives of the investment. In this unit, we will address some of the basic issues measuring return and risk of the portfolio before addressing the main issue of selecting optimal portfolio.

In this unit, We will begin with the analysis of return -risk characteristics of individual assets, and then proceed to examine how individual assets combine into a portfolio to determine its return and risk attributes.

10.3 INPUTS TO PORTFOLIO MANAGEMENT

The term 'portfolio' generally means a collection or combination and in the context of investment management, it means a collection or combination of financial assets (or securities) such as shares, debentures and government securities. However, in a more wider context the term 'portfolio' may be used synonymously with the expression 'collection of assets', which can even include physical assets (gold, silver, real estate, etc.). What is to be borne in mind is that, in the portfolio context, assets are held for 'investment' purposes and not for 'consumption' purposes.

Portfolio analysis builds on the estimates of future return and risk of holding various combinations of assets. As we know, individual assets have risk return characteristics of their own. Portfolios, on the other hand, may or may not take on the aggregate characteristics of their individual parts. In this section, we will reflect on the assessment of return-risk attributes of individual assets and portfolios.

10.3.1 Return and Risk Characteristics of Individual Assets

Any investment decision requires an estimate of return and risk associated with the investment. However the most difficult task of investment decision is estimation of return and risk. Earlier in the previous units, we spent about discussing how should one estimate the future value of the asset so that return can be measured. If we

are able to estimate a range of expected return, then it is possible to estimate the probabilities associated with the range of expected return to get the risk measure. In practice, however, the return and risk of the securities are estimated based on the historical return and risk of securities. A stock's single period basic return is:

$$\text{Total Return} = \frac{\text{Dividend} + (\text{Market Price}_t - \text{Market Price}_{t-1})}{\text{Market Price}_{t-1}} \text{ x } 100$$

There are different measures of historical return. The most elementary form of return measure is holding period yield or return. Here, the dividend received during the holding period is added along with the capital gain and divided by the purchase price. If the holding period is more or less than one year, normally the holding period return is stated for one-year period. This measure is not much useful if one wants to measure the risk associated with the security. There are two other measures of return by which one can measure risk.

a) Arithmetic Average: The arithmetic average return is equal to sum of returns of period and divided by 'n'. For instance, if the stock has offered a holding period return of 11% in period 1, 12% in period 2 and 16% in period 3, then the arithmetic average return is equal to 13%. Though it is better than holding period return, this measure suffers because of its failure in considering time value of money. Another problem of this measure is differential treatment of positive and negative return. For instance if a stock price increases from Rs. 10 to Rs. 20 in period 1 and declines back to Rs. 10 in period 2, the Arithmetic average return is still positive value of 25% (Period I return is 100% and Period 2 return is -50%; Total return is 50% and hence average return is 25%).

b) Geometric Average(GA): The geometric average return is based on the compound value and is also called time-weighted average return. It addresses the problem of differential treatment of positive and negative return described above. The

geometric average return is computed as follows:

$$GMR = [(1 + R_1) \times (1 + R_2) \times (1 + R_3) \ldots\ldots \times (1 + R_n)]^{1/n} \text{ “1}$$

Example 10.1: Five years back, you have applied and was allotted 100 shares of a company at the rate of Rs. 50 per share (Face Value Rs. 10) . The price at the end of each year along with annual dividend per share received from the stock are as follows:

Year	1	2	3	4	5
Dividend per share (Rs.)	1	1.5	1.5	2	2
Market Price (Rs.)	40	55	70	77	91

Find the Holding Period Return (HPR), Arithmetic Average(AA) and Geometric Average return of the stock (GA).

HPR : [Dividend (Rs. 8) + Capital Appreciation (Rs. 41)] / Investment (Rs. 50)

: 49/50 = 98% for five years or 19.60% per year

AA Return : [R_1 (-18%) + R_2 (41.25%) + R_3 (30%) + R_4 (12.86%) + R_5(20.78%)]/5 17.38%

Note: R_1 is equal to [(41-50)/50], R_2 is equal to [(56.5 - 40)/40], etc.

GA Return : $[(1+R_1)x(1+R_2)x(1+R_3)x(1+R_4)x(1+R_5)]^{1/5} - 1$

: [(.82)x(1.41)x(1.30)x I.13)x(1.21%)]$^{1/5}$-1

: 15.47%

As you may observe, for the same set of data, we get different values of return. HPR is the highest and GAR is the lowest. The Geometric Return is lower than other two returns because of compounding. In Table 8.1, the different measures of return of NSE-50 companies are given based on last ten years data. The list contains only for the companies, which have 10-year listed life.

In addition to the above two types of return, a foreign investor or foreign fund would compute dollar-weighted return to adjust differences in the foreign exchanges between the point of

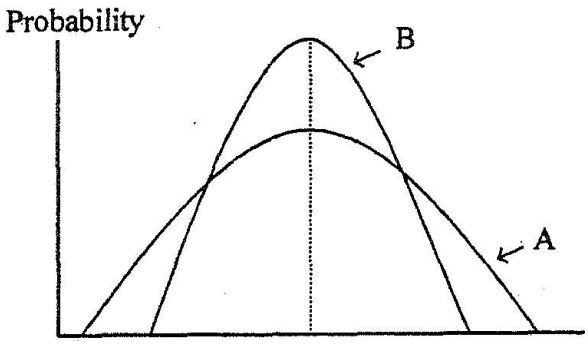
investment and sale. For example, if a foreign fund purchased a stock at Rs. 50 today when the US Dollar - Rupee rate is Rs. 50 per US Dollar and sold the stock at Rs. 55 at the end of one year, the holding period return in Rupee term is 10% [(55-50)/50]. However, if the Rupee depreciates during this period and quotes Rs. 56 per US Dollar, the foreign fund incurs a loss because it can get less than one Dollar with the sale value of the stock. The loss is equal to 1.79% [$1- $(55/56)].

While historical return gives a fair idea about the future return, they are often used to measure the risk. It is true that it is more relevant to use expected risk by measuring the probability associated with various returns, often such measure is not used in practice. Historical data is generally used to measure the risk. The risk associated with an investment in. stocks is measured using variance or standard deviation of the historical return. Table 8.1 also shows the standard deviation of stock return along with different return measures. A question with variance as a measure of risk is: why count 'happy' surprises (those above the average historical return or expected return) at all in a measure of risk? Why not just consider the deviations below the average historical return or expected return (i.e. the downside danger)? Measures to do so have much to recommend them. But if a distribution is symmetric, such as the normal distribution, the result will be the same. Because, left side of a symmetric distribution is a mirror image of the right side. Although distributions of historical or forecasted returns are often not normal, analysts generally assume normality to simplify their analysis.

Company Name	Holding Period Return	Arithmetic Mean Return	Geometric Mean Return	Variance	Standard Deviation
Wipro	2857%	57%	38%	65%	81%
Cipla	646%	42%	19%	58%	76%
Dr. Reddy's Laboratories	517%	40%	24%	44%	66%
Hero Honda Motors	233%	32%	24%	25%	50%
HDFC	202%	31%	22%	26%	51%
Hindustan Lever	126%	26%	24%	7%	27%
Ranbaxy Laboratories	95%	24%	15%	26%	51%
Digital Globalsoft	47%	17%	-4%	55%	74%
I T C	36%	15%	10%	12%	34%
Reliance Industries	36%	15%	8%	16%	40%
Asian Paints (India)	36%	15%	14%	3%	18%
Nestle India	34%	15%	12%	6%	24%
Britannia Industries	28%	13%	3%	19%	43%
Bajaj Auto	26%	13%	4%	22%	47%
Gujarat Ambuja Cements	21%	11%	1%	19%	43%
Castrol India	19%	11%	4%	17%	41%
Hindalco Industries	19%	11%	6%	12%	35%
Procter & Gamble	18%	10%	6%	10%	32%
Glaxosmithkline Pharma	18%	10%	3%	14%	37%
Smithkline Beecham	17%	10%	7%	6%	25%
Indian Hotels Co.	15%	9%	-2%	29%	54%
Mahindra & Mahindra	11%	9%	-2%	22%	47%
Asea Brown Boveri	8%	6%	-4%	20%	44%
B S E S	8%	6%	1%	12%	34%
State Bank of India	7%	5%	0%	13%	36%
Tata Power Co.	6%	5%	1%	9%	29%
Larsen & Toubro	6%	4%	3%	4%	20%
Associated Cement Cos.	4%	3%	-5%	22%	46%
Colgate-Palmolive (India)	2%	2%	-3%	13%	36%
Tata Tea	0%	0%	-18%	31%	56%
I C I C I	0%	0%	-16%	34%	58%
Novartis India	-1%	-1%	-30%	32%	56%
Grasim Industries	-1%	-1%	-10%	19%	44%
Tata Chemicals	-3%	-4%	-12%	21%	46%
Telco	-4%	-5%	-18%	15%	39%
Tata Iron & Steel Co.	-5%	-8%	-10%	4%	21%

Previously, we had discussed how to compute mean and variance (or standard deviation), so we need not reiterate the procedure here. You may, however, look up appendix at the end of this unit to quickly revise the concepts of portfolio return and risk. We may now refer to Figure 8.1 that depicts the distribution of returns that might be expected for two investments, A and B.

Figure 10.1 : Possible Outcomes of two Independent Investments



The mean or expected return, at the vertical dotted line, is the same for both investments. But, investment B is more risky. With investment A, the distribution of returns (or possible outcomes) is more closely grouped about the mean value. In other words, the variance is smaller than that of investment B. Consequently, it can be said with greater degree of accuracy that our forecast will be close to the actual return from investment A.

When we move from evaluating a single asset in isolation to evaluating a portfolio, our return -risk analysis changes. Return is still the expected return, but for a portfolio the return will be the average return from all the assets held in the portfolio. Risk is still the variance (or standard deviation) of the expected returns from the portfolio. The investor is still concerned with upside potential and downside danger. However, the risk of a combination of assets is very different from a simple average of the risk of individual assets. Most dramatically, the variance of a portfolio of two assets may be less than the variance of either of the assets themselves. We will

examine all these aspects in the discussion that follows.

10.2.2 Expected Return and Risk of a Portfolio

Expected Return of a Portfolio

As a first step in portfolio analysis, an investor needs to specify the list of securities eligible for selection or inclusion in the portfolio. Next he has to generate the risk-return expectations for these securities. These are typically expressed as the expected rate of return (mean) and the variance or standard deviation of the return.

The expected return of a portfolio of assets is simply the weighted average of the return of the individual securities held in the portfolio. The weight applied to each return is the fraction of the portfolio invested in that security.

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

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

(0.40 x 15) + (0.60 x 20) = 18 per cent

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

$$R_{(p)} = \sum_{i=1}^{N} X_i R_i$$

Where

R_p = Expected return of the portfolio

X_i = Proportion of funds invested in security i.

R_i = Expected return of security i.

N = Number of securities in the portfolio

Risk of a Portfolio

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

variance of a portfolio is a little more difficult than determining its expected return.

The variance or standard deviation of an individual security measures the riskiness of a security in absolute sense. For calculating the risk of a portfolio of securities, the riskiness of each security within the context of the overall portfolio has to be considered.

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

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

The covariance between two securities X and Y may be calculated using the following formula:

$$Cov_{xy} = \sum_{i=1}^{n} \frac{(R_x - \overline{R}_x)(R_y - \overline{R}_y)}{N}$$

Where:

Cov_{xy} = Covariance between x and y.
R_x =Return of security x.
R_y =Return of security y
$\overline{R}_x$ = Expected or mean return of security x.
$\overline{R}_y$ = Expected or mean return of security y.
N = Number of observations.

The calculation of covariance is illustrated below with an example:

Example 10.2

Calculation of Covariance

Year	Rx	Deviation $R_x - \overline{R}_x$	R...3 y	Deviation $R_y - \overline{R}_y$	Product of deviations $(R_x - \overline{R}_x)(R_y - \overline{R}_y)$
1	10	-4	17	5	-20
2	12	-2	13	1	-2
3	16	2	10	-2	-4
4	18	4	8	-4	-16

$$Cov_{xy} = \sum_{i=1}^{n} \frac{(R_x - \overline{R}_x)(R_y - \overline{R}_y)}{N}$$

=-42 / 4= -10.5

The covariance is a measure of how returns of two securities move together. If the returns of the two securities move in the same direction consistently the covariance would be positive. If the returns of the two securities move in opposite direction consistently the covariance would be negative. If the movements of returns are independent of each other, covariance would be close to zero.

Covariance is an absolute measure of interactive risk between two securities. To facilitate comparison, covariance can be standardized. Dividing the covariance between two securities by product of the standard deviation of each security gives such a standardised measure. This measure is called the coefficient of correlation. This may be expressed as:

$$r_{xy} = \frac{Cov_{xy}}{\sigma_x \sigma_y}$$

Where,

r_{xy} = Coefficient of correlation between x and y

Cov_{xy} =Covariance between x and y

σ_x =Standard deviation of x.

σ_y =Standard deviation of y

It may be noted from the above formula that covariance may be expressed as the product of correlation between the securities and the standard deviation of each of the securities. Thus,

$$Cov_{xy} = r_{xy} ó_x ó_y$$

The correlation coefficients may range from - 1 to 1. A value of -1 indicates perfect negative correlation between security returns, while a value of +1 indicates a perfect positive correlation. A value close to zero would indicate that the returns are independent.

The variance (or risk) of a portfolio is not simply a weighted average of the variances of the individual securities in the portfolio. The relationship between each security in the portfolio with every other security as measured by the covariance of return has also to be considered. The variance of a portfolio with only two securities in it may be calculated with the following formula.

$$ó^2_p = x_1^2 ó_1^2 + x_2^2 ó_2^2 + 2x_1x_2(r_{12} ó_1 ó_2)$$

Where

$ó^2_p$ = Portfolio variance.
x_1 = Proportion of funds invested in the first security.
x_2 = Proportion of funds invested in the second security.
$ó_1^2$ = Variance of first security.
$ó_2^2$ = Variance of second security.
$ó_1$ = Standard deviation of first security.
$ó_2$ = Standard deviation of second security.
r_{12} = Correlation coefficient between the returns of first and second security.Portfolio standard deviation can be obtained by taking the square root of portfolio variance.

Let us take an example to understand the calculation of portfolio variance and portfolio standard deviation.

Example 10.2 Two securities P and Q generate the following sets of expected returns, standard deviations and correlation coefficient:

	P	Q
r = 15 percent		20 percent
σ = 50 percent		30 percent
r_{pq} = -0.60		

The first set of factors is parametric to the investor in the sense that he has no control over the returns, risks and covariances of individual securities. The second sets of factors are choice variables in the sense that the investor can choose the proportions of each security in the portfolio.

A portfolio is constructed with 40 per cent of funds invested in P and the remaining 60 per cent of funds in Q.

The expected return of the portfolio is given by:

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

=(0.40x15)+(0.60x20)=18 Percent

The variance of the portfolio is given by:

$$ó^2_p = x_1^2 ó_1^2 + x_2^2 ó_2^2 + 2x_1x_2(r_{12} ó_1 ó_2)$$

$$= (0.40)2\ (50)2 + (0.60)2\ (30)2 + 2(0.40)(0.60)(-0.60)(50)(30)$$

$$= 400 + 324 - 432 = 292$$

The standard deviation of the portfolio is:

$$s_p = \sqrt{292} = 17.09 \text{ per cent.}$$

The return and risk of a portfolio depends on two sets of factors (a) the returns and risks of individual securities and the covariance between securities in the portfolio, (b) the proportion of investment in each security.

The first set of factors is parametric to the investor in the sense that he has no control over the returns, risks and covariances of individual securities. The second sets of factors are choice variables in the sense that the investor can choose the proportions of each security in the portfolio.

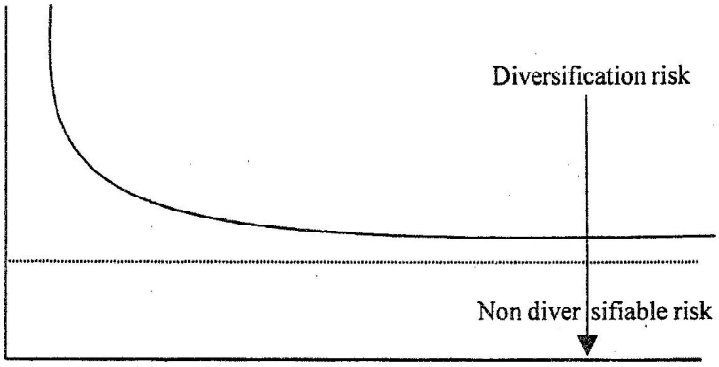
10.2.3 Diversification of Risk

Efforts to spread and minimize portfolio risk take the form of diversification. Most investors prefer to hold several assets rather than putting all their eggs into one basket, with the hope that if one goes bad, the others will provide some protection from extreme loss. Surely enough, there is merit in this approach; although some investors hold a contrary view point that recommends putting all eggs into one basket and then keeping a sharp eye on the basket.

It is not difficult to understand that adding more assets in the portfolio can reduce the overall portfolio risk. Consider the table drawn earlier to compute the portfolio risk and look into the diagonal cells. The diagonal cells contain the variance of securities in the portfolio. In that example, we assumed that an equal investment is made in three stocks. The sum of the diagonal cells is equal to sum of the variance of three securities multiplied by $(1/3)^2$. Suppose, we add one more stock in the portfolio and revise our weights to 0.25 for each stock. The values of diagonal cells is now equal to sum of the variance of four securities multiplied by $(1/4)^2$. We know $(1/4)^2 < (1/3)^2$. Suppose, if the number of securities in the portfolio is increased to 20, then the value of the diagonal cells is equal to sum of the variance of individual securities multiplied by $(1/20)^2$. The value of $(1/20)^2$ is equal to .0025 and close to zero. Since the multiplier is now close to zero, the sum of the diagonal cells will reach close to zero. Thus, when a security is added to the portfolio, the value of diagonal cells is close to zero and thus reduced the variance of the portfolio. However, there is a limitation in adding securities to reduce the risk because the diagonal cells value can not be reduced below

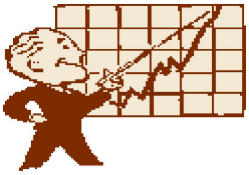
zero (i.e. negative) to reduce the portfolio risk further. Thus, beyond a level, diversification fails to yield further benefit by way of reducing the risk. This is being illustrated in Figure 10.2.

Figure 10.2 : Diversification of Risk



It may be noted that beyond certain portfolio size, the reduction in risk is marginal and insignificant.

We will discuss more about diversifiable and non-diversifiable risk in Unit 12.A word of caution may, however, be urged here. The above discussion would appear to suggest that the overall portfolio risk can be reduced by only increasing number of assets in the portfolio. This is not true. Several empirical studies have indicated that a portfolio comprising a few assets selected carefully for their risk-diversifying characteristics (i.e. nature. and degree of variance and covariance), would be less risky than a portfolio of considerably greater size with assets being selected without regard to risk. Thus, -what matters in diversification is not the number of assets *per se,* but right kinds.



CHECK YOUR PROGRESS

Q1: Define Portfolio.

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Q2: What is Arithmetic Average

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10. 4 PORTFOLIO ANALYSIS AND SELECTION

In the previous section, we have discussed how portfolio risk is measured. Let us summarise important points before discussing how an investor can use the concept in selection of the portfolio. Risk associated with investments can be reduced through diversification and such diversification helps the investors to reduce the risk of the portfolio. Investments in individual securities, risk (variance) associated with individual securities and the relationships (covariance) between the securities are the three variables that affect the risk of the portfolio. While diversification reduces the unsystematic risk of the portfolio, the number of securities required to minimize the portfolio risk is not very large. Finally more than the number of securities, what matters in reducing the risk of the portfolio is the kind of securities included in the portfolio. The last observation is stressed in this section.

10.4.1 Correlation between Securities and its Impact on Portfolio Risk

We have discussed that risk is reduced when the portfolio includes one stock in the portfolio. The above observation is not universal in a sense that if the new stock is perfectly correlated with other securities in the portfolio: In other words, the job of investment analysts or any other persons responsible in constructing the portfolio is to identify stocks or securities that are less related with each other for portfolio construction. The risk of the portfolio can be reduced to zero if the correlation between the assets included in the portfolio is

equal to minus 1. However, such securities are *difficult* to identify in the market. If two securities are perfectly correlated, then there is no diversification benefit and such combination will not reduce the risk of the portfolio. There are only very few securities in the market whose correlation is equal to minus one. What is more prevalent in the market is securities whose return are correlated between minus 1 to plus 1. Depending on the level of correlation, diversification reduces the risk of the portfolios. The relationship between the assets and its impact on portfolio risk is explained below in Figure 8.3 with the help of two securities.

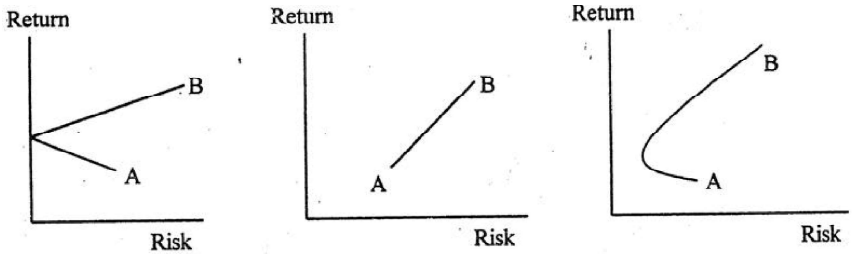


Figure 8.3: Correlation and Portfolio Risk

(a) Correlation = - 1 (b) Correlation = +1 (c) Correlation = 0.72

Figure 10.3 (c) is more relevant for our discussion since the correlation between the securities is often less than 1 and greater than zero. In such a situation, when an investor combine such securities, the risk of the security is initially reduced. We will show you with a real life example in the following Table:

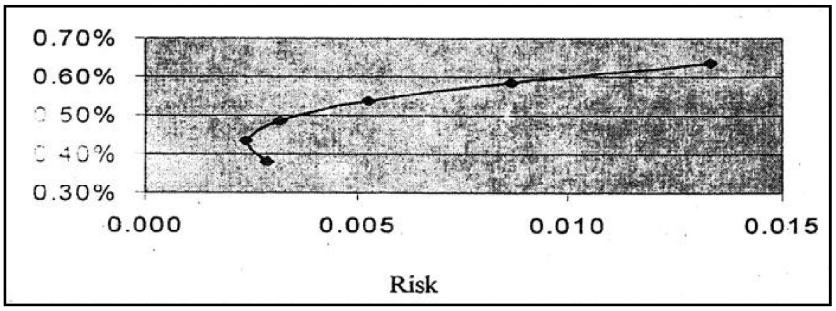
Sl.No.	Proportion of Investment in		Portfolio Return	Portfolio Risk (Variance)
	Hindustan Lever	Infosys		
1	100%	0%	0.38%	0.00289
2	80%	20%	0.43%	0.00240
3	60%	40%	0.48%	0.00320
4	40%	60%	0.54%	0.00529
5	20%	80%	0.59%	0.00867
6	0%	100%	0.64%	0.01334

Note: Correlation between Hindustan Lever Ltd. and Infosys is .0087

The risk and return of the portfolio is plotted below to show how the

graph looks similar to one shown in Figure 8.3 (C)

Figure10 .4: Risk and Return of Portfolios of HLL and Infosys



If there are 10 securities in *the* market, it is possible to draw the diagrams of the above for a number of combination of two-securities.

10.4.2 Portfolio Selection

The objective of every rational investor is to maximise his returns and minimise the risk. Diversification is the method adopted for reducing risk. It essentially results in the construction of portfolios. The proper goal of portfolio construction would be to generate a portfolio that provides the highest return and the lowest risk. Such a portfolio would be known as the optimal portfolio. The process of finding the optimal portfolio is described as portfolio selection. We will discuss this about more in the next unit.



10.5 LET US SUM UP

In this unit we have discussed the following points:

- Portfolio analysis builds on the estimates of future return and risk of holding various combinations of assets.
- The variance or standard deviation of an individual security measures the riskiness of a security in absolute sense.
- The expected return of a portfolio of assets is simply the weighted average of the return of the individual securities held in the portfolio.
- While diversification reduces the unsystematic risk of the portfolio, the

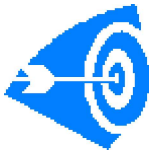
number of securities required to minimize the portfolio risk is not very large.



10.6 FURTHER READING

1) Elton, Edwin J. and Gruber, Matin J., 1987 *Modern Portfolio Theory and Investment Analysis, John Wiley 84 Sons.*

2) Alexander, Gordon J., Sharpe, William F., and Jeffery V. Baibey *Fundamentals of Investments,* (3rd ed.) Prentice-Hall, Inc.



10.7 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q1: The term 'portfolio' generally means a collection or combination and in the context of investment management, it means a collection or combination of financial assets (or securities) such as shares, debentures and government securities.

Ans to Q2: The arithmetic average return is equal to sum of returns of period and divided by 'n'.



10.8 MODEL QUESTIONS

1) The following forecasts have been made for investments A and B.

Investments A		Investments B	
Return (%)	Probability	Return (%)	Probability
10	.05	2	.05
15	.20	12	.25
20	.50	20	.40
25	.20	28	.25
30	.05	38	.05

Calculate the expected rate of return and standard deviation. Which investment has more upside potential and downside danger?

2) If a portfolio's expected return is always equal to the weighted average of the expected return of the component assets, why is not portfolio risk always equal to the weighted average of the component assets' variances? Explain.

3) Suppose an analysts has provided you with the following estimates in respect of equity shares of Century Textiles, Escorts and Hoechst:

	Century	Escorts	Hoechst
Expected monthly Return (%)	5	4	9
Standard Deviation (%)	8	7	17
Correlation coefficients of Returns Between			
Century and Escorts	0.4		
Century and Hoechst	0.6		
Escorts and Hoechst	0.3		

Assuming that equal amounts of the available funds will be invested in the three scrips, estimate the portfolio's mean return and standard deviation.

4) Consider two securities with the following characteristics:

	A	B
Expected Return	12	02
Standard Deviation	08	10

Assuming no correlation between the returns on two securities, calculated expected return and standard deviation for each of the following portfolios:

	Portfolio Weights (X_A)				
Security A	1.0	.75	.50	25	0.0

Plot these portfolios with expected portfolio returns *on x-axis* and standard deviation on y-axis. Locate the efficient frontier' and the portfolio with least risk or standard deviation.

Can you precisely determine X_A corresponding to the portfolio with minimum standard deviation? (Hint: Obtain the equation for σ_p with zero correlation between returns on two securities. To find X_A for which σ_p is minimum, set the first order derivative of σ_p with respect to X_A equal to zero, and then solve for X_A).

UNIT 11 : PORTFOLIO CONSTRUCTION

UNIT STRUCTURE

11.1 Learning Objectives

11.2 Introduction

11.3 Benefits of Portfolios

11.4 Approaches in Portfolio Construction

- 11.4.1 Traditional approach
- 11.4.2 Modern Approach

11.5 Portfolio Risk Return

11.6 Let us Sum Up

11.7 Further Reading

11.8 Answers to Check Your Progress

11.9 Model Questions

11.1 LEARNING OBJECTIVES

After going through this unit, you will be able to will be able to :

- describe the meaning of portfolio construction
- discuss the approaches of portfolio construction
- discuss the reasons and process of portfolio construction of financial instruments.

11.2 INTRODUCTION

Portfolio is a combination of securities such as stocks, bonds and money market instruments. The process of blending together the broad asset classes so as to obtain optimum return with minimum risk is called portfolio construction. Individual securities have risk-return characteristics of their own. Portfolios may or may not take on the aggregate characteristics of their individual parts. Diversification of investment helps to spread risk over many assets. A diversification of securities gives the assurance of obtaining the anticipated return on the portfolio. In a diversified portfolio, some securities may not perform as expected, but others may exceed the

expectation and making the actual return of the portfolio reasonably close to the anticipated one. Keeping a portfolio of single security may lead to a greater likelihood of the actual return somewhat different from that of the expected return. Hence, it is a common practice to diversify securities in the portfolio.

In this unit we will also discuss about approaches in Portfolio Construction like the Traditional approach and Modern Approach.At the end of this unit we shall discuss Portfolio Risk Return and Managing the Portfolio

11.3 BENEFITS OF PORTFOLIOS

Portfolio construction is the process of blending together the broadasset classes to obtain optimum return with minimum risk.

We know that expected return from individual securities carry some degree of risk. Risk was defined as the standard deviation around the expected return. In effect we equated a security's risk with the variability of its return. More dispersion or variability about a security's expected return meant the security was riskier than one with less dispersion.

The simple fact that securities carrying differing degrees of expected risk lead most investors to the notion of holding more than one security at a time, is an attempt to spread risks by not putting all their eggs into one basket. Diversification of one's holdings is intended to reduce risk in an economy in which every asset's returns are subject to some degree of uncertainty. Even the value of cash suffers from the inroads of inflation. Most investors hope that if they hold several assets, even if one goes bad, the others will provide some protection from an extreme loss.

11.4 APPROACHES IN PORTFOLIO CONSTRUCTION

Commonly, there are two approaches in the construction of the portfolio of securities viz. traditional approach and Markowitz efficient frontier approach. In the traditional approach, investor's needs in terms of income and capital appreciation are evaluated and appropriate securities are selected to meet the needs of the investor. The common practice in the traditional

approach is to evaluate the entire financial plan of the individual. In the modern approach, portfolios are constructed to maximise the expected return for a given level of risk. It views portfolio construction in terms of the expected return and the risk associated with obtaining the expected return.

11.4.1 Traditional approach

Traditional approach of portfolio construction is based on thefinancial needs of the individual investors.The traditional approach basically deals with two major decisions.

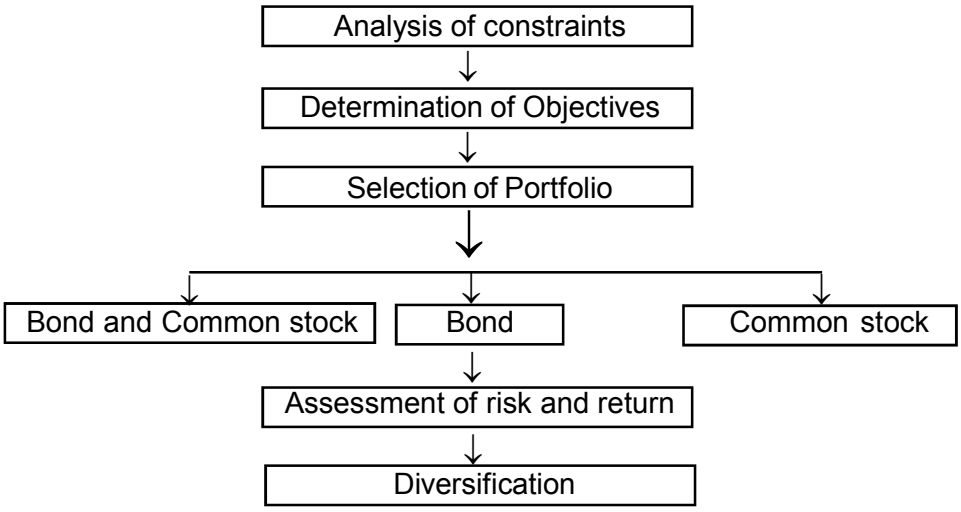
They are:

(a) Determining the objectives of the portfolio.

(b) Selection of securities to be included in the portfolio.

Normally, this is carried out in four to six steps. Before formulating the objectives, the constraints of the investor should be analysed. Within the given framework of constraints, objectives are formulated. Then based on the objectives, securities are selected. After that, the risk and return of the securities should be studied. The investor has to assess the major risk categories that he or she is trying to minimise. Compromise on risk and non-risk factors has to be carried out. Finally relative portfolio weights are assigned to securities like bonds, stocks and debentures and then diversification is carried out. The flow chart Fig 11.1 explains this.

Fig. 11.1 Steps in traditional approach



1. Analysis of constraints : The constraints normally discussed are: Income needs, liquidity, time horizon, safety, tax considerations and the temperament.

Income needs- The income needs depend on the need for incomein constant rupees and current rupees. The need for income in current rupees arises from the investor's need to meet all or part of the living expenses. At the same time inflation may erode the purchasing power, the investor may like to offset the effect of the inflation and so, needs income in constant rupees.

(a) Need for current income: The investor should establish theincome which the portfolio should generate. The current income need depends upon the entire current financial plan of the investor. The expenditure required to maintain a certain level of standard of living and all the other income generating sources should be determined. Once this information is arrived at, it is possible to decide how much income must be provided for the portfolio of securities.

(b) Need for constant income: Inflation reduces the purchasingpower of the money. Hence, the investor estimates the impact of inflation on his estimated stream of income and tries to build a portfolio which could offset the effect of inflation. Funds should be invested in such securities where income from them might increase at a rate that would offset the effect of inflation. The inflation or purchasing power risk must be recognised but this does not pose a serious constraint on portfolio if growth stocks are selected.

Liquidity- Liquidity need of the investment is highly individualisticof the investor. If the investor prefers to have high liquidity, then funds should be invested in high quality short term debt maturity issues such as money market funds, commercial papers and shares that are widely traded. Keeping the funds in shares that are poorly traded or stocks in closely held business and real estate lack liquidity. The investor should plan his cash drain and the need for net cash inflows

during the investment period.

Safety of the principal- Another serious constraint to be consideredby the investor is the safety of the principal value at the time of liquidation, investing in bonds and debentures is safer than investing in the stocks. Even among the stocks, the money should be invested in regularly traded companies of longstanding. Investing money in the unregistered finance companies may not provide adequate safety.

Time horizon- Time horizon is the investment-planning period ofthe individuals. This varies from individual to individual. Individual's risk and return preferences are often described in terms of his 'life cycle'. The states of the life cycle determine the nature of investment. The first stage is the early career situation. At the career starting point assets are lesser than their liabilities. More goods are purchased on credit. His house might have been built with the help of housing loan scheme. His major asset may be the house he owns. His priority towards investments may be in the form of savings for liquidity purposes. He takes life insurance for protecting him from unforeseen events like death and accidents and then he thinks of the investments. The investor is young at this stage and has long horizon of life expectancy with possibilities of growth in income, he can invest in high-risk and growth oriented investments.

The other stage of the time horizon is the mid-career individual. At this stage, his assets are larger than his liabilities. Potential pension benefits are available to him. By this time he establishes his investment program. The time horizon before him is not as long as the earlier stage and he wants to protect his capital investment. He may wish to reduce the overall risk exposure of the portfolio but, he may continue to invest in high risk and high return securities.

The final stage is the late career or the retirement stage. Here, the time horizon of the investment is very much limited. He needs stable income and once he retires, the size of income he needs from investment also increases. In this stage, most of his

loans are repaid by him and his assets far exceed the liabilities. His pension and life insurance programmes are completed by him. He shifts his investment to low return and low risk category investments, because safety of the principal is given priority. Mostly he likes to have lower risk with high interest or dividend paying component to be included in his portfolio. Thus, the time horizon puts restrictions on the investment decisions.

Tax consideration- Investors in the income tax paying group considerthe tax concessions they could get from their investments. For all practical purpose, they would like to reduce the taxes. For income tax purpose, interests and dividends are taxed under the head “income from other sources”. The capital appreciation is taxed under the head “capital gains” only when the investor sells the securities and realises the gain. The tax is then at a concessioanl rate depending on the period for which the asset has been held before being sold. From the tax point of view, the form in which the income is received i.e. interest, dividend, short term capital gains and long term capital gains are important. If the investor cannot avoid taxes, he can delay the taxes. Investing in government bonds and NSC can avoid taxation. This constraint makes the investor to include the items which will reduce the tax.

Temperament- The temperament of the investor himself poses aconstraint on framing his investment objectives. Some investors are risk lovers or takers who would like to take up higher risk even for low return. While some investors are risk averse, who may not be willing to undertake higher level of risk even for higher level of return. The risk neutral investors match the return and the risk. For example, if a stock is highly volatile in nature then the stock may be selling in a range of Rs. 100-200, and returns may fluctuate between Rs. 00-100 in a year. Investors who are risk averse would find it disturbing and do not have the temperament to invest in this stock. Hence, the temperament of the investor plays an important role in setting the objectives.

2. **Determination of objectives :** Portfolios have the common objective of financing present and future expenditures from a large pool of assets. The return that the investor requires and the degree of risk he is willing to take depend upon the constraints. The objectives of portfolio range from income to capital appreciation. The common objectives are stated below:
   - Current income
   - Growth in income
   - Capital appreciation
   - Preservation of capital

The investor in general would like to achieve all the four objectives, nobody would like to lose his investment. But, it is not possible to achieve all the four objectives simultaneously. If the investor aims at capital appreciation, he should include risky securities where there is an equal likelihood of losing the capital. Thus, there is a conflict among the objectives.

3. **Selection of Portfolio :** The selection of portfolio depends on the various objectives of the investor. The selection of portfolio under different objectives are dealt subsequently.

Objectives and asset mix- If the main objective is getting adequateamount of current income, sixty per cent of the investment is made on debts and 40 per cent on equities. The proportions of investments on debt and equity differ according to the individual's preferences. Money is invested in short term debt and fixed income securities. Here the growth of income becomes the secondary objective and stability of principal amount may become the third. Even within the debt portfolio, the funds invested in short term bonds depends on the need for stability of principal amount in comparison with the stability of income. If the appreciation of capital is given third priority, instead of short term debt the investor opts for long term debt. The period may not be a constraint.

Growth of income and asset mix- Here the investor requires a certainpercentage of growth in the income received from his

investment. The investor's portfolio may consist of 60 to 100 per cent equities and 0 to 40 per cent debt instrument. The debt portion of the portfolio may consist of concession regarding tax exemption. Appreciation of principal amount is given third priority. For example computer software, hardware and non-conventional energy producing company shares provide good possibility of growth in dividend.

Capital appreciation and asset mix- Capital appreciation means thatthe value of the original investment increases over the years. Investment in real estates like land and house may provide a faster rate of capital appreciation but they lack liquidity. In the capital market, the values of the shares are much higher than their original issue prices. For example Satyam Computers, share value was Rs. 306 in April 1998 but in October 1999 the value was Rs. 1658. Likewise, several examples can be cited. The market capitalisation also has increased. Next to real assets, the stock markets provide best opportunity for capital appreciation. If the investor's objective is capital appreciation, 90 to 100 per cent of his portfolio may consist of equities and 0-10% of debts. The growth of income becomes the secondary objective.

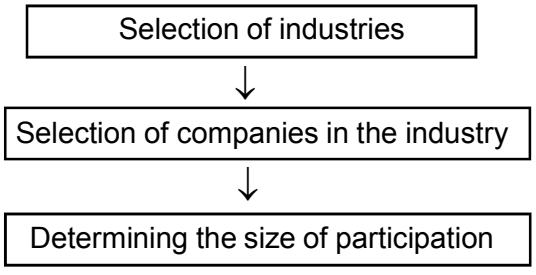
Safety of principal and asset mix- Usually, the risk averse investorsare very particular about the stability of principal. According to the life cycle theory, people in the third stage of life also give more importance to the safety of the principal. All the investors have this objective in their mind. No one like to lose his money invested in different assets. But, the degree may differ. The investor's portfolio may consist more of debt instruments and within the debt portfolio more would be on short term debts.

4. **Risk and return analysis:** The traditional approach to portfoliobuilding has some basic assumptions. First, the individual prefers larger to smaller returns from securities. To achieve this goal, the investor has to take more risk. The ability to achieve higher returns is dependent upon his ability to judge

risk and his ability to take specific risks. The risks are namely interest rate risk, purchasing power risk, financial risk and market risk. The investor analyses the varying degrees of risk and constructs his portfolio. At first, he establishes the minimum income that he must have to avoid hardships under most adverse economic condition and then he decides risk of loss of income that can be tolerated. The investor makes a series of compromises on risk and non-risk factors like taxation and marketability after he has assessed the major risk categories, which he is trying to minimise. The methods of calculating risk and return of a portfolio is classified in following pages of this chapter.

5. **Diversification:** Once the asset mix is determined and therisk and return are analysed, the final step is the diversification of portfolio. Financial risk can be minimised by commitments to top-quality bonds, but these securities offer poor resistance to inflation. Stocks provide better inflation protection than bonds but are more vulnerable to financial risks. Good quality convertibles may balance the financial risk and purchasing power risk. According to the investor's need for income and risk tolerance level portfolio is diversified. In the bond portfolio, the investor has to strike a balance between the short term and long term bonds. Short term fixed income securities offer more risk to income and long term fixed income securities offer more risk to principal. In the stock portfolio, he has to adopt the following steps which are shown in the following figure.

Fig. 11.2 Steps in Stock Portfolio



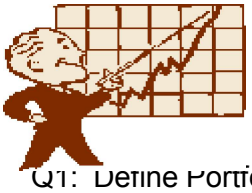
As investor, we have to select the industries appropriate to our investment objectives. Each industry corresponds to specific goals of the investors. The sales of some industries like two wheelers and steel tend to move in tandem with the business cycle, the housing industry sales move counter cyclically.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

11.4.2 Modern Approach

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

Among the list of stocks quoted at the Bombay Stock Exchange or at any other regional stock exchange, the investor selects roughly some group of shares say of 10 or 15 stocks. For these stocks' expected return and risk would be calculated. The investor is assumed to have the objective of maximising the expected return and minimising the risk. Further, it is assumed that investors would take up risk in a situation when adequately rewarded for it. This implies that individuals would prefer the portfolio of highest expected return for a given level of risk.

In the modern approach, the final step is asset allocation process that is to choose the portfolio that meets the requirement of the investor. The risk taker i.e. who are willing to accept a higher probability of risk for getting the expected return would choose high risk portfolio. Investor with lower tolerance for risk would choose low level risk portfolio. The risk neutral investor would choose the medium level risk portfolio.



CHECK YOUR PROGRESS

Q1: Define Portfolio Construction.

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Q2: What is Traditional approach of portfolio construction

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Q3: Write the two major decisions. of traditional approach of of portfolio construction.

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11.5PORTFOLIO RISK/RETURN

As mentioned earlier, an investment decision involves selection of a combination or group of securities for investment. This group of securities is referred to as a portfolio. The portfolio can be a combination of securities irrespective of their nature, maturity, profitability, or risk characteristics. Investors, rather than looking at individual securities, focus more on the performance of all securities together. While portfolio returns are the weighted returns of all securities constituting the portfolio, the portfolio risk is not the simple weighted average risk of all securities in the portfolio. Portfolio risk considers the standard deviation together with the covariance between securities. Co-variance measures the movement of assets together.

The portfolio risk and return using historical data is computed using the following formula:

Portfolio return $= E(r) = \sum_{i=1}^{n} w_i r_i$

Portfolio risk $= \sqrt{\sum_{i=1}^{n} w_i^2 \sigma_i^2 + \sum_{i=1}^{n} \sum_{j=1}^{n} w_i w_j \sigma_{ij}}$

Where

ω = weights (percentage value)

r = return on the securities

Portfolio risk is thus the summation of the individual security variance and the co-movement with other securities in the portfolio. The above formula can be split into a spreadsheet showing all the co-movement measures of the securities.

The total variance is the summation of all cells in the following table. The diagonal summation represents the first part. This is the variance of each security individually. The weights of the securities in the portfolio are represented by the variables ω_i. Weights are the market values of the securities held by the investor. When all securities in the portfolio are given equal weights, the ω_i will be simply (1/n). In a two security portfolio with equal weights the value of ω_i is (1/2) 0.5. When there are three securities in a portfolio, the market values being equal for all the three securities, the

weights for each security will be (1/3) 0.33. Similar weights result in the multiplication of ω_i twice.

The second part of the variance computation equation is the summation of all other cells except the diagonal cells. These are the co-variance of one security with another security in the portfolio. The total covariance is computed by considering the weight of each security in the portfolio. When the weight of each security is different the weight of a combination in a portfolio will be ($\omega_i \times \omega_j$); where i and j represent the two securities.

The square root of the variance gives the standard deviation of the portfolio, i.e., the risk of the portfolio. The following table gives the computation of the standard deviation elaborately. The group of individual securities 1,2,3, … n are related with each other to arrive at the co-variance matrix.

$$\sigma_p^2 = \boxed{\sum_{i=1}^{n} w_i^2 \sigma_i} + \sum_{i=1}^{n}\sum_{j=1}^{n} w_i w_j \sigma_{ij}$$

$$\sigma_p = \sqrt{\sum_{i=1}^{n} w_i^2 \sigma_i + \sum_{i=1}^{n}\sum_{j=1}^{n} w_i w_j \sigma_{ij}}$$

The computation of co-variance i.e., σ_{ij} when i is not equal to j is as follows:

$$\sigma_{ij} = \frac{1}{n}\sum_{t=1}^{n}(r_{it} -)\times(r_{jt} - \bar{r}_j)$$

Co-variance can also be measured in terms of the correlation coefficient. The correlation coefficient is a measure of the relationship between two assets. The correlation coefficient ranges between the value +1 and –1. A correlation coefficient of +1 indicates that two securities returns move perfectly in tandem with each other. A negative correlation coefficient of -1 implies that when one securities' returns increase, the other securities' return reduces by the same quantum.

The computation of the co-variance σ_{ij} through the correlation coefficient is by the application of the following formula:

$$\sigma_{ij=} \sigma_{i\times} \sigma_{j\times} \rho_{ij}$$

ρ_{ij} is the correlation coefficient

The correlation coefficient between two securities can be stated in any of the following formats.

$$\frac{\frac{1}{n}\sum_{t=1}^{N}(r_{it}-\bar{r}_j)\times(r_{jt}-\bar{r}_j)}{\sqrt{\rho ij = \frac{\sum_{t=1}^{n}(r_{it}-\bar{r}_j)^2}{n}}\sqrt{\frac{\sum_{t=1}^{N}(r_{it}-\bar{r}_j)_2}{N}}}$$

$$\rho_{ij}=\frac{\sigma_{ij}}{\sigma_i\times\sigma_j}$$

Illustration - 11.1 Two securities P and Q are considered forinvestment. Compute the risk and return of the portfolio assuming the two securities, whose correlation coefficient of returns is –0.84, are combined in the following proportions in the portfolio: (a) 0: 100,
(b) 10: 90, (c) 20: 80, (d) 50: 50, (e) 80: 20, (f) 90: 10, (g) 100: 0. The historical risk-return of the two securities is as follows:

Table 11.1 - Risk-Return

Security	Risk % (Std. Dev.)	Return %
P	20	15
Q	30	20

Solution. Computation of portfolio return:

(a) 0 : 100 = 20%

(b) 10 : 90 – (0.1*15) + (0.9*20) = 19.5%

(c) 20 : 80 – (0.2*15) + 0.8*20) = 19%

(d) 50 : 50 – (0.5*15) + (0.5*20) = 17.5%

(e) 80 : 20 – (0.8*15) + (0.2*20) = 16%

(f) 90 : 10 – (0.9*15) + (0.1*20) = 15.5%

(g) 100 : 0 = 15%

Computation of portfolio risk:

(a) 0 : 100 = 30%

(b) 10 : 90 = 25.34%

$$\sigma_p = \sqrt{(0.1^2 \times 20^2) + (0.9^2 \times 30^2) + (2 \times 0.1 \times 0.9 \times -0.84 \times 20 \times 30)}$$

(c) 20 : 80 = 20.75%

$$\sigma_p = \sqrt{(0.2^2 \times 20^2) + (0.8^2 \times 30^2) + (2 \times 0.2 \times 0.8 \times -0.84 \times 20 \times 30)}$$

(d) 50 : 50 = 8.54%

$$\sigma_p = \sqrt{(0.5^2 \times 20^2) + (0.5^2 \times 30^2) + (2 \times 0.5 \times 0.5 \times -0.84 \times 20 \times 30)}$$

(e) 80 : 20 = 11.43%

$$\sigma_p = \sqrt{(0.8^2 \times 20^2) + (0.2^2 \times 30^2) + (2 \times 0.8 \times 0.2 \times -0.84 \times 20 \times 30)}$$

(f) 90 : 10 = 15.57%

$$\sigma_p = \sqrt{(0.9^2 \times 20^2) + (0.2^2 \times 30^2) + (2 \times 0.8 \times 0.1 \times -0.84 \times 20 \times 30)}$$

(g) 100 : 0 = 20%

Illustration 11.2 -Compute the risk return characteristic of an equallyweighted portfolio of three securities whose individual risk and return are given in the following table. the correlation between Security A and B is –0.43 and the correlation between security B and C is 0.21 and the correlation coefficient between security A and C is –0.62.

Table 11.2 RiskReturn

Security	Risk	Return
A	15%	12%
B	20%	18%
C	25%	22%

Solution. The portfolio return is computed as follows:

(0.33*12) + (0.33*18) + (0.33*22) = 17.16%

the portfolio risk is computed as follows:

$$\sigma = \sqrt{(0.33_2 \times 15_2) + (0.33_2 \times 20_2) + (0.33_2 \times 25_2)(2 \times 0.33_2 \times 0.43 \times 15 \times 20) + (2 \times 0.33_2 \times 0.21_2 \times 20 \times 25) + (2 \times 0.33 \times -0.62 \times 15 \times 25)}$$

= 8.96%.

When the correlation coefficient ranges between 0 and -1, there is a possibility of minimising the total risk by combining the two securities.

For a two security combination it is possible to find the ratio of investment in the two securities that will result in minimum risk portfolio. The percentage of investment in security (A) can be ascertained using the

following equation.

$$\omega_A = \frac{\sigma_B^2 - \rho_{AB} \times \sigma_A \times \sigma_B}{\sigma_A^2 + \sigma_B^2 - 2 \times \rho_{AB} \times \sigma_A \times \sigma_B}$$

The proportion of investment in security (B) will be 1 - ω_A or can also be computed using the following equation.

$$\omega_B = \frac{\sigma_A^2 - \rho_{AB} \times \sigma_A \times \sigma_B}{\sigma_A^2 + \sigma_B^2 - 2 \times \rho_{AB} \times \sigma_A \times \sigma_B}$$

When the correlation coefficient is -1, the proportion of investment in each security can be given by the following equation.

$$\omega_A = \frac{\sigma_B^2 - \rho_{AB} \times \sigma_A \times \sigma_B}{\sigma_A^2 + \sigma_B^2 - 2 \times \rho_{AB} \times \sigma_A \times \sigma_B} = \frac{\sigma_A(\sigma_A + \sigma_B)}{(\sigma_A + \sigma_B)^2} = \frac{\sigma_B}{\sigma_A + \sigma_B}$$

$$\omega_B = \frac{\sigma_A^2 - \rho_{AB} \times \sigma_A \times \sigma_B}{\sigma_A^2 + \sigma_B^2 - 2 \times \rho_{AB} \times \sigma_A \times \sigma_B} = \frac{\sigma_A(\sigma_A + \sigma_B)}{(\sigma_A + \sigma_B)} = \frac{\sigma_A}{\sigma_A + \sigma_B}$$

Illustration 11.3. From the two securities available for investment opportunity, find the proportion of investment in each security that will minimise the risk for the investor. The correlation coefficient between the two securities is – 0.65. Determine portfolio risk.

Table 11.3 - Risk-return

Security	Risk%	Return%
A	25	18
B	30	22

$$\omega_A = \frac{\sigma_A^2 - \rho_{AB} \times \sigma_A \times \sigma_B}{\sigma_A^2 + \sigma_B^2 - 2 \times \rho_{AB} \times \sigma_A \times \sigma_B}$$

$$\omega_A = \frac{30^2 - (-0.65 \times 25 \times 30)}{30^2 + 25^2 - (2 \times -0.65 \times 25 \times 30)}$$

$\omega_A = 0.556$ $\omega_B = 1 - 0.556 = 0.444$

The risk return composition for a portfolio with these weights are as follows:

Portfolio return

(0.556*18) + (0.444*22) = 19.78%

Portfolio risk

$$\sigma_P = \sqrt{(556^2 \times 25^2) + (0.444^2 \times 30^2) + (2 \times -0.65 \times 25 \times 30)}$$

= 11.40%

Minimal risk is achieved since the correlation coefficient is ranging between 0 and –1. A positive correlation coefficient increases the portfolio risk proportionately. The following table illustrates the risk-return profile of a two security portfolio when the correlation coefficient is 0, 0.5, 1,-0.5 and –1.

Security	Risk%	Return%
A	20	15
B	30	20

ρ	0,100		40,60		50,50		60,40		100,0	
	Risk	Return	Risk	Return	Risk	Return	Risk	Return	Risk	Return
0	30	20	19.7	18	18	17.5	17	17	20	15
0.5	30	20	23.1	18	21.8	17.5	20.8	17	20	15
1	30	20	26	18	25	17.5	24	17	20	15
-0.5	30	20	15.6	18	13.2	17.5	12	17	20	15
-1	30	20	10	18	5	17.5	10	17	20	15

The graph in Figure 11.2 plots all the combinations of securities for different correlation coefficients.

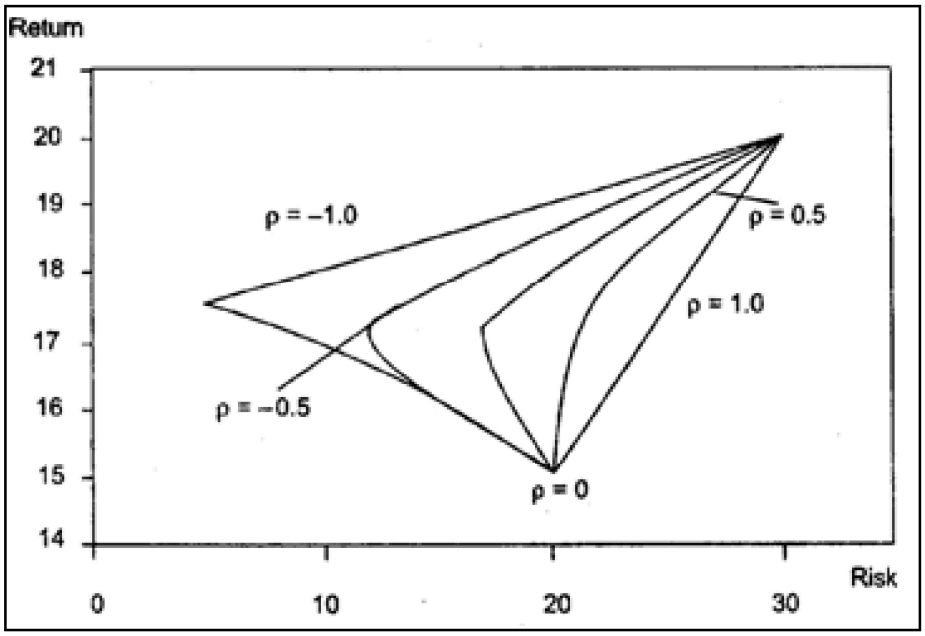


Figure 11.2. Risk-Return impact of different correlations

Plots for a larger number of securities are similar and can be represented through the graphs in Fig 11.4 and Fig 11.5.

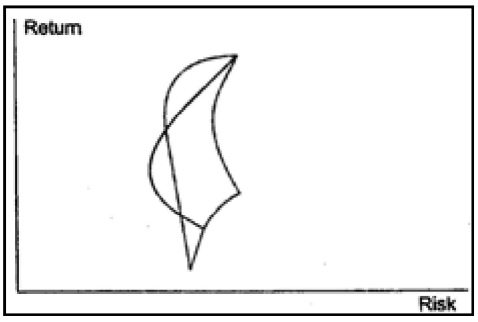


Fig 11.4

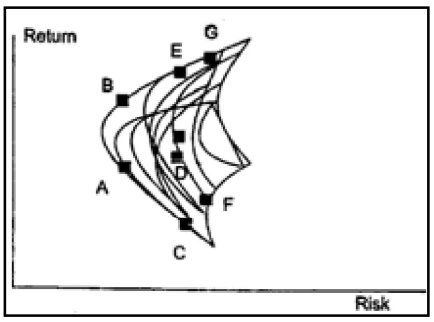


Fig 11.5.

A rational investor, given the above options of portfolios, will tend to select only those portfolios that give the highest return for a given risk or on the other hand, a lowest risk for a given return option. Consider the points A and B in Fig 11.5. Given the same risk level the return from B is higher than A, hence the rational investor will prefer B rather than A. Similarly, consider the points C, D, and E, compared to points C, and D, E gives a higher return for the same level of risk. The preference of investors will be E. Also, as risk level increases between the points F and G, G will be a preferred investment considering the higher return from this investment. The choice between B, E, and G will depend on the risk preference of investors. Given a higher risk preference level the choice of an investor will be towards point G. On the other hand if the investor is averse to risk the preference will be towards B rather than E and G.

The selection of portfolios for the investor is thus made only between the top most points in the feasible portfolio region shown in Figure 11.6. The feasible region is the combination of securities available in the market. The outer layer of the feasible region gives the investor maximum returns for a specific risk. Hence this is called the efficient frontier. An investor can evaluate among the efficient frontier to select the specific risk return portfolio that is preferred. These portfolios provide the highest return for a given level of risk.

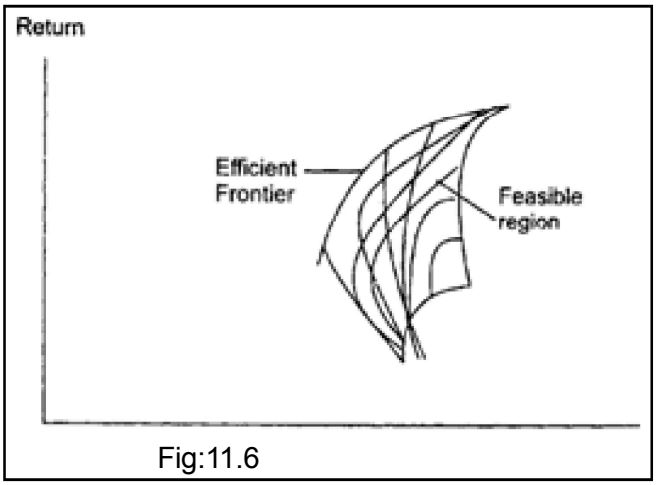


Fig:11.6



11.6 LET US SUM UP

In this unit we have discussed the following :

- Portfolio is a combination of various securities.
- Portfolios can be constructed according to the traditional approach or modern approach.
- In the traditional approach the constraints, investor's need for current income and income in constant rupees are analysed. Liquidity, safety, time horizon of the investment, tax consideration and temperament of the individual investor's are the other constraints to frame the objectives.
- The general objectives of the portfolio are current income, constant income, capital appreciation and preservation of capital.
- According to the objectives the portfolio whether it is a bond portfolio or a stock portfolio or combination of both of bond and stock is decided. After that, the equity component of the portfolio is chosen. The traditional approach takes the entire financial plan of the individual investor.
- In the modern approach, Markowitz model is used. More importance is given to the risk and return analysis.



11.7 FURTHER READING

1) Farrell, J.I., Jr. *Guide to Portfolio Management.* New York: McGraw-Hill, 1983.
2) Harrington, D.R. *Modern Portfolio Theory.* 2d ed. Englewood Cliffs, N.J.: Prentice Hall, 1987.
3) Markowitz, H.M. *Portfolio Selection: Diversificationo f Investments.* New York: John Wiley, 1959.
4) Markowitz, H.M. "Individual versus Institutional Investing." *FinancialServices Review* 1 (1991).
5) Sharpe, W.F. "Capital Asset Prices: A Theory of Market Equilibrium under Conditions of Risk." *Journal of Finance* (September 1964).
6) Sharpe, W.F. *Portfolio Theory and Capital Markets.* New York: McGraw-Hill, 1970.
7) Statman, M. "How Many Stocks Make a Diversified Portfolio?" *Journalof Financial and Quantitative Analysis* (September 1987).



11.8 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q1: Portfolio construction is the process of blending to gether the broadasset classes to obtain optimum return with minimum risk.

Ans to Q2: Traditional approach of portfolio construction is based on thefinancial needs of the individual investors.

Ans to Q3: The traditional approach basically deals with two major decisions. They are:

(a) Determining the objectives of the portfolio.

(b) Selection of securities to be included in the portfolio.



11. 9 MODEL QUESTIONS

1. What are the steps in the traditional approach?
2. Explain the constraints in the formation of objectives.
3. How would you formulate the asset mix according to the given objectives?
4. What are the differences between the traditional approach and modern approach?
5. State the modern approach in the construction of the portfolio.
6. Consider two situations: a young man X in early twenties and another young man Y in the late thirties X and Y earns same amount of money. Mr. Y has a family, a house, a car and all the encumbrances related with the marital status. Both of them like to invest in securities, what would be their constraints and objectives?
7. Ajay, aged 26 is chalking out an investment program to invest in common stocks. Ajay is married and working in a MNC. He is paid nearly 5 lakhs per year. He is having a well furnished house and a car. He is a member of the life insurance scheme. He has purchased his house on loan scheme. The MNC with whom he is working has given him 15 years of job contract.

   They may or may not renew their contract. Assist him in his investment plan. Advise him about the components of his portfolio worth of 5 lakhs.
8. Compute the risk and return of a portfolio of these securities.

   Assume equal weights.

Security	**S1**	**S2**	**S3**	**S4**	**S5**
Return	12%	10%	8%	15%	18%
Risk (standard deviation)	20%	18%	10%	18%	25%

9. Give the minimum risk portfolio from the combination of the following securities.

Security	**S1**	**S2**
Risk (standard deviation)	15%	20%
Return	20%	30%

10. Select suitable portfolios for an investor who falls in the risk bracket of 40 per cent.

Portfolio	**P1**	**P2**	**P3**	**P4**	**P5**
Standard deviation	15%	16%	18%	12%	19%
Return	16%	18%	22%	19%	23%

11. Use the Sharpe Index Model to select the best combination of securities for a portfolio. The risk free rate is 5% and market

standard deviation is 20%.

Security	**S1**	**S2**	**S3**	**S4**	**S5**
Risk (Beta)	1.5	1.2	1.3	1.4	0.85
Return	12%	15%	10%	16%	8%
Error	20%	15%	12%	24%	22%

12. Compute the beta for the following security:

Security price	410	421	415	417	418	422	420	419
Market price	3282	3285	3286	3290	3285	3290	3294	3298

UNIT 12: THE MARKOWITZ MODEL

UNIT STRUCTURE

12.1 Learning Objectives

12.2 Introduction

12.3 The Markowitz Model: Assumptions and Concept

12.4 Varying Degrees of Correlation

12.5 Simple Diversification

12.6 Problems of vast Diversification

12.7 Risk and Return with Different Correlation

12.8 Markowitz Efficient Frontier

12.9 Utility Analysis

12.10 Risk Free Asset

12.11 Sharpe-The Single Index Model

12.12 Sharpe's Optimal Portfolio

12.13 Let Us Sum Up

12.14 Further Reading

12.15 Answers to Check Your Progress

12.16 Model Questions

12.1 LEARNING OBJECTIVES

After going through this unit, you will be able to:

- describe Marrkowitz Model: Assumptions and Concept
- describe the Simple Diversification and Problems of vast Diversification
- outline the risk and return with different correlation
- explain Markowitz Efficient Frontier
- discuss Utility Analysis and Risk Free Asset
- describe Sharpe-The Single Index Model

12.2 INTRODUCTION

In this unit we are going to dicuss about the Marrkowitz Model: Assumptions and Concept, Varying Degrees of Correlation, Simple Diversification and Problems of vast Diversification.In this unit we will also discuss the risk and return with Different Correlation, Markowitz Efficient Frontier.

At the end of this you will get some idea about Risk Free Asset,Sharpe-The Single Index Model and Sharpe's Optimal Portfolio

12.3 THE MARKOWITZ MODEL: ASSUMPTIONS AND CONCEPT

Most people agree that holding two stocks is less risky than holding one stock. For example, holding stocks from textile, banking, and electronic companies is better than investing all the money on the textile company's stock. But building up the optimal portfolio is very difficult. Markowitz provides an answer to it with the help of risk and return relationship.

Assumptions

The individual investor estimates risk on the basis of variability of returns i.e. the variance of returns. Investor's decision is solely based on the expected return and variance of returns only.

For a given level of risk, investor prefers higher return to lower return. Likewise, for a given level of return investor prefers lower risk than higher risk.

The Concept

In developing his model, Markowitz had given up the single stock portfolio and introduced diversification. The single security portfolio would be preference if the investor is perfectly certain that his expectation of highest return would turn out to be real. In the world of uncertainty, most of the risk averse investors would like to join Markowitz rather than keeping a single stock, because diversification reduces the risk. This can be shown with the help of the following illustration.

Take the stock of ABC company and XYZ company. The returns expected from each company and their probabilities of occurrence, expected returns and the variances are given. The calculation procedure is given in the table.

	Stock ABC	Stock XYZ
Return %	11 or 17	20 or 8
Probability	.5 each return	.5 each return
Expected Return	14	14
Variance	9	36
Standard deviation	3	6

ABC Expected return	=.5 X 11 + .5 X 17	= 14
XYZ Expected return	= .5 X 20 + .5 X 8	= 14
ABC variance	= .5 (11-14)2 + .5 (17-14)2	= 9
XYZ variance	= .5 (20-14)2 + .5 (8-14)2	= 36
ABC standard deviation	= $\sqrt{}$ Variance	= $\sqrt{}$ 9 = 3
XYZ standard deviation	= $\sqrt{}$ Variance	= $\sqrt{}$ 36 = 6

ABC and XYZ companies stocks have the same expected return of 9%. XYZ company's stock is much riskier than ABC stock, because the standard deviation of the former being 6 and latter 3. When ABC return is high XYZ return is low and vice-versa i.e. when there is 17% return from ABC, there would be 8% return from XYZ. Likewise when ABC return is 11% XYZ return is 20%. If a particular investor holds only ABC or XYZ he would stand to lose in the time of bad performance.

Suppose the investor holds two thirds of ABC and one third of XYZ, the return can be calculated as follows

$$R_p = \sum_{t=1}^{N} X_1 R_1$$

R_p = return on the portfolio

X_1 = proportion of total portfolio invested in security 1.

R_1 = expected return of security 1.

Let us calculate the expected return for the both the possibilities.

Possibility 1 = 2/3 X 11 + 1/3 X 20 = 14

Possibility 2 = 2/3 X 17 + 1/3 X 8 = 14

In both the situations, the investor stands to gain if the worst occurs, than by holding either of the security individually.

Holding two securities may reduce the portfolio risk too. The portfolio risk can be calculated with the help of the following formula.

$$\sigma_p = \sqrt{X_1^2\sigma_1^2 + X_2^2\sigma_2^2 + 2X_1X_2(r_{12}X_2\sigma_2)}$$

σ_p = portfolio standard deviation

X_1 = percentage of total portfolio value in stock X_1

X_2 = percentage of total portfolio value in stock X_2

σ_1 = standard deviation of stock X_1

σ_2 = standard deviation of stock X_2

r_{12} = correlation co-efficient of X_1 and X_2

$$r_{12} = \frac{\text{covariance of X12}}{\sigma_1\sigma_2}$$

Using the same example given in the return analysis, the portfolio risk can be estimated. Let us assume ABC as X_1 and XYZ as X_2. Now the covariance is: X_{12}

$$\text{Cov of X} = 1/N \sum_{t=1}^{N} (R1 - \bar{R}2)(R1 - \bar{R}2)$$

12

= 1/2[(11-14)(20-14)(17-14)(18-14)

= ½ [(-18) + (-18)] = -36/2 = -18

$$R = \frac{\text{covariance of X12}}{\sigma_1\sigma_2} = -18/3x6 = -1$$

The correlation co-efficient indicates the similarity or dissimilarity in the behavior of X_1 and X_2 stocks. In correlation, co-variance is not taken as an absolute value but relative to the standard deviation of individual securities. It shows, how much X and Y vary together as a proportion of their combined individual variations measured by σ_1 and σ_2. In our example, the correlation

co-efficient is -1.0 which indicates that there is a perfect negative correlation exists between the securities and they tend to move in the same direction. If the correlation is 1, perfect positive correlation exists between the securities and they tend to in the same direction. If the correlation co-efficient is zero, the securities' returns are independent. Thus, the correlation between two securities depends upon the covariance between the two securities and the standard deviation of each security.

Now, let us proceed to calculate the portfolio risk. Combination of two securities reduces the risk factor if less degree of positive correlation exists between them. In our case, the correlation coefficient is -1.

$$\sigma_p = \sqrt{X_1^2\sigma_1^2 + X_2^2\sigma_2^2 + 2X_1X_2(r_{12}\sigma_1\sigma_2)}$$

$$= \sqrt{(2/3)2 \text{ x } 9 + (1/3)2 \text{ x } 36 + 2 \text{ x } 2/3 \text{ x } 1/3 \text{ (-1 x 3 x 6)}}$$

$$= \sqrt{4 + 4 + (-8)}$$

$$= \sqrt{0}$$

The portfolio risk is nil if the securities are related negatively. This indicates that the risk can be eliminated if the securities are perfectly negatively correlated. The standard deviation of the portfolio is sensitive to (1) the proportions of funds devoted to each stock (2) the standard deviation of each security and (3) co-variance between two stocks.

The change in portfolio proportions can change the portfolio risk. Taking the same example of ABC and XYZ stock, the portfolio standard deviation is calculated for different proportions.

Stock ABC (X1)	Stock XYZ (X2)	Portfolio Standard Deviation
100	0	3
66.66	33.3	0
50.0	50.0	1.5
0	100	6

By skillful balancing of the investment proportions in different securities, the portfolio risk can be brought down to zero. The proportion to be invested in each security can be found out by $X_1 = \sigma_2 \div (\sigma_1 + \sigma_2)$ the

precondition is that the correlation co-efficient should be -1.0. Otherwise it is

$$X_1 = \frac{\sigma_2^{\,2} - (r_{12}\sigma_1\sigma_2)}{\sigma_1^{\,2} + \sigma_2^{\,2} - (2r_{12}\sigma_1\sigma_2)}$$

If the correlation co-efficient is less than the ratio of smaller standard deviation to larger standard deviation, then the combination of two securities provides a lesser standard deviation of return than when either of the security is taken alone. In our example,

-1 < 3/6 i.e. -1 < + .50

If the standard deviation ratio is 4/6 and the correlation co-efficient is + .8, the combination of securities is not profitable because

+ 8 > 4/6 i.e. + 8 > .66

12.4 VARYING DEGREES OF CORRELATION

Here in order to learn more about the relationship between securities, different degrees of correlation co-efficients are analyzed. Extreme cases like +1, 1, intermediate values and no correlation are calculated for two securities namely X and Y. We assume that the investor has specific amount of money to invest and that can be allocated in any proportion between the securities. Security X has an expected rate of return of 5% and a standard deviation of 4%. While for security Y, the expected return is 8% and the standard deviation of return is 10%.

Let us first work out the expected return and the portfolio risk for different values of correlation coefficients for varying proportions of the securities X and Y. Portfolio return is calculated with the equation:

$R_p = X_x R_x + X_y R_y$

If there is 75% investment on X and 25% on Y, then Rp = .75(5%) + 0.25 (8%) = 5.75% then the σ_p would be found out by using equation

$$\sigma_p = \sqrt{X_x^{\,2}\sigma_x^{\,2} + X_y^{\,2}\sigma_y^{\,2} + 2X_xX_y(r_{xy}\sigma_x\sigma_y)}$$

$= \sqrt{3/4 \text{ x } ¾ \text{ x } 16 + ¼ \text{ x } ¼ \text{ x } 100 + 2 \text{ x } ¾ \text{ x } ¼ (1 \text{ x } 4 \text{ x} 10)}$

= 5.5

Table gives the values of R_p and σ_p for varying degrees of correlation co-efficients.

Proportion of X security in portfolio X	Proportion of Y security in portfolio 1-X	$R_p$rxy	σ_p Rxy +1	σ_p Rxy -1	σ_p Rxy 0	σ_p +.5
1.00	0.00	5.00	4.0	4.0	4.0	4.0
0.75	0.25	5.75	5.5	0.5	3.9	4.8
0.50	0.50	6.50	7.0	3.0	5.4	6.25
0.25	0.75	7.25	8.5	6.5	7.6	8.1
0.00	1.00	8.00	10.0	10.0	10.0	10.0

12.5 SIMPLE DIVERSIFICATION

Portfolio risk can be reduced by the simplest kind of diversification. Portfolio means the group of assets an investor owns. The assets may vary from stocks to different types of bonds. Some times the portfolio may consist of securities of different industries. When different assets are added to the portfolio, the total risk tends to decrease. In the case of common stocks, diversification reduces the unsystematic risk or unique risk. Analysts opine that if 15 stocks are added in a portfolio of the investor, the unsystematic risk can be reduced to zero. But at the same time if the number exceeds 15, additional risk reduction cannot be gained. But diversification cannot reduce systematic or undiversifiable risk.

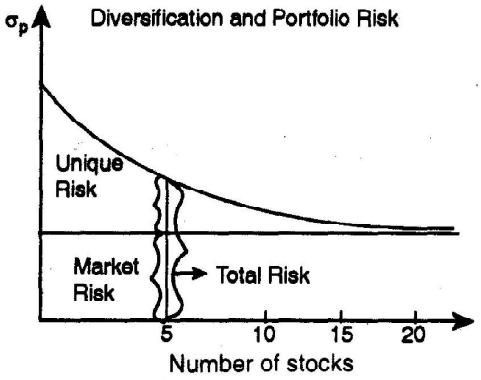
The naive kind of diversification is known as simple diversification. In the case of simple diversification, securities are selected at random and no analytical procedure is used.

Total risk of the portfolio consists of systematic and unsystematic risk and this total risk is measured by the variance of the rates of returns over time. Many studies have shown that the systematic risk forms one quarter of the total risk.

The simple random diversification reduces the total risk. The reason behind this is that the unsystematic price fluctuations are not correlated with the market's systematic fluctuations. The figure shows how the simple

diversification reduces the risk. The standard deviations of the portfolios are given in Y axis and the number of randomly selected portfolio securities in the X axis.

The standard deviation was calculated for each portfolio and plotted. As the portfolio size increases, the total risk line Starts declining. It flattens out after a certain point. Beyond that limit, risk cannot be reduced. This indicates that spreading out the assets beyond certain level cannot be expected to reduce the portfolio's total risk below the level of undiversifiable risk.



12.6 PROBLEMS OF VAST DIVERSIFICATION

Spreading the investment on too many assets will give rise to problems such as purchase of poor performers, information inadequacy, high research cost and transaction cost.They are discussed below:

1. **Purchase of Poor Performers:** While buying numerous stocks, sometimes the investor may also buy stocks that will not yield adequate return.

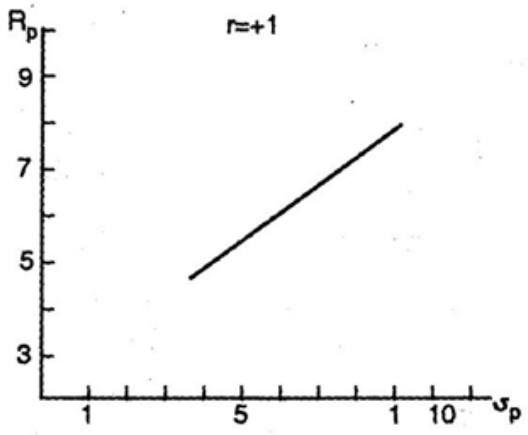
2. **Information Inadequacy:** If there are too many securities in a portfolio, it is difficult for the portfolio manager to get information about their individual performance. The portfolio manager has to be in touch with the details regarding the individual company performance. To get all the information simultaneously is quite High research cost If a large number of stocks are included, before the inclusion itself the returns and

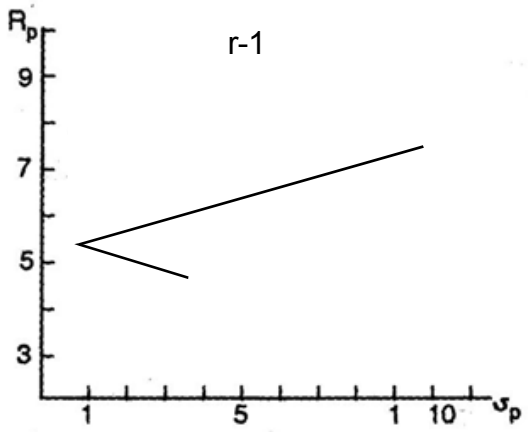
risk of the individual stock have to be analysed. Towards this end, lot of information has to be gathered and kept in store and these procedures involve high cost.

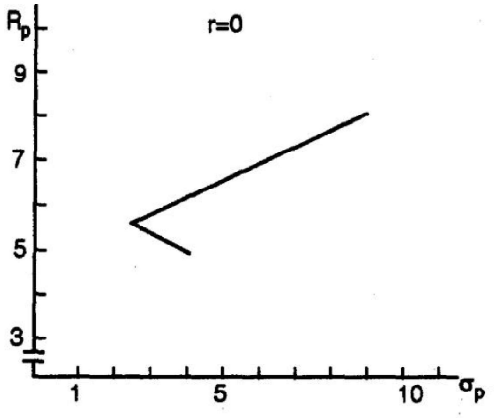
3. High Transaction Cost: When small quantities of stocks are purchased frequently, the investor has to incur higher transaction cost than the purchase of large blocks at less frequent intervals. In spite of all these difficulties big financial institutions purchase hundreds of different stocks. Likewise, mutual funds also invest in different stocks.

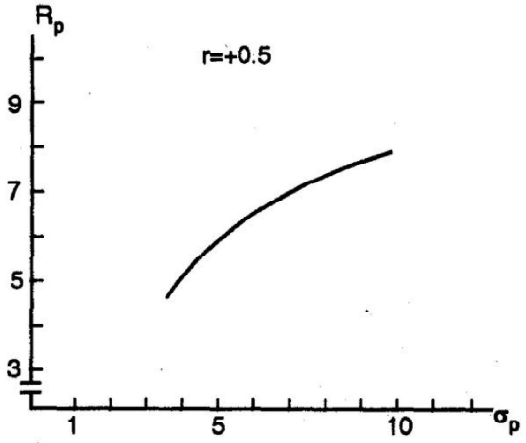
12.7 RISK AND RETURN WITH DIFFERENT CORRELATION

The four figures indicate the relationship between risk and return.



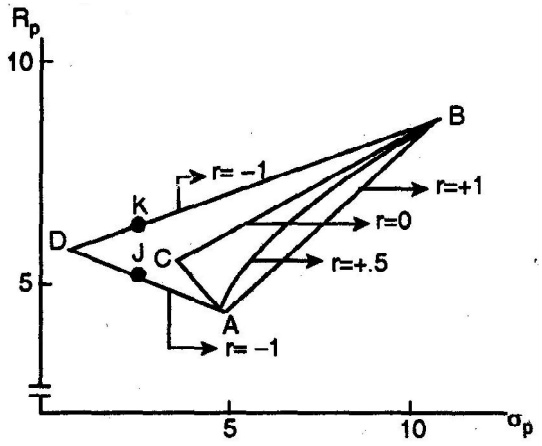






All the graphs show the portfolio risks under varying levels of correlation co-efficients. All the figures can be assembled together and placed in a single figure. The following figure expresses the relationship between expected returns and standard deviations of returns for various correlation coefficients.

Two Security Portfolios with Different Correlation Coefficients



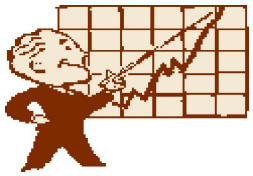
In the figure, portfolio return is given on the vertical axis and portfolio risk on the horizontal axis. Point A represents 100 per cent holdings of X and point B represents 100 per cent holdings of Y. The intermediate points along the line segment AB represent portfolios containing various combinations of two securities.

The straight line r = + 1 shows that the portfolio risk increases with the increase in portfolio return. Here, the combination f two securities could not reduce the portfolio risk-because of their positive correlation. Again, the ratio of smaller standard deviation to larger deviation is less than the correlation coefficient.

1 > 4/10 = 1 > .4 which indicates that benefit cannot be derived by combining both the securities. In this case if an investor wish to minimize his risk, it would be better for him to invest all the money in security X where the risk is comparatively lower.

The r_{xy} = 0 line is a hyperbola. Along the line segment ACB, the r = 0. CB contains portfolios that a superior to those along the line segment AC. Markowitz says that all portfolios along the ACB line segment are feasible but some are more efficient than others. The line segment ADB indicates (r = -1) perfect inverse correlation and it is possible to reduce portfolio risk to zero. Portfolios on the line segment DB provides superior returns than on the line segment AD. For example, take two points on both the line segments K and J. The point K is superior to the point J because with the same level of risk the investor earns more return on point K than on pointy.

Thus, Markowitz diversification can lower the risk if the securities in the portfolio have low correlation coefficients.



CHECK YOUR PROGRESS

Q1: State the Assumption of Markowitz Model

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Q2: Define Portfolio

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12.8 MARKOWITZ EFFICIENT FRONTIER

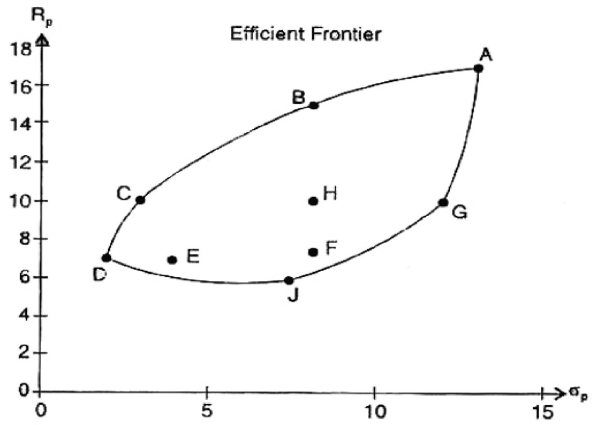
The risk and return of all portfolios plotted in risk-return space would be dominated by efficient portfolios. Portfolio may be constructed from available securities. All the possible combination of expected return and risk compose the attainable set. The following example shows the expected return and risk of different portfolios.

Portfolio Risk and Return

Portfolio	Expected Return (R_P) %	Risk ($ó_P$)
A	17	13
B	15	8
C	10	3
D	7	7
E	7	4
F	7	8
G	10	12
H	9	8
J	6	7.5

The attainable sets of portfolios are illustrated in figure. Each of the portfolios along the line or within the line ABCDEFGJ is possible. It is not possible for the investor to have portfolio outside of this perimeter because no combination of expected return and risk exists there.

When the attainable sets are examined, some are more attractive than others. Portfolio B is more attractive than portfolios F and H because B offers more return on the same level of risk. Likewise, C is more attractive than portfolio G even though same level of return is got in both the points; the risk level is lower at point C. In other words, any portfolio which gives more return for the same level of risk or same return with lower risk is more preferable than any other portfolio.



Among all the portfolios, the portfolios which offer the highest return at particular level of risk are called efficient portfolios. Here the efficient portfolios are A, B, C and D, because at these points no other portfolio offer higher return. The ABCD line is the efficient frontier along which all attainable and efficient portfolios are available. Now the question raised is which portfolio the investor should choose? He would choose a portfolio that maximizes his utility. For that utility analysis has to be done.

12.9 UTILITY ANALYSIS

Utility Analysis

Utility is the satisfaction the investor enjoys from the portfolio return. An ordinary investor is assumed to receive greater utility from higher return and vice-versa. The investor gets more satisfaction or more utility in X + 1 rupees than from X rupee.

If he is allowed to choose between two certain investments, he would always like to take the one with larger outcome. Thus, utility increases with increase in **return.**

The utility function makes certain assumptions about an investors' taste for risk. The investors are categorised into risk averse, risk neutral and risk seeking investor. All the three types can be explained with the help of a **fair gamble.**

In a fair gamble which cost ' 1, the on are A and B events. A event will

yield ‘ 2. Occurrence of B event is a dead loss i.e 0. The chance of occurrence of both the events are 50% and 50%.

The expected value of investment is (1/2) 2 + 1/2 (0) = Rel> the expected value of the gamble is exactly equal to cost. Hence, it is a fair gamble. The position of the investor may, be improved or hurt by undertaking the gamble.

Risk avertor rejects a fair gamble because the disutility of the loss is greater for him than the utility of an equivalent gain. Risk neutral investor means that he is indifferent to whether a fair gamble is undertaken or not.

The risk seeking investor would select a fair gamble i.e. he would choose to invest. The expected utility of investment is higher than the expected utility of not investing. These three different types of investors are shown in figure.

The curves ABC are three different slopes of utility curves. The upward sloping curve A shows increasing marginal utility. The straight line B shows constant utility, and curve C shows diminishing marginal utility. The constant utility, a linear function means doubling of returns would double the utility and it indicates risk neutral situation.

The increasing marginal utility suggests that the utility increases more than proportion to increase in return and shows the risk lover. The curve C shows risk averse investor. The utility he gains from additional return declines gradually. The figures show the utility curves of the different investors.

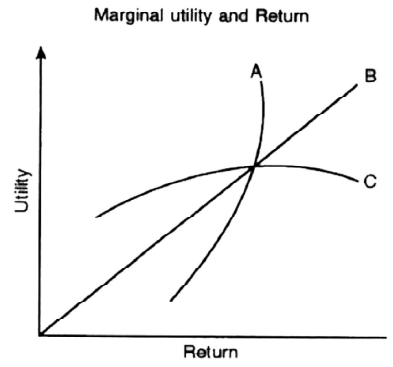


Fig. 17.5

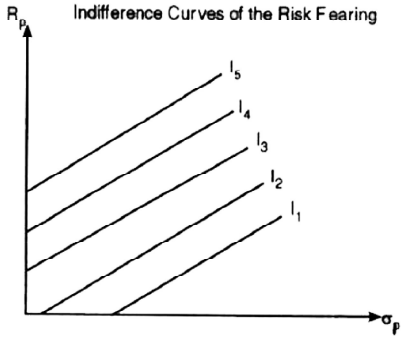
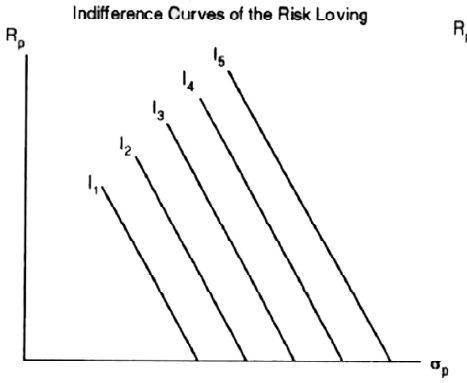
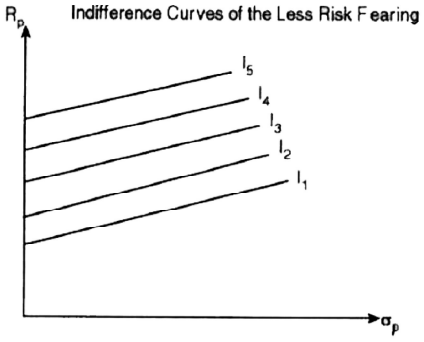


Fig. 17.6





Marginal utility and Return
A
B
C
Utility
Return

Fig. 17.5

Indifference Curves of the Risk Fearing
R_p
I_5
I_4
I_3
I_2
I_1
σ_p

Fig. 17.6

Indifference Curves of the Risk Loving
R_p
I_5
I_4
I_3
I_2
I_1
σ_p

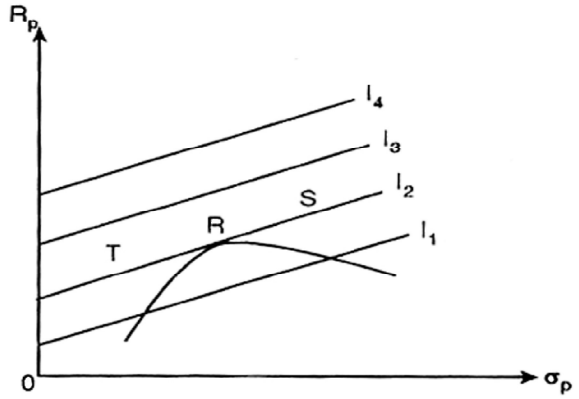
Indifference Curves of the Less Risk Fearing
R_p
I_5
I_4
I_3
I_2
I_1
σ_p

Investors generally like to get more returns for additional risks assumed and the lines would be positively sloped. The risk lover's utility curves are negatively sloped and converge towards the origin. For the risk fearing, lower the risk of the portfolio, happier he would be. The degree of the slope of indifference curve indicates the degree of risk aversion. The conservative investor needs larger return to undertake small increase in risk (Figure) The aggressive investor would be willing to undertake greater risk for smaller return. Even though the investors dislike risk, their trade off between risk and return differs.

Indifference Map and the Efficient Frontier

Each investor has a series of indifference curves. His final choice out of the efficient set depends on his attitude towards risk. The figure shows the efficient frontier and the indifference map.

Indifference Curve and Efficient Frontier



The utility of the investor or portfolio manager increases when he moves up the indifference map from I to 14'He can achieve higher expected return without an increase in risk. In the figure 122 touches the efficient frontier at point R. Even though the points I and S are in the I, curve, R is the only attainable portfolio which maximises the utility of the investor. Thus, the point at which the efficient frontier tangentially touches the highest indifference curve determines the most attractive portfolio for the investor.

Leveraged Portfolios

In the above model, the investor is assumed to have a certain amount

of money to make investment for a fixed period of time. There is no borrowing and lending opportunities. When the investor is not allowed to use the borrowed money, he is denied the opportunity of having financial leverage.

Again, the investor is assumed to be investing only on the risky assets. Riskiess assets are not included in the portfolio. To have a leveraged portfolio, investor has to consider not only risky assets but also risk free assets. Secondly, he should be able to borrow and lend money at a given rate of interest.

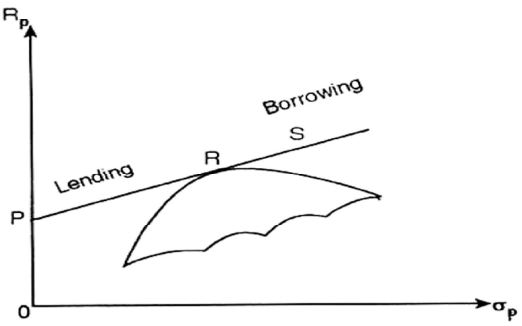
12.10 RISK FREE ASSET

The features of risk free asset are: (a) absence of default risk and interest risk and (b) full payment of principal and interest amount. The return from the risk free asset is certain and the standard deviation of the return is nil. The relationship between the rate of return of the risk free asset and risky asset is zero. These types of assets are usually fixed income securities. But fixed income securities issued by private institutions have the chance of default. If the fixed income securities are from the government, they do not possess the default risk and the return from them are guaranteed. Further, the government issues securities of different maturity period to match the length of investors holding period. The risk free assets may be government securities, treasury bills and time deposits in banks.

Inclusion of Risk Free Asset

Now, the risk free asset is introduced and the investor can invest part of his money on risk free asset and the remaining amount on the risky asset. It is also assumed that the investor would be able to borrow money at risk free rate of interest. When risk free asset is included in the portfolio, the feasible efficient set of the portfolios is altered. This can be explained in the Figure.

Efficient Frontier with Borrowing and Lending



In the figure, OP is gained with zero risk and the return is earned through holding risk free asset. Now, the investor would attempt to maximise his expected return and risk relationship by purchasing various combinations of riskless asset and risky assets. He would be moving on the line connecting attainable portfolio R and risk free portfolio P i.e. the line PR. When he is on the PR, part of his money is invested in fixed income securities i.e. he has lent some amount of money and invested the rest in the risky asset within the point PR. He is depending upon his own funds. But, if he moves beyond the point R to S he would be borrowing money. Hence the portfolios located between the points RP are lending portfolios and beyond the point R consists of borrowing portfolios. Holding portfolio in PR segment with risk free securities would actually reduces risk more than the reduction in return.

12.11 SHARPE-SINGLE INDEX MODEL

Sharpe- Single Index Model

Casual observation of the stock prices over a period of time reveals that most of the stock prices move with the market index. When the Sensex increases, stock prices also tend to increase and vice-versa. This indicates that some underlying factors affect the market index as well as the stock prices. Stock prices are related to the market index and this relationship could be used to estimate the return on stock. Towards this purpose, the following equation can be used

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

where

R_i - expected return on security i

σ_i - intercept of the straight line or alpha co-efficient

β_i - slope of straight line or beta co-efficient

R_m - the rate of return on market index

e_i - error term

According to the equation, the return of a stock can be divided into t components, the return due to the market and the return independent of the market. 13. indicates the sensitiveness of the stock return to the changes in the market return. For example 13 of 1.5 means that the stock returns is expected to increase by 1.5% when the market index return increases by 1% and vice-versa. Likewise, 13.of 0.5 expresses that the individual stock return would change by 0.5 per cent when there is a change of 1 per cent in the market return. 13 of 1 indicate that the market return and the security return are moving in tandem. The estimates of 13.and a are obtained from regression analysis.

The single index model is based on the assumption that stocks vary together because of the common movement in the stock market and there are no effects beyond the market (i.e. any fundamental factor effects) that account the stocks co-movement. The expected return, standard deviation and co-variance of the single index model represent the joint movement of securities. The mean return is

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

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

The covariance of returns between securities i and is

$$\sigma_{ij} + \beta_i \beta_j \sigma^2_m$$

The variance of the security has t components namely, systematic risk or market risk and unsystematic risk or unique risk. The variance explained by the index is referred to systematic risk. The unexplained variance is called residual variance or unsystematic risk. Systematic risk = $\beta_i{}^2$ x variance of market index.

$$= \beta_i{}^2 \sigma_m{}^2$$

Unsystematic risk = Total variance — Systematic risk.

$e_i^2 = \sigma_i^2$ -systematic risk.

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

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

From this, the portfolio variance can be derived

σ_2 = variance of portfolio

σ_{2p} = expected variance of index

e_i^{2m} = variation in security's return not related to the market index x_i = the portion of stock i in the portfolio

Likewise expected return on the portfolio also can be estimated. For each security α_1 and β_1 should be estimated. N

$$RP = \sum_{t=1}^{N} xi(ai + \beta_{i}Rm)$$

$$\Sigma i^N = 1^x$$

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

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

$$\sigma_P = \sum_{t=1}^{N} x_i \alpha_j$$

$$\Sigma i^N = 1^x$$

σ_P - Value of the alpha for the portfolio

x_i - Proportion of the investment on security i α_j - Value of alpha for security i N - The number of securities in the portfolio.

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

$$\sigma = \sum_{t=1}^{N} x\beta$$

p i i

β_p is the portfolio beta.

12.12 SHARPE'S OPTIMAL PORTFOLIO

Sharpe's Optimal Portfolio

Sharpe had provided a model for the selection of appropriate securities in a portfolio.

The selection of any stock is directly related to its excess return-beta ratio.

$$\frac{R_i - R_f}{\beta_i}$$

Where

R_i = the expected return on stock i

R_f = the return on a riskless asset

β_i = the expected change in the rate of return on stock i associated with one unit change in the market return

The excess return is the difference between the expected return on the stock and the riskless rate of interest such as the rate offered on the government security or treasury bill. The excess return to beta ratio measures the additional return on a security (excess of the riskless asset return) per unit of systematic risk or no diversifiable risk this ratio provides a relationship between potential risk and reward

Ranking of the stocks are done on the basis of their excess return to beta. Portfolio managers would like to include stocks with higher ratios. The selection of the stocks depends on a unique cut-off rate such that all stocks with higher ratios of R.-R / B are included and the stocks with lower ratios are left off. The cut-off point is denoted by C*.

The steps for finding out the stocks to be included in the optimal portfolio are given below

1. Find out the "excess return to beta" ratio for each stock under consideration.
2. Rank them from the highest tothe lowest.
3. Proceed to calculate C for all the stocks according to the ranked order using the following formula.

$$C_i = \frac{\sigma^2_m \sum_{t=1}^{N} \frac{(Ri - Rf)\beta_i}{\sigma^2_{ei}}}{1 + \sigma^2_m \sum_{t=1}^{N} \frac{\beta_i^2}{\sigma^2_{ei}}}$$

σ_{m^2} = variance of the market index

σ_{ej^2} = variance of a stock's movement that is not associated with the movement of market index i.e. stock's unsystematic risk.

4. The cumulated values of C start declining after a particular C and that point is taken as the cut-off point and that stock ratio is the dut-off ratio C.

This is explained with the help of an example.

Data for finding out the optimal portfolio are given below:

Security Number	Mean Return R_i	Excess Return $R_i - R_f$	Beta β	Unsystematic Risk σ_{ej^2}	Excess Return to Beta $\frac{R_i - R_f}{\beta_i}$
1	19	14	1.0	20	14
2	23	18	1.5	30	12
3	11	6	0.5	10	12
4	25	20	2.0	40	10
5	13	8	1.0	20	8
6	9	4	0.5	50	8
7	14	9	1.5	30	6

The riskless rate of interest is 5 per cent and the market variance is 10. Determine the cut-off point.

Security Number	$\frac{R_i - R_f}{\beta_i}$	$\frac{(R_i - R_f)x\beta_i}{\sigma e_i^2}$	$\sum \frac{N(R_i - R_f)\beta_i}{i=1\sigma e_i^2}$	$\frac{\beta_i^2}{\sigma e_i^2}$	$\frac{\beta_i^2}{\sigma e_i^2}$	c_i
1	14	0.7	0.7	0.05	0.05	4.67
2	12	0.9	1.6	0.075	0.125	7.11
3	12	0.3	1.9	0.025	0.15	7.60
4	10	1.0	2.9	0.1	0.25	8.29
5	8	0.4	3.3	0.05	0.3	8.25
6	8	0.04	3.34	0.005	0.305	8.25
7	6	0.45	3.79	0.075	0.38	7.90

Calculations are given below

For Security 1

$$C_1 = \frac{10x.7}{1+(10x.05)} = 4.67$$

Here 0.7 is got from column 4 and 0.05 from column 6. Since the preliminary calculations are over, it is easy to calculate the C.

$$C_2 = \frac{10x.1.6}{1+(10x.125)} = 7.11$$

$$C_3 = \frac{10x\ 1.9}{1+(10x.125)} = 7.11$$

$$C_4 = \frac{10x\ 2.9}{1+(10x.25)} = 8.2$$

$$C_5 = \frac{10\,x\ 3.3}{1+(10\,x.3)} = 8.25$$

$$C_6 = \frac{10\,x\ 3.34}{1+(10\,x.305)} = 8.25$$

$$C_7 = \frac{10\,x\ 3.79}{1+(10\,x.38)} = 7.90$$

The highest Ci.value is taken as the cutoff point i.e. C*. The stocks ranked above C* have high excess returns to beta than the cut-off C. and all the stocks ranked below C* have low excess returns to beta. Here, the cut-off rate is 8.29. Hence, the first four securities are selected. If the number of stocks is larger there is no need to calculate C_i values for all the stocks after the ranking has been done. It can be calculated until the C* value is found

and after calculating for one or two stocks below it, the calculations can be terminated.

The C_i can be stated with mathematically equivalent way.

$$C_i = \frac{\beta_{ip}(R_p - R_f)}{\beta_i}$$

β_{ip} - the expected change in the rate of return on stock i associated with 1 per cent change in the return on the optimal portfolio.

R_p - the expected return on the optimal portfolio

β_{ip} and R_p cannot be determined until the optimal portfolio is found. lb find out the optimal portfolio, the formula given previously should be used. Securities are added to the portfolio as long as

$$\frac{R_p - R_f}{\beta_i} > C_i$$

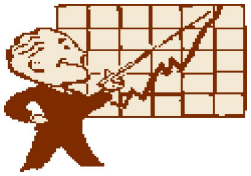
The above equation can be rearranged with the substitution of equation:

$$C_i = \frac{\beta_{ip}(R_p - R_f)}{\beta_i}$$

Now we have,

$$R_i - R_f > \beta_{ip}(R_p - R_f)$$

The right hand side is the expected excess return on a particular stock based on the expected performance of the optimum portfolio. The term on the left hand side is the expected excess return on the individual stock. Thus, if the portfolio manager believes that a particular stock will perform better than the expected return based on its relationship to optimal portfolio, he would add the stock to the portfolio.



CHECK YOUR PROGRESS

Q3: Define Utility Analysis

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Q4: Define Portfolio

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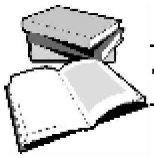
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12.13 LET US SUM UP

In this unit we have discussed the following :

- Assumptions of Markowitz Model is "The individual investor estimates risk on the basis of variability of returns i.e. the variance of returns.
- Investor's decision is solely based on the expected return and variance of returns only".
- Utility is the satisfaction the investor enjoys from the portfolio return.
- The increasing marginal utility suggests that the utility increases more than proportion to increase in return and shows the risk lover.
- The features of risk free asset are: (a) absence of default risk and interest risk and (b) full payment of principal and interest amount.
- Sharpe had provided a model for the selection of appropriate securities in a portfolio.



12.14 FURTHER READING

- M. Ranganathan and R. Madhumathi(2011); *Investment Analysis and Portfolio Management*, Pearson Education, New Delhi.
- Punithavathy Pandian(2016) *Security Analysis and Portfolio Management,* Vikas Publishing House Pvt. Ltd., New Delhi.
- Bharti V. Phathak(2014; *Indian Financial System,* Pearson Education, Delhi.
- Donald E. Fischer and Ronald J. Jordon(2011); *Security Analysis and Portfolio Management,* PHI.
- Prasanna Chandra(2010);*Investment Analysis and Portfolio Management,* TMH, Delhi.



12.15 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q1: Assumptions: The individual investor estimates risk on the

basis of variability of returns i.e. the variance of returns.Investor's decision is solely based on the expected return and variance of returns only.

Ans to Q2: Portfolio means the group of assets an investor owns.

Ans to Q3: Utility is the satisfaction the investor enjoys from the portfolio return. An ordinary investor is assumed to receive greater utility from higher return and vice-versa. The investor gets more satisfaction or more utility in X + 1 rupees than from X rupee.

Ans to Q4: Spreading the investment on too many assets will give rise to problems such as purchase of poor performers, information inadequacy, high research cost and transaction cost.



12.16 MODEL QUESTIONS

Q1: Explai the concept ofMarkowitz Model with examples

Q2: Discuss the relationship between securities and different degrees of correlation

Q3: Explain simple diversification

Q4: Write the problems of vast diversification

Q5: Explain Markowitz efficient frontier

Q6: What is Utility Analysis

Q7: Define Risk Free Assest

Q8: Explain Sharpe-Single Index Model

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UNIT 13: CAPITAL ASSET PRICING THEORY

UNIT STRUCTURE

13.1 Learning Objectives

13.2 Introduction

13.3 Capital Asset Pricing Theory: An Introduction

13.4 Security Market Line

13.5 Evaluation of Securities

13.6 Market Imperfection and SML

13.7 Empirical Tests of the CAPM

13.8 Present Validity of CAPM

13.9 Let Us Sum Up

13.11 Further Reading

13.12 Answers to Check Your Progress

13.13 Model Questions

13.1 LEARNING OBJECTIVES

After going through this unit, you will be able to:

- define capital asset pricing theory
- describe the concept of Security Market Line
- outline the evaluation of Securities
- explain Market Imperfection and SML
- discuss Empirical Tests of the CAPM
- describe Present Validity of CAPM

13.2 INTRODUCTION

In this unit we are going to dicuss about capital asset pricing theory, the concept of Security Market Line,the evaluation of Securities

At the end of this you will get some idea about Market Imperfection and SML, Empirical Tests of the CAPM and Present Validity of CAPM.

13.3 CAPITAL ASSET PRICING THEORY(CAPM): AN INTRODUCTION

Investors are interested in knowing the systematic risk when they search for efficient portfolios. They would like to have assets with low beta co-efficient i.e. systematic risk. Investors would opt for high beta co-efficient only if they provide high rates of return. The risk averse nature of the investors is the underlying factor for this behavior. The capital asset pricing theory helps the investors to understand the risk and return relationship of the securities. It also explains how assets should be priced in the capital market.

The CAPM Theory

Markowitz, William Sharpe, John Lintner and Jan Mossin provided the basic structure for the CAPM model. It is a model of linear general equilibrium return. In the CAPM theory, the required rate return of an asset is having a linear relationship with asset's beta value i.e. undiversifiable or systematic risk.

Assumptions

1. An individual seller or buyer cannot affect the price of a stock. This assumption is the basic assumption of the perfectly competitive market.
2. Investors make their decisions only on the basis of the expected returns, standard deviations and co variances of all pairs of securities.
3. Investors are assumed to have homogenous expectations during the decision-making period.
4. The investor can lend or borrow any amount of funds at the riskless rate of interest. The riskless rate of interest is the rate of interest offered for the treasury bills or Government securities.
5. Assets are infinitely divisible. According to this assumption, investor could buy any quantity of share i.e. they can even buy ten rupees worth of Reliance Industry shares.
6. There is no transaction cost i.e. no cost involved in buying and selling of stocks.
7. There is no personal income tax. Hence, the investor is indifferent to the form of return either capital gain or dividend.

8. Unlimited quantum of short sales is allowed. Any amount of shares an individual can sell short.

Lending and Borrowing

Here, it is assumed that the investor could borrow or lend any amount money at riskless rate of interest. When this opportunity is given to the investors, they can mix risk free assets with the risky assets in a portfolio to obtain a desired rate of risk-return combination.

R_p = Portfolio return

X_f = the proportion of funds invested in risk free assets

$1- X_f$ = the proportion of funds invested in risky assets

R_f = Risk free rate of return

R_m = Return on risky assets

The expected return on the combination of risky and risk free combination is:

$$R_p = R_f X_f + R_m(1 – X_f)$$

This formula can be used to calculate the expected returns for different situations, like mixing ri assets with risky assets, investing only in the risky asset and mixing the borrowing with risky assets.

Now, let us assume that borrowing and lending rate to be 12.5% and the return from the risky assets to be 20%. There is a trade off between the expected return and risk. If an investor invests in risk free assets and risky assets, his risk may be less than what he invests in the risky asset alone. But if he borrows to invest in risky assets, his risk would increase more than he invests his own money in the risky assets. When he borrows to invest, we call it financial leverage. If he invests 50% in risk free assets and 50% in risky assets, his expected return of the portfolio would be

$$R_p = R_f X_f + R_m(1 – X_f)$$
$$= 12.5 \times .5 + 20(1 - .5)$$
$$= 6.25 + 10$$
$$= 16.25\%$$

If there is a zero investment in risk free asset and 100% in risky asset, the return is

$R_p = R_f X_f + R_m(1 - X_f)$

$= 0 + 20\%$

$= 20\%$

If - .5 in risk free asset and 1.5 in risky asset, the return is

$R_p = R_f X_f + R_m(1 - X_f)$

$= (l2.5 \times -.5) + 20x\ 1.5$

$= - 6.25 + 30$

$= 23.75$

The variance of the above mentioned portfolio can be calculated by using the equation.

$$\sigma^2_p = \sigma^2_p X^2_f + \sigma^2_m (1 - X_f)^2 + 2Cov_{fm} X_f (1 - X_f)$$

The previous example can be taken for the calculation of the variance. The variance of the risk free asset is in. The variance of the risky asset is assumed to be 15. Since the variance of the risky asset is zero, the 1, rtfolio risk solely depends on the portion of investment on risky asset.

Proportion in risky asset ($1-X_f$)	Portfolio risk
0.5	1.0
1.5	7.5
1.5	22.5

The risk is more in the borrowing portfolio being 22.5% and the return is also high among the three alternatives. In the lending portfolio, the risk is 7.5% and the return is also the lowest. The risk premium is proportional to risk, where the risk premium of a portfolio is defined as the difference between R_p - R_f i.e. the amount by which a risky rate of return exceeds the riskless rate of return.

Risk - Return Trade Off

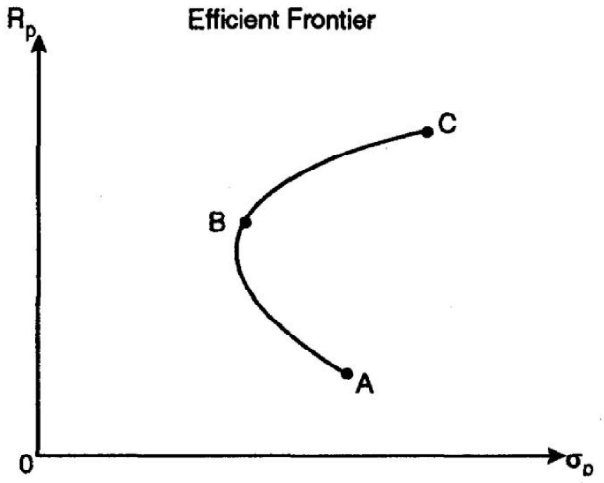
Portfolio Return R_p	Risk-free Return R_f	Risk Premium $R_p - R_f$	Portfolio Risk σ	Factor of Proportionality $(R_p - R_f)\sigma_p$
16.25	12.5	3.75	7.5	0.5
20.0	12.5	7.5	15.0	0.5
23.75	12.5	11.25	22.5	0.5

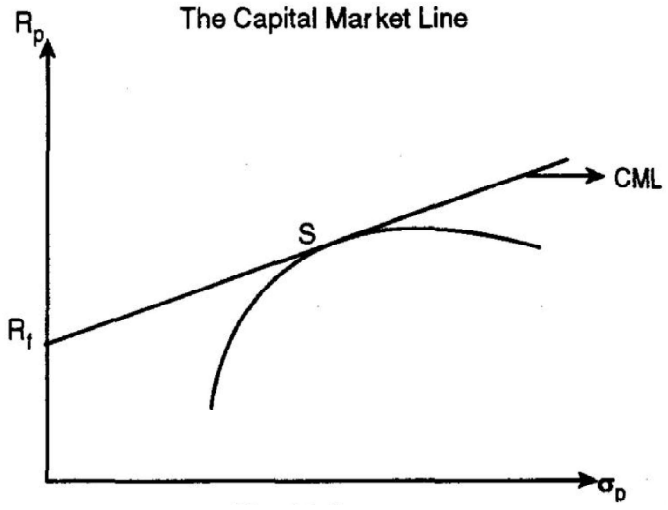
The risk-return proportionality ratio is a constant .5, indicating that one unit of risk premium is accompanied by 0.5 unit of risk.

The Concept

According to CAPM, all investors hold only the market portfolio and riskless securities. The market portfolio is a portfolio comprised of all stocks in the market. Each asset is held in proportion to its market value to the total value of all risky assets. For example, if Reliance Industry share represents 20% of all risky assets, then the market portfolio of the individual investor contains 20% of Reliance industry shares. At this stage, the investor has the ability to borrow or lend any amount of money at the riskiness rate of interest. The efficient frontier of the investor is given in fig 13.1.

fig 13.1.





The figure shows the efficient frontier of the investor. The investor prefers any point between B and C because, with the same level of risk they face on line BA, they are able to get superior profits. The ABC line shows the investor's, portfolio of risky assets. The investors can combine riskless asset either by lending or borrowing. This is shown in Figure.

The line $R_f S$ represents all possible combination of riskless and risky asset. The 'S' portfolio does not represent any riskless asset but the line RS gives the combination of both. The portfolio along the path RS is called lending portfolio that is some money is invested in the riskless asset or may be deposited in the bank for a fixed rate of interest. If it crosses the point S. it becomes borrowing portfolio. Money is borrowed and invested in the risky asset. The straight line is called capital market line (CML). It gives the desirable set of investment opportunities between risk free and risky investments. The CML represents linear relationship between the required rates of return for efficient portfolios and their standard deviations.

$E(R_p)$ = portfolio's expected rate of return

R_m = expected return on market portfolio

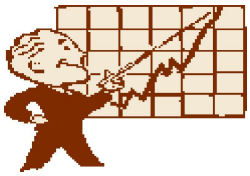
σ_m = standard deviation of market portfolio

σ_p = standard deviation of the portfolio

For a portfolio on the capital market line, the expected rate of return in excess of the risk free rate is in proportion to the standard deviation of the market portfolio. The price of the risk is given by the slope of the line. The slope equals the premium for the market portfolio $R_m - R_f$ divided by the risk or standard deviation of the market portfolio. Thus, the expected return of an efficient portfolio is:

Expected return = Price of time + (Price of risk . Amount of risk)

Price of time is the risk free rate of return. Price of risk is the premium amount higher and above the risk free return.



CHECK YOUR PROGRESS

Q1: What is CAPM Theory

.....

.....

Q2: What is market portfolio

.....

.....

13.4 SECURITY MARKET LINE (SML)

The risk-return relationship of an efficient portfolio is measured by the capital market line. But, it does not show the risk-return trade off for other portfolios and individual securities. Inefficient portfolios lie below the capital market line and the risk-return relationship cannot be established with the help of the capital market line. Standard deviation includes the systematic and unsystematic risk. Unsystematic risk can be diversified and it is not related to the market. If the unsystematic risk is eliminated, then the matter of concern is systematic risk alone. This systematic risk could be measured by beta. The beta analysis is useful for individual securities arid portfolios whether efficient or inefficient.

When an additional security is added to the market portfolio, an additional risk is also added to it. The variance of a portfolio is equal to the weighted sum of the co-variances of the individual securities in the portfolio.

If we add an additional security to the market portfolio, its marginal contribution to the variance of the market is the covariance between the security's return and market portfolio's return. If the security i am included, the covariance between the security and the market measures the risk. Covariance can be standardized by dividing it by standard deviation of market portfolio coy i_m / σ_m. This shows the systematic risk of the security. Then, the expected return of the security i is given by the equation:

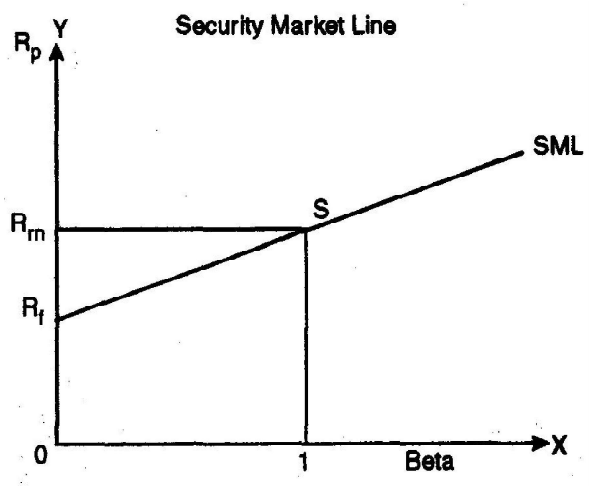
$$R_i - R_f = (R_m - Rf / \sigma_m) Coyi_m / \sigma_m$$

This equation can be rewritten as follows

$$R_i - R_f = Coyi_m / \sigma^2_m (R_m - Rf)$$

The first term of the equation is nothing but the beta coefficient of the stock. The beta coefficient of the equation of SML is same as the beta of the market (single index) model. In equilibrium, all efficient and inefficient portfolios lie along the security market line. The SML line helps to determine

the expected return for a given security beta. In other words, when betas are given, we can generate expected returns for the given securities. This is explained in fig 13.2.



If we assume the expected market risk premium to be 8% and the risk free rate of return tube 7%, we can calculate expected return for A, B and C securities using the formula:

$E(R_i) = R_f + ß_i[E(R_m)-R_f]$

If beta for ß = 1

If beta for = 1

= 7 + 1 (8)

= 15%

Security A

Beta = 1.10

E(R) = 7+1.10(8)

= 15.8

Security B

Beta = 1.20

E(R) = 7 + 1.20(8)

= 16.8 = 16.6

Security C

Beta = .7

E(R) = 7 + .7(8)

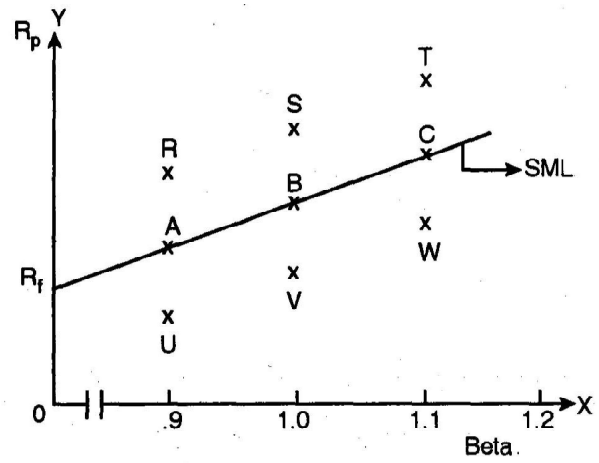
=12.6

The same can be found out easily from the figure too. All we have to do is, to mark the beta on the horizontal axis and draw a vertical line from the relevant point to touch the SML line. Then from the point of intersection, draw another horizontal line to touch the Y axis. The expected return could be very easily read from the Y axis. The securities A and B are aggressive securities, because their beta values are greater than one. When beta values are less than one, they are known as defensive securities. In our example, security C has the beta value less than one.

13.5 EVALUATION OF SECURITIES

Relative attractiveness of the security can be found out with the help of security market line. Stocks with high risk factor are expected to yield more return and vice-versa. But the investor would be interested in knowing whether the security is offering return more or less proportional to its risk.

Fig: 13.3 Evaluation of Securities with SML



The fig 13.3 provides an explanation for the evaluation. There are nine points in the diagram. A, B and C lie on the security market line, R, S and T above the SML and U, V and W below the SML. ARU have the same beta level of, 9. Likewise beta values of SBV = 1.00 and TCW = 1.10. The stocks above the SML yield higher returns for the same level of risk. They are underpriced compared to their beta value. With the simple rate of return formula, we can prove that they are undervalued.

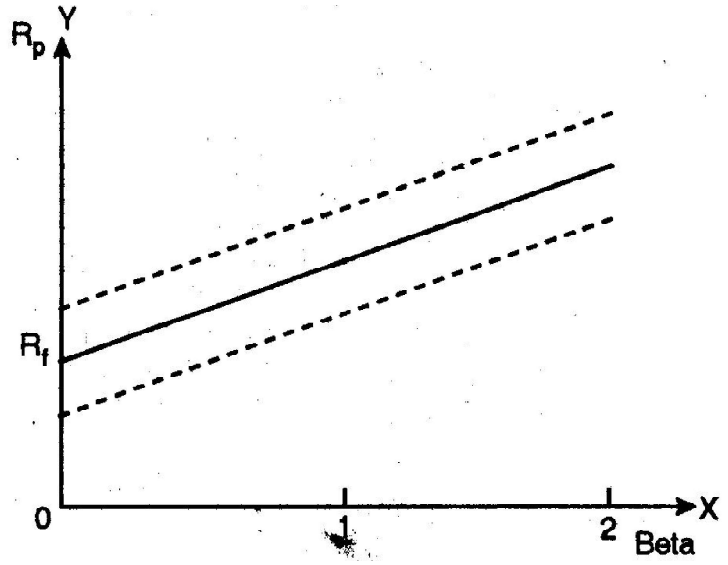
P_i is the present price P_0 - the purchase price and Div - Dividend. When the purchase price is low i.e. when the denominator value is low, the expected return could be high. Applying the same principle the stocks U, V and W can be classified as overvalued securities and are expected to yield lower returns than stocks of comparable risk. The denominator value may be high i.e. the purchase price may be high. The prices of these scripts may fall and lower the denominator. There by, they may increase the returns on securities.

The securities A, B and C are on the line. Therefore considered to be appropriately valued. They offer returns in proportion to their risk. They have average 4oclc performance, since they are neither undervalued nor overvalued.

13.6 MARKET IMPERFECTION AND SML

Information regarding the share price and market condition may not be immediately available to all investors. Imperfect information may affect the valuation of securities. In a market with perfect information, all securities should lie on SML. Market imperfections would lead to a band of SML rather than a single line. Market imperfections affect the width of the SML to a band. If imperfections are more, the width also would be larger. SML in imperfect market is given in fig 13.4.

Fig 13.4 SML in Imperfect Market



13.7 EMPIRICAL TESTS OF THE CAPM

In the CAPM, beta is used to estimate le systematic of the security and reflects the future volatility of the stock in relation to the market. Future volatility of the stock is estimated only through historical data. Historical data are used to plot the regression line or the characteristic line and calculate beta. If historical betas are stable over a period of time, they would be good proxy for their ex-ante or expected risk.

Robert A. Levy, Marshall B. Blume and others have studied the question of beta stability in depth. They calculated betas for both Individual securities and portfolios. Their study results have provided the following conclusions:

(1) The betas of individual stocks are unstable; hence the past betas for the individual securities are not good estimators of future risk.

(2) The betas of portfolios of ten or more randomly selected stocks are reasonably stable, hence the portfolio betas are good estimators of future portfolio volatility. This is because of the errors in the estimates of individual securities' betas tend to offset one another in a portfolio.

Various researchers have attempted to find out the validity of the model by calculating beta and realized rate of return. They attempted to test (1) whether the intercept is equal to i.e. risk free rate of interest or the interest rate offered for treasury bills (2) whether the line is linear and pass through the beta = 1 being the required rate of return of the market. In general, the studies have showed the following results.

(1) The studies generally showed a significant positive relationship between the expected return and t systematic risk. But the slope of the relationship is usually less than that of predicted by the CAPM.

(2) The risk and return relationship appears to be linear. Empirical studies give no evidence of significant curvature in the risk/return relationship,.

(3) The attempts of the researchers to assess the relative importance of the market and company risk have yielded definite results. The CAPM theory implies that unsystematic risk is not relevant, but unsystematic and systematic risks are positively related to security returns. Higher

returns are needed to compensate both the risks. Most of the observed relationship reflects statistical problems rather than the true nature of capital market.

(4) According to Richard Roll, the ambiguity of the market portfolio leaves the CAPM untestable. The practice of using indices as proxies is loaded with problems. Different indices yield different betas for the same security.

(5) If the CAPM were completely valid, i4 should apply to all financial assets including bonds. But, when bonds are introduced into the analysis, they do not fall on the security market line.

13.8 PRESENT VALIDITY OF CAPM

The CAPM is greatly appealing at an intellectual level, logical and rational. The basic assumptions on which the model is built raise, some doubts in the minds of the investors. Yet, investment analysts have been more creative in adapting CAPM for their uses.

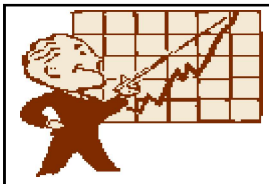
(1) The CAPM focuses on the market risk, makes the investors to think about the riskiness of the assets in general. CAPM provides basic concepts which are truly of fundamental value.

(2) The CAPM has been useful in the selection of securities and portfolios. Securities with higher returns are considered to be undervalued and attractive for buy. The below normal expected return yielding securities are considered to be overvalued and Suitable for sale.

(3) In the CAPM, it has been assumed that investors consider only the market risk. Given the estimate of the risk free rate, the beta of the firm, stock and the required market rate of return, one can find out the expected returns for a firm's security. This expected return can be used as an estimate of the cost of retained earnings.

(4) Even though CAPM has been regarded as a useful tool to financial analysts, it has its own critics too. They point out, when the model is ex-ante, the inputs also should be ex-ante, i.e. based on the expectations of the future. Empirical tests and analyses have used ex-post i.e. past data only.

(5) The historical data regarding the market return, risk free rate of return and betas vary differently for different periods. The various methods used to estimate these inputs also affect the beta value. Since the inputs cannot be estimated precisely, the expected return found out through the CAPM model is also subjected to criticism 4.



CHECK YOUR PROGRESS

Q3: What does standard deviation includes.

.....

.....

Q4: How is historical data calculated.

.....

.....

Q5: What is the use of security market line

.....

.....



13.9 LET US SUM UP

In this unit we have discussed the following :

- Markowitz, William Sharpe, John Lintner and Jan Mossin provided the basic structure for the CAPM model. It is a model of linear general equilibrium return. In the CAPM theory, the required rate return of an asset is having a linear relationship with asset's beta value i.e. undiversifiable or systematic risk.
- According to CAPM, all investors hold only the market portfolio and riskless securities. The market portfolio is a portfolio comprised of all stocks in the market. Each asset is held in proportion to its market value to the total value of all risky assets.
- Price of time is the risk free rate of return. Price of risk is the premium

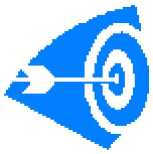
amount higher and above the risk free return.

- Relative attractiveness of the security can be found out with the help of security market line. Stocks with high risk factor are expected to yield more return and vice-versa.
- Market imperfections would lead to a band of SML rather than a single line. Market imperfections affect the width of the SML to a band. If imperfections are more, the width also would be larger.



13.10 FURTHER READING

- M. Ranganathan and R. Madhumathi(2005); *Investment Analysis and Portfolio Management,* Pearson Education, New Delhi.
- Punithavathy Pandian(2012); *Security Analysis and Portfolio Management,* Vikas Publishing House Pvt. Ltd., New Delhi.
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- Prasanna Chandra(2017); *Investment Analysis and Portfolio Management,* McGraw Hill Education, Delhi.



13.11 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q No.1: Markowitz, William Sharpe, John Lintner and Jan Mossin provided the basic structure for the CAPM model. It is a model of linear general equilibrium return. In the CAPM theory, the required rate return of an asset is having a linear relationship with asset's beta value i.e. undiversifiable or systematic risk.

Ans to Q No.2: The market portfolio is a portfolio comprised of all stocks in the market.

Ans to Q No.3: Standard deviation includes the systematic and unsystematic risk.

Ans to Q No.4: Historical data are used to plot the regression line or the characteristic line and calculate beta.

Ans to Q No.5: Relative attractiveness of the security can be found out with the help of security market line.



13.13 MODEL QUESTIONS

Q 1: Discuss Capital Asset Pricing Theory

Q 2: Describe the Security Market Line

Q 3: How is Evaluation of Securities is done.

Q 4: What is Market Imperfection and SML

Q 5: Explain Empirical Tests of the CAPM

Q 6: What is Present Validity of CAPM

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UNIT 14 : CAPITAL MARKET THEORY AND THE ARBITRAGE PRICING THEORY

UNIT STRUCTURE

14.1 Learning Objectives

14.2 Introduction

14.3 Capital Asset Pricing Model (CAPM)

14.4 Concepts of Risk-free Asset, Risk-free Lending and Risk-free Borrowing

14.5 Efficient Set with Risk Free Lending and Borrowing

- 14.5.1 Leveraged Portfolio
- 14.5.2 Market Portfolio
- 14.5.3 Capital Market Line

14.6 The CAPM

- 14.6.1 Assumptions
- 14.6.2 Security Market Line
- 14.6.3 Limitations

14.7 Arbitrage Pricing Theory (APT)

14.8 Let Us Sum Up

14.9 Further Reading

14.10 Answers to Check your Progress

14.11 Model Question

14.1 LEARNING OBJECTIVES

After going through this unit, you will be able to:

- outline the basic tenets and assumptions of Capital Asset Pricing Model (CAPM) define risk free asset, risk free lending, risk free borrowing and leveraged portfolio
- discuss and illustrate the implications of leveraged portfolio for efficient set and Capital Market Line (CML)
- describe 'beta' measure of systematic risk and the Security Market Line (SML) that relates the expected return for an asset to its beta
- discuss the limitations of CAPM and describe alternative theory namely Arbitrage Pricing Theory (APT) Structure.

14.2 INTRODUCTION

In this unit we are going to discuss the concepts of Capital Market Theory, Assumptions,Security Market Line and its limitations. This theory sets the environment in which securities analysis is preformed. Without a well-constructed view of modem capital markets, securities analysis may be a futile activity. A great debate, and great divide, separates the academics, with their efficient market hypothesis, and the practitioners, with their views of market inefficiency. Although the debate appears surreal and unimportant at times, its resolution is immensely critical for conducting effective securities analysis and investing successfully.

In this unit we will geta fair idea about Concepts of Risk-free Asset, Risk-free Lending and Risk-free Borrowing, Leveraged Portfolio,Market Portfolio, Capital Market Line and Arbitrage Pricing Theory (APT).

14.3 CAPITAL ASSET PRICING MODEL(CAPM)

The Capital Asset Pricing Model (CAPM) is commonly confused with portfolio theory. Portfolio theory is simply the use of statistical and mathematical programming techniques to derive optimal tradeoffs between risk and return. Under very restrictive assumptions (rarely found in financial markets), the CAPM is a highly specialized subset of portfolio theory. Even so, the CAPM has become very popular as it provides a logical, common sense tradeoff between risk and return.

In this unit, our endeavor will be to extend the portfolio theory described in the previous two units, to the capital market theory that is concerned with pricing risky assets. In particular, we would like to know if two assets differ with respect to their risk, how will they differ in terms of the price investors are willing to pay or the rate of return investors expect to get from them?

The major implication of the capital market theory is that the expected return of an asset will be related to a measure of risk for that asset, known as ‘beta’. The exact manner in which expected return and beta are related

is specified by the Capital Asset Pricing Model or CAPM, which was developed in mid-1960s. The model has generally been attributed to Williams Sharpe, but similar independent derivations were, made to by John Linter and Jan Mossin. Consequently, the model is often referred to as Sharpe-Linter-Mossin (SLM) Capital Asset Pricing Model. Although the model has been extensively examined, modified and extended in the literature, the original SLM version of the CAPM still remains the central theme in capital market theory as well as in current practices of investment management.

14.4 CONCEPTS OF RISK-FREE ASSET, RISK-EREE LENDING AND BORROWING

Following the development of Markowitz portfolio model, institutional investors and others started realizing the need for considering the relationship between the stocks in constructing the portfolios. Many of these investors started using sophisticated mathematical models to derive optimal portfolio but always found it difficult to measure the same in view of large number of assets traded in the market. CAPM resolves this problem to an extent by considering investments in risk-free asset. As we will see in this Unit, giving investors these new opportunities will have major impact in the shape and allocation of the efficient set and subsequent portfolio selection. But before we proceed to discuss this aspect, let us get acquainted with the terms like 'risk-free asset', 'risk-free lending' and 'risk-free borrowing'.

Risk-free Asset: Risk-free asset is an asset, which has a certain future return. In other words, a risk-free asset is one for which there is no uncertainty regarding the future returns; that is, the investor knows exactly what the value of the asset will be at the end of the holding period. Thus, variance of returns of a risk-free asset is equal to zero. A good example of such asset is government bonds.

Whether all types of government bonds are risk-free asset? It is difficult to say because long-term government bonds are exposed to certain types of risk like interest rate risk and inflation risk. For instance, if the maturity period of a government security is (say) 15 years, while the investment

horizon (or the holding period) of an investor is (say) three-months, then the investor does not really know at what market price he will be able to sell the security at the end of his holding period. Any change in interest-rate structure during the holding period will-influence the market price of the security. To give an idea, upward revision of interest rate will have a tendency to lower the market price, such that yield-to-maturity at market-price-based acquisition of the security of given maturity period compares well with the yield-to-maturity of new issue with similar maturity period. This is an example of what is termed as 'interest-rate-risk'. Thus, normally, the short-term government securities like Treasury Bills are called risk-free securities. Can corporate debentures be treated as risk-free asset? Certainly not, because risk of default is associated with them in addition to interest rate risk and inflation risk. In fact, corporate bonds have more risk like liquidity risk. However, in relative term, they are better than equity on risk.

What is the co-movement of returns of risk-free asset and risky asset (or portfolio of risky assets)? Interestingly, it is always zero. We may recall that covariance between returns of two-assets 'i' and 'j' are given by

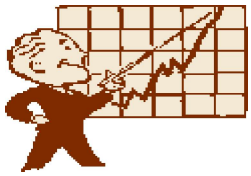
$$\sigma_{ij} = \rho_{ij}\sigma_i\sigma_j$$

where ρ_{ij}, σ_i, σ_j are the correlation co-efficient and standard deviation of returns on assets i' and 'j' respectively. If one of the assets is risk-free asset, say asset 'i', then by definition returns on risk-free asset are certain such that the standard deviation (σ_i) is zero and hence the co-variance (σ_{ij}) is also zero.

As we will see later, these two characteristics of risk-free asset, namely, (a) variance = 0; and (b) covariance of returns with any other asset = 0, are quite significant in determining the shape of efficient frontier.

Risk-Free Lending and Borrowing: Investing in a risk-free asset is frequently referred to as 'risk-free lending', since investment in such assets tantamount to giving loan directly to the government. An investor does not have to depend solely on his own wealth to decide how much to invest in assets. She/he can borrow and invest, i.e., the investor can use financial

leverage. However, investor will have to pay interest on borrowed funds and such borrowing is also assumed to have same risk-free interest rate and hence deemed as "risk-free borrowing". Though it may not be practical for an ordinary investor to borrow at risk-free interest rate, it is quiet possible for large funds to borrow at a rate close to risk-free rate.



CHECK YOUR PROGRESS

Q1:What do the following stand for:

a. CAPM ……

b. CML ……

c. SML……

d. SLM……

e. APT……

14.5 EFFICIENT SET WITH RISK-FREE LEADING AND BORROWING

The efficient frontier consists of only risky securities. What happens to the average rate of return and standard deviation of returns when a risk-free asset is combined with a portfolio of risky assets such as exists on the Markowitz efficient frontier?

The expected portfolio return (R_P is given by

$R_P = XR_f + (1- x)R_i$

where,

x = the proportion of the portfolio invested in a risk free asset;

R_f = risk-free rate of return; and

R_i = expected return on risky portfolio 'i' .

Recalling equation (10.2), variance of returns for two-asset portfolio (σ^2_p) is as follows:

$$\sigma^2 = [x^2\sigma^2_f] + [(1-x)^2\sigma^2_i] + [2x(1-x)\sigma_{if}] \quad \text{---- eq 14.1}$$

Where, σ^2_f and σ^2_i are the return variances of risk-free asset and risky portfolio respectively, and σ_{if} is the covariance of returns between risk-free asset and portfolio of risky assets i.

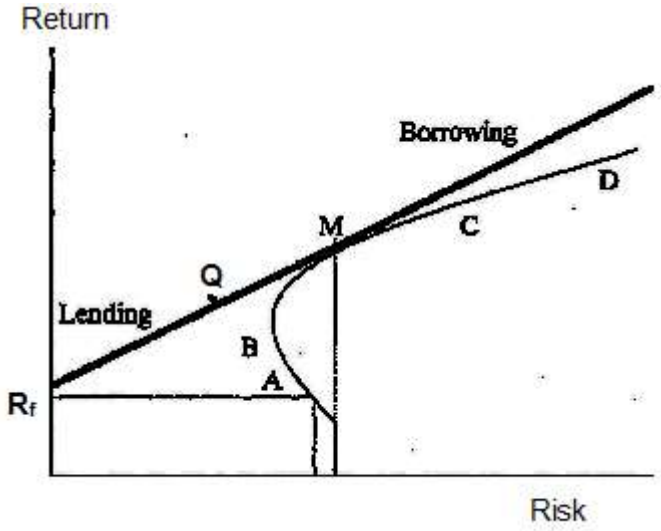
As we have noted earlier, for risk-free asset variance and covariance terms are Zero, i.e., $\sigma^2_f = 0$ and $\sigma_{if} = 0$; and so equation retains only the middle terns and reduces to

$$\sigma^2_p = (1-x)^2\sigma^2_i$$

$$\sigma_p = (1-x)\sigma_i \qquad \text{---- eq 14.3}$$

As the equations (14.1) and (14.2) are both linear, the returns-risk graph for portfolio possibilities, combining the risk-free asset and risky portfolios on Markowitz efficient frontier, is represented by a straight line. Figure 14.1 illustrates the position.

Figure 14.1: Efficient Set of Portfolios with Risk-Free Asset



The set of efficient portfolios marked in the curve A, B, M, C, and D are set of portfolios consisting of risky assets. Suppose there is a risk-free asset offering a return of R_f Now compare an investment in the portfolio of A (consisting of risky assets) and investment in risk-free security. Investment in risk-free security offers a return higher than A but without any risk. Thus, investment in risk-free security is superior to investments in A and in that process A become inefficient portfolio. A tangent line drawn from R_f through the curve A-B-M-C-D is now become efficient portfolio. You may note that only one portfolio marked 'M', which consists of risky assets falls under the

new efficient frontier. Such portfolio is called 'market portfolio' which consists of all risky assets. Investors can now earn any return they like on the efficient frontier by investing a part of money in M, and the rest in R_f For instance, an investor, who is willing to take maximum risk, will invest entire wealth in M whereas an investor, who dislike risk invest the entire wealth in R_f An investor with moderate risk preference will invest 50% in R_f and the balance 50% in M. An investor, who want to go beyond M has to borrow at risk-free rate of interest and invest the amount in M and capture the difference between M and R_f to increase the return.

14.5.1 Leveraged Portfolio

A portfolio that includes at least some securities that were bought with borrowed money. A leveraged portfolio is risky because the securities may result in a loss, which would leave the investor liable to repay the borrowed capital. However, if the securities result in a gain, the investor has essentially made a profit without using his/her own money.

In the foregoing analysis it has been tacitly assumed that investors holding portfolios by combining risk-free asset and risky portfolio M, do so with their own funds. This is not a realistic assumption. In the real world, investors often purchase assets with borrowed funds. We now explore the implications of borrowing.

Assume that an investor is, of course, ready to accept higher level of risk, i.e., the investor is willing to hold portfolio with expected standard deviation of returns σ_p greater than σ_m. One alternative would be to choose a portfolio of risky assets on

Markowitz efficient frontier beyond M, such as the one at point C. A second alternative is to borrow money (i.e., add financial leverage) at risk-free rate and invest the same in the risky asset portfolio at M. By doing so, the investor can move from point M to, say, point Q along the extension of R_f to M line. And as is evident from Figure 14.1, such portfolios as at Q dominate all portfolios below

the line, including the portfolio at C.

To illustrate the point, let us assume that investors can borrow, whatever amount he wants, at a risk-free rate. In other words, we are assuming that risk-free lending and risk-free borrowing rates are the same (we will see the implication of relaxing this assumption later). We may further note that investors would not desire to simultaneously invest in risk-free asset and borrow money at risk-free rate. Now, suppose that an investor borrows an amount equal to 50 per cent of his original wealth of, say, Rs. 10,000. So he has total of Rs. 15,000 which he proposes to invest in portfolio M. What is the proportion of fund being invested in M? It is given by

1 - x = 15,000/10,000= 1.5

However, the sum of proportions being invested in risk-free assets and M must still equal one, which means that

x =-5,000/10,000=-0.5

The negative sign indicates borrowing, on which there will be interest payment at R_f. Thus, restating equation (14.1), we have

$R_P = -0.5R_f + 1.5R_m$

Assuming that R_f = 8% and R_m = 20%, the return on the leveraged portfolio will be = - 0.5 (.08) + 1.5 (0.20) = 0.26 or 26 per cent which is significantly higher than R_m, the expected return of 20 per cent on risky portfolio M. Using equation (14.2), the standard deviation of returns from leveraged portfolio works out to

$$\sigma_p = [1-(-.5)]\sigma_m = 1.5\sigma_m$$

Thus, our investor could increase return along the line R_f - M - Q. Herein lies the advantage of owning a 'leveraged' portfolio. However, leveraging also involves a trade-off; the risk of a leveraged portfolio is always higher than that of tangency portfolio, M (in the instant case it is 1.5 times).

14.5.2 Market Portfolio

In this unit you will learn more about the portfolio. A market portfolio is a theoretical bundle of investments that includes every

type of asset available in the world financial market, with each asset weighted in proportion to its total presence in the market. The discussion may look a bit abstract but necessary to get complete understanding on capital market theory. The portfolio M represents 'optimal combination of risky assets' and is referred to as "market portfolio". It may be explained as follows.

If all investors have homogenous expectations and they all face the same risk-free lending and borrowing rate (R_f), each one of them will generate the same risk-return graph as depicted in figure 14.1. Everyone would obtain the same tangency portfolio M, and invest in this portfolio in conjunction with risk-free lending or borrowing to achieve a personally preferred overall combination of risk and return. An aggressive investor may prefer a leveraged portfolio, which would have a higher risk and return than portfolio M. In contrast, a conservative investor might prefer a lending portfolio, which would have lower risk and return than the portfolio M. The decision to hold a leveraged or lending portfolio is purely a "financial decision" on an investor's risk preference. It has nothing to do with the decision about holding the combination of risky asset (i.e., investment decision) corresponding to the portfolio M. In other words, the composition of risky portfolio M and its inclusion in every investor's portfolio is independent of his or her risk -return preference; this aspect is known as `separation theorem', introduced by James Tobin in 1958.

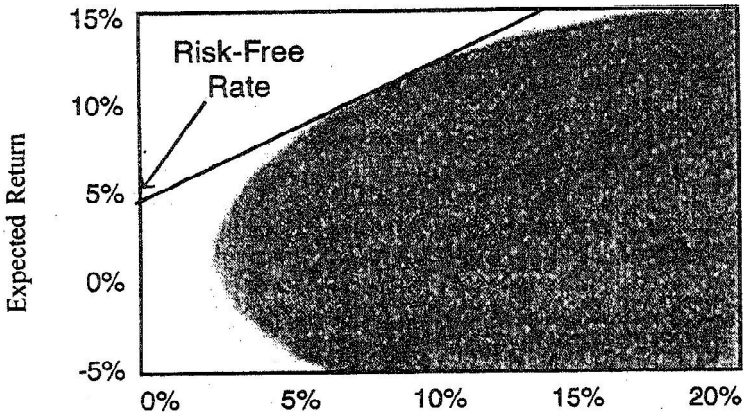
Another important feature of the portfolio M is that it represents a 'market portfolio - a portfolio that is comprised of all risky assets, where the proportion to be invested in each asset corresponds to its relative market value. Why must the portfolio M include some investment in every risky asset? If a risky asset was not in this portfolio, it would mean that nobody is investing in that asset; obviously, the market price of the asset must fall, which in turn would cause the expected return to rise, until it is being included in the portfolio M. In the market portfolio, the asset is held in the proportion that the market value of that asset represents of the total

market value of all risky assets. If, for example, there is a higher proportion of an asset than is justified by its market value, the excess demand for this asset will result in increase in its price until its value becomes consistent with the proportion. Thus, when all the price adjustments are over, i.e., market is brought into equilibrium, tangency portfolio M becomes the market portfolio. Besides, it is the most diversified portfolio, since it contains all the risky assets.

14.5.3 Capital Market Line (CML)

Capital market line (CML) is the tangent line drawn from the point of the risk-free asset to the feasible region for risky assets.With the identification of M as market portfolio, we may define the straight line from R_f through M, as 'capital market line' (CML). This line represents the risk premium as a result of taking on extra risk. James Tobin added the notion of leverage to Modern Portfolio Theory by incorporating into the analysis an asset, which pays a risk-free rate of return. By combining a risk-free asset with risky assets, it is possible to construct portfolios whose risk-return profiles are superior to those of portfolios on the efficient frontier. Consider the diagram below:

Figure 14.2: Capital Market Line



The capital market line is the tangent line to the efficient frontier that passes through the risk free rate on the expected return axis.

The risk -free rate is assumed to be 5%, and a tangent line-

called the capital market line-has been drawn to the efficient frontier passing through the risk-free rate. The point of tangency corresponds to a portfolio on the efficient frontier. That portfolio is called the "super efficient" portfolio. The Capital Asset Pricing Model demonstrates that, given certain simplifying assumptions, the super-efficient portfolio must be the market portfolio.

Using the risk-free asset, investors who hold the super-efficient portfolio may:

- Leverage their position by shorting the risk-free asset and investing the proceeds in additional holdings in the super-efficient portfolio, or
- Deleverage their position by selling some of their holdings in the super-efficient portfolio and investing the proceeds in the risk-free asset.

All types of investors, whether aggressive or conservative, will achieve their desired risk-return levels by combining market portfolio with risk-free lending or borrowing along the CML. Let us re-examine the equation (14.1) of the capital market line to make a few more observations at this stage. The term $(rm - r_m) / \sigma_m$, the slope of capital market line, can be thought of as the market price of risk for all efficient portfolios. It is extra return that can be gained by increasing the level of risk (standard deviation) on an efficient portfolio by one unit. Thus, the entire second term of equation (14.1) represents that element of expected portfolio return that compensates for the risk level accepted. The first term, risk-free rate (or the intercept of CML), is often referred to as the reward for waiting or the return required for delaying potential consumption for one period.

With these two terms, CML sets the expected return on an efficient portfolio as (Price of time) + [(Price of risk) x (Amount of risk)]

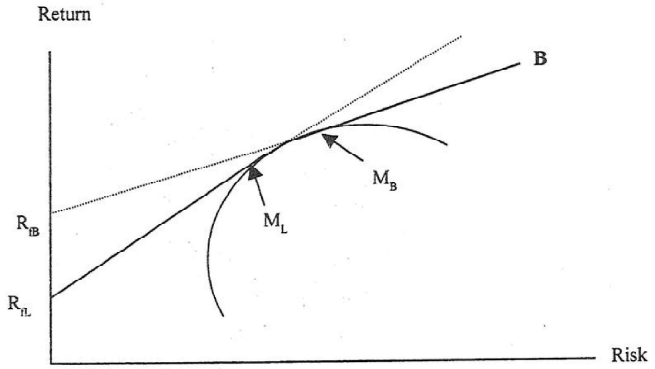
When Risk-Free Rates are different

In the foregoing discussion we assumed that risk-free rates

of lending and borrowing are the same. We now relax this assumption, and consider that where the additional subscripts B and L refer to borrowing and lending respectively.

Figure 14.3 shows the modified efficient set; it consists of three distinct but connected segments, R_{fL} - M_L - M_B - B

Figure 14. 3: Efficient Set of Portfolios with different Risk-free rates



The construction of this efficient set can be explained as follows: If $R_{fL} = R_{fB}$, then the resulting efficient set will be given by the straight line from R_{fL} through M_L. On the other hand, if risk-free lending and borrowings rates are the same, but the rate is set at a higher level equal to R_{fB}, then the efficient set of portfolios will lie on the straight line from R_{fB} through M_B. We may note that M_B is at a higher level than M_L on Markowitz's efficient set, since it corresponds to a tangency point associated with higher risk-free rate, R_{fB}

Now, since the investor cannot borrow at R_{fL}, that part of the line emanating from R_{fL} that extends past M_L is not available to the investors (shown in Figure 14.3 by dotted lines) and can be removed from our consideration. Again, since the investors cannot invest in a risk-free asset that earns a rate equal to R_{fB}, that part of the line from R_{fB} and going through M_B, but lying to the left of M_B, is not available to the investors; and, hence, can be ignored. On the whole, R_{fL} - M_L - M_B - B becomes the relevant efficient set to investors who can lend at R_{fL} and borrow at R_{fB}

14.5 THE CAPITAL ASSET PRICING MODEL (CAPM)

In this section, we turn to the basic Capital Asset Pricing Model developed by Sharpe, Linter and Mossin. We present here a descriptive model of how assets are priced.

The CAPM model describes the relationship between risk and expected return, and serves as a model for the pricing of risky securities. CAPM says that the expected return of a security or a portfolio equals the rate on a risk-free security plus a risk premium. If this expected return does not meet or beat required return then the investment should not be undertaken.

The CAPM builds upon the Markowitz portfolio model and capital market line. Obviously, it pre-supposes all the assumptions stated earlier at appropriate places (including those stated in the previous two Units). Besides, the model itself adds few more assumptions. So, let us begin our discussion of the CAPM by putting together all the assumptions of the model at one place.

14.6.1 Assumptions

1. Investors evaluate portfolios by looking at expected returns and standard deviations of those portfolios over a one-period horizon.
2. Investors, when given a choice, between two otherwise identical portfolios, will choose the one with higher expected return.
3. Investors, when given a choice, between two otherwise identical portfolios, will choose the one with the lower standard deviation or risk.
4. Individual assets are infinitely divisible, meaning that an investor can buy a fraction of a share if he or she so desires.
5. There is a risk-free rate at which an investor may either lend money or borrow money.
6. Taxes and transaction costs are irrelevant.
7. All investors have the same one-period horizon.

8. The risk-free rate is the same for all investors.
9. Information is freely and instantly available to all investors.
10. Investors have homogeneous expectations, meaning that they have the same perceptions in regard to the expected returns, standard deviations and covariance of returns between any two assets.

Needless to say, many of these assumptions are unrealistic, and one may very well wonder how useful a model can be that is based on them. But, then assumptions are necessary in building a model, and we should not be so much concerned about the assumptions as we should be about how well the model explains the relationships that exist in the real world. In fact, several authors have shown that many of the above assumptions can be relaxed with minor impact on the CAPM and no change in the overall concept of the model.

14.6.2 Security Market Line (SML)

The security market line (SML) is a line drawn on a chart that serves as a graphical representation of the capital asset pricing model (CAPM), which shows different levels of systematic, or market, risk of various marketable securities plotted against the expected return of the entire market at a given point in time.

Given the capital market line (CML) and the dominance of the market portfolio, the relevant risk measure for an individual risky asset is its covariance with the market portfolio ($Cov_{i,M}$), or what is known as its 'systematic risk'. When this covariance is standardized by the covariance for the market portfolio, we obtain the well-known 'beta' measure. of systematic risk and a security market line (SML) that relates the expected return for an asset to its beta. Under the CAPM, the postulated relationship is such that higher an asset's beta, the higher its expected return.

To understand the CAPM and computation of beta, let us examine the whole issue intuitively. If the concept of CML is clear,

you will agree that it is not possible for any stock to offer a risk-return relationship below or above the CML. If it is below the CML, such stocks are known as overpriced stocks (meaning they offer lower return for a given level of risk and there is an alternative portfolio on the line of CML, which offer higher return) and investors will start selling the stock until its return increases to the level of CML. The same applies if there is a stock above CML in terms of risk and return and investors will buy such stocks by offering higher price until its return declines to CML. In CML, you can observe only two points namely R_f and M. Since M is an efficient portfolio, we assume that the risk associated with the M is the least. Further it is also a diversified portfolio and hence one can expect no unsystematic risk (Recall the discussion in Unit 9 on how diversification beyond a point fails to yield further results in reducing the risk) . Suppose a stock lies beyond M in the CML line and it means that the stock's risk is higher and hence offer higher return. Now, it is possible to quantify how much that the stock is riskier than M and such a measure is called beta of the stock. If the stock falls on the CML line, it's return (R_s) should satisfy the following equation.

$$R_s = R_f + \beta_s(R_m - R_f)$$

where $\beta_s = \beta_{sm} / \sigma^2 m$

The term β_s, representing covariance of returns between asset 's' and the market portfolio divided by return variance of market portfolio, is known as "beta co-efficient" or simply "beta" for asset. The above equation is the most often written form of the CAPM. If the beta and expected return of stocks are plotted, the line that shows the risk and return of all stocks in the market is called security market line (SLM). Let us now examine some properties of beta.

Beta is a means of measuring the volatility of a security or portfolio of securities in comparison with the market as a whole. Beta is calculated using regression analysis. Beta of 1 indicates that the security's price will move with the market. Beta of greater than 1 indicates that the security's price will be more volatile than

the market. Beta less than 1 means that it will be less volatile than the market.

Many Utilities stocks have a beta of less than 1. Conversely most high-tech stocks have a beta greater than one, they offer a higher rate of return but they are also very risky. For example, if a stock's beta is 1.2, it's 20% more volatile than the market. Beta is a good indicator of how risky a stock is. Beta is the sensitivity of a stock's returns in comparision to the returns on some market index (e.g., BSE Sensex, NSE-50 or BSE-100).

Beta values can be roughly characterized as follows:

1. β less than 0
   Negative beta is possible but not likely. People thought gold should have negative betas but that hasn't been true.
2. β equal to 0
   Cash under your mattress, assuming no inflation or any investments with a guaranteed constant return.
3. β between 0 and 1
   Low-volatility investments (e.g., Utility stocks)
4. β equal to 1
   Matching the index (e.g., any index fund offered by mutual funds)
5. β greater than 1
   Anything more volatile than the index (e.g., small cap. funds)
6. β much greater than 1 (tending toward infinity)
   Impossible, because the stock would be expected to go to zero on any market decline.
   Beta of 2-3 is probably as high as you will get.
   More interesting is the idea that securities may have different betas in up and down markets.

Here is an example showing the inner details of the beta calculation process: Suppose we collected end- of- the-month prices and any dividends for a stock and the BSE sensitive index for 61 months (0 to 60). We need n + 1 price observations to calculate n holding period returns, so since we would like to index the returns

as 1 to 60, the prices are indexed 0 to 60. Also, professional beta services use monthly data over a five-year period.

Now, calculate monthly holding period returns using the prices and dividends. For example, the return for month 2 will be calculated as:

$R_2 = (P_2-P_1+D_2) / P_1$

Here R denotes return, P denotes price, and D denotes dividend.

The following table of monthly data may help in visualizing the process. (Monthly data is preferred in the profession because investors' horizons are said to be monthly.)

Sl. No.	Date	Price	Dividend *	Return
0	31/12/96	45.20	0.00	
1	31/01/97	47.00	0.00	0.0398
2	28/02/97	*46.75*	0.30	0.0011
....	.....	.....	.....	.....
59	30/11/01	46.75	0.30	0.0011
60	31/12/01	48.00	0.00	0.0267

Note: (*) Dividend refers to the dividend paid during the period. They are assumed to be paid on the date. For example, the dividend of 0.30 could have been paid between 01/02/97 and 28/02/97, but is assumed to be paid on 28.02.97.

So now we'll have a series of 60 returns on the stock and the index (1 to 61). Plot the returns on a graph and fit the best-fit line (visually or using least squares process). In Figure 14.4(in the next page), you can see the monthly return of BSE Sensex and ITC over 60 months period (January 1997 - December 2001). In Table 14.1, the beta of stocks forming part of BSE Sensex along with return and total risk measures are listed. You may observe that many new economy stocks like Satyam, Zee Tele have high beta whereas multinational companies like Nestle, Castrol, HLL, Colgate have shown low beta. You may also observe that returns of the new economy stocks were also high compared to other low beta stocks. You may have to periodically revise the beta values since the risk of the stock changes over time based on changes in the economy and industry characteristics.

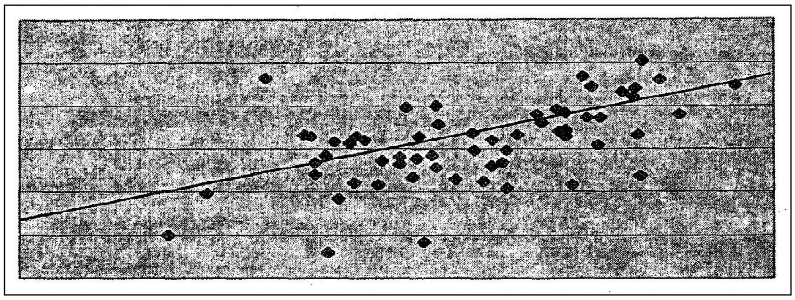
Table 14.1: Return, Variance, SD and Beta of BSE Sensex Stocks

Stock	Return	Variance	SD	Beta
BSE Sensex	0.10	16.99	4.12	1.00
Satyam	2.25	132.18	11.50	1.70
Infosys	1.67	97.61	9.88	1.44
Zee Tele	1.65	138.74	11.78	1.39
MTNL	0.08	61.20	7.82	1.25
L&T	0.18	50.86	7.13	1.18
BHEL	0.10	59.48	7.71	1.17
Telco	-0.18	66.10	8.13	1.16
RIL	0.47	58.62	7.66	1.15
ACC	0.34	60.15	7.76	1.13
ICICI	0.33	80.74	8.99	1.10
NET	0.64	101.07	10.05	1.10
SBI	0.14	47.16	6.87	1.08
M&M.	-0.24	61.47	7.84	1.07
Tisco	-0.02	49.57	7.04	1.03
ITC	0.53	45.90	6.78	0.92
Ranbaxy	0.56	44.92	6.70	0.90
Grasim	0.16	73.30	8.56	0.88
BSES	0.20	45.36	6.74	0.82
Dr. Reddy	1.17	53.77	.7.33	0.82
GA Cement	0.38	39.25	.6.26	0.78
Cipla	1.00	55.28	7.44	0.77
RPL	0.59	44.55	6.67	0.73
Glaxo	0.23	34.16	5.84	0.70
HPCL	0.29	60.29	7.76	0.68
Hindalco	0.19	41.01	6.40	0.67
HLL	0.53	29.88	5.47	0.67
Colgate	0.03	26.21	5.12	0.65
Bajaj Auto	-0.14	33.87	5.82	0.60
Castrol	0.08	22.78	4.77	0.53
Nestle	0.48	29.28	5.41	0.51

Note: Returns represent weekly return of the stock for a period of 1997-2001

If you had a portfolio of beta 1.2, and decided to add a stock with beta 1.5, then you know that you are slightly increasing the riskiness (and average return) of your portfolio. This conclusion is reached by merely comparing two numbers (1.2 and 1.5). That parsimony of computation is the major contribution of the notion of "beta". Conversely if you got cold feet about the variability of your beta = 1.2 portfolio, you could augment it with a few companies with beta less than 1. If you had wished to figure such conclusions without the notion of beta, you would have had to deal with large covariance matrices and nontrivial computations.

Figure 14.4: Monthly Return of BSE Sensex vs. ITC (1997 - 2001)



Hence, beta is the relevant measure of risk for an asset; it measures what is termed as 'systematic or market risk'. It can be shown that the 'total risk' of the asset, as measured by variance of its return, is of the following form

$$\sigma^2_i = \beta^2_i \sigma^2_m + \sigma^2_{ei} \qquad \text{(eq-14.3)}$$

where σ^2_{ei}, is the variance of return for the asset that is not related to the market portfolio. It is also said to measure 'unsystematic or unique risk'. We know that unique or unsystematic risk can be eliminated *in* a completely diversified portfolio such as the market portfolio. So, unsystematic risk is not relevant to investors, and they should not expect to receive added returns for assuming this risk. It is only in the case of assets with greater market risk or betas that

investors should expect higher return.

Second, beta of a portfolio is simply a weighted average of the betas of its component assets (n) where the proportions invested in the assets (x_i) are the weights. Thus, portfolio beta (β_p) is given by

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

we may illustrate this point by taking a stock portfolio comprising seven stocks with their betas and portfolio proportions given as follows:

(1)	(2)	(3)	(4)
Company	Beta	PORTFOLIO PROPORTIONS	WEIGHTED BETA
A	1.50	11.7	.175
B	1.36	22.2	.302
C	1.37	15.7	.215
D	1.07	5.3	.056
E	1.17	26.2	.306
F	1.73	13.9	.240
G	1.09	5.1	.055
		100.0	1.349

The beta of this stock portfolio is 1.35, which is obtained by summing up the multiproduct of (2) and (3) above and shown under (4). It is easy to see the central role played by the beta in the determination of expected return and risk for stocks as well as portfolio and thus in stock selection and portfolio creation and revision.

14.6.3 Limitations

You may be now interested in knowing whether security returns is in fact directly related to beta, as the CAPM asserts. Research results suggest that the CAPM does not reflect the world well at least when tested using ex-post data. Critics have pointed

out that the inadequacy of the model is due to its austerity. The market, in principle includes all stocks, a variety of other financial instruments, and even non-marketable assets such as an individual's investment in education; to which no market index like the SP 500 Index in US or Bombay Stock Exchange National Index (or any other index used to represent the market) can be a perfect proxy. And when we measure market risk using an imperfect proxy, we may obtain a quite imperfect estimate of market sensitivity. Secondly, the CAPM asserts that only a single number- market return - is required to measure risk. The actual returns depend upon a variety of anticipated an unanticipated events. Thus, while systematic factors are the major sources of risk in portfolio return, different portfolios have different sensitivities to these factors. It is the recognition of this phenomenon which lies at the core of an alternative-pricing model called Arbitrage Pricing Theory (APT). Let us briefly discuss APT in the following section.

14.7 ARBITRAGE PRICING THEORY (APT)

As noted above, at the core of APT is the recognition that several systematic factors affect security returns. It is possible to see that the actual return, R, on any security or portfolio may be broken down into three constituent parts, as follows:

$$R = E + b f + e$$

where:

E = expected return on the security

b = security's sensitivity to change in the systematic factor

f = the actual return on the systematic factor

e = returns on the unsystematic factors

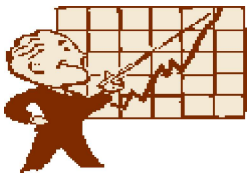
The above Equation merely states that the actual return equals the expected return, plus factor sensitivity times factor movement, plus residual risk. The subtler rationale and mathematics of APT are left out here. The empirical work suggests that a three or four - factor model adequately captures the influence of systematic factors on stock - market returns. The APT Equation may thus be expanded to :

$$R = E + (b_1)(f_1) + (b_2)(f_2) + (b_3)(f_3) + (b_4)(f_4) + e$$

Each of the four middle terms in this equation is the product of the returns on a particular economic factor and the given stock's sensitivity to that factor. What are these factors and separating unanticipated from anticipated factor movements in the measurement of sensitivities is perhaps the biggest problem in APT. Some of the factors empirically found to be useful in measuring risk are:

- Changes in expected inflation, unanticipated changes in inflation, industrial production, default-risk premium and term structure of interest rates (Roll & Ross, J FE, Mar 77)
- Default risk, term structure of interest rates, inflation, long term expected growth rate of profits for the economy, and residual market risk (Berry, FAJ, Mar-Apr 88)

It may be noted that CAPM and APT are different variants of the true equilibrium pricing model. Both are, therefore, useful in supplying intuition into the way security prices and equilibrium returns are established.



CHECK YOUR PROGRESS

Q2: Define Leveraged Portfolio.

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Q3: Define Capital Market line.

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Q4: Define Market Portfolio.

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Q5: Define Security Market line.

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14.8 LET US SUM UP

In this unit we have discussed the following points:

- CAPM is a highly specialized subset of portfolio theory.
- Risk-free asset is an asset, which has a certain future return. In other words, a risk-free asset is one for which there is no uncertainty regarding the future returns; that is, the investor knows exactly what the value of the asset will be at the end of the holding period.
- A leveraged portfolio is risky because the securities may result in a loss, which would leave the investor liable to repay the borrowed capital.
- Capital market line (CML) is the tangent line drawn from the point of the risk-free asset to the feasible region for risky assets.
- The security market line (SML) is a line drawn on a chart that serves as a graphical representation of the capital asset pricing model (CAPM), which shows different levels of systematic, or market, risk of various marketable securities plotted against the expected return of the entire market at a given point in time.



14.9 FURTHER READING

- Fischer, Donald E, and Ronald J. Jordon (1995), *Security Analysis and Portfolio Management, 6th* ed., PHI, New Delhi
- Nancy, Efficient? Chaotic? *What is the New Finance?* Harvard Business Review, March-April, 1993.M. Ranganathan and R. Madhumathi(2005); *Investment Analysis and Portfolio Management,* Pearson Education, New Delhi.
- Punithavathy Pandian(2012); *Security Analysis and Portfolio Management,* Vikas Publishing House Pvt. Ltd., New Delhi.
- Bharti V. Phathak (2014); *Indian Financial System,* Pearson Education, Delhi.

- Donald E. Fischer and Ronald J. Jordon (2002): *Security Analysis and Portfolio Management*, Pearson Education India.
- Prasanna Chandra(2017); *Investment Analysis and Portfolio Management,* McGraw Hill Education, Delhi.



14.10 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q1: a. CAPM -Capital Asset Pricing Model

b. CML -Capital Market Line

c. SML-Security Market Line

d. SLM- Sharpe-Linter-Mossin Capital Asset Pricing Model

e. APT- Arbitrage Pricing Theory

Ans to Q2: A portfolio that includes at least some securities that were bought with borrowed money. A leveraged portfolio is risky because the securities may result in a loss, which would leave the investor liable to repay the borrowed capital. However, if the securities result in a gain, the investor has essentially made a profit without using his/her own money.

Ans to Q3: Capital market line (CML) is the tangent line drawn from the point of the risk-free asset to the feasible region for risky assets.

Ans to Q4: A market portfolio is a theoretical bundle of investments that includes every type of asset available in the world financial market, with each asset weighted in proportion to its total presence in the market.

Ans to Q5: The security market line (SML) is a line drawn on a chart that serves as a graphical representation of the capital asset pricing model (CAPM), which shows different levels of systematic, or market, risk of various marketable securities plotted against the expected return of the entire market at a given point in time.



14.11 MODEL QUESTIONS

1) Define risk free asset. List out two risk free assets.
2) Compare and contrast Capital Market Line (CML) and Security Market Line (SML).
3) What are the basic assumptions underlying Capital Asset Pricing Model?
4) Define efficient frontier. What happens to the Capital Market Line and the choice of an optimal portfolio if borrowing rate is allowed to exceed the lending rate?
5) Define leveraged portfolio and bring out its implications for capital market line.
6) Compare and contrast CAPM and APT. Which of the two is a better model for pricing risky assets and why?
7) Assume the SML is given as $R_i = 0.05 + .06\beta$ and the estimated below on two stocks are $\beta_x = .04$ and $\beta_\gamma = 1.5$. What must be the expected return on two securities in order for one to feel that they are a good purchase?
8) What specifically should a 'true believer' in the CAPM do with her money if she seeks to hold a portfolio with a beta of 1.5?
9) The following data are available to you as a portfolio manager:
    a) Draw a security market line. In terms of the security market line, which of the securities listed above are undervalued? Why?
    b) Assuming that a portfolio is constructed using equal proportions of the five stocks listed above, calculate the expected return and risk of such a portfolio.
10. Compare and contrast standard deviation and beta as measure of stock and portfolio risks.

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