INVESTMENT:

UNIT - 1

Investment involves making of a sacrifice in the present with the hope of deriving future benefits. Two most important features of an investment are current sacrifice and future benefit. Investment is the sacrifice of certain present values for the uncertain future reward. It involves numerous decision such as type, mix, amount, timing, grade etc, of investment the decision making has to be continues as well as 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 has many meaning and facets. However, investment can be interpreted broadly from three angles -

- economic,
- layman,
- financial.

Economic investment includes the commitment of the fund for net addition to the capital stock of the economy. The net additions to the capital stock means an increase in building equipments or inventories over the amount of equivalent goods that existed, say, one year ago at the same time.

The layman uses of the term investment as any commitment of funds for a future benefit not necessarily in terms of return. For example a commitment of money to buy a new car is certainly an investment from an individual point of view.

Financial investment is the commitment of funds for a future return, thus investment may be understood as an activity that commits funds in any financial or physical form in the presence of an expectation of receiving additional return in future. In the present context of portfolio management, the investment is considered to be financial investment, which imply employment of funds with the objective of realizing additional income or growth in value of investment at a future date. Investing encompasses very conservative position as well as speculation the field of investment involves the study of investment process. Investment is concerned with the management of an investors' wealth which is the sum of current income and the present value of all future incomes. In this text investment refers to financial assets. Financial investments are commitments of funds to derive income in form of interest, dividend premium, pension benefits or appreciation in the value of initial investment. Hence the purchase of shares, debentures post office savings certificates and insurance policies all are financial investments. Such investment generates financial assets. These activities are undertaken by any one who desires a return, and is willing to accept the risk from the financial instruments.

INVESTMENT VERSES SPECULATION:

Often investment is understood as a synonym of speculation. Investment and speculation are some what different and yet similar because speculation requires an investment and investment are at lest some what speculative. Probably the best way to make a distinction between investment and speculation is by considering the role of expectation. Investments are usually made with the expectation that a certain stream of income or a certain price that has existed will not change in the future. Where as speculation are usually based on the expectation that some change will occur in future, there by resulting a return.

Thus an expected change is the basis for speculation but not for investment. An investment also can be distinguished from speculation by the time horizon of the investor and often by the risk return characteristic of investment. A true investor is interested in a good and consistent rate of return for a long period of time. In contrast, the speculator seeks opportunities promising very large return earned within a short period of time due to changing environment. Speculation involves a higher level of risk and a more uncertain expectation of returns, which is not necessarily the case with investment.

Basis	Investment	Speculation
Type of contract	Creditor	Ownership
Basis of acquisition	Usually by outright purchase	Often- on-margin
Length of commitment	Comparatively long term	For a short time only
Source of income	Earnings of enterprise	Change in market price
Quantity of risk	Small	Large
Stability of income	Very stable	Uncertain and erratic
Psychological attitude of Participants	Cautious and conservative	Daring and careless
Reasons for purchase	Scientific analysis of intrinsic worth	Hunches, tips, “inside dope”, etc.

The identification of these distinctions 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 of 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.

INVESTMENT PROCESS

An organized view of the investment process involves analyzing the basic nature of investment decisions and organizing the activities in the decision process.

Investment process is governed by the two important facets of investment they are risk and return. Therefore, we first consider these two basic parameters that are of critical importance to all investors and the trade off that exists between expected return and risk.

Given the foundation for making investment decisions the trade off between expected return and risk- we next consider the decision process in investments as it is typically practiced today. Although numerous separate decisions must be made, for organizational purposes, this decision process has traditionally been divided into a two step process: security analysis and portfolio management. Security analysis involves the valuation of securities, whereas portfolio management involves the management of an investor's investment selections as a portfolio (package of assets), with its own unique characteristics.

Security Analysis

Traditional investment analysis, when applied to securities, emphasizes the projection of prices and dividends. That is, the potential price of a firm's common stock and the future dividend stream are forecasted, then discounted back to the present. This intrinsic value is then compared with the security's current market price. If the current market price is below the intrinsic value, a purchase is recommended, and if vice versa is the case sale is recommended.

Although modern security analysis is deeply rooted in the fundamental concepts just outlined, the emphasis has shifted. The more modern approach to common stock analysis emphasizes return and risk estimates rather than mere price and dividend estimates.

Portfolio Management

Portfolios are combinations of assets. In this text, portfolios consist of collections of securities. Traditional portfolio planning emphasizes on the character and the risk bearing capacity of the investor. For example, a young, aggressive, single adult would be advised to buy stocks in newer, dynamic, rapidly growing firms. A retired widow would be advised to purchase stocks and bonds in old-line, established, stable firms, such as utilities.

Modern portfolio theory suggests that the traditional approach to portfolio analysis, selection, and management may yield less than optimum results. Hence a more scientific approach is needed, based on estimates of risk and return of the portfolio and the attitudes of the investor toward a risk-return trade-off stemming from the analysis of the individual securities.

Characteristics of Investment

The characteristics of investment can be understood in terms of as

- return,
- risk,
- safety,
- liquidity etc.

Return: All investments are characterized by the expectation of a return. In fact, investments are made with the primary objective of deriving 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. The expectation of return from an investment depends upon the nature of investment, maturity period, market demand and so on.

Risk: Risk is inherent in any investment. Risk may relate to loss of capital, delay in repayment of capital, nonpayment of return or variability of returns. The risk of an investment is determined by the investments, maturity period, repayment capacity, nature of return commitment and so on.

Risk and expected return of an investment are related. Theoretically, the higher the risk, higher is the expected returned. The higher return is a compensation expected by investors for their willingness to bear the higher risk.

Safety: The safety of investment is identified with the certainty of return of capital without loss of time or money. Safety is another feature that an investor 6 desires from investments. Every investor expects to get back the initial capital on maturity without loss and without delay.

Liquidity: An investment that is easily saleable without loss of money or time is said to be liquid. A well developed secondary market for security increase the liquidity of the investment. An investor tends to prefer maximization of expected return, minimization of risk, safety of funds and liquidity of investment.

<u>Investment categories:</u>

Investment generally involves commitment of funds in two types of assets:

-Real assets

- Financial assets

Real assets: Real assets are tangible material things like building, automobiles, land, gold etc.

Financial assets: Financial assets are piece of paper representing an indirect claim to real assets held by some one else. These pieces of paper represent debt or equity commitment in the form of IOUs or stock certificates. Investments in financial assets consist of –

- Securitiesed (i.e. security forms of) investment
- Non-securities investment

The term 'securities' used in the broadest sense, consists of those papers which are quoted and are transferable. Under section 2 (h) of the Securities Contract (Regulation) Act, 1956 (SCRA) 'securities' include:

i) Shares., scrip's, stocks, bonds, debentures, debenture stock or other marketable securities of a like nature in or of any incorporated company or other body corporate.

ii) Government securities.

iii) Such other instruments as may be declared by the central Government as securities, and,

iv) Rights of interests in securities.

Therefore, in the above context, security forms of investments include Equity shares, preference shares, debentures, government bonds, Units of UTI and other Mutual Funds, and equity shares and bonds of Public Sector Undertakings (PSUs). Non-security forms of investments include all those investments, which are not quoted in any stock market and are not freely marketable. viz., bank deposits, corporate deposits, post office deposits, National Savings and other small savings certificates and schemes, provident funds, and insurance policies. Another popular investment in physical assets such as Gold, Silver, Diamonds, Real estate, Antiques etc. Indian investors have always considered the physical assets to be very attractive investments. There are a large number of investment avenues for savers in India. Some of them are marketable and liquid, while others are non marketable, Some of them are highly risky while some others are almost risk less. The investor has to choose proper avenues from among them, depending on his specific need, risk preference, and return expectation. Investment avenues can be broadly categorized under the following heads: -

1.Corporate securities

. Equity shares	.Preference shares
. Debentures/Bonds	. GDRs /ADRs
. Warrants	. Derivatives

2.Deposits in banks and non banking companies

3.Post office deposits and certificates

4.Life insurance policies

5.Provident fund schemes

6.Government and semi government securities

7.Mutual fund schemes

8.Real assets

CORPORATE SECURITIES

Joint stock companies in the private sector issue corporate securities. These include equity shares, preference shares, and debentures. Equity shares have variable dividend and hence belong to the high risk high return category; preference shares and debentures have fixed returns with lower risk. The classification of corporate securities that can be chosen as investment avenues can be depicted as shown below.

Equity Shares-: By investing in shares, investors basically buy the ownership right to that company. When the company makes profits, shareholders receive their share of the profits in the form of dividends. In addition, when a company performs well and the future expectation from the company is very high, the price of the company’s shares goes up in the market. This allows shareholders to sell shares at profit, leading to capital gains. Investors can invest in shares either through primary market offerings or in the secondary market. Equity shares can be classified in different ways but we will be using the terminology of Investors. It should be noted that the line of demarcation between the classes are not clear and such classification are not mutually exclusive.

Blue Chips (also called Stalwarts) : These are stocks of high quality, financially strong companies which are usually the leaders in their industry. They are stable and matured companies. They pay good dividends regularly and the market price of the shares does not fluctuate widely. Examples are stocks of Colgate, Pond's Hindustan Lever, TELCO, Mafatlal Industries etc.

Growth Stocks: Growth stocks are companies whose earnings per share is grows faster than the economy and at a rate higher than that of an average firm in the same industry. Often, the earnings are ploughed back with a view to use them for financing growth. They invest in research and development and diversify with an aggressive marketing policy. They are evidenced by high and strong EPS. Examples are ITC, Dr. Reddy's Bajaj Auto, Sathyam Computers and Infosys Technologies ect.. The high growth stocks are often called
" GLAMOUR STOCK' or HIGH FLYERS'.

Income Stocks: A company that pays a large dividend relative to the market price is called an income stock. They are also called defensive stocks. Drug, food and public utility industry shares are regarded as income stocks. Prices of income stocks are not as volatile as growth stocks.

Cyclical Stocks: Cyclical stocks are companies whose earnings fluctuate with the business cycle. Cyclical stocks generally belong to infrastructure or capital goods industries such as general engineering, auto, cement, paper, construction etc. Their share prices also rise and fall in tandem with the trade cycles.

Discount Stocks: Discount stocks are those that are quoted or valued below their face values. These are the shares of sick units.

Under Valued Stock: Under valued shares are those, which have all the potential to become growth stocks, have very good fundamentals and good future, but somehow the market is yet to price the shares correctly.

Turn Around Stocks: Turn around stocks are those that are not really doing well in the sense that the market price is well below the intrinsic value mainly because the company is going through a bad patch but is on the way to recovery with signs of turning around the corner in the neat future. Examples- EID – Parry in 80's, Tata Tea (Tata Finlay), SPIC, Mukand Iron and steel etc.

Preference Shares: Preference shares refer to a form of shares that lie in between pure equity and debt. They have the characteristic of ownership rights while retaining the privilege of a consistent return on investment. The claims of these holders carry higher priority than that of ordinary shareholders but lower than that of debt holders. These are issued to the general public only after a public issue of ordinary shares.

Debentures and Bonds: These are essentially long-term debt instruments. Many types of debentures and bonds have been structured to suit investors with different time needs. Though having a higher risk as compared to bank fixed deposits, bonds, and debentures do offer higher returns. Debenture investment requires scanning the market and choosing specific securities that will cater to the investment objectives of the investors.

Depository Receipts (GDRs/ADRs): Global Depositary Receipts are instruments in the form of a depositary receipt or certificate created by the overseas depositary bank outside India and issued to non-resident investors against ordinary shares or Foreign Currency Convertible Bonds (FCCBs) of an issuing company. A GDR issued in America is an American Depositary Receipt (ADR). Among the Indian companies, Reliance Industries Limited was the first company to raise funds through a GDR issue. Besides GDRs, ADRs are also popular in the capital market. As investors seek to diversify their equity holdings, the option of ADRs and GDRs are very lucrative. While investing in such securities, investors have to identify the capitalization and risk characteristics of the instrument and the company's performance in its home country (underlying asset).

Warrants: A warrant is a certificate giving its holder the right to purchase securities at a stipulated price within a specified time limit or perpetually. Sometimes a warrant is offered with debt securities as an inducement to buy the shares at a latter date. The warrant acts as a value addition because the holder of the warrant has the right but not the obligation of investing in the equity at the indicated rate. It can be defined as a long-term call option issued by a company on its shares.

A warrant holder is not entitled to any dividends; neither does he have a voting right. But the exercise price of a warrant gets adjusted for the stock dividends or stock splits. On the expiry date, the holder exercises an option to buy the shares at the predetermined price. This enables the investor to decide whether or not to buy the shares or liquidate the debt from the company. If the market price is higher than the exercise price, it will be profitable for the investor to exercise the warrant. On the other hand, if the market price falls below the exercise price, the warrant holder would prefer to liquidate the debt of the firm.

Derivatives: The introduction of derivative products has been one of the most significant developments in the Indian capital market. Derivatives are helpful risk-management tools that an investor has to look at for reducing the risk inherent in as investment portfolio. The first derivative product that has been offered in the Indian market is the index future. Besides index futures, other derivative instruments such as index options, stock options, have been introduced in the market. Stock futures are traded in the market regularly and in terms of turnover, have exceeded that of other derivative instruments. The liquidity in the futures market is concentrated in very few shares. Theoretically the difference between the futures and spot price should reflect the cost of carrying the position to the future of essentially the interest. Therefore, when futures are trading at a premium, it is and indication that participants are bullish of the underlying security and vice versa. Derivative trading is a speculative activity. However, investors have to utilize the derivative market since the opportunity of reducing the risk in price movements is possible through investments in derivative products.

DEPOSITS:

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

Savings Bank Account with Commercial Banks:

A safe, liquid, and convenient investment option, a savings bank account is an ideal investment avenue for setting aside funds for emergencies or unexpected expenses. Investors may prefer to keep an average balance equal to three months of their living expenses. A bank fixed deposit is recommended for those looking for preservation of capital along with current income in the short term. However, over the long-term the returns may not keep pace with inflation.

Company Fixed Deposits:

Many companies have come up with fixed deposit schemes to mobilize money for their needs. The company fixed deposit market is a risky market and ought to be looked at with caution. RBI has issued various regulations to monitor the company fixed deposit market. However, credit rating services are available to rate the risk of company fixed deposit schemes.

The maturity period varies from three to five years. Fixed deposits in companies have a high risk since they are unsecured, but they promise higher returns than bank deposits.

Fixed deposit in non-banking financial companies (NBFCs) is another investment avenue open to savers. NBFCs include leasing companies, hire purchase companies, investment companies, chit funds, and so on. Deposits in NBFCs carry higher returns with higher risk compared to bank deposits.

Post Office Deposits and Certificates:

The investment avenues provided by post offices are non-marketable. However, most of the savings schemes in post offices enjoy tax concessions. Post offices accept savings deposits as well as fixed deposits from the public. There is also a recurring deposit scheme that is an instrument of regular monthly savings.

National Savings Certificates (NSC) is also marketed by post office to investors. The interest on the amount invested is compounded half-yearly and is payable along with the principal at the time of maturity, which is six years from the date of issue.

There are a variety of post office savings certificates that cater to specific savings and investment requirements of investors and is a risk free, high yielding investment opportunity. Interest on these instruments is exempt from incometax. Some of these deposits are also exempt from wealth tax.

Life Insurance Policies:

Insurance companies offer many investment schemes to investors. These schemes promote savings and additionally provide insurance cover. LIC is the largest life insurance company in India. Some of its schemes include life policies, convertible whole life assurance policies, endowment assurance policies, Jeevan Saathi, Money Back Plan, Jeevan Dhara, and Marriage Endowment Plan. Insurance policies, while catering to the risk compensation to be faced in the future by investors, also have the advantage of earning a reasonable interest on their investment insurance premiums. Life insurance policies are also eligible for exemption from income tax.

Provident Fund Scheme:

Provident fund schemes are deposit schemes, applicable to employees in the public and private sectors. There are three kinds of provident funds applicable to different sectors of employment, namely, Statutory Provident Fund, Recognised Provident Fund, and Unrecognised Provident Fund. In addition to these, there is a voluntary provident fund scheme that is open to any investor, employed or not. This is known as the Public Provident Fund (PPF). Any member of the public can join the PPF, which is operated by the State Bank of India

Equity Linked Savings Schemes (ELSSs):

Investing in ELSSs gets investors a tax rebate of the amount invested. ELSSs are basically growth mutual funds with a lock-in period of three years. ELSSs have a risk higher than PPF and NSCs, but have the potential of giving higher returns.

Pension Plan:

Certain notified retirement/pension funds entitle investors to a tax rebate. UTI, LIC, and ICICI are some financial institutions that offer retirement plans to investors.

Government and Semi-Government Securities:

Government and semi-government bodies such as the public sector undertakings borrow money from the public through the issue of government securities and public sector bonds. These are less risky avenues of investment because of the credibility of the government and government undertakings. The government issues securities in the money market and in the capital market.

Money market instruments are traded in the Wholesale Debt Market (WDM) trades and retail segments. Instruments traded in the money market are short-term instruments such as treasury bills and repos. The government also introduced the pricatisation programme in many corporate enterprises and these securities are traded in the secondary market. These are the semi-government securities. PSU stocks have performed well during the years 2003-04 in the capital market.

Mutual Fund Schemes:

The Unit Trust of India is the first mutual fund in the country. A number of commercial banks and financial institutions have also set up mutual funds. Mutual funds have been set up in the private sector also. These mutual funds offer various investment schemes to investors. The number of mutual funds that have cropped up in recent years is quite large and though, on an average, the mutual fund industry has not been showing good returns, select funds have performed consistently, assuring the investor better returns and lower risk options.

REAL ASSETS

Investments in real assets are also made when the expected returns are very attractive. Real estate, gold, silver, currency, and other investments such as art are also treated as investments since the expectation from holding of such assets is associated with higher returns.

Real Estate: Buying property is an equally strenuous investment decision. Real estate investment is often linked with the future development plans of the location. It is important to check the value while deciding to purchase a movable/immovable property other than buildings. Besides making a personal assessment from the market, the assistance of government-approved valuers may also be sought. A valuation report indication the value of the each of the major assets and also the basis and manner of valuation can be obtained from an approved valuer against the payment of a fee. In case of a plantation, a valuation report may also be obtained from recognized private valuers.

Bullion Investment: The bullion market offers investment opportunity in the form of gold, silver, and other metals. Specific categories of metals are traded in the metals exchange. The bullion market presents an opportunity for an investor by offering returns and end value in future. It has been observed that on several occasions, when the stock market failed, the gold market provided a return on investments. The changing pattern of prices in the bullion market also makes this market risky for investors. Gold and Silver prices are not consistent and keep changing according to the changing local/global demands in the market. The fluctuation prices, however, have been compensated by real returns for many investors who have followed a buy and hold strategy in the bullion market.

Return and Risk – The Basis of Investment Decisions :

An organized view of the investment process involves analyzing the basic nature of investment decisions and organizing the activities in the decision process. Common stocks have produced, on average, significantly larger returns over the years than savings accounts or bonds. Should not all investors invest in common stocks and realize these larger returns? The answer to this question is to pursue higher returns investors must assume larger risks. Underlying all investment decisions is the trade off between expected return and risk. Therefore, we first consider these two basic parameters that are of critical importance to all investors and the trade- off that exists between expected return and risk.

Given the foundation for making investment decisions the trade off between expected return and risk – we next consider the decision process in investments as it is typically practiced today. Although numerous separate decisions must be made, for organizational purposes, this decision process has traditionally been divided into a two step process: security analysis and portfolio management. Security analysis involves the valuation of securities, whereas portfolio management involves the management of an investor's investment selections as a portfolio (package of assets), with its own unique characteristics.

Return: Why invest? Stated in simplest terms, investors wish to earn a return on their money. Cash has an opportunity cost: By holding cash, you forego the opportunity to earn a return on that cash. Furthermore, in an inflationary environment, the purchasing power of cash diminishes, with high rates of inflation bringing a relatively rapid decline in purchasing power. In investments it is critical to distinguish between an expected return (the anticipated return for some future period) and a realized return (the actual return over some past period). Investors invest for the future for the returns they expect to earn but when the investing period is over, they are left with their realized returns. What investors actually earn from their holdings may turn out to be more or less than what they expected to earn when they initiated the investment. This point is the essence of the investments process; Investors must always consider the risk involved in investing.

Risk: Risk is explained theoretically as the fluctuation in returns from a security. A security that yields consistent returns over a period of time is termed as " risk less security " or " risk free security ". Risk is inherent in all walks of life. An investor cannot foresee the future definitely; hence, risk will always exist for an investor. Risk is in fact the watchword for all investors who enter capital markets. Investment risk can be an extraordinary stress for many investors. When the secondary market does not respond to rational expectations, the risk component of such markets are relatively high and most investors fail to recognize the real risk involved in the investment process. Risk aversion is the criteria commonly associated with many small investors in the secondary market. Many small investors look upon the market for a definite return and when their expectations are not met, the effect on the small investors' morale is negative. Hence these investors prefer to lock up their funds in securities that would rather give them back their investment with small returns than those securities that yield high returns on an average but are subject to wild fluctuations.

There are different types and therefore different definition of risk. Risk is defined as the uncertainty about the actual return that will earn on an investment. When one invest, expects some particular return, but there is a risk that he ends up with a different return when he terminates the investment. The more the difference between the expected and the actual the more is the risk. It is not sensible to talk about the investment returns with out talking about the risk, because the investment decision involves a trade-off between the two, return and risk.

Factors influence risk: What makes financial assets risky. Traditionally, investors have talked about several factors causing risk such as business failure, market fluctuations, change in the interest rate inflation in the economy, fluctuations in exchange rates changes in the political situation etc. Based on the factors affecting the risk the risk can be understood in following manners-

Interest rate risk: The variability in a security return resulting from changes in the level of interest rates is referred to as interest rate risk. Such changes generally affect securities inversely, that is other things being equal, security price move inversely to interest rate.

Market risk: The variability in returns resulting from fluctuations in overall market that is, the agree get stock market is referred to as market risk. Market risk includes a wide range of factors exogenous to securities them selves, like recession, wars, structural changes in the economy, and changes in consumer preference. The risk of going down with the market movement is known as market risk.

Inflation risk: Inflation in the economy also influences the risk inherent in investment. It may also result in the return from investment not matching the rate of increase in general price level (inflation). The change in the inflation rate also changes the consumption pattern and hence investment return carries an additional risk. This risk is related to interest rate risk, since interest rate generally rise as inflation increases, because lenders demands additional inflation premium to compensate for the loss of purchasing power.

Business risk: The changes that take place in an industry and the environment causes risk for the company in earning the operational revenue creates business risk. For example the traditional telephone industry faces major changes today in the rapidly changing telecommunication industry and the mobile phones. When a company fails to earn through its operations due to changes in the business situations leading to erosion of capital, there by faces the business risk.

Financial risk: The use of debt financing by the company to finance a larger proportion of assets causes larger variability in returns to the investors in the faces of different business situation. During prosperity the investors get higher return than the average return the company earns, but during distress investors faces possibility of vary low return or in the worst case erosion of capital which causes the financial risk. The larger the proportion of assets finance by debt (as opposed to equity) the larger the variability of returns thus lager the financial risk.

Liquidity risk: An investment that can be bought or sold quickly without significant price concession is considered to be liquid. The more uncertainty about the time element and the price concession the greater the liquidity risk. The liquidity risk is the risk associated with the particular secondary market in which a security trades.

Exchange rate risk: The change in the exchange rate causes a change in the value of foreign holdings, foreign trade, and the profitability of the firms, there by returns to the investors. The exchange rate risk is applicable mainly to the companies who operate oversees. The exchange rate risk is nothing but the variability in the return on security caused by currencies fluctuation.

Political risk: Political risk also referred, as country risk is the risk caused due to change in government policies that affects business prospects there by return to the investors. Policy changes in the tax structure, concession and levy of duty to products, relaxation or tightening of foreign trade relations etc. carry a risk component that changes the return pattern of the business.

TYPES OF RISK

Thus far, our discussion has concerned the total risk of an asset, which is one important consideration in investment analysis. However modern investment analysis categorizes the traditional sources of risk identified previously as causing variability in returns into two general types: those that are pervasive in nature, such as market risk or interest rate risk, and those that are specific to a particular security issue, such as business or financial risk. Therefore, we must consider these two categories of total risk. The following discussion introduces these terms. Dividing total risk in to its two components, a general (market) component and a specific (issue) component, we have systematic risk and unsystematic risk which are additive:

Total risk = general risk + specific risk
= market risk + issuer risk
= systematic risk + non systematic risk

Systematic risk: Variability in a securities total return that is directly associated with overall moment in the general market or economy is called as systematic risk. This risk cannot be avoided or eliminated by diversifying the investment. Normally diversification eliminates a part of the total risk the left over after diversification is the non-diversifiable portion of the total risk or market risk. Virtually all securities have some systematic risk because systematic risk directly encompasses the interest rate, market and inflation risk. The investor cannot escape this part of the risk, because no matter how well he or she diversifies, the risk of the overall market cannot be avoided. If the stock market declines sharply, most stock will be adversely affected, if it rises strongly, most stocks will appreciate in value. Clearly mark risk is critical to all investors.

Non-systematic risk: Variability in a security total return not related to overall market variability is called un systematic (non market) risk. This risk is unique to a particular security and is associated with such factors as business, and financial risk, as well as liquidity risk. Although all securities tend to have some nonsystematic risk, it is generally connected with common stocks.

MEASURING RETURNS:

Return is the out come of an investment. Measurement of return occupies a strategic importance in investment analysis as the investment is undertaken with a view to get returns in future

Total Return

A correct returns measure must incorporate the two components of return, yield and price changes. Returns across time or from different securities can be measured and compared using the total return concept. Formally, the total return (TR) for a given holding period is a decimal (or percentage) number relating all the cash flows received by an investor during any desired time period to the purchase price of the asset. Total return is defined as

$$TR = \frac{\text{any cash payments received + Price changes over the period}}{\text{Price at which the asset is purchased}}$$

All the items are measured in rupees. The price change over the period, defined as the difference between the beginning (or purchase) price and the ending (or sale) price, can be either positive (sales price exceeds purchase price), negative (purchase price exceeds sales price), or zero. The cash payments can be either positive or zero. Netting the two items in the numerator together and dividing by the purchase price results in a decimal return figure that can easily be converted into percentage form. Note that in using the TR, the two components of return, yield and price change have been measured.

The general equation for calculating TR is

$$TR = \frac{CF_t + (P_E - P_B)}{P_B} = \frac{CFt + PC}{P_B}$$

Where

CF_t = Cash flows during the measurement period

P_E = price at the end of the period t or sale price

P_B = purchase price of the asset or price at the beginning of the period

PC = change in price during the period, or P_E minus P_B

The cash flows for a bond comes from the interest payments received, and that for a stock comes for the dividends received. For some assets, such as warrant or a stock that pays no dividends, there is only a price change. Although one year is often used for convenience, the TR calculation can be applied to periods of any length.

In summary, the total return concept is valuable as a measure of return because it is all-inclusive measuring the total return per rupees of original investment. Total return is the basic measure of the actual return earned by investors on any financial assets for any specific period of time. It facilitates the comparison of asset returns over a specified period whether the comparison is of different assets, such as stocks versus bonds, or of different securities have to be sold within the same type, such as several common socks.

RETURN RELATIVE:

It is often necessary to measure returns on a slightly different basis than TRs. This is particularly true when calculating a geometric mean because negative returns cannot be used in the calculation. The return relative (RR) solves this problem by adding 1.0 to the total return.

- RR = TR in decimal form +1.0
- TR in decimal form = RR – 1.0

Although return relatives may be less than 1.0, they will be greater than zero, thereby eliminating negative numbers.

$$\text{Relative Return} = RR = \frac{CFt + P_E}{P_B}$$

SUMMARY STATISTICS FOR RETURNS:

The total return, return relative, are useful measures or return for a specified period of time. Also needed in investment analysis are statistics to describe a series of returns. Two such measures used with returns data are described below:

Arithmetic Mean The best-known statistics to most people is the arithmetic mean. It is customarily designated by the symbol $\overline{X}$, of a set of values is calculated as:

$$\bar{X} = \frac{\sum X}{n}$$

Or the sum of each of the values being considered divided by the total number of values n.

Geometric Mean The arithmetic mean return is an appropriate measure of the central tendency of a distribution consisting of returns calculated for a particular time period, such as 10 years. However, when percentage changes in value over time are involved as a result of compounding, the arithmetic mean of these changes can be misleading. A different mean, the geometric mean, is needed to describe accurately the "true" average rate of return over multiple periods.

Calculation of the Arithmetic and Geometric mean for the years 1996-2005 for the Sensex Stock Composite Index

Year	Sensex TRs (%)	Sensex Return Relative
1996	-3.14	0.9687
1997	30.00	1.30001
1998	7.43	1.30001
1999	9.94	1.09942
2000	1.29	1.01286
2001	37.11	1.37113
2002	22.68	1.22683
2003	33.10	1.33101
2004	28.34	1.28338
2005	20.88	1.2088

Arithmetic mean = [-3.14 + 30.00 +…. + 20.88]/10

= 18.76%

Geometric mean = [(0.9687) (1.30001)(1.30001)(1.09942)…(1.2088)] $^{1/10}$ - 1

= 1.18 - 1

= 0.18, or 18%

The geometric mean returns measure the compound rate of growth over time. It is often used in investments and finance to reflect the steady growth rate of invested funds over some past period; that is, the uniform rate at which money actually grew over time per period. Therefore, it allows measuring the realized change in wealth over multiple periods. It is calculated as follows:

$$G = [(1+TR_1)(1+TR_2)\dots(1+TR_n)]^{1/n} -$$

1 Where TR is a series of total returns in decimal form.

The geometric mean will always be less than the arithmetic mean unless the values being considered are identical. The spread between the two depends on the dispersion of the distribution; the greater the dispersion, the greater the spread between the two means.

ARITHMETIC MEAN VERSUS GEOMETRIC MEAN:

Arithmetic mean is a better measure of average performance over single periods. It is the best estimate of the expected return for next period.

Geometric mean is a better measure of the change in wealth over the past. It is a backward-looking concept, measuring the realized compound rate of return at which money grew over a specific period.

MEASURING RISK:

Risk is often associated with the dispersion in the likely outcomes. Dispersion refers to variability. It is assumed to arise out of variability, which is consistent with our definition of risk as the chance that the actual outcome of an investment will differ from the expected outcome. If an assets' return has no variability, in effect it has no risk. Thus a one-year treasury bill purchased to yield 10 percent and held to maturity will, in fact, yield (a nominal) 10 percent. No other outcome is possible, barring default by the government, which is not considered a reasonable possibility.

STANDARD DEVIATION:

The risk can be measured with an absolute measure of dispersion, or variability. The most commonly used measure of dispersion over some period of years is the standard deviation, which measures the deviation of each observation from the arithmetic mean of the observations and is a reliable measure of variability, because all the information in a sample is used.

The standard deviation is a measure of the total risk of an asset or a portfolio. It captures the total variability in the assets or portfolio's return, whatever the source(s) of that variability. The standard deviation is the square root of variance, which can be calculated as follows:

n

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

Where

σ^2 = the variance of a set of values

$\bar{X}$ = the mean of the observations

n = the number of returns in the sample

σ = Standard deviation

$\sigma = (\text{Variance})^{1/2}$

In summary, the standard deviation of return measures the total risk of one security or the total risk of a portfolio of securities. The historical standard deviation can be calculated for individual securities or portfolio of securities using TRs for some specified period of time. This ex post value is useful in evaluating the total risk for a particular historical period and in estimating the total risk that is expected to prevail over some future period.

COMMON STOCK VALUATION:

The use of present-value theory by bond and preferred-stock investors is well established. The valuation task is relatively straightforward because benefits are generally constant and reasonably certain. One deals with perpetuities, or infinite life securities with constant dividend receipts, with straight preferred stock. Bonds represent constant income flows with a finite, measurable life.

Common-stock valuation is different because earnings and dividend streams are uncertain as to the timing of receipt and the amount of the dividend. The value of a common stock at any moment in time can be thought of as the discounted value of a series of uncertain future dividends that may grow or decline at varying rates over time. The more theoretical present-value approach to common-stock valuation will be compared with the more traditional and pragmatic capitalization or multiplier approach in the next several sections.

PRESENT-VALUE APPROACH:

One year Holding Period:

It is easiest to start with common-stock valuation where the expected holding period is one year. The benefits any investor receives from holding a common stock consists of dividends plus any change in price during the holding period. Suppose that we buy one share of the X Co. at the beginning of the year for Rs.25. We hold the stock for one year. One Rupees in dividends is collected at year-end, and the share is sold for Rs.26.50. The rate of return achieved is the composite of dividend yield and change in price (capital gains yield). Thus we get

$$\text{Dividend yield} = \frac{D}{P} = \frac{\text{Rs.}1}{\text{Rs.}25} = .04$$

$$\text{Capital gains yield} = \frac{\text{Rs.}26.50 - \text{Rs.}25.00}{\text{Rs.}25} = .06$$

The total rate of return achieved is .04 + .06 = .10, or 10 percent.

The same notion in terms of present values is thus:

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

Where

D_1 = dividend to be received at the end of year 1

r = investor's required rate of return or discount rate

P_1 = selling price at the end of year 1

P_0 = selling price today

Should a rate of return of 15 percent have been required, the purchase price would have been too high at Rs.25. (The Rs.1 dividend is assumed fixed, and the selling price of Rs.26.50 remains constant). To achieve a 15 percent return, the value of the stock at the beginning of the year would have had to be

$$P_0 = \frac{\text{Rs.}1.00}{1+.15} + \frac{\text{Rs.}26.50}{1+.15}$$

$$= \text{Rs.}23.91$$

An alternative approach would be to ask the question; at what price must we be able to sell the stock at the end of one year (if the purchase price is Rs.25 and the dividend is Rs.1) in order to attain a rate of return of 15 percent?

$$Rs.25 = \frac{Rs.1.00}{1+.15} + \frac{P_1}{1+.15}$$

$$Rs.25 = Rs.0.87 + Rs.0.87\ P_1$$

$$Rs.24.13 = Rs.0.87P_1$$

$$Rs.27.74 = P_1 \text{ (selling price)}$$

Multiple-Year Holding Period:

Consider holding a share of the X Co. for five years. In most cases the dividend will grow from year to year. To look at some results, let us stipulate the following:

g = annual expected growth in earnings, dividends and price = 6 %

e_0 = most recent earnings per share = Rs.1.89 d/e = dividend payout (%) = 50 %

r = required rate of return = 10 %

P = price per share

P/E = price earnings ratio = 12.5

N = holding period in years = 5

$$P = \left(\sum_{n=1}^{N} \frac{[(e_0)(d/e)]\,(1+g)^n}{(1+r)^n} \right) + \left(\frac{(P/E)\,[(e_0)(1+g)^{N+1}]}{(1+r)^N} \right)$$

This imposing formula says, "Sum the present value of all dividends to be received over the holding period, and add this to the present value of the selling price of the stock at the end of the holding period to arrive at the present value of the stock."

Let us write out the string of appropriate numbers. Since the current earnings per share e_0 are Rs.1.89 and the dividend payout d/e is 50 percent, the most recent dividend per share is e_0 time's d/e or Rs.1.89 times 50 percent, or Rs. 945. This was stipulated in the beginning of the problem. After one year, the dividend is expected to be Rs..943 times $(1 + g)^{1}$ ·So the first year's dividend will be Rs.1. The process is repeated for years 1 through 5 as follows:

Dividend Year 1	***Dividend Year 2***	***Dividend Year 3***	***Dividend Year 4***	***Dividend Year 5***
Rs.0.943 (1.06)	Rs.0.943 $(1.06)^{2}$	Rs.9.43 $(1.06)^{3}$	Rs.0.943 $(1.06)^{4}$	Rs.0.943$(1.06)^{5}$
Rs.1.00	Rs.1.06	Rs.1.12	Rs.1.19	Rs.1.26

The next step is to discount each dividend at the required rate of return of 10 percent. Thus:

$$\frac{\text{Rs.1.00}}{(1.10)^{1}} + \frac{\text{Rs.1.06}}{(1.10)^{2}} + \frac{\text{Rs.1.12}}{(1.10)^{3}} + \frac{\text{Rs.1.19}}{(1.10)^{4}} + \frac{\text{Rs.1.26}}{(1.10)^{5}}$$

The string of fractions reduces to

$$\frac{\text{Rs.}1.00}{1.10} + \frac{\text{Rs.}1.06}{1.21} + \frac{\text{Rs.}1.12}{1.333} + \frac{\text{Rs.}1.19}{1.464} + \frac{\text{Rs.}1.26}{1.611}$$

Thus the present value of the stream of dividends is equal to Rs.4.225 over the five-year period if the required rate of return is 10 percent and the dividends grow at a rate of 6 percent per year. Although the number of Rupees of dividends is Rs.5.63, their present value is only Rs.4.225 as indicated, since the dividends grow at only 6 percent and the investor requires a 10 percent rate of return.

The price of the stock at the end of the holding period (year 5) is the last part of our equation. Let us assume that the current price of the stock is Rs.25, forecasted earnings per share e_1 are Rs.2.00 [Rs.1.89 (1.06)], and the price-earnings ratio (P/E) is 12.5. Holding P/E at 12.5, the earnings, expected to grow at 6 percent per year, should amount to Rs.2.68 [Rs.1.89 $(1.06)^6$] for year 6.Thus:

$$\text{Selling price at the end of year 5} = (1.25)[(\text{Rs.}1.89)(1.06)^6] = \text{Rs.}33.45$$

The present value of the selling price is Rs.33.45/(1.10), or Rs.20.78. Adding the present value of the stream of dividends to the present value of the expected selling price of the stock yields Rs.4.22 + Rs.20.78, or Rs.25.00

Notice that throughout this explanation, the analyst or investor estimates the variables g, d/e, and P/E. The current price of the stock (P) and current earnings (e_0) are observed.

Mc DONALD'S STOCK. Let us estimate the return on McDonald's stock as an investment to be held for five years. McDonald's operates the largest fast-food restaurant system in the country. Assume that its common stock can be purchased at the beginning of 1985 for Rs.52. A thoroughgoing analysis of expected future earnings, dividends, and price-earnings ratio (P/E) has provided the following predictions:

Year	***Earnings per share***	***Dividends per share***
2001	Rs.5.05	Rs.0.82
2002	5.80	0.95
2003	6.65	1.10
2004	7.85	1.25
2005	8.80	1.45

It is estimated that at the end of 2005 the stock will sell for twelve times 2005 earnings. Given the estimated earnings in 2005 of Rs.8.80, the forecast selling price at the end of the fifth year is Rs.105 (Rs.8.80 X 12).

What rate of return would equate the flow of dividends and the terminal price shown above back to the current price of Rs.52? Alternatively stated, what yield or return is required on an investment of Rs?

In order that an investor may withdraw dividends each year as indicated above and be able to remove a final balance of Rs.105 at the end of five years?

In effect, we want the rate of return that will solve the following:

$$\text{Rs.}52 = \frac{\text{Rs.}0.82}{(1+r)} + \frac{\text{Rs}0.95}{(1+r)^2} + \frac{\text{Rs.}1.10}{(1+r)^3} + \frac{\text{Rs.}1.25}{(1+r)^4} + \frac{\text{Rs.}1.45}{(1+r)^5} + \frac{\text{Rs.}105}{(1+r)^6}$$

Where r is the rate of return. Calculating the rate that will solve the equation is a somewhat tedious task, requiring trial-and-error computation. Let us turn the equation into columnar form and try a discount rate:

Year	***Receipt***	***17 % Present Value factor***	***Present Value***
1	Rs.0.82	.854	Rs.0.70
2	Rs.0.95	.730	0.69
3	Rs.1.10	.624	0.69
4	Rs.1.25	.533	0.67
5	Rs.1.45	.456	0.66
6	Rs.105	.456	47.89
			Rs.51.30

At 17 percent, this stream of receipts has a present value of Rs.51.30, which is close to the market price of Rs.52. This suggests that the discount rate is just slightly less than 17 percent. The investor must decide if 17 percent is a satisfactory return, given the alternative investment opportunities and the investor's attitude toward risk in holding McDonald's stock.

What happened to earnings? We instinctively feel that earnings should be worth something, whether they are paid out as dividends or not, and wonder why they do not appear in the valuation equation. In fact, they do appear in the equation but in the correct form. Earnings can be used for one of two purposes: they can be paid out to stockholders in the form of dividends or they can be reinvested the firm. If they are reinvested in the firm they should result in increased future earnings and increased future dividends. To the extent earnings at any time, say time t are paid out to stockholders, they are measured by the term D_t and to the extent they are retained in the firm and used productively they are reflected in future dividends and should result in future dividends being larger than D_t .To discount the future earnings stream of a share of stock would be double counting since we would count retained earnings both when they were earned and when they, or the earnings from their reinvestment, were later paid to stockholders.

Constant Growth:

The simplest extension of what we have been doing assumes that dividends will grow at the same rate (g) into the indefinite future. Under this assumption the value of a share of stock is

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

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

This model states that the price of a share of stock should be equal to next year's expected dividend divided by the difference between the appropriate discount rate for the stock and its expected long-term growth rate. Alternatively, this model can be stated in terms of the rate of return on a stock as

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

The constant growth model is often defended as the model that arises from the assumption that the firm will maintain a stable dividend policy (keep its retention rate constant) and earn a stable return on new equity investment over time.

How might the single period model be used to select stocks? One way is to predict next year's dividends, the firm's long-term growth rate, and the rate of return stockholders require for holding the stock. The equation could then be solved for the theoretical price of the stock that could be compared with its present price. Stocks that have theoretical prices above their actual price are candidates for purchase; those with theoretical prices below their actual price are candidates for sale.

Another way to use the approach is to find the rate of return implicit in the price at which the stock is now selling. Thos can be done by substituting the current price, estimated dividend, and estimated growth rate into Equation 4.6 and solving for the discount rate that equates the present price with the expected flow of future dividends. If this rate is higher than the rate of return considered appropriate for the stock, given its risk, it is a candidate for purchase.

It seems logical to assume that firms that have grown at a very high rate will not continue to do so infinitely. Similarly, firms with very poor growth might improve in the future. While a single growth rate can be found that will produce the same value as a more complex pattern, it is so hard to estimate this single number, and the resultant valuation is so sensitive to this number that many analysts have been reluctant to use the constant growth model without modification.

Two-Stage Growth:

The most logical further extension of the constant growth model is to assume that a period of extraordinary growth (good or bad) will continue for a certain number of years, after which growth will change to a level at which it is expected to continue indefinitely. Firms typically go through life cycles; during part of these cycles their growth is much faster than that of the economy as a whole. Automobile manufacturers in the mid 1980s are examples.

A hypothetical firm is expected to grow at a 20 percent rate for ten years, then to have its growth rate fall to 4 percent, the norm for the economy. The value of the firm with its growth pattern is determined by the following equation:

Present price = PV of dividends during above-normal growth period

+ Value of stock price at the end of above-normal growth period

discounted back to present

N $\quad D_0 (1 + g_s)^t \quad D_{N+1}$

1

P_0=å $\quad +$

$$t=1 \quad (1 + r_s)^t \qquad r_s - g_n \qquad (1 + r_s)^N$$

Where:

g_s = above-normal growth rate

g_n = normal growth rate

N = period of above-normal growth rate

Consider McDonald's, whose previous dividend was Rs.0.71 (D_0 = Rs.0.71), with the dividend expected to increase by 15 percent a year for ten years and thereafter at 10 percent a year indefinitely. If a stockholder's required rate of return is 16 percent, the value of the stock will be as follows:

Calculating the value of a Two-stage Growth Stock

Assumptions:

a. Required rate of return = 16%

b. Growth rate is 15% for ten years 10% thereafter

(g_s =15%, g_n = 10%, and N=10)

c. Last year's dividend was Rs.0.71 (d_0 = Rs.0.71)

Step 1. Find the present value of dividends during the rapid growth period

End of year	***Dividend Rs. 0.71(1.15)*** ^{t}	***PVIF = 1/(1.16)*** ^{t}	***PV***
1	Rs.0.82	0.862	Rs.0.71
2	0.95	0.743	0.71
3	1.10	0.640	0.70
4	1.25	0.552	0.69
5	1.45	0.476	0.69
6	1.66	0.410	0.68
7	1.90	0.354	0.67
8	2.18	0.305	0.66
9	2.51	0.263	0.66
10	2.88	0.226	0.65

$$\text{PV of first ten year's dividends} = \sum_{t=1}^{10} \frac{d_0 (1 + g_s)^t}{(1 + r_s)^t}$$

$$= \text{Rs.}6.82$$

Step 2**. Find the present value of the year 10 stock price.**

a. Find the value of the stock at the end of year 10:

$$P_{10} = \frac{d_{11}}{r_s - g_n} = \frac{\text{Rs.}2.88\ (1.10)}{0.06} = \text{Rs.}52.80$$

b. Discount P_{10} back to the present:

$$PV = P_{10}\left[\frac{1}{1 + r_s}\right]^{10} = \text{Rs.}52.80\,(.226) = \text{Rs.}11.93$$

Step 3. Sum to find out the total value of the stock today:

$$P_{10} = \text{Rs.}6.82 + \text{Rs.}11.93 = \text{Rs.}18.75$$

THE CAPITALIZATION OR MULTIPLIER APPROACH:

Judging from current practice, the capitalization or multiplier approach to valuation still holds the preeminent position. A survey of practicing analysts indicated that 75 percent of them preferred simple multiplier techniques. Present-value techniques were preferred by only about 6 percent. The underlying reasons for ignoring present-value formulas seem to lie in (1) severe earnings forecasting limitations, and (2) the influence of sharply increases competition on short-range performance.

The multiplier is a shortcut computation to find the present value. The analyst estimates earnings per share for the year ahead. He divides this figure into the current market price of the stock, and the result is an earnings multiplier.

The terms multiplier and price earnings ratio (P/E) are used interchangeably. Thus:

$$\text{Earnings multiplier} = \text{P/E ratio} = \frac{\text{Current market price}}{\text{Estimated earnings per share}}$$

The multiplier or P/E is primarily determined by the riskiness of the firm and the growth rate in its earnings. High multipliers are associated with high earnings growth. The Dow Jones Industrial Average might sell in the range 9 to11 P/E. It represents a cross section of stocks with average risk and growth prospects. McDonald's may sell at a P/E of 12, because of earnings growth. American Telephone and Telegraph Co. may sell at a P/E of 9, because of average growth.

The analysts seek various rules of thumb for selecting an appropriate price earnings ratio that can be applied to a company's earnings to determine value for its shares. The resulting price is compared with current market prices to assess bargains or overpriced stocks.

The determination of the current P/E on a stock must be followed by a standard of comparison, taken from the historical record of the stock in question. The analyst may ascertain the median or mean P/E for a stock, as well as its range over time. More weight can be given to the recent past. This provides boundaries within which the P/E should fall and indicates whether the stock is tending to sell at the upper limits of expectation or lower limits. Industry P/Es provide some guidelines; however different companies in the same industry frequently carry quite different P/Es.

STATISTICAL APPROACHES TO P/E:

Still another approach to valuation is to take the broad determinants of common stock prices-earnings, growth, risk, time value of money, and dividend policy- and to measure these and to weight hem together in some manner to form an estimate of the P/E ratio. One way to do this is to use statistical analysis to define the weights the market places on asset of determinants of common stock prices.

From our earlier discussion of constant growth models, price to price-earnings form model can easily be converted:

$$P = \frac{D}{r - g} \qquad \text{(And)}$$

$$P/E = \frac{D/E}{r - g}$$

The relationship that exists in the market at any point in time between price or price-earnings ratios and a set of specified variables can be estimated using regression analysis.

The usual technique of relating price or price earnings ratios to more than one variable is directly analogous to this. Called multiple regression analysis, it finds that linear combination of a set of variables that best explains price earnings ratios.

One of the earliest attempts to use multiple regressions to explain price earnings ratios, which received wide attention, was the Whitbeck-Kisor model to measure the relationship of the P/E on a stock to dividend policy, growth and risk.

The ability of cross sectional regressions actually to distinguish winners from losers is questionable. As forecasting devices these models are plagued by instability in the regression coefficients. The coefficients are extremely sample sensitive that is, the results are partially dependent upon the sample selected (time period and companies).

Review Questions:

1. Distinguish carefully between investing and speculating. Is it possible to incorporate investment and speculation within the same security? Explain.
2. Compare briefly the traditional and modern approaches to security analysis, to portfolio management.
3. Classify the traditional source of risk as to whether they are general source of risk or specific source of risk.
4. Why is it more difficult to determine the value of a common stock as opposed to finding the value of a bond? Explain the various methods of common stock valuation.
5. Discuss various avenues of investment and evaluate the merits and demerits of financial assets from the point of view of investors.
6. Define investment. What are the characteristics of investment and also explain the criteria for evaluating the investment?

7. How risk and return of equity investment can be measured? Explain with examples.

8. Discuss the broad process involved in making investment decisions and highlight the factors to be considered in the decision process.

Reference for detailed study:

1. Donald E. Fischer, "Security Analysis and Portfolio Management", Prentice Hall Inc.

2. Charles P. Jones, " Investments Analysis and Management", Wiley International.

3. Jack Clark Francis, "Investments Analysis and Management", Mc-Graw Hills International.

4. M. Ranganatham, and R. Madhumathi, "Investments Analysis and Portfolio Management", Pearson Education.

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UNIT – II

Equity Stock Analysis

The primary motive for buying stock is to sell it later at an enhanced price. In many cases, the investor also expects a dividend. Both price and dividend are the principal ingredients in an investors return or yield.

If the investor had adequate information about and knowledge of stock prices and dividend yields he would be able to make handsome returns. However, in reality complexities of political, economic, social and other forces hinder the prediction of stock movements and returns with any certainty.

King observed that on an average over half the variation in stock prices could be attributed to a market influence that affects all stock market indexes. But stocks are also subject to industry influence over and above the influence common to all stocks. King noted that industry influence explained, on the average, 13 percent of the variations in a stocks price.In sum about two thirds of variation in the prices of stocks observed in the kings study was the result of market and industry. This highlights the necessity of the financial analyst to examine the economic and industry influences as well as the individual companies' performance in order to accurately take any investment decisions.

The multitude of factors affecting a firm's profitability can be broadly classified as:

- ***Economy-wise factors****:* These include factors like growth rate of the economy, the rate of inflation, foreign exchange rates etc. which affect the profitability of all the companies.

- ***Industry-wise factors:*** These factors are specific to the industry in which the firm is operating; for example the demand supply gap in the industry, the emergence of substitute products and changes in government policy relating to the industry.

- ***Firm specific factors:*** Such as age of the plant, the quality of its management, the brand image of its products and its labour relations.

Economic Analysis

Return assumptions for the stock and bond markets and sales, cost, and profit projections for industries and nearly all companies necessarily embody economic assumptions. Investors are concerned with those forces in the economy which affect the performance of organization in which they wish to participate, through purchase of stock. By identifying key assumptions and variables, we can monitor the economy and gauge the implications of new information on our economic outlook and industry analysis. In order to beat the market on a risk adjusted basis, the investor must have forecasts that differ from the market consensus and must be correct more often than not.

Economic trends can take two basic forms: cyclical changes that arise from ups and downs of the business cycle, and structural changes that occur when the economy is undergoing a major change in how it functions. Some of the broad forces which impact the economy are:

Population

Population gives and idea of the kind of labour force in a country. Increasing population gives demand for more industries like hotels, residences, service industries like health, consumer demand like refrigerators and cars. Increasing population therefore shows a greater need for economic development. Although it does not show the exact industry that will expand.

Research and technological development

The economic forces relating to investments would depend on the amount of resources spent by the government on the particular technological development affecting the future. Investors would prefer to invest in those industries in which the larger share of development funds are being allocated by the government. For example in India oil and information technology are receiving a greater amount of attention and may be considered for investment.

Macroeconomic Stability

General macroeconomic conditions are very important in terms of the general climate under which investment decisions are made. So economic growth will depend to some extent upon the stability of the economy e.g. fiscal balance, and reasonably predictable levels of inflation. Macroeconomic stability reduces the risks of investment and might therefore be seen as a necessary condition for growth. Fiscal balance ensures that there is less risk of inflation, because there will be less risk of governments printing money. This may also stabilize the exchange rate and allow interest rates to be set at a reasonably low level - so further encouraging investment.

Trade Liberalization, Capital Mobility and Exchange Rate Policy

The abolition of trade restrictions (tariffs and quotas) is often seen as a necessary condition for growth. The idea is to widen markets and thus allow economies of scale in exporting industries. It is often argued that exchange rates need to be adjusted downwards at the same time, to ensure that potential exporters can compete on world markets. To encourage direct foreign investment restrictions on international capital flows may need to be reduced.

Natural Resources and Raw Material

The natural resources are largely responsible for a country's economic development and overall improvement in the condition of corporate growth. The discovery of oil in Middle Eastern countries and the discovery of gas in America has significantly changed the economic and investment pattern of the countries.

Gross domestic product (GDP)

GDP measures the total output of goods and services for final use occurring within the domestic territory of a given country, regardless of the allocation to domestic and foreign claims. Gross domestic product at purchaser values (market prices) is the sum of gross value added by all resident and nonresident producers in the economy plus any taxes and minus any subsidies not included in the value of the products. Higher GDP level is an indication of higher economic development and thereby higher investment ability.

International Trade

Exports and Imports of goods and services represent the value of all goods and other market services provided to or received from the rest of the world. They include the value of merchandise, freight, insurance, transport, travel, royalties, license fees, and other services, such as communication, construction, financial, information, business, personal, and government services. They exclude labor and property income (formerly called factor services) as well as transfer payments. Higher levels of international trade especially higher exports are indicative of higher earnings and therefore higher economic development of a country.

Inflation

Higher inflation is generally negative for the stock market because it causes higher interest rates, it increases uncertainty about future prices and costs, and it harms firms that cannot pass their cost increases on to consumers. Some industries may benefit inflation. Natural resource industries benefit if their production costs do not rise with inflation, because their output will likely sell at higher price.

Interest Rates

Banks usually benefit from volatile interest rates because stable interest rates lead to heavy competitive pressures that squeeze their interest margins. High interest rates clearly harm the housing and the construction industry.

Economic Indicators

Besides the factors discussed above there are other significant economic indicators such as country’s fiscal policy, monetary policy, stock prices, state of capital market, labour productivity, consumer activity etc.

A look of India's economic indicators for the year 2005-2006 is as follows

ECONOMIC SUMMARY		
	2005-06	**Growth %**
GDP at factor cost at current prices: (Rs. Thousand crore) US$ million	3200.6 72316.3	12.5
At 1999-00 prices (Rs. Thousand crore) US$ million	2586.6 584542.3	8.1
Agriculture and allied sectors: (Rs. Thousand crore) (US$ million)	508.6 114937.8	2.3
Food grains production (Million tones)	209.3	2.3
Index of industrial production	215.4	7.8
Electricity generated (Billion kwh)	458.6	4.7
Wholesale price index	196.2 (on February 4, 2006)	4.1
Consumer price index for industrial workers	550 (December 2005)	5.6
Money supply (Rs. Thousand crore) (Outstanding at the end of financial year) (US$ million)	2551.9 (on January 20, 2006) 576700.5	16.4
Imports at current prices (US$ million)	108,803 (April-Jan 2005-06)	26.7
Exports at current prices (US$ million)	74,978 (April-Jan 2005-06)	18.9
Foreign currency assets (US$ million)	133,770 (by end January 2006)	8.2
Exchange rate (Re/US$)	44.25 (Average exchange rate for April-January 2005-06)	2.1

Forecasting techniques

There are basically five economic forecasting techniques:

Surveys: It is a method of short term forecasting. It is broadly used to convey the future course of events in the economy. The method to do this is approximate "because it is based on beliefs, notions and future budgeting of the government. It, however, broadly indicates the future of events in the economy.

Economic Indicators: It gives indication of the economic process through cyclical timings. These projections are a method of getting indications of the future relating to business depressions and business prosperity. This method although has its advantages of giving the future indications of the economy is not an exact method of finding out the economic activity. It gives results approximately and is at best an estimation of the future of the economic conditions.

Diffusion Indexes: The diffusion index is a method which combines the different indicators into one total measure and it gives weaknesses and strength of a particular time series of data. The diffusion index is also called a census or a composite index.

Economic Model Building: This is a mathematical and statistical application to forecast the future trend of the economy. This technique can be used by trained technicians and it is used to draw out relation between two or more variables. The technique is to make one independent variable and independent variable and to draw out a relationship between these variables. The answer of drawing these relationships is to get a forecast of direction as well as magnitude.

***Opportunistic Model Building*:** This method is the most widely used economic forecasting method. This is also sectoral analysis of Gross National Product Model Building. This method uses the national accounting data to be able to forecast for a future short-term period. It is a flexible and reliable method of forecasting. The method of forecasting is to find out the total income and the total demand for the forecast period. To this are added the environment conditions of political stability, economic and fiscal policies of the government, policies relating to tax and interest rates. This must be added to Gross domestic investment, government purchases of goods in services, consumption expenses and net exports. The forecast has to be broken down first by an estimate of the government sector which is to be divided again into State Government and Central Government expenses. The gross private domestic investment is to be calculated by adding the business expenses for plan, construction and equipment changes in the level of business. The third sector which is to be taken is the consumption sector relating to the personal consumption factor. This sector is usually divided into components of durable goods, non-durable goods and services. When data has been taken of all these sectors these are added up to get the forecast for the Gross National Product

Industry Analysis

Once economic Analysis is made and the forecast of economy is known , the analyst needs to look at the industry groups which are promising in the coming years and then choose the companies to invest in within those industry groups. There is no necessary co relation between economic growth and industry growth some industries may grow in spite of poor economic growth. The industry has been defined as a homogeneous group of people doing a similar kind of activity or similar work. But industry broadly covers all the economic activity happening in a country to bring growth. A broad concept of industry would include all the factors of production, transportation, trading activity and public utilities. The broad classification of industry, however, would not be relevant for an investor who would like to ensure that he does not lose from the investment that he makes. It is, therefore, essential to qualify the industry into some characteristics homogeneous group. Usually, the industry is classified in processes and in stages. It may also be classified according to work group that it identifies to.

Classification of industries

In India asset based industry grouping used to exist under MRTP Act and FERA Act. However, since economic reforms in 1991 onwards, there is no limit to the asset growth and the classification of MRTP and non MRTP companies has since disappeared. Nowadays, even multinational firms can operate in India through their subsidiaries or directly by having a majority stake in a company.

The size wise classification of industries is as follows:

Small scale units: These industries are not listed and those which have a minimum paid up capital of Rs 30 lakhs can be listed on OTCEI.

Medium Scale Industries**:** The units having paid up capital of Rs 5 crores and above can be listed on regional stock exchanges.

Large scale Industries**:** Industrial units with paid up capital of Rs 10 crores or more can be listed on major stock exchanges like BSE.

Proprietary Based Classification

The industries can be classified on the basis of ownership into (a) private sector industries which are open to the general public for investment (b) public sector (Government and semi-government ownership) (c) and in joint sector.

Use Based Classification

(a) Basic Industries: These are in the core sector in India and constitute the infrastructure industries which are mostly in the public sector but are now kept open to the public sector. The examples are fertilizers, chemicals, coal, cement, steel etc.

(b) Capital Goods Industries: These are both in the private and public sectors. These are highly capital intensive industries and are used to produce inputs of other industries such as machine tools, agricultural machinery, wires, cables etc.

(c) Intermediate goods: These are goods in the intermediate stage of production, having undergone some processing already but will be used for further production examples are tyres, synthetic yarn, cotton spinning, automobile parts etc.

(d) Consumer goods industries: These are of two categories, namely, consumer durables and consumer non durables. These are final products for the consumption of households. Durables are fans, bulbs, Automobiles, Cycles, Two wheelers, Telephone equipment etc. Non durables are food products, Agro based products, tobacco, woolen and jute textiles etc.

Input based Classification

(a) Agro based products like jute, sugar cotton, tobacco, groundnuts etc.
(b) Forest based products like plywood, paper, wood, ivory, resin honey etc.
(c) Marine based products like fisheries, prawns, etc.
(d) Metal based products like engineering products, aluminium, copper, gold etc.
(e) Chemical based products like fertilizers, pesticides, drugs paints etc.

Each of the above classifications is useful for identifying the characteristic features of the industry, its inputs and outputs or uses and the likely demand for it, constraints in production, impact of economic factors etc.

Industry Life Cycle

An insightful analysis when predicting industry sales and trends in profitability is to view the industry over time and divide its development into stages similar to those that humans progress through. The number of stages in the industry life cycle analysis can be based on a five stages model, which includes:

1. Pioneering Development
2. Rapid accelerating growth
3. Mature growth during this period is very small or negative profit margins and profits.
4. Stabilization and market maturity
5. Deceleration of growth and decline.

Besides being useful when estimating sales, the analysis of an industry's life cycles also can provide insights into profit margins and earnings growth.

The profit margin series typically peaks early in the total cycle and then levels off and declines as competition is attracted by the early success of the industry.

1. ***Pioneering Development:*** During this start up stage, the industry experiences modest sales growth and very small or negative profit margins and profits. The market for the industry's product or service during this time period is small, and the firms involved incur major development costs.

2. ***Rapid Accelerating Growth****:* During this stage a market develops for the product or service and demand becomes substantial. The limited number of firms in the industry faces little competition and individual firms can experience substantial backlogs. The profit margins are very high. The industry builds its productive capacity as sales grow at an increasing rate as the industry attempts to meet excess demand. High scales growth and high profit margins that increase as firms become more efficient cause industry and firm profits to explode. During this phase profits can grow at over 100% a year as a result of the low warning base and the rapid growth of scales and net profit margins.

3. ***Mature Growth:*** The success in stage two has satisfied most of the demand for the industry goods or service. Thus, future scales growth may be above normal but it no longer accelerates for example, if the over all economy is growing at 8% scale for this industry might grow at an above normal rate of 15% to 20% a year. Also the rapid growth of scales and high profit margins attract competitors to the industry which causes an increase in supply and lower prices which means that the profit margins begin to decline to normal levels.

4. ***Stabilization And Market Maturity****:* During this stage which is probably the longest phase the industry growth rate declines to the growth rate of the aggregate economy or its industry segment. During this stage investors can estimate growth easily because scales correlate highly with an economic series. Although scales grow in line with the economy profit growth varies by industry because the competitive structure varies by industries and by individual firms within the industry because the ability to control costs differs among companies. Competition produces tight profit margins and the rates of return on capital eventually become equal to or slightly below the competitive level.

5. ***Declaration of Growth and Decline:*** At this stage of maturity the industry sales growth declines because of shifts in demand or growth of substitutes. Profit margins continue to be squeezed and some firms experience low profit or even losses. Firms that remain profitable may show very low rates of return on capital. Finally, investors begin thinking about alternative uses for the capital tied up in this industry.

Assessing the Industry Life Cycle

The industry life cycle classification of industry evolvement helps investors to assess the growth potential of different companies in an industry. Based on the stage of industry, they can better assess the potential of different companies within an industry. However, there are limitations to this type of analysis First, it is only a generalization, and investors must be careful not to attempt to categorize every industry, or all companies within a particular industry, into neat categories that may not apply. Second, even the general framework may not apply to some industries that are not categorized by many small companies struggling for survival. Finally, the bottom line in security analysis is stock prices, a function of the expected stream of benefits and the risk involved.

The industry life cycle tends to focus on sales and share of the market and investment in the industry. Although all of these factors are important to investors, they are not the final items of interests. Given these qualifications to industry life cycle analysis, what are the implications for investors?

The pioneering stage may offer the highest potential returns, but it also poses the greatest risk. Several companies in an industry will fail or do poorly. Such risk may be appropriate for some investors, but many will wish to avoid the risk inherent in this stage.

Investors interested primarily in capital gains should avoid the maturity stage. Companies at this stage may have relatively high payouts because they have fewer growth prospects. These companies will often offer stability in earnings and dividend growths.

Clearly, companies in the fourth stage of the industrial life cycle, decline, are usually to be avoided. Investors should seek to spot industries in this stage and avoid them. It is the second stage, expansion that is probably of most interest to investors. Industries that have survived the pioneering stage often offer good opportunities for the demand for their products and services is growing more rapidly than the economy as a whole. Growth is rapid but orderly an appealing characteristic to investors.

ELEMENTS OF FINANCIAL ANALYSIS

Share price depends partly on its intrinsic worth for which financial analysis of a company is necessary to help the investor to decide whether to buy or not the shares of that company. The soundness and intrinsic worth of a company is known only by such analysis. The market price of a share depends, among others on the sound fundamentals of the company, the financial and operational efficiency and the profitability of that company. These factors can be examined by a study of the financial management of the company. An investor needs to know the performance of the company, its intrinsic worth as indicated by some parameters like book value, EPS, P/E multiple etc., and come to a conclusion whether the share is rightly priced for purchase or not. This, in short is the importance of financial analysis of a company to the investor.

What is Financial Analysis?

The financial management of a company is concerned with management of its funds which reflects how efficiently the company is managing its funds. The overall objective of all business is to secure funds at low cost and their effective utilization in the business for a profit. The funds so utilized must generate an income higher than the cost of procuring them. Here it is to be noted that all companies need both long-term and short-term capital. The finance manager must therefore keep in view the needs of both long-term debt and working capital and ensure that the business enjoys an optimum level of working capital a id that it does not keep too many funds blocked in inventories, book-debts, cash, etc. The capital structuring and average cost of capital for the company should also be examined.

Financial analysis is analysis of financial statements of a company to assess its financial health and soundness of its management. "Financial

Statement analysis" involves a study of the financial statements of a company to ascertain its prevailing state of affairs and the reasons therefore. Such a study would enable the public and investors to ascertain whether one company is more profitable than the other, and also to state the causes and factors that are probably responsible for this.

Components of Financial Statements

The term 'financial statements' as used in modern business refers to the balance sheet, or the statement of financial position of the company at a point of rime and income and expenditure statement, or the profit and loss statement over a period. To this is added, the profit allocation statement which reconciles the balance in this account at the end of the period with that at the beginning. Thus, the financial statements provide a summary of the accounts of a company over a period of one year, and the balance sheet reflecting the assets, liabilities and capital as at a point of time say at the end of the year.

Analysis and Interpretation*:* With a view to interpret the financial statements, it is necessary to analyse them with the object of formation of an opinion with respect to the financial condition of that company. This Analysis involves the following steps:

(a) Comparison of the financial statements, over two to five years.
(b) Ratio analysis, for two to three years.
(c) Funds or Cash Flow analysis, over a short period.
(d) Trend analysis, over a period of 5 to 10 years.

Comparison of the Financial Statements

Comparison is the precondition for a meaningful interpretation. It may be in the nature of:

(a) Figures of one year with that of another year;

(b) Inter-firm comparison of figures, within the same industry;

(c) Comparison of one product figures with that of another product; and

(d) Comparison of budgeted figures with the actual figures.

RATIO ANALYSIS

Ratios, are probably the most frequently used tool to analyse a company, and are popular because they are readily understood and can be computed with ease. In addition, the information used in ratio analysis is easy to obtain, for many ratios employ data available in a firm's annual report and quarterly reports. Ratio's are used not only by investors but also by a firm's management and its creditors. Creditors use the analysis to establish the ability of the borrowers to pay interest and retire debt. Management use ratio's to plan, control, and to identify weaknesses within the firm. Shareholders use ratio's to measure firms profitability. The ratio is a statistical yardstick that provides a measure of relationship between any two variables.

The ratios are conveniently classified as follows:

(i) Balance Sheet Ratios which deal with the relationships between two items or groups of items which are both in the Balance Sheet, e.g., the ratio of current assets to current liabilities (Current Ratio).

(ii) Revenue Statement Ratios which deal with the relationship between two items or groups of items which are both in the Revenue Statement, e.g., ratio of gross profit to sale or gross profit margin.

*(iii) Balance Sheet and Revenue Statement Ratios which deal with relationship b*etween items from the Revenue Statement and. items from the Balance Sheet, e.g., ratio of net profit to own Funds (Composite Ratios), Return on Total Resources, Return on Own Funds (iv) solvency ratios which deal with the liquidity and ability of the company e.g. Debt to Equity Ratio, Current ratio etc

(iv) *Turnover ratio's:* Turnover of Inventory Composite Ratios, Turnover of Fixed Assets, Turnover of Debtors etc

Further ratios can be classified on the basis of objective for which they are being used.

(i) ***Liquidity Ratio's:*** Liquidity is the ease with which assets may be quickly converted into cash without the firm incurring a loss. If the firm has a high degree of liquidity, it will be able to meet its debt obligations as they become due. Therefore, liquidity ratios are a useful tool for the firm's creditors, who are concerned about being paid. These include current ratio and quick ratio.

(a) ***Current Ratio:*** This is defined as:

Current Ratio = Current Assets /Current Liabilities

This ratio indicates the company's ability to meet current obligations, *i.e.*, the current assets must be sufficient to pay current liabilities as and when the latter matures. As a rule of thumb, the current ratio should at least be 2:1 by which is meant that even if half of the current assets could not be quickly converted into cash, there would still be left enough to pay off short-term obligations. However, for interpreting current ratio the quality and liquidity of each current asset and current liability must be considered as also 'the nature of the business as it may well be that various types of business may require less liability.

(b) ***Quick Ratio or Acid-Test Ratio***

This is defined as:

Quick Ratio/Acid Test Ratio = $\dfrac{\text{Cash+ Bills Receivable + Debtors +Temporary Investment}}{\text{Current Liabilities}}$

The Acid-Test Ratio thus ignores less liquid assets like inventory, or prepaid and deferred charges, and takes into account only the most readily available cash and other assets which can be applied for meeting short-term obligations at short notice. As a rule of thumb, a quick ratio of 1:1 is indicative of a company having a good short-term liquidity, and one which can meet its short-term debts without strain.

(ii) Activity Ratios: Activity ratios indicate the rate at which the firm is turning its inventory and accounts receivable into cash. The more rapidly the firm turns over its inventory and receivables, the more quickly it acquires cash. Higher turnover indicates that the firm is rapidly receiving cash and is in a better position to pay its liabilities as they become due. Such high turnover however may not indicate that the firm is making profits. For example, high inventory turnover may indicate that the firm

is selling items for too low a price in order to have quicker sales. These ratio's include inventory turnover ratio, average collection period, receivables turnover, fixed asset turnover etc.

a) Turnover of Current Assets this is defined as: Turnover Current Assets = Net Sales / Current Assets

$$\text{Turnover Current Assets} = \frac{\text{Net Sales}}{\text{Current Assets}}$$

The higher the turnover of current assets ratio, the greater is the liquidity of the firm, and the lesser is the amount blocked in current assets. This ratio will vary from business to business and should be high for a trading company not involved in manufacturing activity, which should be able to sell-off stock through its distribution channels as quickly as possible. It will be low for companies having a long reduction time, e.g., ship manufactures or heavy equipment manufactures with long product manufacturing cycles.

b) Turnover of Inventory Ratio

This is defined as:

$$\text{Turn over of Inventory Ratio} = \frac{\text{Cost of Goods Sold}}{\text{Average Inventory}}$$

This ratio gives the turnover of inventory and indicates how funds invested in inventories ire being turned over. The higher the turn over of inventory ratio, the smaller is the amount blocked in inventory and, therefore, the less need is there for working capital for financing the inventory. A high ratio indicates that manufacturing activity is capable of being sustained with the help of smaller inventory stock and consequently there is less chance of stock becoming obsolete/ in saleable and also that the company can afford to sell on a small gross profit margin. This is important in a highly competitive market where small margins can be important. The volume of profits having to come from high turn over volume rather than from high margins on unit-product.

c) *Credit Collection Period*

This is defined as:

$$\text{Credit Collection Period} = \frac{\text{Account receivable x No of working days}}{\text{Credit sales during the year}}$$

The smaller the number of days, the higher will be the efficiency of the credit collection department. This ratio is indicative of the efficiency of the bill collectors of the company. It; indicates whether the company is haying too liberal a credit position and which would, therefore, require tightening up. This ratio is useful for Sales Manager both to review the efficiency of his credit collectors, and to review his credit policy, as also to appraise the supervisors/ salesmen responsible for collection of credit sales proceeds.

(iii) Profitability Ratios: The amount that a firm earns is particularly important to investors. Earnings accrue to stockholders and are either distributed to them as dividends or are retained. Profitability ratios are measures of performance that indicate the amount the firm is earning relative to some base, such as sales, assets or equity. These ratios include, Gross profit ratio, net profit ratio, operating profit ratio, return on equity etc.

I

a) *Gross Profit Ratio*

This is defined as:

$$\text{Gross Profit Margin} = \frac{\text{Gross Profit}}{\text{Net Sales}} \times 100$$

And is expressed as a percentage. The gross profit margin shows the proportion of sales after meeting the direct cost of goods sold, i.e., direct material, direct labour and other direct expenses. The gross profit margin should be high enough to covey other operating, administrative and distribution expenses as otherwise the line of activity would not be profitable for the company. Usually, if the level of corporate profit taxation is, say 65-70 per cent at the highest slab, the gross profit margins should be of the order of 30-35 per cent, in order to leave a margin of 12 per cent post-tax, which is usually considered to be a satisfactory level if continued resources for ploughing back for growth have to be found by a company out of its own resources. If the management wants to analyse which product of multi-product range should be discarded or stopped it should analyse the gross profit margin of each product and then come to a rational decision.

b) *The Ratios of Operating Profit to Sales*

This is defined as:

$$\text{Operating Profit Margin} = \frac{\text{Operating Profit xlOO}}{\text{Net Sales}}$$

This is expressed as a percentage, and indicates the operating profit margin after taking into account all indirect costs and expenses of manufacturing, administrative and distribution activities. All variables and fixed costs are thus taken into account but not taxes. This ratio reflects the profitability of the entire business after meeting all its costs but before having to meet the tax liability.

c) *Net Profit Ratio*

This is defined as:

$$\text{Net Profit Ratio} = \frac{\text{Net Profit}}{\text{Net Sales}} \text{ xlOO}$$

The net profit ratio, expressed as percentage, shows the return left for the shareholders after meeting all expenses and taxes.

d) *Return of Investment (ROI)* — A Key Profitability Ratio is the return on investment ratio (ROI), which is a measure of efficiency and provides a starting point for analyzing the influence and trends in a company's performance.

It is defined as:

$$\text{Return on Investment} = \frac{\text{Net profit (After tax)}}{\text{Share holders funds}} \times 100$$

ROI is a very significant ratio in measuring the overall profitability or operational efficiency of a company. It enables the management to know whether the basic objective of the business ---maximization of profits is achieved. This ratio is also known as net worth ratio.

e) ***Return on Owners***

Equity This is defined as:

$$\text{ROEC} = \frac{\text{Net profit (after tax)-Preference Dividend}}{\text{Paid up equity share capital}} \times 100$$

it indicates to the equity shareholders what is the return on their investment in the company and whether their continued investment in the company is worthwhile or not.

The ratio is also called "Return on net worth".

(iv) Leverage Ratios: In order to magnify the return to shareholders a firm may use leverage in the capital structure. Financial leverage refers to the extent to which a firm finances its assets by use of debt. Since debt financing impacts return to shareholders each of these ratios is extremely valuable in analyzing the financial position of the firm. The most commonly used leverage ratios are debt equity ratio and debt to total asset ratio.

a) Debt Equity Ratio

This is defined as:

Operating Profit Margin = Total debt i.e. long-term loans + Short-term loans + debentures + Interest bearing deposits / Equity

This ratio indicates what is the proportion of fixed interest bearing capital taken by the company, as compared to the equity shareholders' capital. A high ratio would indicate that the company has preferred to go in for fixed-charges capital rather than for equity shareholders' capital.

b) Shareholders' Equity to Total Capital

This is defined as:

Shareholder's Equity to Total Capital = Owned Capital (Equity Capital + Reserves) / Total Capital (Fixed Assets + Working Total Capital + Loan Capital)

This is an important ratio for determining the long-term solvency of a company. In *general,* the higher the share of proprietors' or owned capital in the total capital of the company, the less the likelihood of insolvency in future, given normally efficient management.

(v) Coverage Ratios: While leverage ratios measure the firm's use of debt, coverage ratios specifically measure its ability to service its debt. These ratios indicate to the creditors and management how much the firm is earning form operations relative to what is owed. These ratios include interest coverage ratio.

Debt Service Coverage Ratio = Profit before interest and depreciation

Interest payments and principal installments falling due during the year.

This indicates at a glance whether the borrowing company will have adequate funds for servicing both interest payments falling due and the principal re-payment falling due in installments for the loan taken. Depreciation is added back to the net profits, as also the interest, in order to calculate this ratio.

USING FINANCIAL STATEMENT ANALYSIS

Financial statement analysis can be a very useful tool for understanding a firm's performance and condition. However, there are certain problems and issues encountered in such analysis which call for care, circumspection, and judgment.

Problems in Financial Statement Analysis

You have to cope with the following problems while analyzing financial statements.

Lack of an Underlying Theory: The basic problem in financial statement analysis is that there is no theory that tells us which numbers to look at and how to interpret them. In the absence of an underlying theory, financial statement analysis appears to be ad hoc, informal, and subjective. As Horrigan put it: "From a negative viewpoint, the most striking aspect of ratio analysis is the absence of an explicit theoretical structure...... As a result the subject of ratio analysis is replete with untested assertions about which ratios should be used and what their proper levels should be."

***Conglomerate Firms**:* Many firms, particularly the large ones, have operations spanning a wide range of industries. Given the diversity of their product lines, it is difficult to find suitable benchmarks for evaluating their financial performance and condition. Hence, it appears that meaningful benchmarks may be available only for firms which have a well defined industry classification.

Window Dressing: Firms may resort to window dressing to project a favourable financial picture. For example, a firm may prepare its balance sheet at a point when its inventory level is very low. As a result, it may appear that the firm has a very comfortable liquidity position and a high turnover of inventories. When window dressing of this kind is suspected, the financial analyst should look at the average level of inventory over a period of time and the not the level of inventory at just one point of time.

***Price Level Changes**:* Financial accounting, as it is currently practiced in India and most other countries, does not take into account price level changes. As a result, balance sheet figures are distorted and profits misreported. Hence, financial statement analysis can be vitiated.

Variations in Accounting Policies: Business firms have some latitude in the accounting treatment of items like depreciation, valuation of stocks, research and development expenses, foreign exchange transactions, installment sales, preliminary and pre-operative expenses, provision of reserves, and revaluation of assets. Due to diversity of accounting policies found in practice, comparative financial statement analysis may be vitiated.

Interpretation of Results: Though industry averages and other yardsticks are commonly used in financial ratios, it is somewhat difficult to judge whether a certain ratio is 'good' or *"bad'. A* high current ratio, for example, may indicate a strong liquidity position (something good) or excessive inventories (something bad). Likewise, a high turnover of fixed assets may mean efficient utilization of plant and machinery or continued flogging of more or less fully depreciated, worn out, and inefficient plant and machinery.

Another problem in interpretation arises when a firm has some favourable ratios and some unfavorable ratios—and this is rather common. In such a situation, it may be somewhat difficult to form an overall judgement about its financial strength or weakness. Multiple discriminant analysis, a statistical tool, may be employed to sort out the net effect of several ratios pointing in different directions.

Correlation among Ratios: Notwithstanding the previous observation, financial ratios of a firm often show a high degree of correlation. Why? This is because several ratios have some common element (sales, for example, are used in various turnover ratios) and several items tend to move in harmony because of some common underlying factor. In view of ratio correlations, it is redundant and often confusing to employ a large number of ratios in financial statement analysis. Hence it is necessary to choose a small group of ratios from a large set of ratios. Such a selection requires a good understanding of the meaning and limitations of various ratios and an insight into the economics of the business.

Guidelines for Financial Statement Analysis

From the foregoing discussion, it is clear that financial statement analysis cannot be treated as a simple, structured exercise. When you analyse financial statements bear in mind the following guidelines.

1. *Use ratios to get clues to ask the right questions:* By themselves ratios rarely provide answers, but they definitely help you to raise the right questions.

2. Be *selective in the choice of ratios:* You can compute scores of different ratios and easily drown yourself into confusion. For most purposes a small set of ratios—three to seven—would suffice. Few ratios, aptly chosen, would capture most of the information that you can derive from financial statements.

3. *Employ proper benchmarks:* It is a common practice to compare the ratios (calculated from a set of financial statements) against some benchmarks. These benchmarks may be the average ratios of the industry or the ratios of the industry leaders or the historic ratios of the firm itself.

4. *Know the tricks used* by accountants: Since firms tend to manipulate the reported income, you should learn about the devices employed by them.

5. *Read the footnotes:* Footnotes sometimes contain valuable information. They may reveal things that management may try to hide. The more difficult it is to read a footnote, the more information—laden it may be.

Cash Flow Analysis

Analysis of a firm's income statement and balance sheet with special emphasis on profitability and net earnings available to the shareholder is important. However, increased interest has developed among financial analysts in a firm's operational income and cash flow. Since net earnings may be affected by non recurring items for example profit on sale of fixed assets, some financial analysts place more emphasis on cash flow. The argument is that the cash flow generated by a firm's operations is a better indication of its profitability and value. Thus the use of cash flow is greatly increasing. This statement determines the changes in the firm's holdings of cash and cash equivalent (i.e. short term liquid assets, treasury bills etc). The emphasis is not on the income or the firm's assets and liabilities but on the inflow and outflow of cash from the firms operations, investments, and financing decisions. By placing emphasis on cash, the statement permits the individual to see where the firm generated cash and how these funds were used.

The cash flow statement can also help investors examine the quality of earnings. For example, if inventories are rising more quickly than sales, this can be a real sign of trouble – demand is weakening. If a firm is cutting back on its capital expenditures, this could be a signal of problems down the road. If accounts receivables are rising at a greater rate than sales are increasing a company may be having trouble collecting money owed. If accounts payable are rising too high this may indicate that the company is trying to conserve cash by delaying payment to creditors and suppliers which may lead to problems for the company.

HOW TO PREPARE CASH FLOW STATEMENT?

The data come from the Balance sheet and Income Expenditure statement in the form of changes over a period of each in the items of these financial statements. The example of a cash flow statement is as follows:

Basis for Company Analysis *113 (Rs. Lakhs)*

Sources	Rs.	Use of or Decline in Cash	
Cash at Bank	10,000	Increase in Inventories	20,000
AM: Cash inflows		Purchase of Fixed Assets	60,000
(a) Issue of Equity Capital as Rights	50,000	Increase in Debtors	20,000
		Payment for Expenses	30,000
(b) Issue of Debentures	20,000		
(c) Raising of Public Deposits	10,000		
(d) Increase of Creators	10,000		
(e) Cash Trading Profits (generated)60,000			
	160,000		130,000
		Closing Balance in Bank	30,000

Cash profits are brought forward from profit allocation statement, while the other items are derived from the Balance Sheet and income and expenditure statement. A reading of the above statement helps the cash management techniques adopted by the company and its liquidity position.

Trend Analysis

In trend analysis, regression technique is used and the dependent variable says sales are regressed over time, say months or years. Similarly, earnings can be regressed over time to know the short term and long-term trend of earnings.

These techniques require a good deal of data of the past and analysis for a length of time for experimentation. Trend Analysis refers to comparison of some important ratios and rates of growth over a time period of a few years. These trends in the case of GPM or Sales Turnover are useful to indicate the extent of improvement or deterioration over a period of time in the aspects considered. The trends in dividends, E.P.S., asset growth or sales growth are some examples of the trends used to study the operational performance of the companies. Any temporary rise in inventories to sales would indicate sluggish demand for the products of the company.

Thus, the trends of the results, rather than the actual ratios and percentages, are important. Structural relationships taken from the financial statements of one year only are of limited value and the trends of these structural relationships established from statements over a number of years may be more significant than absolute ratios

Market Price and Corporate Performance

The market price of a share depends primarily on the Company's performance, reflected in the earnings per share or cash earning per share, dividend record and bonus payments made by the company. Besides, share price also depends on the goodwill factors which are subjective in nature such as management reputation, expansion plans, tax planning, technological set-up, reputation of collaborators and locational advantages. The management rating is subjective and is a factor contributing to the goodwill of the company. This goodwill also depends on the Government attitude to the management, Government policy with regard to the imports etc.

Honesty, integrity and consistency of management give good rating for the company. The price of a share also depends on subjective factors like sentiment of the market, phase of the market such as gloom, fear, indecision, optimism and Euphoria etc. Thus, many non-economic and non-financial factors play a role in price formation of a scrip in die market.

To sum up, the market price of share depends on some fundamental factors like intrinsic value of the share, as also on subjective and goodwill factors and sentimental factors depending on the phase of the market. The intrinsic worth of the company is judged by the net present value, derived by discounting future returns of shares, book value of the share, earnings per share etc.

Forecasting earnings

Forecasting earnings per share (EPS) is an important task for both outside investors and internal managers. Outside the firms, investors use these forecasts as a basis to form profitable investment portfolios. Inside the firms, managers use these forecasts for a host of critically important decisions including operational budgeting, capital investment, and other resource allocation decisions. Accuracy in these forecasts, therefore, is essential for both optimum portfolio management in capital markets and optimum resource allocation within a firm.

Selecting a forecasting methodology is, in itself, a major decision for investors and for managers. Earlier research on the accuracy of alternative forecasting methods has been in one of the two categories: (1) comparing different statistical or mechanical forecasting methods, and (2) comparing statistical models with judgmental analysts' forecasts. Building on these two lines of research, later literature suggests that a combination of the statistical forecasts and financial analyst forecasts will produce more accurate results.

The considerable amount of research on statistical forecasting models in the literature has created the need for varied means of categorization to identify and select models one means of basic categorization of the statistical forecasting methods used to aid in model selection is to identify models as either being linear or nonlinear. Another categorization of statistical forecasting models is to refer to them as being either "univariate" (i.e., using one independent variable in the model) or "multivariate" (i.e., more than one independent variable). In the context of EPS forecasts, to date, the majority of the statistical methods used in forecasting EPS are linear. For example, the family of time-series forecast models widely used in forecasting EPS belongs to the linear forecasting category. Some practical methods are as follows:

1. **Use of Earnings Model, for EBT (Earning before tax)namely,**

EBT={R+(R-I) L /E} E

Where, R is the average return on Investments or Assets, I is the interest cost on liabilities other than equity, L/E is the debt equity ratio or total liabilities other than equity to equity.

If we have the data on the past ernings on assets, the manner of financing and the average cost of interest on liabilities, we will have the average past trends of R, I and plug in these values for the present and future. If we know EBT, by deducting the tax payable at the effective rate in the past we can arrive at the EAT (Earning after tax). Once we know EAT by dividing EAT by the outstanding number of shares we will get the EPS (Earning per share). If the past average P/E (Price earning ratio) multiple is say Rs15 and the EPS works out to Rs 10 then the market price can be estimated at Rs 150 i.e., EPS x P/E .

2. Market Share Approach

From an industry anlaysis, it is known that the share of the company XYZ is 9% of the market and the demand for its product will go up from 26 lakhs to 28 lakhs. Then the sales of XYZ can be put at 2.5 lakhs in the next year. On the basis of this sales rate and the average operating profit margin of last three years say 35% one can estimate the income from sales and 35% of it is taken as operating profits, from which interest and depreciation and taxes can be deducted at their normal rates and arrive at profit after taxes (EAT). Then estimates of EPS and P/E multiple and the market price at the end of the next year can be made.

Intrinsic Value

For equity analysis, Graham and Dodd noted that there were three approaches. The first they called the anticipation approach. This involved selecting and recommending that equity shares "out perform" the market over a given span of time, usually the ensuing 12 months. This approach they noted did not involve seeking an answer to the question:" *What is the stock worth?*" The second concept stands in market contrast. It attempts to value a share independently of its current market price. If the value found is substantially above or below the current price, the analyst concludes that the issue should be bought or disposed off. This independent value has a variety of names, the most familiar of which is the intrinsic value. It may also be called indicated value, central value, normal value, investment value, reasonable value, fair value and appraised value. Graham, Dodd and Cattle's third approach is concerned with relative rather than with intrinsic value from the current level of the equity prices. In estimating relative value, the analyst more or less accepts the prevailing market level and seeks to determine the value of equity in terms of it. His efforts, therefore, are devoted fundamentally to appraising the relative attractiveness of individual issues in terms of the then existing level of equity prices and not to determine the fundamental worm of equity.

A general definition of intrinsic value would be "that value which is justified by the facts, e.g. assets, earnings, dividends, definite prospects, including the factor of management". The primary objective in using the adjective "intrinsic" is to emphasize the distinction between value and current market price, but not to invest minus "value" with an aura of performance. The most important single factor determining a stock's value is now held to be the indicated future earning power i.e., the estimated average earnings for a future span of years. Intrinsic value would then be found by first forecasting minus earning power and then multiplying that prediction by an appropriate "capitalization factor".

Graham, Dodd and Cottle were explicit that their intrinsic value approach would not apply to high growth rate stocks or inherently speculative issues since they do not admit of a "soundly ascertained value". They consider only growth stocks at high price earnings ratios basically in this category. In other words, a genuine growth stock will typically appear to be selling too high by one evaluation standards and the true investor may do well to avoid it for mis reason. But both the price and the ultimate value may often develop independently of, and contrary to, any given valuation.

Definitions and Characteristics of Bonds

A bond is a long-term promissory note that promises to pay the bondholder a predetermined, fixed amount of interest each year until maturity.

At maturity, the principal will be paid to the bondholder. In the case of a firm's insolvency, a bondholder has a priority of claim to the firm's assets before the preferred and common stockholders. Also, bondholders must be paid interest due them before dividends can be distributed to the stockholders. A bond's par value is the amount that will be repaid by the firm when the bond matures.

The contractual agreement of the bond specifies a coupon interest rate that is expressed either as a percent of the par value or as a flat amount of interest which the borrowing firm promises to pay the bondholder each year. For example: A Rs 1,00 par value bond specifying a coupon interest rate of 9 percent is equivalent to an annual interest payment of Rs 9. The bond has a maturity date, at which time the borrowing firm is committed to repay the loan principal.

An indenture (or trust deed) is the legal agreement between the firm issuing the bonds and the bond trustee who represents the bondholders. It provides the specific terms of the bond agreement such as the rights and responsibilities of both parties. The current yield on a bond refers to the ratio of annual interest payment to the bond's market price.

In comparison to equities, bonds might, at first sight, appear much less glamorous and exciting, but bonds too have their subtleties and pitfalls for the unwary. In fact, in some ways bonds demand greater alertness and skill on the part of the investor. This is because, in general, there is less uncertainty about the cash flows accruing to the bond holder as compared to the shareholder: the emphasis is therefore, on more fine tuned calculations and analysis. Typically, bond prices fluctuate less than equity prices, and the investor who desires superior performance has to be on the lookout for even small differentials in prices and returns.

Bond Valuation

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

GENERAL RELATIONSHIPS

The present value relationship

The fair price of a straight bond (a bond with no embedded option; is determined by discounting the expected cash flows:

- Cash flows:
  - the periodic coupon payments **C**, each of which is made once every period;
  - the par or face value **P**, which is payable at maturity of the bond after **T** periods.
- Discount rate: the required (annually compounded) yield or rate of return **r**.
  - **r** is the market interest rate for new bond issues with similar risk ratings

Bond Price = $$P_0 = \sum_{t=1}^{T} \frac{C}{(1+r)^t} + \frac{P_T}{(1+r)^T}.$$

Because the price is the present value of the cash flows, there is an inverse relationship between price and discount rate: the higher the discount rates the lower the value of the bond (and vice versa). A bond trading below its face value is *trading at a discount*; a bond trading above its face value is *at a premium*.

Coupon yield

The coupon yield is simply the coupon payment (C) as a percentage of the face value (F).

Coupon yield = C / F

Coupon yield is also called nominal yield.

Current yield

The current yield is simply the coupon payment (C) as a percentage of the bond price (P).

Current yield = C / P_0.

Yield to Maturity

The yield to maturity, YTM, is the discount rate which returns the market price of the bond. It is thus the internal rate of return of an investment in the bond made at the observed price. YTM can also be used to price a bond, where it is used as the required return on the bond.

Solve for YTM where

Market Price = $\sum_{t=1}^{T} \frac{C}{(1+YTM)^t} + \frac{F}{(1+YTM)^T}$

To achieve a return equal to YTM, the bond owner must 1) Reinvest each coupon received at this rate 2) Redeem at Par 3) Hold until Maturity

BOND PRICING

1. Relative price approach

Here the bond will be priced relative to a benchmark, usually a government security. The discount rate used to value the bond is determined based on the bond's rating relative to a government security with similar maturity. The better the quality of the bond, the smaller the spread between its required return and the YTM of the benchmark. This required return is then used to discount the bond cash flows as above.

2. **Arbitrage free pricing approach**

In this approach, the bond price will reflect its arbitrage free price (arbitrage=practice of taking advantage of a state of imbalance between two or more markets). Here, each cash flow is priced separately and is discounted at the same rate as the corresponding government issues Zero coupon bond. (Some multiple of the bond (or the security) will produce an identical cash flow to the government security (or the bond in question).) Since each bond cash flow is known with certainty, the bond price today must be equal to the sum of each of its cash flows discounted at the corresponding risk free rate - i.e. the corresponding government security. Were this not the case, arbitrage would be possible - see rational pricing.

Here the discount rate per cash flow, r_t, must match that of the corresponding zero coupon bond's rate.

Bond Price $= \sum_{t=1}^{T} \frac{C}{(1+r_t)^t} + \frac{F}{(1+r_T)^T} \cdot P_0$

BOND INTRINSIC VALUES

As a final step in bond analysis, investors should examine the market position of bonds. They must investigate whether the market price of a bond is out of line with the similarly rated bonds by performing an evaluation — calculating intrinsic values. Astute investors feel that value of bonds stems from the income stream these securities throw off. Thus, they feel that the value of a bond depends upon the present value of the aggregate interest payments plus the present value of the final maturity payment. But, this valuation technique presents investors with-a serious problem, namely, what is an appropriate discount rate ? The answer will depend upon the required rate of return the investor has in his mind. It will differ from person to person too. Generally, an Indian bond investor is aiming at a return of 15-18 percent per annum. The rate used to discount bond flows, thus, is a critical value judgement.

The question can be answered through regression analysis — marking returns with maturity dates so that a regression line can be determined. The investors can use their regression line to establish discount rates use with bond flows.

In addition, investors often average the yields supplied by investment services for various bonds retiring. This technique might be termed as the "quick method". Finally, the appraisal value is compared with the market price to indicate the degree of fairness present.

BOND MANAGEMENT STRATEGIES

Interest Rate Anticipation

Strategies which involve forecasting interest rates and altering a bond portfolio to take advantage of that forecast are called "interest rate anticipation" strategies. Interest rates are the most important factor in the pricing of bonds. The price of a bond is based on its interest rate or "yield" at any particular time and the most important influence on a bond's yield is the market interest rate structure. The market interest rate for any particular term of bond is generally agreed to be represented by the yields on government bonds, as these are viewed as highly liquid and of very low default risk.

- ***Basic Interest rate Anticipation Strategy:*** involves moving between long-term government bonds and very short-term treasury bills, based on a forecast of interest rates over a certain time horizon.
- ***Yield Curve Strategies:*** are more sophisticated interest rate anticipation strategies taking into account the differences in interest rates for different terms of bonds, called the "term structure" of interest rates. A chart of the interest rates for bonds of different terms is called the "yield curve". A yield curve strategy would position a bond portfolio to profit the most from an expected change in the yield curve, based on an economic or market forecast.

Sector Rotation in Bonds

A sector rotation strategy for bonds involves varying the weights of different types of bonds held within a portfolio**.** An investment manager will form an opinion on the valuation of a specific sector of the bond market, based on the credit fundamental factors for that sector and relative valuations compared to historical norms and technical factors, such as supply and demand, within that sector. A manager will usually compare her portfolio to the weightings of the benchmark index that she is being compared to on a performance basis.

Security Selection for Bonds

Security selection for bonds involves fundamental and credit analysis and quantitative valuation techniques at the individual security level. Fundamental analysis of a bond considers the nature of the security and the potential cash flows attached to it. Credit analysis evaluates the likelihood that the payments will be received as contemplated, or at all. Modern quantitative techniques use statistical analysis and advanced mathematical techniques to attach values to the cash flows and assess the probabilities inherent in their nature.

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Questions

1. How is a fundamental analysis useful to a prospective investor?

2. What is the meaning of company analysis? What financial statements in your opinion are helpful in understanding the company's prospects?

3. Is intrinsic value of a share important? How would you calculate it?

4. The three important elements of investments are risk return and timing. Elaborate.

5. What are the basic valuation models of bonds? How do you calculate 'yield' on bonds?

6. Find the present value of the bond when par value is Rs 100, coupon rate is 15% and current market price is Rs 90. The bond has a six year maturity value and has a premium of 10%.

7. If a bond has a market price of Rs 83 and a par value of Rs 100. It has an interest rate of 13% and matures after five years. What rate of return would an investor receive if he buys this bond and holds it till maturity?

UNIT - III

FUTURES AND OPTIONS

Objectives of the study:

The objectives of this unit are to help one understand, in general

- The general frame work of Futures and Options as a financial derivative
- Importance and working of Futures and Options in the financial market

Syllabus

Options: Types - Determinants of Option value - Option Position and Strategies -Option pricing. Futures: Stock Index futures - Portfolio strategies using futures -Futures on fixed income securities - Futures on long term Securities.

CONTENTS DESIGN:

3.7.3 Volatile Market Strategies

3.7.4. Stable Market Strategies

3.8 .Futures Contract - Meaning

3.9. Futures Characteristics

3.10. Contract specification for Index futures contracts.

3.11. Eligibility Criteria for introducing futures option contracts on Index.

3.12. Importance of index futures.

3.13. Security Futures

3.14. Cataract specifications for single stock futures.

3.15. Eligibility criteria for introducing futures option contracts on stocks.

3.16. Security Futures Vs stock options.

3.17. Trading system

3.17.1. The players

3.17.2. Order matching rules.

3.17.3. Order conditions

3.17.4. Session timings

3.17.5. Price bands.

3.17.6. Limited trading membership

3.18. Futures strategies

3.19. Advantages of Future Index

3.20. Future on fixed income securities.

3.21. Hedging by fixed income founds.

3.22. Valuations of index futures.

3.23. Futures of bonds.

3.24. Security futures risks.

3.25. Some technical terms.

3.26. Activities

3.27. Self Analyzing questions.

3.28. References.

3.1. INTRODUCTION

TRADING in stock index futures contracts was introduced by the Kansas City Board of Trade on February 24, 1982.In April 1982, the Chicago Mercantile Exchange (CME) began trading in futures contract based on the Standard and Poor's Index of 500 common stocks. The introduction of both contracts was successful, especially the S&P 500 futures contract, adopted by most institutional investors.

BSE created history on June 9th, 2000 by launching the first Exchange traded Index Derivative Contract i.e. futures on the capital market benchmark index - the BSE Sensex. The inauguration of trading was done by Prof. J.R. Varma, member of SEBI and chairman of the committee responsible for formulation of risk containment measures for the Derivatives market. The first historical trade of 5 contracts of June series was done on June 9, 2000 at 9:55:03 a.m. between M/s Kaji & Maulik Securities Pvt. Ltd. and M/s Emkay Share & stock Brokers Ltd. at the rate of 4755.

In the sequence of product innovation, the exchange commenced trading in Index Options on Sensex on June 1, 2001. Stock options were introduced on 31 stocks on July 9, 2001 and single stock futures were launched on November 9th 2002.

September 13, 2004 marked another milestone in the history of Indian Capital Markets, the day on which the Bombay Stock Exchange launched Weekly Options, a unique product unparallel in derivatives markets, both domestic and international. BSE permitted trading in weekly contracts in options in the shares of four leading companies namely Reliance, Satyam, State Bank of India, and Tisco in addition to the flagship index-Sensex.

3.2 OPTIONS-MEANING

An **option** is a contract whereby one party (the *holder* or buyer) has the right, but not the obligation, to exercise the contract (the option) on or before a future date (the exercise date or expiry). The other party (the *writer* or seller) has the obligation to honour the specified feature of the contract. Since the option gives the buyer a right and the seller an obligation, the buyer has received something of value. The amount the buyer pays the seller for the option is called the option premium.

Because this is a security whose value is determined by an underlying asset, it is classified as a derivative. The idea behind an option is present in everyday situations.

For example, you discover a house that you'd love to purchase. Unfortunately, you won't have the cash to buy it for another three months. You talk to the owner and negotiate a deal that gives you an option to buy the house in three months for a price of Rs.200, 000. The owner agrees, but for this option, you pay a price of Rs.3, 000.

Now, consider two theoretical situations that might arise:

1. It's discovered that the house is actually the true birthplace of a great man. As a result, the market value of the house skyrockets to Rs.1 crore. Because the owner sold you the option, he is obligated to sell you the house for Rs.200, 000. In the end, you stand to make a profit of Rs.97, 97,000 (Rs.1 Crore – Rs.200, 000 – Rs.3, 000).
2. While touring the house, you discover not only that the walls are chock-full of asbestos, but also that a ghost haunts the

master bedroom; furthermore, a family of super-intelligent rats have built a fortress in the basement. Though you originally thought you had found the house of your dreams, you now consider it worthless. On the upside, because you bought an option, you are under no obligation to go through with the sale. Of course, you still lose the Rs.3, 000 price of the option.

This example demonstrates two very important points. First, when you buy an option, you have a right but not an obligation to do something. You can always let the expiration date go by, at which point the option becomes worthless. If this happens, you lose 100% of your investment, which is the money you used to pay for the option. Second, an option is merely a contract that deals with an underlying asset. For this reason, options are called derivatives, which mean an option derives *i*ts value from something else. In our example, the house is the underlying asset. Most of the time, the underlying asset is a stock or an Index.

3.3. REASON FOR USING OPTIONS.

Two main reasons why an investor would use options are:

a. Speculation

Speculation is the betting on the movement of a security. The advantage of options is that one isn't limited to making a profit only when the market goes up. Because of the versatility of options, one can also make money when the market goes down or even sideways.

Speculation is the territory in which the big money is made - and lost. The use of options for making big money or less is the reason why they have the reputation of being risky. This is because when one buys an option; one has to be correct in determining not only the direction of the stock's movement, but also the magnitude and the timing of this movement. To succeed, one must correctly predict whether a stock will go up or down, and has to be right about how much the price will change as well as the time frame it will take for all this to happen commissions must also be taken into account.

b. Hedging

The other function of options is hedging. Think of this as an insurance policy. Just as one insures one's house or car, options can be used to insure the investments against a downturn. By using options, one would be able to restrict one's downslide while enjoying the full upside in a cost-effective way.

3.4. WORKING OF OPTIONS

In order to understand the working of options, an assumed firm by the name Justus Company, is taken Let's say that on May 1, the stock price of Justus Co. was Rs.75 and the premium (cost) was Rs.3.15 for a July 78 Call, which indicated that the expiration was the third Friday of July and the strike price was Rs.78. The total price of the contract was Rs.3.15 x 100 = Rs.315. In reality, you'd also have to take commissions into account, but we'll ignore them for this example.

Remember, a stock option contract is the option to buy 100 shares; that's why you must multiply the contract by 100 to get the total price. The strike price of Rs. 78 means that the stock price must rise above Rs.78 before the call option is worth anything; furthermore, because the contract is Rs.3.70 per share, the break-even price would beRs.81.

When the stock price is Rs.67, it's less than the Rs.70 strike price, so the option is worthless. But don't forget that you've paid Rs.315 for the option, so you are currently down by this amount.

Three weeks later the stock price is Rs.84. The options contract has increased along with the stock price and is now worth Rs.6 x 100 = Rs.600. Subtract what you paid for the contract, and your profit is (Rs.3) x 100 = Rs.300. You almost doubled the money in just three weeks! You could sell your options, which are called "closing your position," and take your profits - unless, of course, you think the stock price will continue to rise. For the sake of this example, let's say we let it ride. By the expiration date, the price drops to Rs.60. Because this is less than our Rs.78 strike price and there is no time left, the option contract is worthless. We are now down to the original investment of Rs.300. Putting it in the form of a table: here is what happened to our option investment:

Date	**May 1**	**May 21**	**Expiry Date**
Stock Price	Rs.78	Rs.84	Rs.60
Option Price	Rs.3	Rs.6	worthless
Contract Value	Rs.300	Rs.600	Rs.0
Paper Gain/Loss	Rs.0	Rs.300	-Rs.300

The price swing for the length of this contract from high to low was Rs.600, which would have given us over double our original investment.

This is leverage in action.

Option frameworks

- The buyer pays the price (premium) to the seller (writer).The buyer assumes a long position and the writer a corresponding short position. Thus the writer of a call option is "short a call" and has the obligation to sell to the holder, who is "long of a call option" and who has the right to buy. The writer of a put option is "on the short side of the position", and has the obligation to buy from the taker of the put option, who is "long a put".

- The option style determines when the buyer may exercise the option which will affect the valuation. Generally the contract will either be **American style** - which allows exercise up to the expiry date - or **European style** - where exercise is only allowed on the expiry date - or **Bermudian style** - where exercise is allowed on several, specific dates up to the expiry date. European contracts are easier to value.

- Buyers and sellers of exchange-traded options do not usually interact directly - the futures and options exchange acts as intermediary. The seller guarantees the exchange to fulfill his obligation if the buyer chooses to execute.

- The risk for the option holder is limited: he cannot lose more than the premium paid as he can "abandon the option". His potential gain with a call option is theoretically unlimited;

- The maximum loss for the writer of a put option is equal to the strike price. In general, the risk for the writer of a call option is unlimited. However, an option writer who owns the underlying instrument has created a covered position; he can always meet his obligations by using the actual underlying. Where the seller does not own the underlying on which he has written the option, he is called a "naked writer", and has created a "naked position".

- Options can be in-the-money, at-the-money or out-of-the-money. The "in-the-money" option has a positive intrinsic value, options in "at-the-money" or "out-of-the-money" have an intrinsic value of zero. Additional to the intrinsic value an option has a time value, which decreases when the option is closer to its expiry date.

3.5. TYPES OF OPTIONS

There are two main types of options:

a. **American options** can be exercised at any time between the date of purchase and the expiration date.
b. **European options** can only be exercised at the end of their lives.
c. **Long-Term Options** are options with holding times of one, two or multiple years, which may be more appealing for long-term investors, which are called long-term equity anticipation securities (LEAPS). By providing opportunities to control and manage risk or even to speculate, LEAPS are virtually identical to regular options. LEAPS, however, provide these opportunities for much longer periods of time. Although they are not available on all stocks, LEAPS are available on most widely held issues.
d. **Real option** is a choice that an investor has when investing in the real economy - in the production of goods or services, rather than in financial contracts – which may be something as simple as the opportunity to expand production, or to change production inputs. They are an increasingly influential tool in corporate finance with typically difficult or impossible to trade

e. **<u>Traded options</u>** (also called "Exchange-Traded Options" or "Listed Options") are Exchange traded derivatives which have: standardized contracts; quick systematic pricing; and are settled through a clearing house (ensuring fulfillment.) These include: stock options; bond options; interest rate options; and swaption.

f. **<u>Vanilla options</u>** are 'simple', well understood and traded options, whereas an exotic option is more complex, or less easily understood and non-standard in nature. Asian options, look back options, barrier options are considered to be exotic, especially if the underlying instrument is more complex than simple equity or debt.

g. **<u>Employee stock options</u>** are issued by a company to its employees as compensation.

3.6. <u>PRICING OF OPTIONS</u>

3.6.1.Factors affecting the Option premium:

Options are used as risk management tools and the valuation or pricing of the instruments is a careful balance of market factors.

There are four major factors affecting the Option premium:

- Price of Underlying
- Time to Expiry
- Exercise Price Time to Maturity
- Volatility of the Underlying

And Two less important factors:

- Short – Term Interest Rates
- Dividends

a. The Intrinsic Value of an Option

The intrinsic value of an option is defined as the amount by which an option is in-the immediate exercise value of the option when the underlying position is marked-to-market.

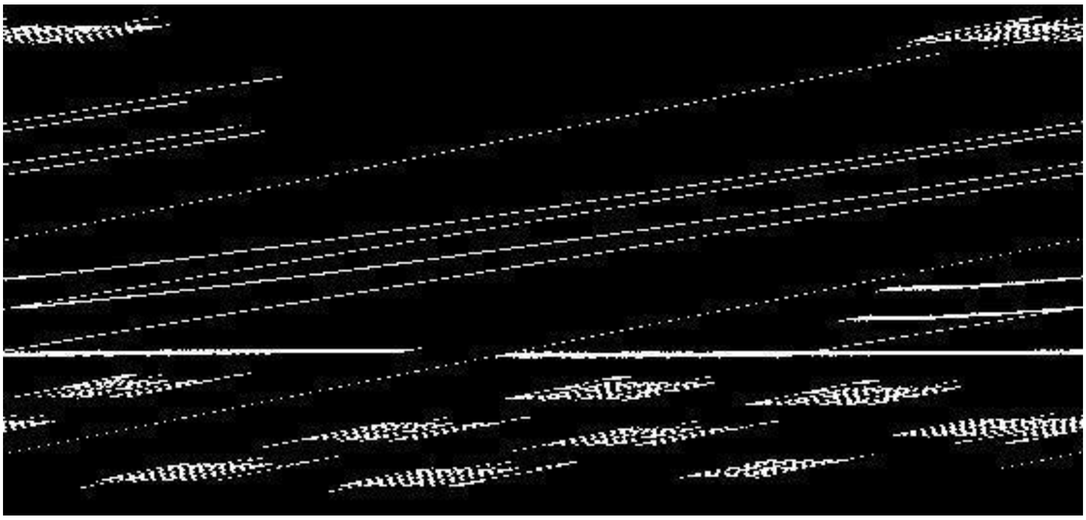
For a call option: Intrinsic Value = Spot Price – Strike Price

For a put option: Intrinsic Value = Strike Price – Spot Price

The intrinsic value of an option must be positive or zero. It cannot be negative. For a call option, the strike price must be less than the price of the underlying asset for the call to have an intrinsic value greater than 0. For a put option, the strike price must be greater than the underlying asset price for it to have intrinsic value.

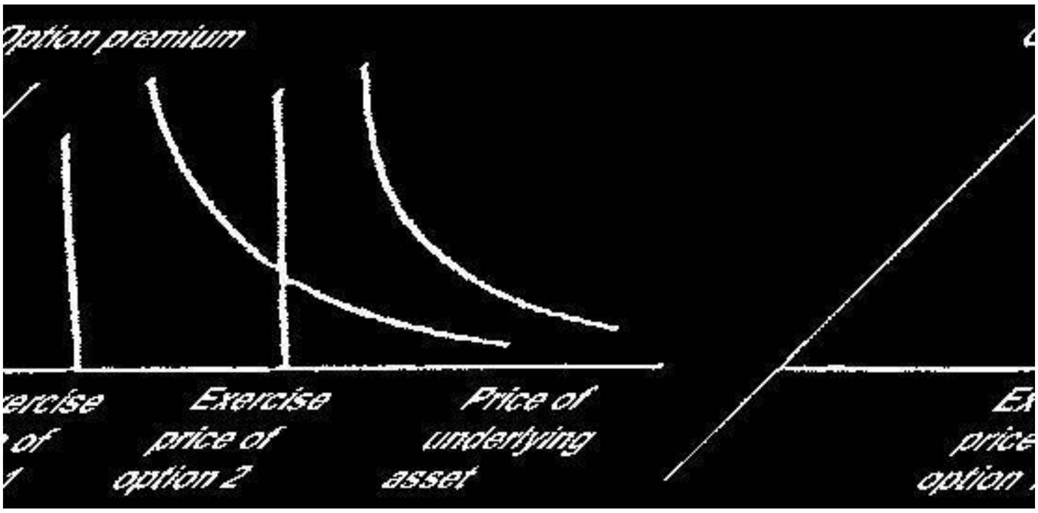
Comparing two calls with the same underlying asset; the higher the exercise price of a call, the *lower* its premium.

Call



Comparing two puts with the same underlying asset; the higher the exercise price of a put, the *higher* its premium.

Put



b. Price of Underlying

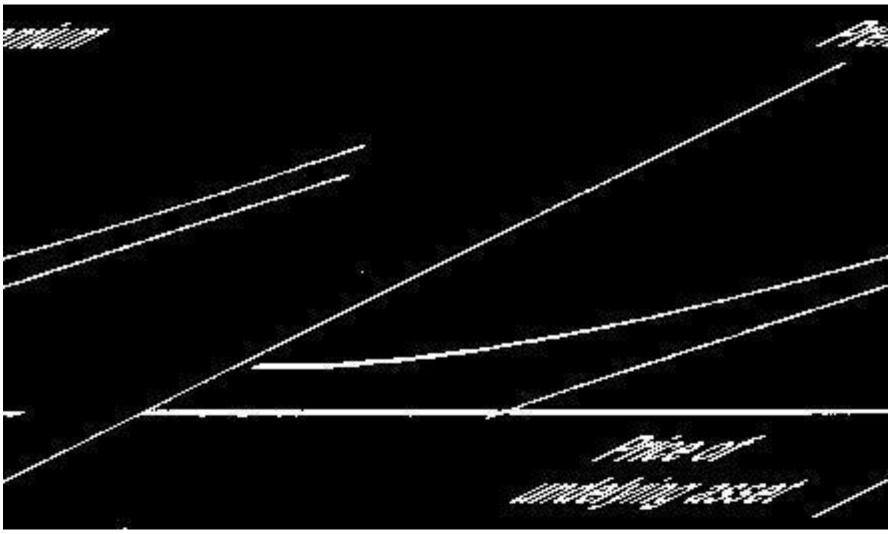
The premium is affected by the price movements in the underlying instrument. For Call options the right to buy the underlying at a fixed strike price – as the underlying price raises so does its premium. As the underlying price falls so does the cost of the option premium. For put options – the right to sell the underlying at a fixed strike price as the underlying price rises, the premium falls; as the underlying price decreases the premium cost raises.

Call options become more valuable as the stock price increases and less valuable as the strike price increases. For a put option, the payoff on exercise is the amount by which the strike price exceeds the stock price. Put options, therefore, behave in the opposite way to call options. They become less valuable as the stock price increases and more valuable as the strike price increases.

The price of underlying asset

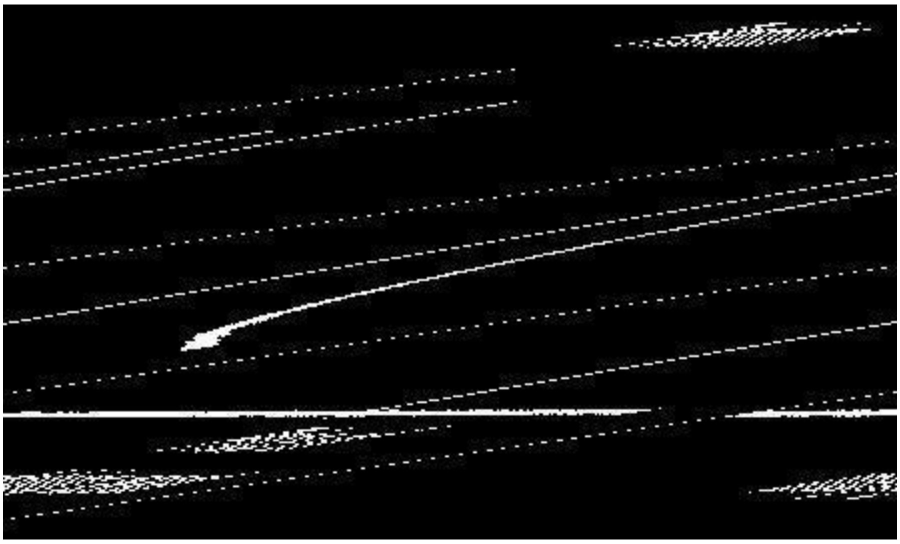
The option premium will be higher when the price of the underlying asset is higher.

Call



The option premium will be lower when the price of the underlying asset is lower .

Put



The more the options is in-the-money or out-of-the-money, the lower is its time value; i.e. the option premium is close to the intrinsic value of the option.

c. The Time Value of an Option

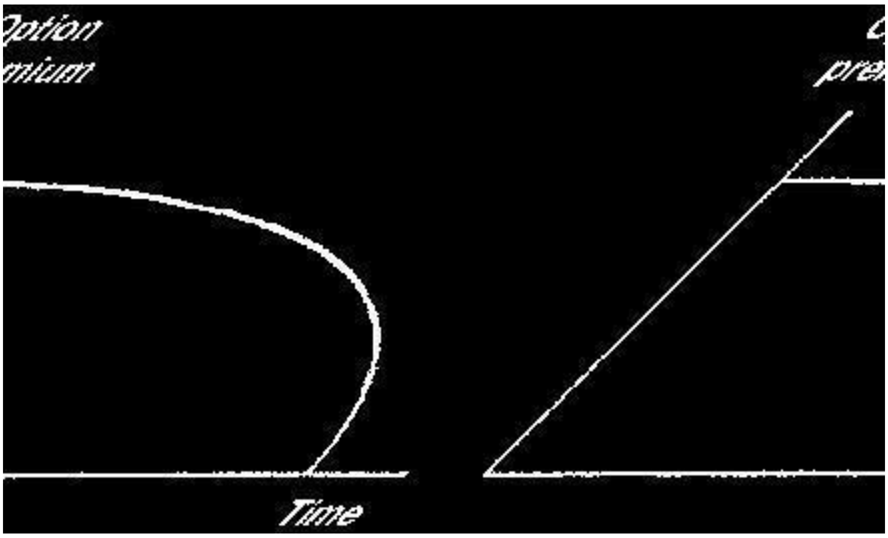
Generally, the longer the time remaining until an option's expiration, the higher will be its premium, because the longer an option's lifetimes, greater is the possibility that the underlying share price might move so as to make the option in-the-money. All other factors affecting an option's price remaining the same, the time value portion of an option's premium will decrease with the passage of time.

Both put and call American options become more valuable as the time to expiration increases. To see this, consider two options that differ only with respect to the expiration date. The owner of the long-life option has all the exercise opportunities open to that of the owner of the short-life on- and more.

The long-life option must, therefore, always be worth at least as much as the short-life option.

European put and call options do not necessarily become more valuable as the time to expiration increases. This is because the owner of a long-life European option does not have all the exercise opportunities open to the owner of a short-life European option. The owner of the long-life European option can exercise only at the maturity of that option. Consider two European call options on a stock, one with an expiration date in one month and the other with an expiration date in two months. Suppose that a very large dividend is expected in six weeks. The dividend will cause the stock price to decline. It is possible that this will lead to the short-life option being worth more than the long-life option.

The value of an option will be lower at the near closer of the expiration date, when all other factors remaining equal. The loss of time value is faster as the expiration date approaches.



d. Volatility

Volatility is the tendency of the underlying security's market price to fluctuate either up or down. It reflects a price change's magnitude; it does not imply a bias towards price movement in one direction or the other. Thus, it is a major factor in determining an option's premium. The higher the volatility of the underlying stock, the higher the premium because there is a greater possibility that the option will move in-the-money. Generally, as the volatility of an underlying stock increases, the premiums of both calls and puts overlying that stock increase, and vice versa.

Higher volatility = Higher premium

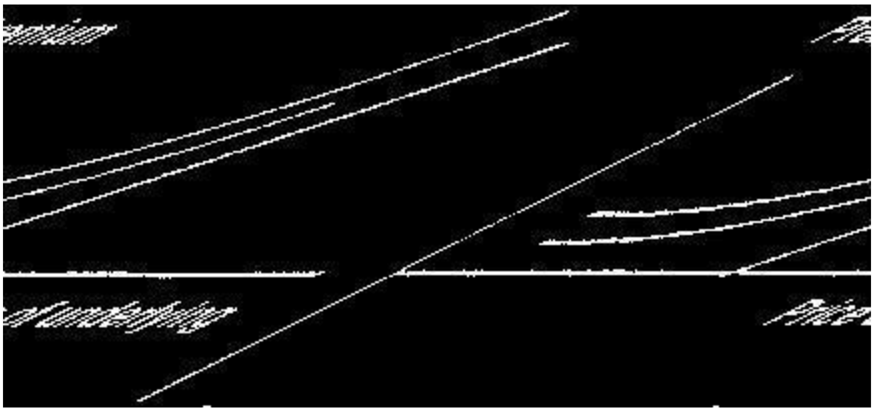
Lower volatility = Lower premium

The volatility of a stock price, ó is defined so that $\triangle$ ó$\setminus\triangle$ is the Standard deviation of the return on the stock in a short length of time t. It is a measure of how uncertain we are about future stock price movements. As volatility increases, the chance that, the stock will do very well or very poorly increases. For the owner of a stock. these two outcomes tend to offset each other. However, this is not so for the owner of a call or put.

The owner of a call benefits from price increases but bas limited downslide *risk* in the event of price decreases because the most that the owner can lose is the price of the option. Similarly, the owner of a put benefits from price decreases but has limited downslide risk in the event of price increases. The value of both calls and puts, therefore, increases as volatility increase.

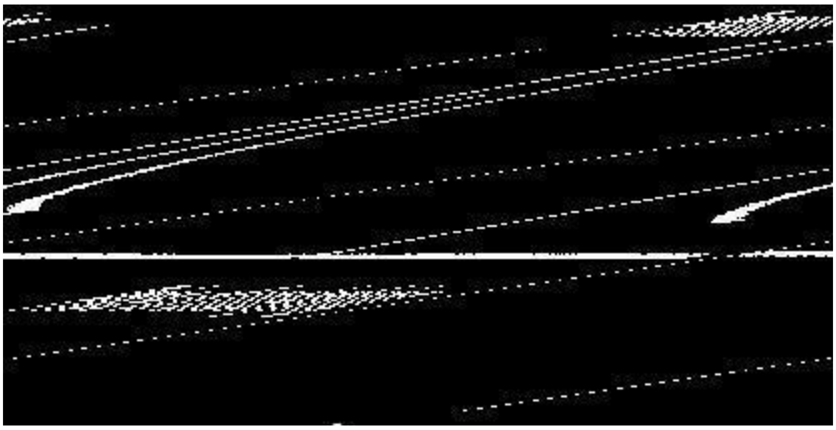
The higher the price volatility of the underlying asset, the higher the likelihood that the option will end up in-the-money; therefore, the higher the premium.

Call



The higher the price volatility of the underlying asset, the higher the likelihood that the option will end up out-of-the-money; therefore, the lower the premium.

Put

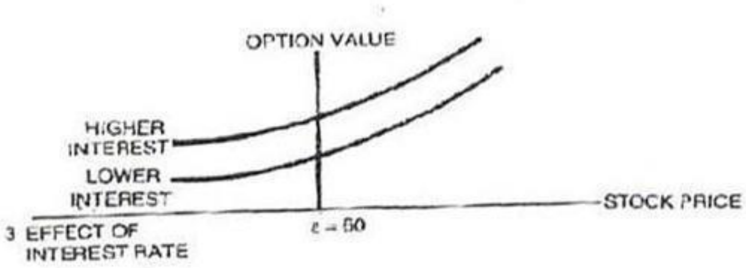


e. Interest rates

In general interest rates have the least influence on options and equate approximately to the cost of carry of a futures contract. If the size of the options contract is very large, then this factor may take on some importance. All other factors being equal as interest rates rise, premium costs fall and vice versa. The relationship can be thought of as an opportunity cost. In order to buy an option, the buyer must either borrow funds or use funds on deposit. Either way the buyer incurs an interest rate cost. If interest rates are rising, then the opportunity cost of buying options increases and to compensate the buyer premium costs fall. Why should the buyer be compensated? Because the option writer receiving the premium can place the funds on deposit and receive more interest than was previously anticipated. The situation is reversed when interest rates fall - premiums rise. This time it is the writer who needs to be compensated.

As interest rates in the economy increases, the expected growth rate of the stock price tends to increase and the present value of any future cash flows received by the holder of the option decreases. These two effects tend to decrease the value of a put option and hence, put option prices decline as the risk-free interest rate increases. In the case of calls, the first effect tends to increase the price and the second effect tends to decrease it. It can be shown that the first effect always dominates the second effect; that the price of a call always increases as the risk-free interest rate increases.

The higher the "riskless interest rate", the higher the call premium. The higher the "riskless interest rate", the lower the put premium



f. Dividends

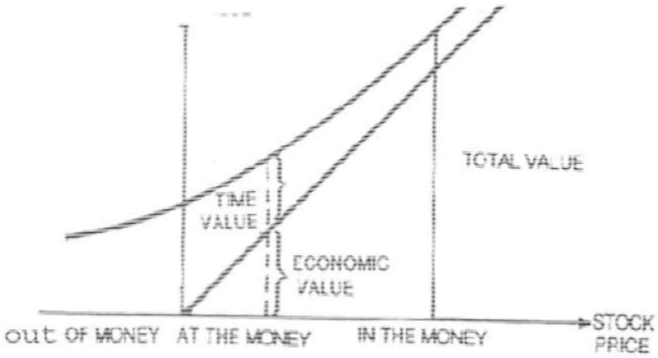
Dividends have the effect of reducing the stock price on the ex-dividend date. The value of a call option is negatively related to the size of any anticipated dividend and the value of a put option is positively related to the size of any anticipated dividend.

3.6.2. option zones

The value of the stock option has three different zones, as shown below:

1. Out of the Money : Where the stock price is below the exercise price.
2. At the Money : Where it is close to or at the exercise price.
3. In the Money: Where the stock price is above the exercise price.

These zones are depicted in the chart below:



Say the exercise price is Rs.60. If the stock price is below 60, there is no economic value. There is only time value; if stock price starts above Rs.60 it will have been economic value and time value. As seen from the chart time value is maximum, when the exercise price and stock price are the same but is lower below the exercise price or above it. If the actual price is lower than the exercise price there is less change of profit on the call. If the actual price is above the exercise price, then there is a chance of profit, and there is less reason to pay a premium over the economic value (intrinsic value)

3.6.3. Assumptions And Notation

Some relationships have been derived between option price that do not require any assumptions about volatility and the probabilistic behavior of stock prices For this purposes it is, therefore, reasonable to assume that there are no arbitrage opportunities.

The following notations have been used: .

So :current stock price

ST: stock price at time *T*

X: strike price of option

T: time of expiration of option

r: risk-free rate of interest for maturity *T* (continuously compounded)

C: value of American call option to buy one share

P: value of American put option to sell one share

c: value of European all option to buy one share

p: value of European put option to sell one share

It should be noted that *r* is the nominal rate of interest, *not* the real rate of interest and assumed that $r > O$. Otherwise, a risk-free investment would provide no advantages over cash.

3.6.4.Upper And Lower Bounds For Option Prices

If the option price is above *the* upper bound or below *the* lower bound, there are profitable opportunities for arbitrageurs.

Upper Bounds:

An American or European call option gives the holder *the* right *to* buy one share of a stock for a certain price. No matter what happens, the option can never be worth more than the stock. Hence, the *stock* price is an upper bound *to* the option price:

$$c \leq So \text{ and } C \leq So$$

If these relationships do not hold, an arbitrageur can easily make a risk less profit by buying *the stock* and selling the call option.

An American or European *put* option gives *the* holder *the* right *to* sell one share of a stock for *X*. No matter how low the *stock* price becomes, the option can never be worth more than *X*. Hence

$$P \leq X \text{ and } P \leq X$$

For European p*ut* options, we know *that* at time *T* the option will not be *worth* more than *X. It* follows that its value today cannot be more than the present value of *X:*

$$P \leq Xe^{-rT}$$

If this were not true, an arbitrageur could make a risk less profit by selling the option and investing the proceeds of *the* sale at *the* risk-free Interest rate.

Lower Bound for European Calls on Non-Dividend-Paying Stocks

A lower bound for the price of a European call option on a non-dividend-paying stock is $S_0 - X^{-rT}$

First illustrated with a numerical example and then with a more formal argument.

Suppose that So = *Rs20, X* = Rs18, *r* = 10% per annum, and *T* = 1 year. In this case,

$$So - Xe^{-rT} = 20 - 18e^{-0\text{-}i} = 3.71$$

or Rs3.71. Consider the situation where the European call price is Rs3.00, which is less than the theoretical minimum of Rs3.71. An arbitrageur can buy the call and short the stock. This provides a cash inflow of Rs20.00 Rs3.00 = Rs17.00. If invested for one year at 10% per annum, the Rs17.00 grows to Rs18.79. At the end of the year, the option expires. If the stock price is greater than Rs18, the arbitrageur exercises the option, closes out the short position, and makes a profit of

Rs18.79 -Rs18.00 = Rs0.79

If the stock price is less than Rs18, the stock is bought in the .market and the short (X) position is closed out. The arbitrageur then makes an even greater profit. For example, if the stock price is Rs17, the arbitrageur's profit is

Rs18.79 -Rs17.00 = l. 79

For a more formal argument, we consider the following two portfolios:

Portfolio *A:* one European call option plus an amount of cash equal to

Xe^{-rT}

Portfolio B: one share)

In portfolio A, if the cash is invested at the risk-free interest rate, it will grow to *X* at time *T*. If *ST* > *X*, the call option is exercised at time *T* and portfolio

A is worth S_T. If $S_T < X$, the call option expires worthless and the portfolio is worth X. Hence, at time T portfolio A is worth

$$max(ST, X)$$

Portfolio B is worth ST at time T. Hence, portfolio A is always worth at least as much and is sometimes worth more than, portfolio B at time T. It follows that it must be , worth at least as much as portfolio B today.

Hence, $C + X e^{-rT} \geq So$

$$C \geq S_0 - Xe^{-rT}.$$

Because the worst that can happen to a call option is that it expires worthless, its value must be positive. This ~~mea~~ns that $c > 0$ and, therefore,

$$C + Xe^{-rT} \geq So$$

$$C \geq \max(So - Xe^{-rT}, 0)$$

Lower Bound for European Puts on Non-Dividend-Paying Stocks

For a European put option on a non-dividend-paying stock, a lower bound for the price is

$$Xe^{-rT} - So$$

Suppose that So = Rs37, X = Rs40, r = 5% per annum, and T = 0.5 year. In this case

$$Xe^{-rT} - So = 4Oe^{-o.osxo.s} - 37 = 2.01$$

Rs2.01. Consider the situation where the European put price is Rs1.00, which is less In the theoretical minimum of Rs2.01. An arbitrageur can borrow Rs38.00 for six months to buy both the put and the stock. At the end of the six months, the arbitrageur will be required to repay $38^{-o.osxo.s}$ = Rs38.96. If the stock price is below Rs40.00, : arbitrageur exercises the option to sell the stock for Rs40.00, repays the loan, and makes a profit of

Rs.40.00 –Rs.38.96 = Rs1.04

If the stock price is greater than Rs40.00, the arbitrageur discards the option, sells and repays the loan for an even greater profit. For example, if the stock price is . 2.00, the arbitrageur's profit is

Rs.42.00 –Rs.38.9.6 = Rs3.04

For a more formal argument, we consider the following two portfolios:

Portfolio C: one European put option plus one share

Portfolio D: an amount of cash equal to Xe^{-rT}

If ST < X, the option in portfolio C is exercised at time *T,* and the portfolio becomes worth X. If ST > X, the put option expires worthless, and the portfolio is worth ST at time *T.* Hence portfolio C is worth max(ST. X) at time *T.* Assuming that the cash is invested at the risk-free interest rate, portfolio D is worth X at time *T.* Hence, portfolio C is always worth as much as, and is sometimes worth more than, portfolio D at time *T.* It follows that in the absence of arbitrage opportunities. portfolio C must be worth at least as much as portfolio D today. Hence

$$p + So \geq Xe^{-rT}$$

or

$$p \geq Xe^{-rT} - So$$

Because the worst that can happen to a put option is that it expires worthless, value must be non-negative. This means that

$$p \geq \max (Xe^{-rT} - So. 0)$$

Summary - Factors affecting the option premium

	Call premium	Put premium
Longer time to expiration	+	+
Higher price of underlying	+	-
Higher volatility of underlying	+	+
Higher exercise price	-	+
Higher interest rate	+	-
Dividend	-	+

3.6.5. Greeks

The more sophisticated tools used to measure the potential variations of options premiums are as follows:

- Delta
- Gamma
- Vega
- Rho
- Delta

Delta

Delta is the measure of an option's sensitivity to changes in the price of the underlying asset. Therefore, it is the degree to which an option price will move given a change in the underlying stock or index price, all else being equal.

$$\text{Delta} = \frac{\text{Change in option premium}}{\text{Change in underlying price}}$$

For example, an option with a delta of 0.5 will move Rs 5 for every change of Rs 10 in the underlying stock or index.

Illustration:

A trader is considering buying a Call option on a futures contract, which has a price of As 19. The premium for the Call option with a strike price of As 19 is 0.80. The delta for this option is +0.5. This means that if the price of the underlying futures contract rises to As 20 -a rise of Rs.1 -then the premium will increase by 0.5 x 1.00 = 0.50. The new option premium will be 0.80 + 0.50 = As 1.30.

Far out-of-the-money calls will have a delta very close to zero, as the change in underlying price is not likely to make them valuable or cheap. At-the-money call would have a delta of 0.5 and a deeply in-the-money call would have a delta close to 1.

While Call deltas are positive, Put deltas are negative, reflecting the fact that the put option price and the underlying stock price are inversely related. This is because if one buys a put his view is bearish and expects the stock price to go down. However, if the stock price moves up it is contrary to his view therefore, the value of the option decreases. The put delta equals the call delta minus 1.

It may be noted that if delta of one's position is positive, he desires the underlying asset to rise in price. On the contrary, if delta is negative, he wants the underlying asset's price to fall.

Uses: The knowledge of delta is of vital importance for option traders because this parameter is heavily used in margining and risk management strategies.

The delta is often called the hedge ratio. e.g. if you have a portfolio of 'n' shares of a stock then 'n' divided by the delta gives you the number of calls you would need to be short (i.e. need to write) to create a riskless hedge -i.e. a portfolio which would be worth the same whether the stock price rose by a very small amount or fell by a very small amount.

In such a "delta neutral" portfolio any gain in the value of the shares held due to a rise in the share price would be exactly offset by a loss on the value of the calls written, and vice versa.

Note that as the delta changes with the stock price and time to expiration the number of shares would need to be continually adjusted to maintain the hedge. How quickly the delta changes with the stock price is given by gamma, which we shall learn subsequently.

Gamma

This is the rate at which the delta value of an option increases or decreases as a result of a move in the price of the underlying instrument.

$$\textbf{Gamma} = \frac{\text{Change in an option delta}}{\text{Change in underlying price}}$$

For example, if a Call option has a delta of 0.50 and a gamma of 0.05, then a rise of +/- 1 in the underlying means the delta will move to 0.55 for a price rise and 0.45 for a price fall. Gamma is rather like the rate of change in the speed of a car -its acceleration -in moving from a standstill, up to its cruising speed, and braking back to a standstill. Gamma is greatest for an A TM (at-the-money) option (cruising) and falls to zero as an option moves deeply ITM (in-the-money) and OTM (out-of-the-money) (standstill).

If you are hedging a portfolio using the delta-hedge technique described under "Delta", then you will want to keep gamma as small as possible as the smaller it is the less often you will have to adjust the hedge to maintain a delta neutral position. If gamma is too large a small change in stock price could wreck your hedge. Adjusting gamma, however, can be tricky and is generally done using options --unlike delta, it can't be done by buying or selling the underlying asset as the gamma of the underlying asset is, by definition, always zero so more or less of it won't affect the gamma of the total portfolio.

Theta

It is a measure of an option's sensitivity to time decay. Theta is the change in option price given a one-day decrease in time to expiration. It is a measure of time decay (or time shrunk). Theta is generally used to gain an idea of how time decay is affecting your portfolio.

$$\text{Theta} = \frac{\text{Change in an option premium}}{\text{Change in time to expiry}}$$

Theta is usually negative for an option as with a decrease in time, the option value decreases. This is due to the fact that the uncertainty element in the price decreases.

Assume an option has a premium of 3 and a theta of 0.06. After one day it will decline to 2.94, the second day to 2.88 and so on. Naturally other factors, such as changes in value of the underlying stock will alter the premium. Theta is only concerned with the time value. Unfortunately, we cannot predict with accuracy the change's in stock market's value, but we can measure exactly the time remaining until expiration.

Vega

This is a measure of the sensitivity of an option price to changes in market volatility. It is the change of an option premium for a given change - typically 1 % -in the underlying volatility.

$$\text{Vega} = \frac{\text{Change in an option premium}}{\text{Change in volatility}}$$

If for example, XYZ stock has a volatility factor of 30% and the current premium is 3, a Vega of .08 would indicate that the premium would increase to 3.08 if the volatility factor increased by 1 % to 31 %. As the stock becomes more volatile the changes in premium will increase in the same proportion. Vega measures the sensitivity of the premium to these changes in volatility.

What practical use is the Vega to a trader? If a trader maintains a delta neutral position, then it is possible to trade options purely in terms of volatility -the trader is not exposed to changes in underlying prices. "

Rho

Rho measures the change in an option's price per unit increase - typically 1 % -in the cost of funding the underlying.

$$\text{Rho} = \frac{\text{Change in an option premium}}{\text{Change in cost of funding underlying}}$$

Example:

Assume the value of Rho is 14.10. If the risk free interest rates go up by 1 % the price of the option will move by Rs 0.14109. To put this in another way: if the risk-free interest rate changes by a small amount, then the option value should change by 14.10 times that amount.

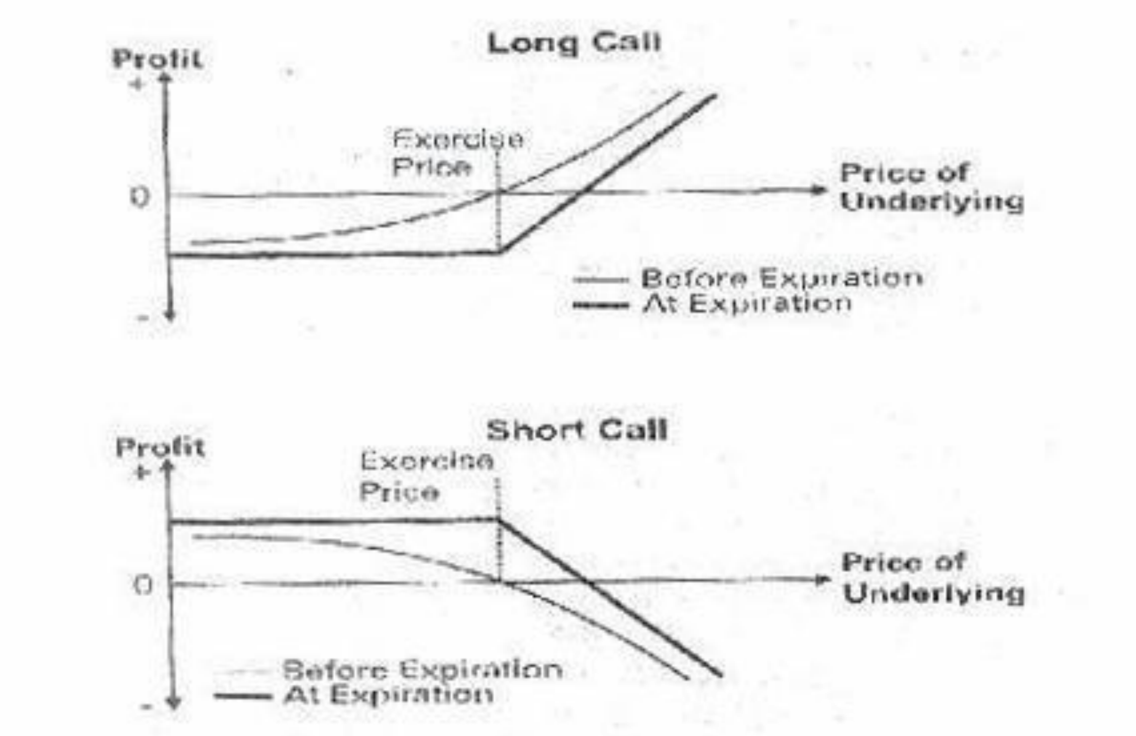
For example, if the risk-free interest rate increased by 0.01 (from 10% to 11 %), the option value would change by 14.10*0.01 = 0.14. For a put option, inverse relationship exists. If the interest rate goes up the option value decreases and therefore, Rho for a put option is negative. In general Rho tends to be small except for long-dated options.

3.7.<u>TRADING STRATEGIES</u>

3.7.1. Bull Market Strategies

Call in a Bullish Strategy:

An investor with a bullish market outlook should buy call option. It one expects the market price of the underlying asset to rise, then, he would rather have the right to purchases at a specified price and sell later at a higher price than have the obligation to deliver later at a higher price.



The investor's profit potential on buying a call option is unlimited. His profit is the market price less the exercise price less the premium. The increase in price of the underlying increases the investor's profit.

The investor's potential loss is limited. Even if the market takes a drastic decline in price levels, the holder of a call is under no obligation to exercise the option and let the option expire worthless. The investor breaks even when the market price equals the exercise price plus the premium.

An increase in volatility will increase the value of call and thereby increases the return. Because of the increased likelihood that the option will become in- the-money, an increase in the underlying volatility (before expiration), will increase the value of a long options position.

Puts in a Bullish Strategy

An investor with a bullish market outlook can also go short on a Put option. Basically, an investor anticipating a bull market could write put options. If the market price increases and puts become out-of-the-money, investors with long put positions will let their options expire worthless.

By writing Puts, profit potential is limited. A Put writer profits when the price of the underlying asset increases and the option expires worthless. The maximum profit is limited to the premium received.

However, the potential loss is unlimited. Because a short put position holder has an obligation to purchase if exercised. He will be exposed to potentially large losses if the market moves against his position and declines.

The break-even point occurs when the market price equals the exercise price: minus the premium. At any price less than the exercise price minus the premium, the investor loses money on the transaction. At higher prices, his option is profitable.

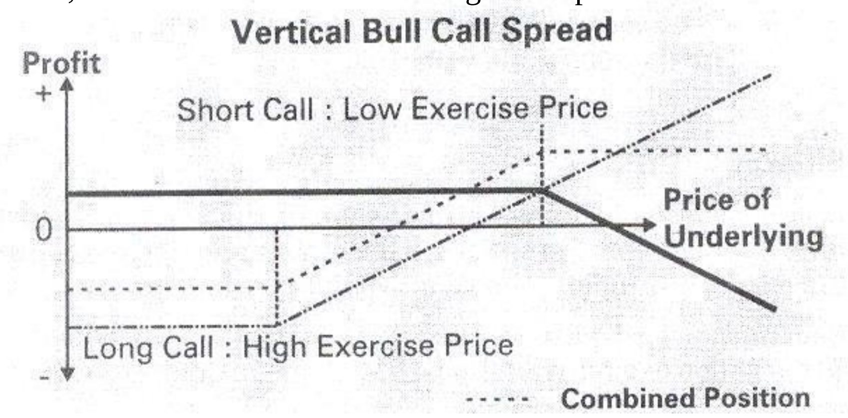
An increase in volatility will increase the value of your put and decrease your return. As an option writer, the higher price you will be forced to pay in order to buy back the option at a later date, lower is the return. Bullish Call Spread Strategies

A vertical call spread is the simultaneous purchase and sale of identical call options but with different exercise prices.

To "buy a call spread" is to purchase a call with a lower exercise price and to write a call with a higher exercise price. The trader pays a net premium for the position.

To "sell a call spread" is the opposite, here the trader buys a call with a higher exercise price and writes a call with a lower exercise price, receiving a net premium for the position.

An investor with a bullish market outlook should buy a call spread. The "Bull Call Spread" allows the investor to participate to a limited extent in a bull market, while at the same time limiting risk exposure.



To put on a bull spread, the trader needs to buy the lower strike call and sell the higher strike call. The combination of these two options will result in a bought spread. The cost of Putting on this position will be the difference between the premium paid for the low strike call and the premium received for the high strike call.

The investor's profit potential is limited. When both calls are in-the-money, both will be exercised and the maximum profit will be realised. The investor delivers on his short call and receives a higher price than he is paid for receiving delivery on his long call.

The investor’s potential loss is limited. At the most, the investor can lose is the net premium. He pays a higher premium for the lower exercise price call than he receives for writing the higher exercise price call than he receives for writing the higher exercise price call.

The investor breaks even when the market price equals the lower exercise price plus the net premium. At the most, an investor can lose is the net premium paid. To recover the premium, the market price must be as great as the lower exercise price plus the net premium.

An example of a Bullish call spread:

Let's assume that the cash price of a scrip is Rs. 100 and one bought a November call option with a strike price of Rs. 90 and paid a premium of Rs. 14. At the same time he sold another November call option on a scrip with a strike price of Rs.110 and received a premium of Rs.4. Here, he is buying a lower strike price option and selling a higher strike price option. This would result in a net outflow of Rs.10 at the time of establishing the spread.

Now let us look at the fundamental reason for this position. Since this is a bullish strategy, the first position established in the spread is the long lower strike price call option with unlimited profit potential. At the same time to reduce the cost of purchase of the long position a short position at a higher call strike price is established. While this not only reduces the outflow in terms of premium but also his profit potential and at the sometime the risk is limited. Based on the above figures the maximum profit, maximum loss and breakeven point of this spread would be as follows:

Maximum profit = Higher strike price -Lower strike price -Net premium paid

= 110-90-10

= 10

Maximum Loss = Lower strike premium -Higher strike

premium = 14-4 = 10

Breakeven Price = Lower strike price + Net premium paid =90+10=100

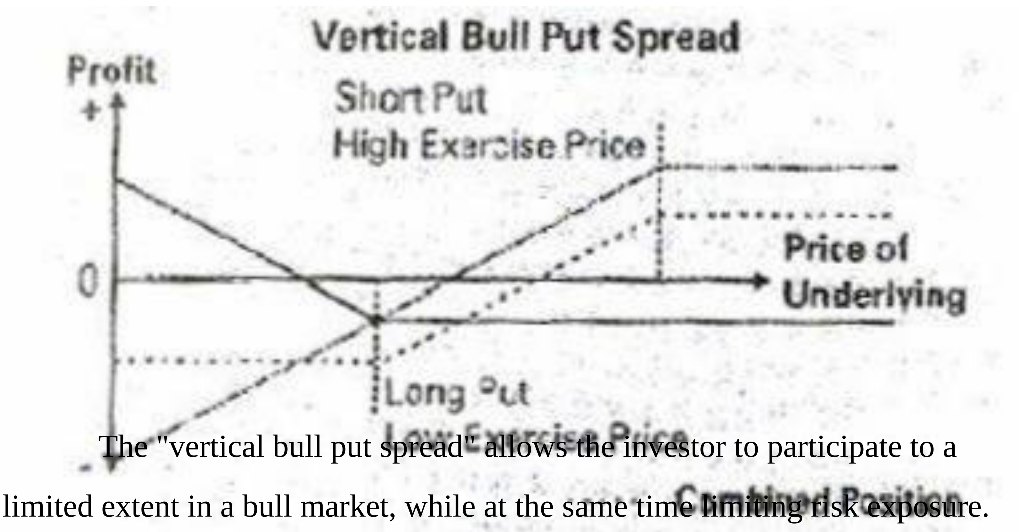
Bullish Put Spread Strategies

A vertical Put spread is the simultaneous purchase and sale of identical Put options but with different exercise prices.

To "buy a put spread" is to purchase a Put with a higher exercise price and to write a Put with a lower exercise price. The trader pays a net premium for the position.

To "sell a put spread" is the opposite: the trader buys a Put with a lower exercise price and writes a put with a higher exercise price, receiving a net premium for the position.

An investor with a bullish market outlook should sell a Put spread.



The "vertical bull put spread" allows the investor to participate to a limited extent in a bull market, while at the same time limiting risk exposure.

To put on a bull spread can be created by buying the lower strike and selling the higher strike of either calls or put. The difference between the premiums paid and received makes up one leg of the spread.

The investor's profit potential is limited. When the market price reaches or exceeds the higher exercise price, both options will be out-of-the-money and will expire worthless. The trader will realize his maximum profit, the net premium.

The investor's potential loss is also limited. If the market falls, the options will be in-the-money. The puts will offset one another, but at different exercise prices.

The investor breaks-even when the market price equals the lower exercise price less the n premium. The investor achieves maximum profit i.e. the premium received; when the mark price moves up beyond the higher exercise price (both puts are then worthless).

An example of a bullish put spread.

Lets us assume that the cash price of the scrip is Rs.100. One now buys a November put option scrip with a strike price of Rs.90 at a premium of Rs.5 and sells a put option with a strike price Rs.110 at a premium of Rs.15.

The first position is a short put at a higher strike price. This has resulted in some inflow in terms of premium. But here the trader is worried about risk and so caps his risk by buying another put option at the lower strike price. As such, a part of the premium received goes off and the ultimate position has limited risk and limited profit potential. Based on the above figures the maximum profit, maximum loss and breakeven point of this spread would be as follows:

Maximum profit = Net option premium income or net

credit = 15-5= 10

Maximum loss = Higher strike price -Lower strike price -Net premium received

= 110-90-10= 10

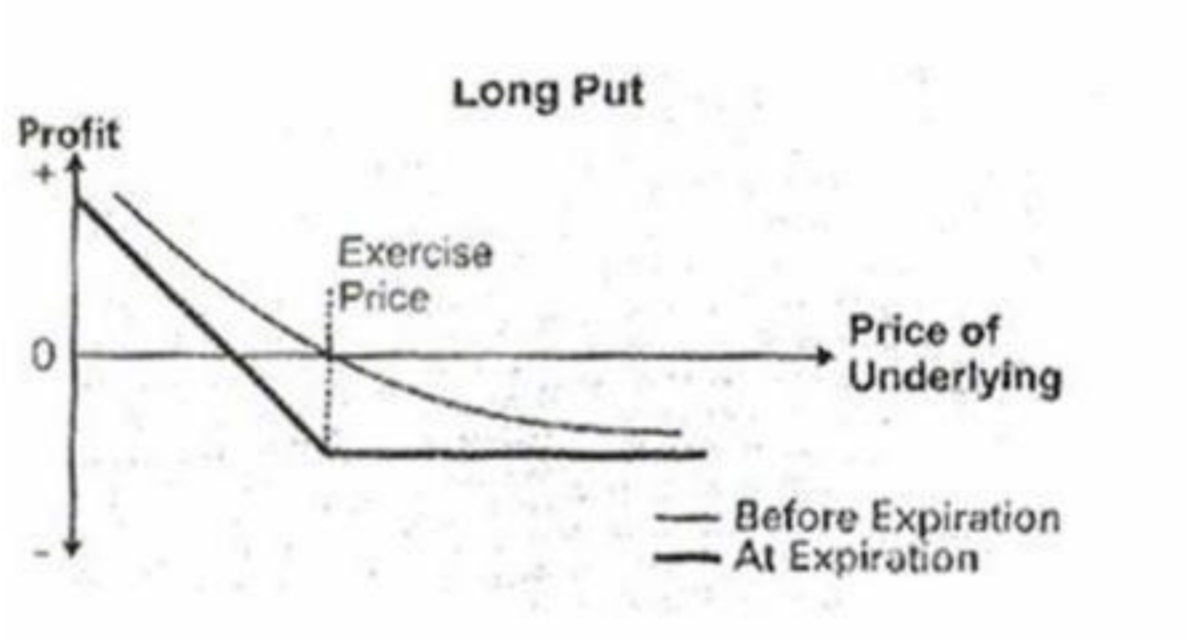
Breakeven Price = Higher Strike price -Net premium

income = 110-10= 100

3.7.2. Bear Market Strategies

Puts in a Bearish Strategy

When one purchases a put he is long and wants the market to fall. A put option is a bearish position which will increase in value if the market falls. By purchasing put options, the trader has the right to choose whether to sell the underlying asset at the exercise price. In a falling market, this choice is preferable to being obligated to buy the underlying at a price higher.



An investor's profit potential is practically unlimited. The higher the fall in price of the underlying asset, higher the profits.

The investor's potential loss is limited. If the price of the underlying asset rises instead of falling as' the investor has anticipated, he may let the option expire worthless. At the most, he may lose the premium for the option.

The trader's breakeven point is the exercise price minus the premium. To profit, the market price must be below the exercise price. Since the trader has paid a premium he must recover the premium he paid for the option.

An increase in volatility will increase the value of the put and increases the return. An increase in volatility will make it more likely that the price of the underlying instrument will move, increasing the value of the option.

Calls in a Bearish Strategy

Another option for a bearish investor is to go short on a call with the intent to purchase it back in the future. By selling a call, you have a net short position and needs to be bought back before expiration and cancel out your position.

For this an Investor needs to write a call option. If the market price falls, long call holders will let their out-of-the-money options expire worthless, because they could purchase the underlying asset at the lower market price.

The investor's profit potential is limited because the trader's maximum profit is limited to the premium received for writing the option.

Here the loss potential is unlimited because a short call position holder has an obligation to sell if exercised; he will be exposed to potentially large losses if the market rises against his position.

The investor breaks even when the market price equals the exercise price: plus the premium. At any price greater than the exercise price plus the premium, the trader is losing money. When the market price equals the exercise price plus the premium, the trader breaks even.

An increase in volatility will increase the value of call and decreases its return.

When the option writer has to buy back the option in order to cancel out his position, he will be forced to pay a higher price due to the increased value of the calls.

Bearish Put Spread Strategies

A vertical put spread is the simultaneous purchase and sale of identical put options but with different exercise prices.

To "buy a put spread" is to purchase a put with a higher exercise price and to write a put with a lower exercise price. The trader pays a net premium for the position.

To "sell a put spread" is the opposite. The trader buys a put with a lower exercise price and writes put with a higher exercise price, receiving a net premium for the position.

To put on a bear put spread buy the higher strike put and sell the lower strike put.

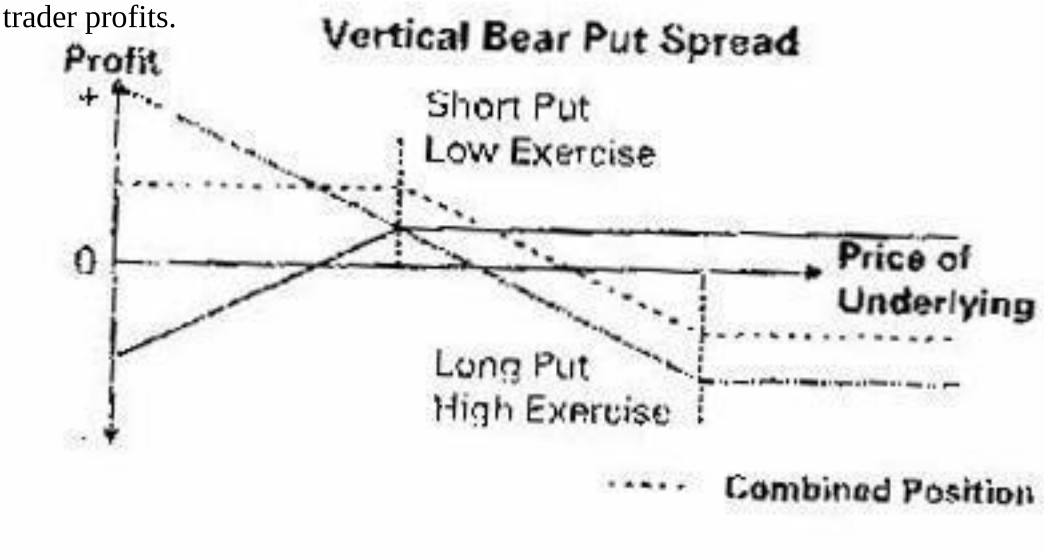
Sell the lower strike and buy the higher strike of either calls or puts to set up a bear spread.

An investor with a bearish market outlook should: buy a put spread. The "Bear Put Spread" allows the investor to participate to a limited extent in a bear marker, while at the same time limiting risk exposure.

The investor's profit potential is limited. When the market price falls to or below the lower exercise price, both options will be in-the-money and the trader will realize his maximum profit when he recovers the net premium paid for the options.

The investor's potential loss is limited. The trader has offsetting positions at different exercise prices. If the market rises rather than falls, the options will be out-of-the-money and expire worthless. Since the trader has paid a net premium.

The investor breaks even when the market price equals the higher exercise price less the net premium. For the strategy to be profitable, the market price must fall. When the market price falls to the high exercise price less the net premium, the trader breaks even. When the market falls beyond this point, the trader profits.



An example of a bearish put spread.

Lets assume that the cash price of the scrip is Rs 100. One buys a November put option on a scrip with a strike price of Rs 110 at a premium of Rs 15 and sell a put option with a strike price of Rs 90 at a premium of Rs 5.

In this bearish position the put is taken as long *on* a higher strike price put with the *outgo of* some premium. *This* position has huge profit potential *on* downslide. The trader may recover a part *of* the premium paid by him by writing a lower strike price put option. *The* resulting position is a mildly bearish position with limited risk and limited profit profile. Though the trader has reduced the cost *of* taking a bearish position, he has also capped the profit portential as well. *The* maximum profit, maximum loss and breakeven point *of* this spread would be as *follows:*

Maximum profit = Higher strike price option -Lower strike price option -Net premium paid

= 110-90-10= 10

Maximum loss = Net premium paid

= 15-5= 10

Breakeven Price = Higher strike price -Net premium paid

= 110-10= 100

Bearish Call Spread Strategies

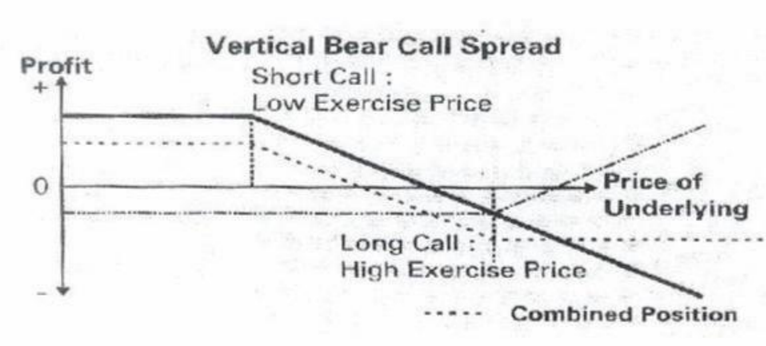
A vertical call spread is the simultaneous purchase and sale *of* identical call options but with different exercise prices.

To "buy a cal' spread" is to purchase a call with a lower exercise price and to write a call with a higher exercise price. *The* trader pays a net premium *for* the position.

To "sell a call spread" is the opposite: the trader buys a call with a higher exercise price and writes a call with a lower exercise price, receiving a net premium *for* the position.

To put *on* a bear ca" spread you sell the lower strike call and buy the higher strike call. An investor sells the lower strike and buys the higher strike *of* either calls *or* puts to put *on* a bear spread.

An investor with a bearish market outlook should: sell a call spread. *The* "Bear Call Spread" allows f the investor to participate to a limited extent in a bear market, while at the same time limiting risk exposure.



The investor's profit potential is limited. When the market price falls to the lower exercise price, both out-of-the-money options will expire worthless. The maximum profit that the trader can realize is the net premium: The premium he receives for the call at the higher exercise price.

Here the investor's potential loss is limited. If the market rises, the options will offset one another, At any price greater than the high exercise price, the maximum loss will equal high exercise price minus low exercise price minus net premium.

The investor breaks even when the market price equals the lower exercise price plus the net premium. The strategy becomes profitable as the market price declines. Since the trader is receiving a net premium, the market price does not have to fall as low as the lower exercise price to breakeven.

An example of a bearish call spread.

Let us assume that the cash price of the scrip is Rs.100. One now buys a November call option on a scrip with a strike price of Rs.110 at a premium of Rs.5 and sell a call option with a strike price of Rs.90 at a premium of Rs.15.

In this spread he has to buy a higher strike price call option and sell a lower strike price option. As the low strike price option is more expensive than the higher strike price option, it is a net credit strategy. The final position is left with limited risk and limited profit. The maximum profit, maximum loss and breakeven point of this spread would be as follows: Maximum profit = Net premium received

= 15-5= 10

Maximum loss = Higher strike price option -Lower strike price option -Net premium received

= 110-90-10= 10

Breakeven Price = Lower strike price + Net premium paid

=90+10=100

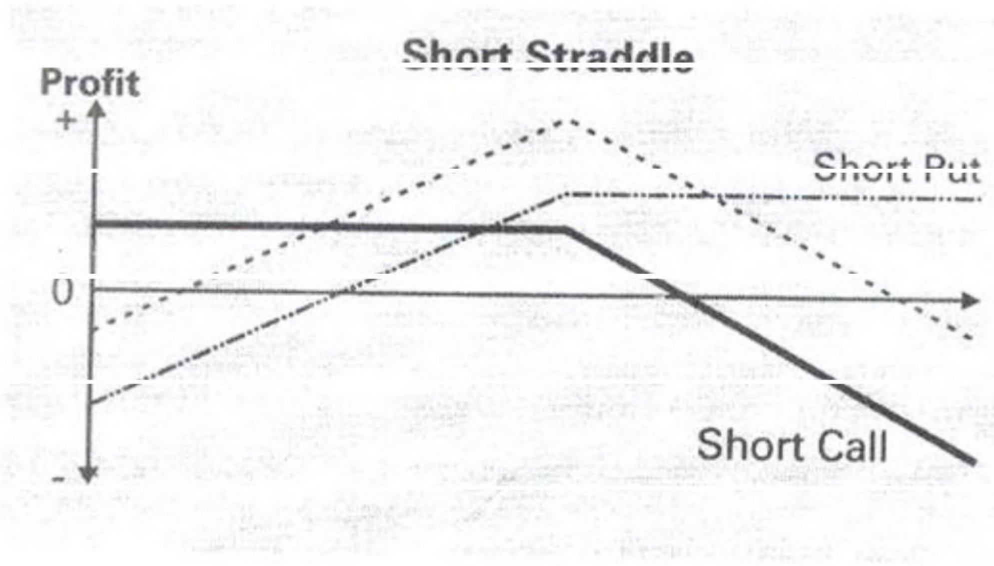
3.7.3 Volatile Market Strategies

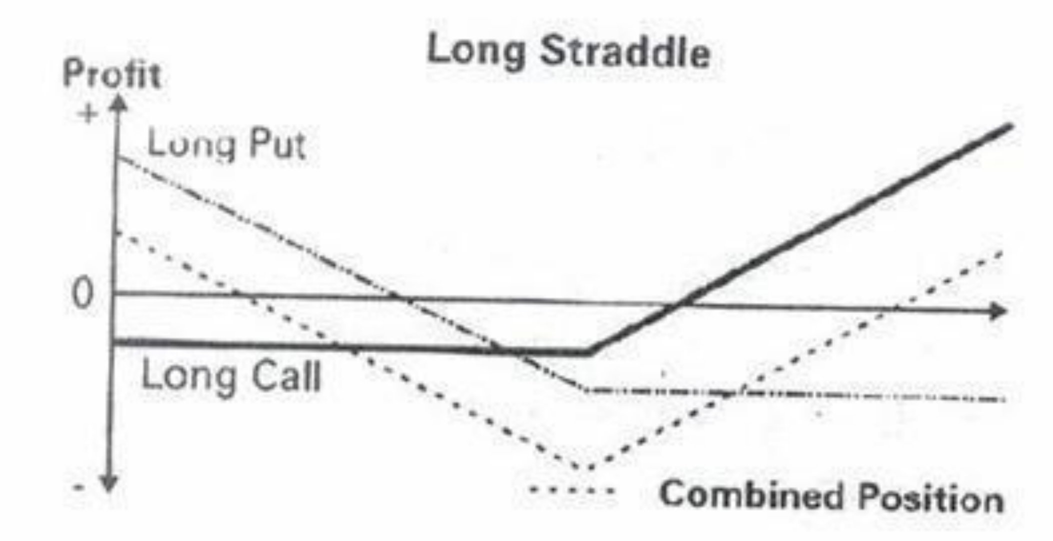
Straddles in a Volatile Market Outlook

Volatile market trading strategies are appropriate when the trader believes the market will move but does not have an opinion on the direction of movement of the market. As long as there is significant movement upwards or downwards, these strategies offer profit opportunities. A trader need not be bullish or bearish. He must simply be of the opinion that the market is volatile.

- A straddle is the simultaneous purchase (or sale) of two identical options, one a call and the other a put.
- To "buy a straddle" is to purchase a call and a put with the same exercise price and expiration date.
- To "sell a straddle" is the opposite: the trader sells a call and a put with the same exercise price and expiration date.

A trader, viewing a market as volatile, should buy option straddles. A "straddle purchase" allows the trader to profit from either a bull market or from a bear market.





Here the investor's profit potential is unlimited. If the market is volatile, the trader can profit from an up- or downward movement by exercising the appropriate option while letting the other option expire worthless. (Bull market, exercise the call; bear market, the put.)

If the price of the underlying asset remains stable instead of either rising or falling as the trader anticipated, the maximum he will lose is the premium he paid for the options.

In this case the trader has long two positions and thus, two breakeven points. One is for the call which is exercise price plus the premiums paid, and the other for the put, which is exercise price minus the premiums paid.

Strangles in a Volatile Market Outlook

A strangle is similar to a straddle, except that the call and the put have different exercise price Usually, both the call and the put are out-of-the-money.

To "buy a strangle" is to purchase a call and a put with the same expiration date, but differ exercise prices.

To "sell a strangle" is to write a call and a put with the same expiration date, but different exercise prices.

A trader, viewing a market as volatile, should buy strangles. A "strangle purchase" allows the trader to profit from either a bull or bear market. Because the options are typically out-of-the money, the market must move to a greater degree than a straddle purchase to be profitable.

The trader's profit potential is unlimited. If the market is volatile, the trader can profit from up or downward movement by exercising the appropriate option, and letting the other expire worthless. (In a bull market, exercise the call; in a bear market exercise the put).

The investor's potential loss is limited. Should the price of the underlying remain stable, the most the trader would lose is the premium he paid for the options. Here the loss potential is also very minimal because, the more the options are out-of-the-money, the lesser the premiums.

Here the trader has two long positions and thus, two breakeven points. One for the call, which breakevens when the market price equal the high exercise price plus the premium paid, and the put, when the market price equals the low exercise price minus the premium paid.

The Short Butterfly Call Spread:

Like the volatility positions ,the Short Butterfly position will realize a profit if the market makes a substantial move. It also uses a combination of puts and calls to achieve its profit/loss profile -but combines them in such a manner that the maximum profit is limited.

The profit loss profile of a short butterfly spread looks like two short options coming together at the center Calls.

One's potential gains or losses are: limited on both the upside and the downside.

The Call Ratio Back spread

The call ratio back spread is similar in contraction to the short butterfly call spread. The only difference is that one omits one of the components (or legs) used to build the short butterfly when constructing a call ratio back spread.

When putting on a call ratio back spread, one is neutral but want the market to move in either direction. The call ratio back spread will lose money if the market sits. The market outlook one would have in putting on this position would be for a volatile market, with greater probability that the market will rally.

To put on a call ratio back spread, one sells one of the lower strike and buy two or more of the higher strike. By selling an expensive lower strike option and buying two less expensive high strike options, one receives an initial credit for this position. The maximum loss is then equal to the high strike price minus the low strike price minus the initial net premium received.

The profit on the downside is limited to the initial net premium received when setting up the spread. The upside profit is unlimited.

An increase in implied volatility will make the spread more profitable. Increased volatility increases a long option position's value. The greater number of long options will cause this spread to become more profitable when volatility increases.

The Put Ratio Backspread

In combination positions (e.g. bull spreads, butterflies, ratio spreads), one can use calls or puts to achieve similar, if not identical, profit profiles. Like its call counterpart, the put ratio backspread combines options to create a spread which has limited loss potential and a mixed profit potential.

It is created by combining long and short puts in a ratio *of* 2: 1 or 3: 1. In a 3: 1 spread, one would buy three puts at a low exercise price and write one put at a high exercise price. While one may, *of* course, extend this position out to six long and two short or nine long and three short, it is important that one respect the (in this case) 3: 1 ratio in order to maintain the put ratio backspread profitless profile.

When put on a put ratio backspread one is neutral but wants the market to move in either direction.

One's market expectations here would be for a volatile market with a greater probability that the market will fall than rally.

Unlimited profit would be realized on the downside.

The two long puts offset the short. put and result in practically unlimited profit on the bearish side *of* the market. The cost *of* the long puts is offset by the premium received for the (more expensive) short put, resulting in a net premium received.

To put on a put ratio backspread, one buy two or more *of* the lower strike and sell one *of* the higher strike.

One sells the more expensive put and buy two or more *of* the cheaper put. One usually receives an initial net premium for putting on this spread. The Maximum loss is equal to: High strike price -Low strike price -Initial net premium received.

3.7.4. Stable Market Strategies

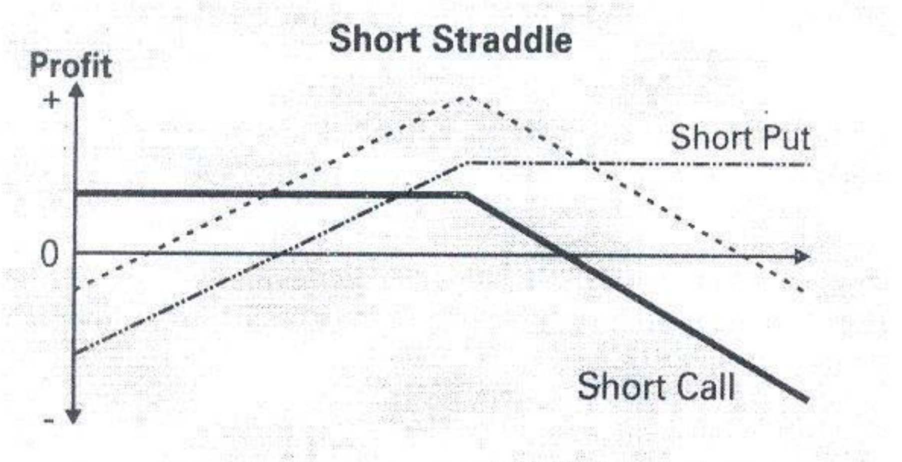
Straddles in a Stable Market Outlook

- A straddle is the simultaneous purchase (or sale) *of* two identical options, one a call and the other a put.
- To "buy a straddle" is to purchase a call and a put with the same exercise price and expiration date.
- To "sell a straddle" is the opposite: the trader sells a call and a put with the same exercise price and expiration date.

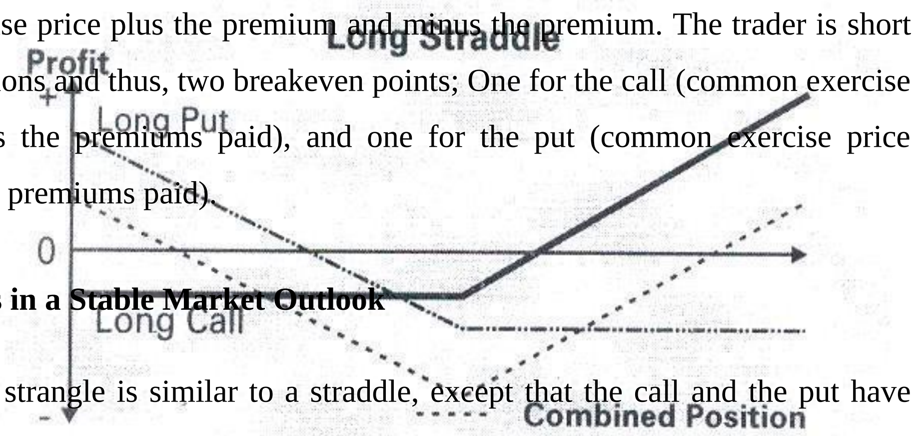
A trader, viewing a market as stable, should: write option straddles. A "straddle sale" allows the trader to profit from writing calls and puts in a stable market environment.

The investor's profit potential is limited. If the market remains stable, traders long out-of-the- money calls or puts will let their options expire worthless. Writers of these options will not called to deliver and will profit from the sum of the premiums received.

The investor's potential loss is unlimited. Should the price of the underlying rise or fall, the writer of a call or put would have to deliver, exposing himself to unlimited loss if he has to deliver on the call and practically unlimited loss if on the put.



The breakeven points occur when the market price at expiration equals the exercise price plus the premium and minus the premium. The trader is short two positions and thus, two breakeven points; One for the call (common exercise price plus the premiums paid), and one for the put (common exercise price minus the premiums paid).



Strangles in a Stable Market Outlook

A strangle is similar to a straddle, except that the call and the put have different exercise prices. Usually, both the call and the put are out-of-the-money.

To "buy a strangle" is to purchase a call and a put with the same expiration date, but different exercise prices. Usually the call strike price is higher than the put strike price.

To "sell a strangle" is to write a call and a put with the same expiration date, but different exercise prices.

A trader, viewing a market as stable, should: write strangles.

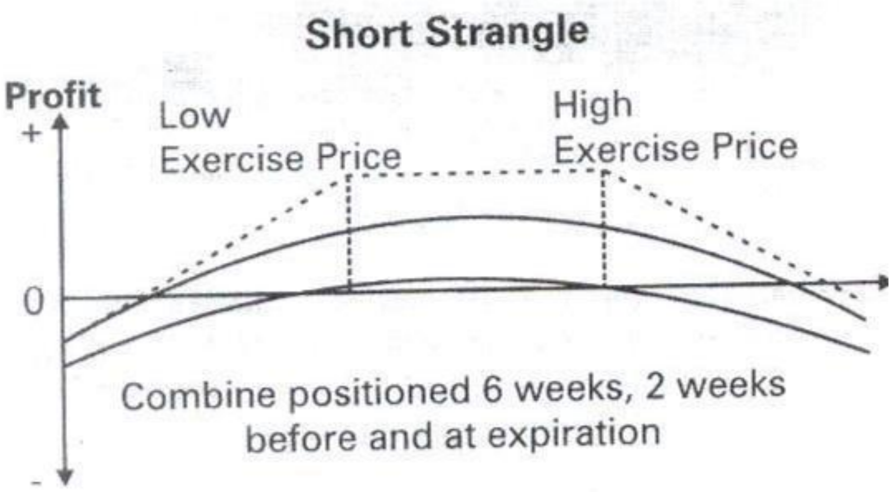
A "strangle sale" allows the trader to profit from a stable market. The investor's profit potential is: limited.

If the market remains stable, investors having out-of-the-money long put or long call positions will let their options expire worthless and seller of the options will have limited Profit and will be equal to the premium received. The investor's potential loss is: unlimited.

If the price of the underlying interest rises or falls instead of remaining stable as anticipated, he will have to deliver on the call or the put.

The breakeven points occur when market price at expiration equals the high exercise price the premium and the low exercise price minus the premium.

The trader is short two positions and thus, two breakeven points. One for the call (high exercise price plus the premiums paid), and one for the put (low exercise price minus the premiums paid).



The risk is lower with a strangle. Although the seller gives up a substantial amount of potential profit by selling a strangle rather than a straddle, he also holds less risk. Notice that the strangle requires more of a price move in both directions before it begins to lose money.

Long Butterfly Call Spread Strategy: The long butterfly call spread is a combination of a bull spread and a bear spread, utilizing calls and three different exercise prices.

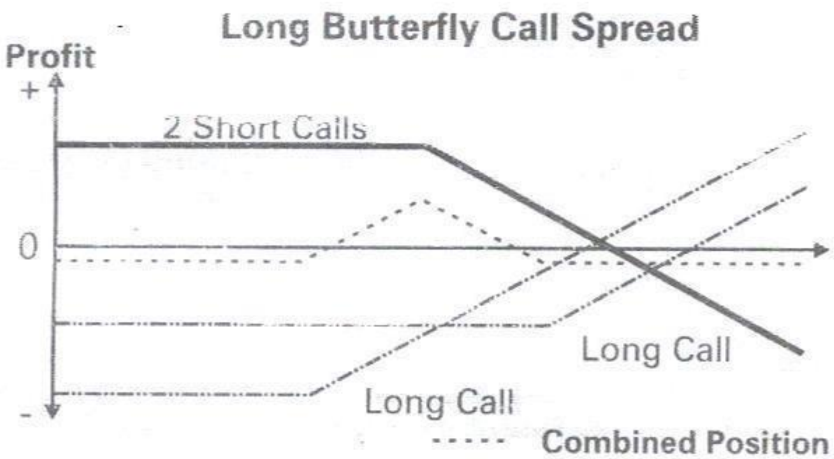
A long butterfly call spread involves:

- Buying a call with a low exercise price,
- Writing two calls with a mid-range exercise price,
- Buying a call with a high exercise price.

This spread is put on by purchasing one each of the outside strikes and selling two of the inside strike. To put on a short butterfly, you do just the opposite.

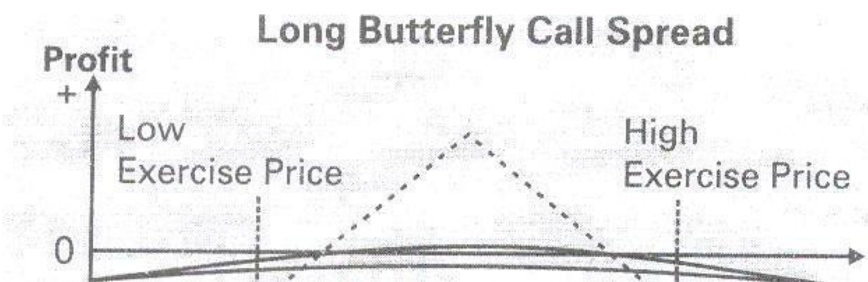
The investor's profit potential is limited.

Maximum profit is attained when the market price of the underlying interest equals the mid-range exercise price (if the exercise prices are symmetrical).



The investor's potential loss is limited.

The maximum loss is limited to the net premium paid and is realized when the market price underlying asset is higher than the high exercise price or lower than the low exercise price.

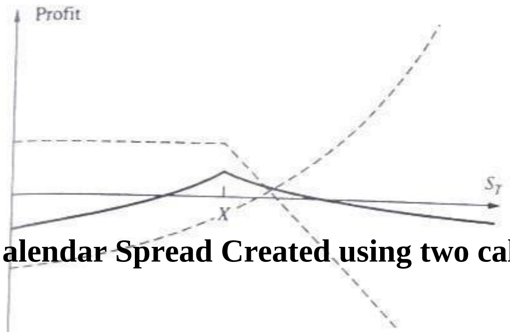


The breakeven points occur when the market price at expiration equals the high exercise minus the premium and the low exercise price plus the premium. The strategy is profitable when the market price is between the low exercise price plus the net premium and the high exercise price minus the net premium.

Calendar Spreads

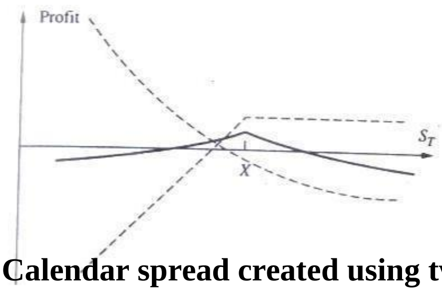
A calendar spread can be created by selling a call option with a certain strike price and buying a longer-maturity call option with the same strike price. The longer the maturity of an option the more experience its. A calendar spread, there fore required an initial investment. The following figure shows the: profit from a calendar spread at the time when the short-maturity option expires. (It is assumed that the long-maturity option is sold at this time.) The trader makes a profit if the stock price at the expiration of the short-maturity option is close to the strike price of the short-maturity option. However, a loss is incurred if the stock price is significantly above or significantly below this strike price.

To understand the profit pattern from a calendar spread, first consider what happens if the stock price is very low when the short-maturity option expires. The short-maturity option is worthless, and the value of the long-maturity option is close to zero. The trader, therefore, incurs a loss that is only a little less than the cost of setting up the spread initially. Consider next what happens if the stock price, *ST,* is very high when the short-maturity option expires. The short-maturity option costs the trader *ST* -' X, I and the long-maturity option is worth a little more than *ST* -X_l where X_l is the strike price of die options. Again, the trader has a net loss that is a little less than the cost of setting up the spread initially. If ST is close to X, the short-maturity option costs the trader either a small amount or nothing at all. However, the long-maturity option is still quite valuable. In this case, a significant net profit is made.



Calendar Spread Created using two calls.

In a *neutral calendar spread* a strike price close to the current stock price is chosen. A *bullish calendar spread* involves a higher strike price, whereas a *bearish calendar spread* ,involves a lower strike price.



Calendar spread created using two puts.

Calendar spreads can be created with put options as well as call options. The trader buys long maturity put option and sells a short-maturity put option. As shown in the above figure, the profit pattern is similar to that obtained from using calls.

A *reverse calendar spread* is the opposite trading strategy where the trader buys a short-maturity option and sells a long-maturity option. A small profit arises if the stock price at the expiration of the short-maturity option is well above or well below the strike price of the short-maturity option. However, a significant loss results if it is close to the strike price.

Diagonal Spreads

Bull, bear, and calendar spreads can all be created from a long position in one call (put) and a short position in another call (put). In the case of bull and rear spreads, the calls (puts) have different strike prices and the same expiration date. In the case of calendar spreads, the calls (puts) have the same strike price and different expiration dates. In it *diagonal spread* both the expiration dates and the strike prices of the call (puts) are different. There are several types of diagonal spreads. Their profit pattern are generally variations on the profit patterns from the corresponding bull or spreads.

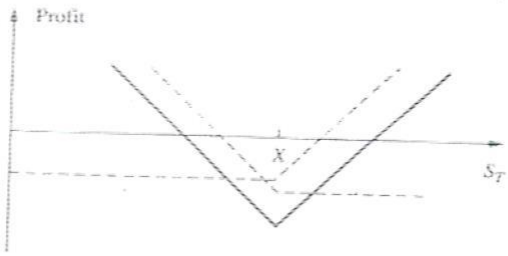
COMBINATIONS

A *combination* is an option trading strategy that involves taking a position in both calls and puts on the same stock. We will consider straddles, strips, straps, and strangles.

Straddle

One popular combination is a *straddle*, which involves buying a call and a put with the same strike price and expiration date. The profit pattern is shown in Figure 8.10. The strike price is denoted by X. If the stock price is close to this strike price at expiration of the options, the straddle leads to a loss. However, if there is a sufficiently large move in either direction, a significant profit will result The payoff from a straddle is calculated in Table 8.4.

straddle is appropriate when a trader is expecting a large move in a stock price but does not know in which direction the move will be. Consider a trader who feels that the price of a certain stock, currently valued at Rs69 by the market. will move significantly in the next three months. The trader could create astraddle by buying both a put and a call with a strike price of Rs70 and an expiration date in three months. Suppose that the call costs Rs4 and the put costs Rs3. If the stock price stays at Rs69, it is easy to see that the strategy costs the trader Rs6.



(An up- Straddle front investment of Rs7 is required, the call expires worthless, and the put expires worth Rs1.) If the stock price moves to Rs70, a loss of Rs7 is experienced- (This is the worst that can happen.)

Range of Stock Price	Pay of From Call	Pay of From Put	Total Payoff
ST <X	0	X-ST	X–ST
ST> X	ST–X	0	ST-X

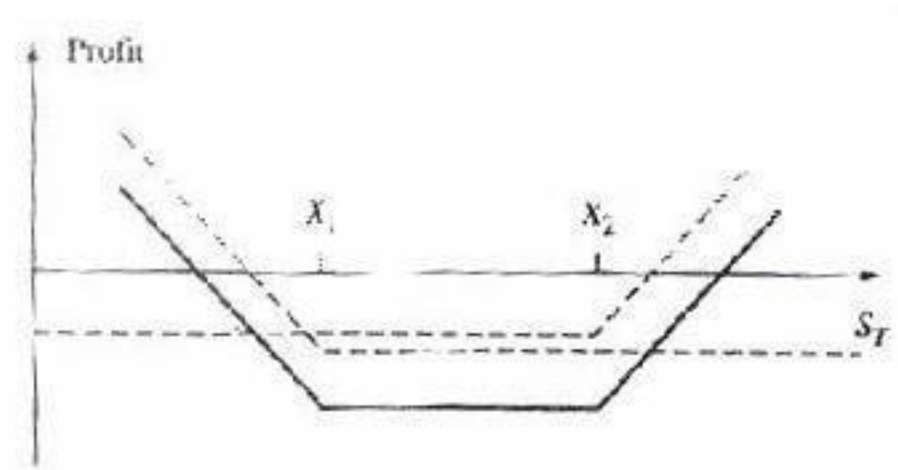
However, if the stock price jumps to Rs90, a profit ofRs13 is made; if the stock moves down to Rs55, a profit of 'i;8 is made; and so on.

A straddle seems like a natural trading strategy when a big jump in the price of a company's stock is expected for example, when there is a takeover bid for the company or when the outcome of a major lawsuit is expected to be announced soon. However, this is not necessarily the case. If the general view of the market is that there will be a big jump in the stock price soon, that view will be reflected in the prices of . options. A trader will find options on the stock to be significantly more expensive I than options on a similar stock. for which no jump is expected. For a straddle to be an t effective strategy, the trader must believe that there are likely to be big movements in the stock price, and this belief must be different from those of most other market participants.

The straddle in Figure 8.10 is sometimes referred to as a *bottom straddle* or s*traddle purchase.* A *top straddle* or s*traddle write* is the reverse position. It is created by selling a call and a put with the same exercise price and expiration date. It is a highly risky strategy. If the stock price on the expiration date is close to the strike price, a significant profit result. However, the loss arising from a large move in either direction is unlimited.

Strips and Strops

A strip consists of a long position in one call and two puts with the same strike price and one put with the same price and expiration data. A strap consists of a long position in two calls and one put with the same strike price and expiration data. The profit patterns from strips and straps are show in Figure 8.11. In a strip the trader is betting that there will be a big stock price move and considers a decrease in the stock price to be more likely than an increase. In a strap the trader is also betting that there will be a big stock price move. However, in a strap the trader is also betting that there will be a big stock price move. However, in this case, an increase in the stock price is considered to be more likely than a decrease.



Profit potentials from a strip and strap.

Option strategies – in brief

Combining any of the four basic kinds of option trades (possibly with different exercise prices) and the two basic kinds of stock trades (long and short) allows a variety of options strategies. Simple strategies usually combine only a few trades, while more complicated strategies can combine several.

- **Covered call** — Long the stock, short a call. This has essentially the same payoff as a short put.
- **Straddle** — Long a call and long a put with the same exercise prices (a long straddle), or short a call and short a put with the same exercise prices (a short straddle).
- **Strangle** — Long a call and long a put with different exercise prices (a long strangle), or short a call and short a put with different exercise prices (a short strangle).

- **Bull spread** — Long a call with a low exercise price and short a call with a higher exercise price, or long a put with a low exercise price and short a put with a higher exercise price.
- **Bear spread** — Short a call with a low exercise price and long a call with a higher exercise price, or short a put with a low exercise price and long a put with a higher exercise price.
- **Butterfly** — Butterflies require trading options with 3 different exercise prices. Assume exercise prices X1 < X2 < X3 and that (X1 + X3) /2 = X2
  - **Long butterfly** — long 1 call with exercise price X1, short 2 calls with exercise price X2, and long 1 call with exercise price X3. Alternatively, long 1 put with exercise price X1, short 2 puts with exercise price X2, and long 1 put with exercise price X3.
  - **Short butterfly** — short 1 call with exercise price X1, long 2 calls with exercise price X2, and short 1 call with exercise price X3. Alternatively, short 1 put with exercise price X1, long 2 puts with exercise price X2, and short 1 put with exercise price X3.
- **Box spreads** — Any combination of options that has a constant payoff at expiry. For example combining a long butterfly made with calls, with a short butterfly made with puts will have a constant payoff of zero, and in equilibrium will cost zero. In practice any profit from these spreads will be eaten up by commissions (hence the name "alligator spreads").

3.8. FUTURES CONTRACT-MEANING

A futures contract is a type of derivative instrument, or financial contract, in which two parties agree to transact a set of financial instruments or physical commodities for future delivery at a particular price. If one buys a futures contract, he is basically agreeing to buy something that a seller has not yet produced for a set price. But participating in the futures market does not necessarily mean that he will be responsible for receiving or delivering large inventories of physical commodities, instead, buyers and sellers in the futures market primarily enter into futures contracts to hedge risk or speculate rather than to exchange physical goods (which is the primary activity of the cash/spot market). That is why futures are used as financial instruments by not only producers and consumers but also speculators.

The consensus in the investment world is that the futures market is a major financial hub, providing an outlet for intense competition among buyers and sellers and, more importantly, providing a center to manage price risks. The futures market is extremely liquid, risky and complex by nature, but can be understood.

3.9.FUTURESCHARA CHARACTERISTICS

Margins

In the futures market, margin has a definition distinct from its definition in the stock market, where margin is the use of borrowed money to purchase securities. In the futures market, margin refers to the initial deposit of "good faith" made into an account in order to enter into a futures contract. This margin is referred to as good faith because it is this money that is used to debit any day-to-day losses.

When one opens a futures contract, the futures exchange will state a minimum amount of money that one must deposit into ones account which is called the initial margin. When the contract is liquidated, the initial margin plus or minus any gains or losses that occur over the span of the futures contract will be refunded. The minimum-level margin is determined by the futures exchange and is usually 5% to 10% of the futures contract. These predetermined initial margin amounts are continuously under review: at times of high market volatility, initial margin requirements can be raised.

The initial margin is the minimum amount required to enter into a new futures contract, but the maintenance margin is the lowest amount an account can reach before needing to be replenished. For example, if your margin account drops to a certain level because of a series of daily losses, brokers are required to make a margin call and request that you make an additional deposit into your account to bring the margin back up to the initial amount.

When a margin call is made, the funds usually have to be delivered immediately. If they are not, the brokerage can have the right to liquidate your position completely in order to make up for any losses it may have incurred on your behalf.

Leverage:

In the futures market, leverage refers to having control over large cash amounts of commodities with comparatively small levels of capital. In other words, with a relatively small amount of cash, you can enter into a futures contract that is worth much more than you initially have to pay (deposit into your margin account). It is said that in the futures market, more than any other form of investment, price changes are highly leveraged, meaning a small change in a futures price can translate into a huge gain or loss.

Futures positions are highly leveraged because the initial margins that are set by the exchanges are relatively small compared to the cash value of the contracts in question (which is part of the reason why the futures market is useful but also very risky). The smaller the margin in relation to the cash value of the futures contract, the higher the leverage.

As a result of leverage, if the price of the futures contract moves up even slightly, the profit gain will be large in comparison to the initial margin. However, if the price just inches downwards, that same high leverage will yield huge losses in comparison to the initial margin deposit.

Pricing and Limits

Futures prices have a price change limit that determines the prices between which the contracts can trade on a daily basis. The price change limit is added to and subtracted from the previous day's close and the results remain the upper and lower price boundary for the day.

The exchange can revise this price limit if it feels it's necessary. It's not uncommon for the exchange to abolish daily price limits in the month that the contract expires (delivery or "spot" month). This is because trading is often volatile during this month, as sellers and buyers try to obtain the best price possible before the expiration of the contract.

In order to avoid any unfair advantages, the futures exchanges impose limits on the total amount of contracts or units of a commodity in which any single person can invest. These are known as position limits and they ensure that no one person can control the market price for a particular commodity.

Stock index futures are traded in terms of number of contracts. Each contract is to buy or sell a fixed value of the index. The value of the index is defined as the value of the index multiplied by the specified monetary amount. The monetary value is fixed by the exchange where the contract is traded.

An index future is a future on the index i.e. the underlying is the index itself and no underlying security or a stock, which is to be delivered to fulfill the obligations. Index futures are cash settled. As other derivatives, the contract derives its value from the underlying index. The underlying indices in this case will be the various eligible indices and as permitted by the Regulator from time to time.

3.10.CONTRACT SPECIFICATION FOR INDEX FUTURES CONTRACTS

Contract Period	1, 2, 3 months
Tick size	0.05 index points
Price Quotation	index points
Trading Hours	9:30 a.m. to 3:30 p.m.
Last Trading/Expiration Day	Last Thursday of the contract month. If it is holiday, the immediately preceding business day. Note: Business day is a day during which the underlying stock market is open for trading.
Final Settlement	Cash Settlement. On the last trading day, the closing value of the underlying index would be the final settlement price of the expiring futures contract.

Sr. No.	Security Symbol	Underlying	Contract Multiplier
1	BSX	BSE SENSEX	25
2	TEK	BSE TECK INDEX	125
3	BNK	BSE BANKEX	50
4	OGX	BSE OIL & GAS INDEX	38
5	PSU	BSE PSU INDEX	50
6	MET	BSE METAL INDEX	25
7	FMC	BSE FMCG INDEX	175

3.11.Eligibility criteria for introducing Futures Option Contracts on Index

The Futures Options Contracts on an index can be issued only if 80% of the index constituents are individually eligible for derivatives trading. However, no single ineligible stock in the index shall have a weight age of more than 5% in the index. The index on which Futures and Options contracts are introduced shall be required to comply with the eligibility criteria on a monthly basis.

Discontinuance of Derivatives Contracts on index:

If the index fails to meet the above eligibility criteria for three months consecutively, then no fresh month contract shall be issued on that Index. However, the existing unexpired contracts shall be permitted to trade till expiry and new strike prices will continue to be introduced in the existing contracts.

3.12. IMPORTANCE OF INDEX FUTURES

Technical analysts thrive on their ability to predict the movement of the broad market indices. However, as they cannot trade the index, the normal practice is to try to capture a relation between the index and individual stocks. The introduction of the futures contract on stock indices gives them the opportunity to actually buy into the components of the index.

The other important use of stock index futures is for hedging. Mutual funds and other institutional investors are the main beneficiaries. Hedging is a technique by which such institutions can protect their portfolios from market risks. There are three different views in the literature on the nature and purpose of hedging:

* Risk minimisation.

* Profit maximisation.

- Reaching a satisfactory risk-return trade-off using a portfolio.

Historically, stock index futures have supplemented, and often replaced, the secondary stock market as a stock price discovery mechanism. The futures market has heralded institutional participation in the market with increased velocity and concentration on stock-trading.

Programme-trading and index arbitrage are necessary for an efficient and thriving futures market. However, on the flip side, these strategies have increased the risks associated with stock specialists. The increased concentration, the velocity of futures trading, and the resultant increase in volatility in the stock market, may have a long-term impact on the participation of individual investors in the market.

However, index futures provide investors an efficient and cost-effective means of hedging and significant improvements in market timing.

3.13. A SECURITY FUTURES

Contract is a legally binding agreement between two parties to buy or sell a specific quantity of shares of an individual stock or a narrow-based security index at a specified price, on a specified date in the future (known as the settlement or expiration date). If one buys a futures contract, he is entering into a contract to buy the underlying security and are said to be "long" the contract. Conversely, if one sells a futures contract, he is entering into a contract to sell the underlying security and are considered "short" the contract.

Security Futures Contract Specifications

Contract size - Typically, one single stock futures contract will represent 100 shares of the underlying stock. A narrow-based index futures contract will represent the value of the index times rupee amount set by the exchange. **Contract month** - The month when the contract expires. There will be several different contract months available for trading at any one time, and the number of contract months may vary from exchange to exchange.

Offsetting Transactions

Prior to expiration, one can realize the current gains or losses by executing an offsetting sale or purchase in the same contract (i.e., an equal and opposite transaction to the one that opened the position).

Example: Investor A is long one September ABC Corp. futures contract. To close out or offset the long position, Investor A would sell an identical September ABC Corp. contract.

Investor B is short one October XYZ Corp. futures contract. To close out or offset the short position, Investor B would buy an identical October XYZ Corp. contract.

Contract Expiration and Delivery

Any futures contract that hasn't been liquidated by an offsetting transaction before the contract's expiration date will be settled at that day's settlement price. The terms of the contract specify whether a contract will be settled by physical delivery - receiving or giving up the actual shares of stock - or by cash settlement. Where physical delivery is required, a holder of a short position must deliver the underlying security. Conversely, a holder of a long position must take delivery of the underlying shares.

Where cash settlement is required, the underlying security is not delivered. Rather, any security futures contracts that are open are settled through a final cash payment based on the settlement price. Once this payment is made, neither party has any further obligations on the contract.

Margin & Leverage

When a brokerage firm lends one part of the funds needed to purchase a security, such as common stock, the term "margin" refers to the amount of cash, or down payment, the customer is required to deposit. By contrast, a security futures contract is an obligation not an asset and has no value as collateral for a loan. When one enters into a security futures contract, he is required to make a payment referred to as a "margin payment" or "performance bond" to cover potential losses.

For a relatively small amount of money (the margin requirement), a futures contract worth several times as much can be bought or sold. The smaller the margin requirement in relation to the underlying values of the futures contract, the greater the leverage. Because of this leverage, small changes in price can result in large gains and losses in a short period of time.

Gains & Losses

Unlike stocks, gains and losses in security futures accounts are posted to the account every day, which are determined by the settlement price set by the exchange. If due to losses one’s account falls below maintenance margin requirements, he will be required to place additional funds in the account to cover those losses.

Tax Implications

The tax consequences of a security futures transaction may depend on the status of the taxpayer and the type of position (that is, long or short, covered or uncovered). For example, for most individual investors, security futures are not taxed as futures contracts. Short security futures contract positions are taxed at the short-term capital gains rate, regardless of how long the contract is held. Long security futures contracts may be taxed at either the long-term or short-term capital gains rate, depending on how long they are held. For dealers, however, security future contracts are taxed like other futures contracts at a blend of 60% long-term and 40% short-term capital gains rates. Depending on the type of trading strategy that is used, there can be additional or different tax consequences too.

Variety and Fungibility of Security Futures Contracts

Contract specifications may vary from contract to contract as well as from exchange to exchange. For instance, most security futures contracts require settling by making physical delivery of the underlying security, as opposed to making cash settlement. Carefully review the settlement and delivery conditions before entering into a security futures contract.

At this time, security futures traded on one exchange are not "fungible" with security futures traded on another exchange. This means one will only be able to offset a position on the exchange where the original trade took place - even though a better price may be available for a comparable futures contract on the same underlying security or index on another exchange.

3.14.CONTRACT SPECIFICATIONS FOR SINGLE STOCK FUTURES

Contract Period	1, 2 & 3 months
Tick size	0.05 points i.e. 5 paisa
Price Quotation	Rupees per share.
Trading Hours	9:30 a.m. to 3:30 p.m.
Last Trading/Expiration Day	Last Thursday of the contract month. If it is holiday, then the immediately preceding business day.Note: Business day is a day during which the underlying stock market is open for trading.
Final Settlement	Cash Settlement. On the last trading day, the closing value of the underlying stock is the final settlement price of the expiring futures contract.

Stock Futures Products

Sr. No.	**Product**	**Product Code**
1	ACC FUTURES	ACCFUT
2	ALLAHABAD BANK FUTURES	ALBKFUT
3	ALOK INDUSTRIES FUTURES	ALOKFUT
4	ARVIND MILLS FUTURES	ARVFUT
5	ASHOK LEYLAND FUTURES	ASHFUT
6	BAJAJ AUTO FUTURES	BAJFUT
7	BANK OF BARODA FUTURES	BOBFUT
8	BHARTI TELE FUTURES	BTLFUT
9	BHEL FUTURES	BHEFUT
10	BOI FUTURES	BOIFUT
11	BPCL FUTURES	BPCFUT
12	CANARA BANK FUTURES	CNBFUT
13	CENTURY TEXTILES FUTURES	CENFUT
14	CIPLA FUTURES	CIPFUT
15	DR. REDDY FUTURES	DRRFUT
16	GACL FUTURES	GACFUT
17	GAIL FUTURES	GAILFUT

18	GESCO FUTURES	GESHFUT
19	GMR INFRASTRUCTURE FUTURES	GMRFUT
20	GNFC FUTURES	GNFCFUT
21	GRASIM FUTURES	GRSFUT
22	HCLTECH FUTURES	HCLTFUT
23	HDFC BANK FUTURES	HDBKFUT
24	HDFC FUTURES	HDFFUT
25	HEROHONDA FUTURES	HEROFUT
26	HINDALCO FUTURES	HNDFUT
27	HLL FUTURES	HLLFUT
28	HPCL FUTURES	HPCFUT
29	ICICI BANK FUTURES	ICICFUT
30	IDBI FUTURES	IDBIFUT
31	IDFC FUTURES	IDFCFUT
32	IFLEX FUTURES	IFLXFUT
33	INDIA CEMENT FUTURES	INCMFUT
34	INDUSIND BANK FUTURES	INBKFUT
35	INFOSYS FUTURES	INFFUT
36	IOCL FUTURES	IOCLFUT
37	IPCL FUTURES	IPCLFUT
38	ITC FUTURES	ITCFUT
39	JET AIRWAYS FUTURES	JETFUT
40	JHPL FUTURES	JHPFUT
41	JINDAL STEEL & POWER FUTURES	JNSTFUT
42	LIC HOUSING FINANCE FUTURES	LICHFUT
43	LNT FUTURES	LNTFUT
44	MAHINDRA & MAHINDRA FUTURES	MNMFUT
45	MARUTI UDYOG FUTURES	MULFUT
46	MTNL FUTURES	MTNFUT
47	NALCO FUTURES	NALCFUT
48	NICHOLAS PIRAMAL FUTURES	NCPRFUT
49	NTPC FUTURES	NTPCFUT
50	OBC FUTURES	OBCFUT

51	ONGC FUTURES	ONGCFUT
52	ORCHID CHEMICALS FUTURES	ORCHFUT
53	PNB FUTURES	PNBFUT
54	POLARIS FUTURES	POLAFUT
55	PUNJ LLYOD FUTURES	PNJFUT
56	RANBAXY FUTURES	RBXFUT
57	RELENRG FUTURES	RENFUT
58	RELIANCE CAPITAL FUTURES	RCAPFUT
59	RELIANCE COMMUNICATION Ltd FUTURES	RCOMFUT
60	RIL FUTURES	RILFUT
61	RPL FUTURES	RPLFUT
62	SAIL FUTURES	SAILFUT
63	SATYAM FUTURES	SATFUT
64	SBI FUTURES	SBIFUT
65	SCI FUTURES	SCIFUT
66	SIEMENS FUTURES	SIEMFUT
67	STERLITE INDS FUTURES	STERFUT
68	SUNTV FUTURES	SNTVFUT
69	SUZLON FUTURES	SUZFUT
70	TATA CHEMICALS FUTURES	TCHMFUT
71	TATA MOTORS FUTURES	TELFUT
72	TATA POWER FUTURES	TPWFUT
73	TATA TEA FUTURES	TTEFUT
74	TCS FUTURES	TCSFUT
75	TISCO FUTURES	TISFUT
76	UBI FUTURES	UBIFUT
77	UTI BANK FUTURES	UTIBFUT
78	VSNL FUTURES	VSNLFUT
79	WIPRO FUTURES	WIPRFUT
80	ZEE TELEFILMS LTD	ZEEFUT

3.15.ELIGIBILITY CRITERIA FOR INTRODUCING FUTURES OPTION CONTRACTS ON STOCKS.

- The stocks would be chosen from amongst the top 500 stocks in terms of average daily market capitalization and average daily traded value in the previous six-month on a rolling basis.
- For a stock to be eligible, the median quarter-sigma order size over the last six months should not be less than Rs. 1 lac. For this purpose, a stock's quarter sigma order size shall mean the order size (in value terms) required to cause a change in the stock price equal to one-quarter of a standard deviation.
- The market wide position limit in the stock should not be less than Rs. 50 crores. Since, the market wide position limit in terms of number of shares is computed at the end of the every month, the Exchange shall ensure that the stocks comply with this criterion before the introduction of new contracts. The market wide position limit in terms of number of shares shall be valued taking the closing prices of the stocks in the underlying cash market on the date of expiry of contract in the month.

Eligibility criteria for stocks on account of corporate restructuring:

All the following conditions should be met in the case of shares of a company undergoing restructuring through any means for eligibility to re-introduce derivative contracts on that company from the first day of listing of the post restructured company in the underlying market:

- The Futures and Options contracts on the stock of the original (pre-restructure) company were traded on any exchange prior to its restructuring.

- The pre restructured company had a market capitalization of at least Rs. 1000 crores prior to restructuring.
- The post restructure company would be treated like a new stock and if it is, in the opinion of the exchange, likely to be at least one third of the size of the pre structuring company in terms of revenues or assets or analyst valuations, and
- In the opinion of the exchange, the scheme of restructuring does not suggest that the post restructured company would have any characteristic that would render the company ineligible for derivatives trading.
- If the post restructured company comes out with an Initial Public Offering (IPO), then the same prescribed criteria as currently applicable for introduction of derivatives on a company coming out with an IPO is applied for introduction of derivatives on stocks of the post restructured company from its first day of listing.

Discontinuance of Derivatives Contracts on stocks :

No fresh month contracts shall be issued on the stocks under the following instances:

- If a stock does not conform to the above eligibility criteria for a consecutive period of three months, no fresh month contracts shall be issued on the same.
- If the stock remains in the banned position in the manner stated as per para 4 (i) (a), (b) (c) of the aforementioned SEBI circular, for a significant part of the month, consistently for three months, then no fresh month contracts shall be issued on those scrips.

However, in both the above instances, the existing unexpired contracts shall continue to be available for trading till they expire on the last Thursdays of the respective months and new strike prices will continue to be introduced in the existing contracts.

3.16. DIFFERENCES BETWEEN SECURITY FUTURES AND STOCK OPTIONS

Although security futures share some characteristics in common with stock options, these products differ significantly. Most importantly, an option buyer may choose whether or not to exercise the option by the exercise date. Options purchasers who neither sell their options in the secondary market nor exercise them before they expire will lose the amount of the premium they paid for each option, but they cannot lose more than the amount of the premium. A security futures contract, on the other hand, is a binding agreement to buy or sell. Based upon movements in price of the underlying security, holders of a security futures contract can gain or lose many times their initial margin deposit.

3.17.TRADING SYSTEM

The futures market is a centralized marketplace for buyers and sellers from around the world who meet and enter into futures contracts. Pricing can be based on an open cry system, or bids and offers can be matched electronically. The futures contract will state the price that will be paid and the date of delivery. But don't worry, as we mentioned earlier, almost all futures contracts end without the actual physical delivery of the commodity.

3.17.1.The Players

The players in the futures market fall into two categories: hedgers and speculators.

Hedgers

Farmers, manufacturers, importers and exporters can all be hedgers. A hedger buys or sells in the futures market to secure the future price of a commodity intended to be sold at a later date in the cash market. This helps protect against price risks.

The holders of the long position in futures contracts (the buyers of the commodity), are trying to secure as low a price as possible. The short holders of the contract (the sellers of the commodity) will want to secure as high a price as possible. The futures contract, however, provides a definite price certainty for both parties, which reduces the risks associated with price volatility. Hedging by means of futures contracts can also be used as a means to lock in an acceptable price margin between the cost of the raw material and the retail cost of the final product sold.

Speculators

Other market participants, however, do not aim to minimize risk but rather to benefit from the inherently risky nature of the futures market. These are the speculators, and they aim to profit from the very price change that hedgers are protecting themselves against. Hedgers want to minimize their risk no matter what they're investing in, while speculators want to increase their risk and therefore maximize their profits.

In the futures market, a speculator buying a contract low in order to sell high in the future would most likely be buying that contract from a hedger selling a contract low in anticipation of declining prices in the future.

Unlike the hedger, the speculator does not actually seek to own the commodity in question. Rather, he or she will enter the market seeking profits by offsetting rising and declining prices through the buying and selling of contracts.

Trader	Short	Long
The Hedger	Secure a price now to protect against future declining prices	Secure a price now to protect against future rising prices
The Speculator	Secure a price now in anticipation of declining prices	Secure a price now in anticipation of rising prices

In a fast-paced market into which information is continuously being fed, speculators and hedgers bounce off of - and benefit from - each other. The closer it gets to the time of the contract's expiration, the more solid the information entering the market will be regarding the commodity in question. Thus, all can expect a more accurate reflection of supply and demand and the corresponding price.

Futures contracts are traded on recognised exchanges. In India, both the NSE and the BSE introduced index futures in the S&P CNX Nifty and the BSE Sensex. The operations are similar to that of the stock market, the exception being that, in index futures, the marking-to-market principle is followed, that is, the portfolios are adjusted to the market values on a daily basis.

The Derivatives Trading at BSE takes place through a fully automated screen based trading platform called as DTSS (Derivatives Trading and Settlement System). The DTSS is designed to allow trading on a real time basis. In addition to generating trades by matching opposite orders, the DTSS also generates various reports for the member participants.

3.17.2. Order Matching Rules

Order Matching will take place after order acceptance wherein the system searches for an opposite matching order. If a match is found, a trade will be generated. The order against which the trade has been generated will be removed from the system. In case the order is not exhausted further matching orders will be searched for and trades generated till the order gets exhausted or no more match-able orders are found. If the order is not entirely exhausted, the system will retain the order in the pending order book. Matching of the orders will be in the priority of price and timestamp. A unique trade-id will be generated for each trade and the entire information of the trade is sent to the members involved.

3.17.3.Order Conditions

The derivatives market is order driven i.e. the traders can place only Orders in the system. Following are the Order types allowed for the derivative products. These order types have characteristics similar to ones in the cash market.

- Limit Order: An order for buying or selling at a limit price or better, if possible. Any unexecuted portion of the order remains as a pending order till it is matched or its duration expires.
- Market Order: An order for buying or selling at the best price prevailing in the market at the time of submission of the order. There are two types of Market orders:
    1. Partial fill rest Kill (PF): execute the available quantity and kill any unexecuted portion.
    2. Partial fill rest Convert (PC): execute the available quantity and convert any unexecuted portion into a limit order at the traded price.

- Stop Loss: An order that becomes a limit order only when the market trades at a specified price.
- All orders shall have the following attributes:
- Order Type (Limit / Market PF/Market PC/ Stop Loss)
- The Asset Code, Product Type, Maturity, Call/Put and Strike Price.
- Buy/Sell Indicator
- Order Quantity
- Price
- Client Type (Own / Institutional / Normal)
- Client Code
- Order Retention Type (GFD / GTD / GTC) Good For Day (GFD) - The lifetime of the order is that trading session.
- Good Till Date (GTD) - The life of the order is till the number of days as specified by the Order Retention Period. Good Till Cancelled (GTC) - The order if not traded will remain in the system till it is cancelled or the series expires, whichever is earlier.
- Order Retention Period (in calendar days) This field is enabled only if the value of the previous attribute is GTD. It specifies the number of days the order is to be retained.
- Protection Points This is a field relevant in Market Orders and Stop Loss orders. The value enterable will be in absolute underlying points and specifies the band from the touchline price or the trigger price within which the market order or the stop loss order respectively can be traded.

- Risk Reducing Orders (Y/N): When the member's collateral falls below 50 lacs then he will be allowed to put only risk reducing orders and he will not be allowed to take any fresh positions. It is not essentially a type of order but a mode into which the member is put into when he violates his collateral limit. A member who has entered the risk-reducing mode will be allowed to put only one risk reducing order at a time.

3.17.4. Session Timings

SESSION NAME	FROM	TO
Beginning of the Day Session	8:00	9:00
Login Session	9:00	9:30
Trading Session	9:30	15:30
Position Transfer Session	15:30	15:50
Closing Session	15:50	16:05
Option Exercise Session	16:05	16:35
Margin Session	16:35	16:50
Query Session	16:50	17:35
End of Day Session	17:35	17:35

3.17.5.Price Bands

There are no maximum and minimum price ranges for Futures and Options Contracts. However, to avoid erroneous order entry, dummy price bands have been introduced in the Derivatives Segment. Further, no price bands are prescribed in the Cash Segment for stocks on which Futures & Options contracts are available for trading. Also, for those stocks which do not have Futures & Options Contracts available on them but are forming part of the index on which Futures & Options contracts are available, no price bands are attracted provided the daily average trading on such indices in the F & O Segment is not less than 20 contracts and traded on not less than 10 days in the preceding month.

3.17.6. Limited Trading Membership For Bse Derivatives Segment

A Limited Trading Member (LTM) is a non-clearing trading participant having full trading rights and direct market access to the Derivatives Trading System of the Exchange.

- A LTM is provided with derivatives trading terminals for execution of trades either on his own account or on account of his clients.
- A LTM can issue contract notes to his clients in his own name.
- A LTM can exercise and perform trade and position management functions online and also check his payment obligations that may result from his trading activities.
- A LTM, however, cannot clear and settle trades executed by him directly with the Clearing House of the Exchange. For this purpose, we would need to enter into an arrangement with an existing Clearing Member of the Derivatives Segment of BSE. (A list of Clearing Members can be obtained from the Exchange.)

Advantages of becoming a LTM

1. Direct access to the on-line Derivatives Trading System of the Exchange
2. Trading in Option and Futures on Sensex, Single Stock Futures and options in eligible scrips and interest rate derivative instruments

2. Access to new products as and when they are introduced

Requirements for becoming a LTM

Individuals, firms, corporate and institutions, who are not members of the Cash Segment of BSE, can become LTM.

- Minimum networth of Rs. 25 lakhs
- A registration with SEBI
- One-time (non-refundable) contribution to Trade Guarantee Fund (TGF) : Rs.1,00,000 One-time (non-refundable) contribution to Investors Protection Fund (IPF) : Rs.2,00,000
- **Annual membership charges : Rs.25,000**

LTM has to maintain a minimum security deposit of Rs.7,50,000 with the Clearing Member and the same is available to him for the purpose of trading limits and initial margin requirements.

The members are at present required to pay transaction charges at a Re. 0.25 per Rs.1,00,000 of turnover which is appropriated towards TGF & IPF.

Sub-brokers in the Cash Segment can become LTMs of the Derivatives Segment with minimum investment and significant advantages as mentioned above.

3.18. FUTURES STRATEGIES

Essentially, futures contracts try to predict what the value of an index or commodity will be at some date in the future. Speculators in the futures market can use different strategies to take advantage of rising and declining prices. The most common are known as going long, going short and spreads.

Going Long

When an investor goes long - that is, enters a contract by agreeing to buy and receive delivery of the underlying at a set price - it means that he or she is trying to profit from an anticipated future price increase.

Going Short

A speculator who goes short - that is, enters into a futures contract by agreeing to sell and deliver the underlying at a set price - is looking to make a profit from declining price levels. By selling high now, the contract can be repurchased in the future at a lower price, thus generating a profit for the speculator.

Spreads

Spreads involve taking advantage of the price difference between two different contracts of the same commodity. Spreading is considered to be one of the most conservative forms of trading in the futures market because it is much safer than the trading of long/short (naked) futures contracts.

There are many different types of spreads, including:

Calendar Spread - This involves the simultaneous purchase and sale of two futures of the same type, having the same price, but different delivery dates.

Intermarket Spread - Here the investor, with contracts of the same month, goes long in one market and short in another market. For example, the investor may take Short June Wheat and Long June Pork Bellies.

Inter-Exchange Spread - This is any type of spread in which each position is created in different futures exchanges. For example, the investor may create a position in the Chicago Board of Trade (CBOT) and the London International Financial Futures and Options Exchange (LIFFE).

3.19. ADVANTAGE OF FUTURES INDEX

It is a *risk* hedge and caters to speculative instinct of investors. It is a more efficient method of controlling *risk* on a portfolio, as it reduces the" transactions trading costs and price pressure. Neither the buyer nor the seller pays the full value of the underlying asserts but deals only in differences, in cash without involving delivery of the assets. The futures smoothens the asset reallocation, provides hedge hedge inflows or outflows of cash and reduces the impact of bullish and bearish ling as futures do not involve full payment on receipt both the underlying assets is a dealing in differences.

Operation of Hedge of Risk

To illustrate the coverage of *risk,* assume that you expect a future cash inflow of Rs.50,000 a month hence, which you wish to invest in equities. But the market is bullish and prices are expected to rise. Then *you* buy an index future contract to are the expected rise in price. You can also seli short if the market is expected to fall in prices. Suppose, you have the securities in your portfolio and expect the market to fall then *you* can sell the futures, instead of the securities. If the actual fall lore than the expected price, you will receive the difference in cash. A bullish expectation makes *you* buy the futures contract and a bearish expectation makes you the futures contract. If your expectations are correctly realised, *you* can make they on the deals without actually buying and selling the underlying securities. s will enable you to trade on a smaller investment as the margins you have to p for trading in Futures is generally 6 to 10%, and the loss of interest money is expensive then the loss of interest on a bigger outlay involved in buying and mg for deliveries of underlying securities or shares or bonds.

3.20.FUTURES ON FIXED INCOME SECURITIES

Investment strategies of fixed income securities are fairly simple when compared to equity as they invest in government securities, corporate bonds, etc where the returns are fixed. Though fixed income securities have much lower risks than equities, they are not completely risk free either. The following are the various risks associated with them.

Credit risk

Credit risk is the possibility of default in the repayment of principal and interest by a borrower. Among fixed income securities, corporate bonds carry the highest credit risk. If the issuing company falls into serious financial difficulties, there is every possibility that repayment will be delayed considerably and may never even be made. Funds reduce this risk by investing only in bonds issued by companies with good credit rating. However, a good credit rating is no guarantee that the company would continue to perform well in future and honour all its financial commitments.

Government securities carry no credit risk, as the issuer can never default, and are backed by the sovereign guarantee of the country and are called sovereign securities. However, they carry lower returns than other fixed income securities.

Liquidity risk

Liquidity in any market refers to the possibility for traders to enter and exit positions with relative ease in relation to volume and size of transactions. Highly liquid markets also reduce the impact costs of transactions which result from fluctuations in prices when large transactions are pushed through in a less liquid market. (The difference between the market price before the sale offer and the price at which the bonds are sold constitutes the impact cost for the seller).

The market for government securities and short term money markets are very liquid where the impact costs are almost negligible, but, the returns offered by these assets are much lower than the relatively illiquid corporate bonds.

Price risks

Corporate bonds will always be rated by a reputed rating agency for their creditworthiness which may be changed to reflect the changes in the economy, industry or the company in question. These rate changes can affect the market prices of the bonds. This exposes the fund investing in such bonds to a price risk.

Interest rate risks

Market prices of all fixed income securities are largely dependent on the prevailing interest rate in the economy. If interest rates are expected to come down in future, bonds issued in the past would become more attractive and vice verse.

Almost all investments made by fixed income funds are subject to interest rate risks. But, the securities with longer maturities are more volatile than shorter term securities.

Other risks

Indian mutual funds are allowed to invest in overseas fixed income securities denominated in a foreign currency. Such investments are subject to fluctuations in currency values. They are also exposed to various political and economic risks associated with the country in which the security was issued.

3.21.HEDGING BY FIXED INCOME FUNDS

Like equity funds, fixed income funds can also hedge their price risks by entering into derivative transactions. However, fixed income derivatives are not easily understood and they are not traded in an open market like stock futures. Two common derivatives used by fixed income funds are:

Interest rate swaps

Interest rates are of two types, fixed interest rates and floating rates which vary according to changes in a standard benchmark interest rate. An investor holding a security which pays a floating interest rate is exposed to interest rate risk. The investor can manage this risk by entering into an interest rate swap.

An interest rate swap is a financial agreement between two parties to swap or exchange interest obligations of varying nature for an agreed period. The contract will specify the interest rates, the benchmark rate to be followed, the notional principal amount for the transaction, etc.

For example, take the case of a mutual fund which has invested Rs.50 crore in a floating interest bond of one year maturity. The interest payable by the issuer of the bond is not fixed and will vary with the changes in the benchmark interest rate specified.

The mutual fund can enter into an interest rate swap agreement with a counter party who will guarantee to pay interest at a fixed rate, say 10 per cent, on the notional amount of Rs.50 crore for a period of one year. In return, the fund will guarantee to pay the counter party interest at the benchmark rate on Rs.50 crore for one year. In other words, the fund will pass on the interest received on its investment in floating rate bond to the counter party and receive a fixed interest in return.

In practice, at the end of the contract period the total interest payable by each party is calculated and the net amount is settled in cash. If the benchmark rate, compounded daily for one year as it fluctuates on a daily basis, is lower than 10 per cent the mutual fund will receive the difference from the counter party. If it is the other way round the fund will pay the difference to the counter party. Either way, the fund is assured of an interest rate of 10 per cent whatever happens to the benchmark rate.

Forward rate agreements

A forward rate agreement, commonly known as FRA, is another form of interest rate swap. Under a FRA, the parties agree to pay and receive the difference between a fixed interest rate and the benchmark interest rate prevailing on a future date. As in the case of a swap, the interest rate, the benchmark rate and the notional amount will be mentioned in the contract. The difference is that unlike a swap in which the benchmark interest rate for a period is considered and is calculated on a daily compounding basis, a FRA considers the benchmark date only on a specified future date.

Funds having fixed income derivative positions are exposed to counter party risk. This is the risk of parties on the other side of the derivative transactions failing to honour their contractual commitments. Since fixed income derivatives are not traded on recognised stock exchanges like stock derivatives, counter party risk is higher in their case.

3.22. VALUATION OF INDEX FUTURES

If an investor invests in B.S.E. 30 index he will collect dividends on the scrips he holds and his principal value may go up or down depending on the index. In the case of the futures index, the investor will get the same outcome as if he invests all his money in riskless Treasury bills and enters into a futures contract for future delivery of the index. The futures then must sell at a price equal to today's price of the index plus a premium *equal* to risk free return plus dividend on the index shares.

To show this symbolically let Fe be the price of the futures, Fs is today's price of futures, Is current price of the Index and D is dividend on the index shares, and

I_E is the index price at the expiration date.

Return to Index = Index price at Expiration – Current Index price + Divided

$$= I_E - I_B + D \qquad ---- \qquad (1)$$

Return to Futures = Futures price at Expiration – current futures price + Interest on Risk free asset.

$$= F_E - F_B + R_F \qquad ----(2)$$

The above equation means that the present price of futures, will equal present price of Index plus the *"cost of carry",* which equals (Rf - D), namely, the interest obtainable on risk-free asset (Rf) minus dividend on Index Shares (D). The cost of purchasing the Index Shares is substantially higher than the cost of buying the futures contract for the same index. The money used to buy the futures will involve interest cost and by not buying the shares, dividends are lost. Assume that the money used to purchase the index shares is invested in Treasury bills to give risk free return (Rf). If Rf is less than the dividends lost, the futures price will be below the Index price (that is $F_a < I.$) and ($R_F < D$).

3.23. FUTURES ON BOND

While stock index future provide low cost and efficient method of insuring inst systematic risk of the portfolio, futures on bonds and Treasury bills provide risk coverage to interest rate risk, which is the largest source of systematic risk lading fixed income securities.

In the case of index futures, delivery is in cash settlements only but in the case Futures on Treasury bills or bonds, delivery is in bills or bonds. In the U.S.,

Treasury Note futures are more popular and easy to understand and operate. These contracts are available for delivery dates in March, June, Sept. and Dec. for delivery dates of upto two years from the current date. Yields are basic unit on which prices are determined.

Thus Annual discount rate =

$$= \frac{\text{Face Value} - \text{price}}{\text{face value}} \times \frac{\text{No.of days to maturity}}{360}$$

Treasury Bill futures prices is decided on the basis of change in the discount rate.

Price Paid = 100 – Discount Rate

$$\text{(as a percent of face value)} \times \frac{90}{360}$$

if discount rate is 6%, for example

1
4

100–6X ——
100-1.50
=98.50

Deliverable grade is also set out in the terms of the contract as for example 8%coupon Bill with a maturity period of 6.5 years to 10 years. There are some futures on long-term honds, like Mortgage Bonds, U.S. Gulf honds, Municipal Bonds etc. The hond that is cheapest to deliver is used for delivery by traders.

Bonds sell in the cash market at varying prices, some above and some-low the converted price of the futures contracts futures prices x conversion factor). The conversion factors are equal to the ratio of the actual price of the deliverable bond, to the delivery price of the futures contract; the bond that is cheapest to deliver is used for delivery by traders and that *is* decided by the bond, for which the difference between the invoice price and market price is the most positive.

Futures price = cash price + carrying costs

Carrying costs depend on the interest at which money can be borrowed by the investor and the period of financing, say 3 months to delivery.

Duration Effect

Using the above futures on fixed income securities, the duration of the portfolio can be changed. Instead of buying in the cash market, it is cheaper to hedge in futures. If interest rates are likely to increase, the investor should shorten. to duration of the portfolio and vice versa. He then uses in technique of buying or selling the futures to lengthen or shorte9 the duration, respectively. This effect on portfolio is caused duration effect of futures.

Portfolio can have reduced duration by selling short in futures and increased duration by buying futures. If cash is expected and interest rates are likely to futures pushing up the prices of bonds, then investor can go tong in futures and when funds come in, the futures can be converted into cash purchase of bonds or the underlying security. The opposite stand can be taken (if an) outflow of cash is expected at a I specific time period in future.

Hedging Effect:

Hedging in futures can be done to reduce the interest rate risk. A futures f position can be taken to offset the risk in the cash market. Thus a ten year bond is likely to suffer capital loss due to rise in yields and that is held in the portfolio of the investor. The risk can be hedged by an appropriate sale of that security -backed future. If the loss on the existing security is offset by the gain in the futures contract then it is called a perfect hedge. The difference between futures price and cash price is called the basis and the risk of variance of this basis is called basis risk.

The above bond’s risk is substantial when the cross hedging is one. Cross hedging is hedging in a bland futures, which is not identical with the bland to be hedged and held in the portfolio. A hedged position thus creates a b3Sis risk which can be reduced or eliminated by taking extreme caution and use of expertise in anticipation of the proper time and bond to be hedged.

Yield enhancement Effect

The futures on fixed income security, say a bond, can be used to improve yields also. What hedging has done is to reduce the risk on the portfolio by holding a long term bond for a short maturity. As the price of the futures is fixed, the risk is nil on this period of the futures say 3 months, and the ten year bond of 10 years, purch3Sed will have greater risk than a riskless bond of 3 months in futures plus a 9 year 9 month bond in the portfolio. The holding of a riskless bond for short period.. of time in the futures, reduces the risk. This process may, or may not increase the yield however .

To enhance the yields, the yield on the synthetic security should be higher than on the cash market security. This synthetic security is created by being short in a three months futures Treasury bill along with a long position in the cash market. If the yield on the three month Treasury bill is higher say 6.6% as against the Treasury bill yield in cash market of 6.4%, then the portfolio will benefit, from higher yield of 0.2% on the synthetic security, in the futures market.

3.24. SECURITY FUTURES RISKS

All security futures contracts involve risk, and there is no trading strategy that can eliminate it. Strategies using combinations of positions, such as spreads may be as risky as outright long or short futures positions. The following specific risks involved when trading security futures contracts:

- **Trading security futures contracts may result in potentially unlimited losses that are greater than the amount deposited with the broker**. As with any high-risk financial product, one should not risk any money that one cannot afford to lose, such as: retirement savings, medical and other emergency funds, funds set aside for education or home ownership, or funds required meeting living expenses.
- **Be cautious of claims that one can make large profits from trading security futures**. Although the high degree of leverage in

futures can result in large and immediate gains, it can also result in large and immediate losses. As with any financial product, there is no such thing as a "sure winner."

- **Because of the leverage involved and the nature of futures transactions, one may feel the effects of his losses immediately**. Unlike holdings in traditional securities, gains and losses in security futures are credited or debited to ones account on a daily basis at a minimum. Daily market moves may require one to have or make additional funds available. If one’s account is under the minimum margin requirements set by the exchange or the firm, his position may be liquidated at a loss, and he will be liable for any deficit in his account.
- **Under some market conditions, it may be difficult or impossible to hedge or liquidate a position**. If one cannot hedge or liquidate his position, any existing losses may continue to mount. Even if one can hedge or liquidate his position, he may be forced to do so at a price that involves a large loss. This can occur, for example:

    - If trading is halted due to unusual trading activity in either the security futures contracts or the underlying security,
    - If trading is halted due to recent news events involving the issuer of the underlying security,
    - If computer systems failures occur on an exchange or at the firm carrying one’s position, or
    - If the market is illiquid and therefore doesn't have enough trading interest to get a good price.

- **Under some market conditions, the prices of security futures may not maintain their customary or anticipated relationships to the prices of the underlying security or index**. This can occur, for example, when the market for the security futures contract is illiquid and lacks trading interest, when the primary market for the underlying security is closed, or when the reporting of transactions in the underlying security has been delayed. For index products, this could also occur when trading is delayed or halted in some or all of the securities that make up the index.
- **May experience losses due to computer systems failures**. As with any financial transaction, one may experience losses if the orders cannot be executed normally due to systems failures on a regulated exchange or at the firm carrying the position and the losses may be greater if the brokerage firm does not have adequate back-up systems or procedures.
- **Placing contingent orders, if permitted, such as "stop-loss" or "stop-limit" orders, will not necessarily limit your losses to the intended amount**. Market conditions may make it impossible to execute the order or to get the stop price.
- **Day trading strategies involving security futures pose special risks**. As with any financial product, seeking to profit from intra-day price movements poses a number of risks, including increased trading costs, greater exposure to leverage, and heightened competition with professional traders.

3.25.SOME TECHNICAL TERMS:

Futures contract - a futures contract is (1) an agreement to purchase or sell a commodity for delivery in the future; (2) at a price determined at initiation of the contract; (3) that obligates each party to the contract to fulfill it at the specified price; (4) that is used to assume or shift risk; and (5) that may be satisfied by delivery or offset.

Narrow-based security index - In general, an index that has any one of the following four characteristics: (1) it has nine or fewer component securities; (2) any one of its component securities make up more than 30% of its weighting; (3) the five highest weighted component securities together make up more than 60% of its weighting; or (4) the lowest weighted component securities making up, in the aggregate, 25% of the index's weighting have an aggregate dollar value of average daily trading volume of less than $50 million (or in the case of an index with 15 or more component securities, $30 million).

Nominal value - The face value of the futures contract, obtained by multiplying the contract price by the number of shares or units per contract. If XYZ stock index futures are trading at $.50.25 and the contract is for 100 shares of XYZ stock, the nominal value of the futures contract would be $5,025.

Settlement price - 1) The daily price that the clearing organization uses to mark open positions to market for determining profit and loss and margin calls and for invoicing deliveries in physical delivery contracts, 2) The price at which open cash settlement contracts are settled on the last trading day and open physical delivery contracts are invoiced for delivery.

Spread - 1) Holding a long position in one futures contract and a short position in a related futures contract or contract month in order to profit from an anticipated change in the price relationship between the two, 2) The price difference between two contracts or contract months.

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UNIT - IV

TECHNICAL ANALYSIS

Technical analysis has an important bearing on the study of price behavior and has its own method in predicating significant price behavior. Technical analysis is probably the most controversial aspect of investment management. That technical analysis is a delusion, that it can never be more useful in predicating stock performance than examining the insides of a dead sheep, in the ancient Greek traditions.

Technical analysis involves a study of market generated data like prices and volumes to determine the future direction of price movement. Martin J. Pring explains as "The technical approach to investing is essentially a reflection of the idea that prices move in trends which are determined by the changing attitudes of investors toward a variety of economic, monetary, political and psychological forces. The art of technical analysis-for it is an art-is to identify trend changes at an early stage and to maintain an investment posture until the weight of the evidence indicates that the trend has been reversed.

Basic assumption

The basic premises underlying technical analysis are as follows.

1. The market and / or an individual stock act like a barometer rather than a thermometer. Events are usually discounted in advance with movements as the likely result of informed buyers and sellers at work.

2. Before a stock experiences a mark-up phase, whether it is minor or major, a period of accumulation usually will take place. Accumulation or distribution activity can occur within natural trading trends. The ability to analyse

accumulation or distribution within net natural price patterns will be, therefore, a most essential pre-requisite.

3. The third assumption is an observation that deals with the scope and extends of market movements in relation to each other. In most cases, a small phase of stock price consolidation – which is really phase of backing and filling – will be followed by a relative short-term movement, up or down, in the stocks price. On the other hand a larger consolidation phase can lead to a greater potential stock price move.

Differences between Technical Analysis and Fundamental Analysis

The key differences between technical analysis and fundamental analysis are as follows:

1. Technical analysis mainly seeks to predict short –term price movements, whereas fundamental analysis tries to establish long-term values.
2. The focus of technical analysis is mainly on internal market data, particularly price and volume data. The focus of fundamental analysis is on fundamental factors relating to the economy, the industry, and the firm.
3. Technical analysis appeals mostly to short-term traders, whereas fundamental analysis appeals primarily to long-term investors.

Charting - A Technical Tool

Technical analysts, while defining their own theory about stock price behavior and criticizing the fundamental school, do feel that there is some merit in the fundamental analysis also. But according to them, the method is very tedious and it takes a rather long time for the common man to evaluate stocks through this method. They consider their own techniques and charts as superior to fundamental analysis. Some of their theories, techniques and methods of stock prices are given below:

Concepts Underlying Chart Analysis

The basic concepts underlying chart analysis are: (a) persistence of trends; (b) relationship between volume and trend; and (c) resistance and support levels.

Trends: The key belief of the chartists is that stock prices tend to move in fairly persistent trends. Stock price behavior is characterized by inertia: the price movement continues along a certain path (up, down or sideways) until it meets an opposing force, arising out of an altered supply-demand relationship.

Relationship between volume and trends: Chartists believe that generally volume and trend go hand in hand. When a major upturn begins the volume of trading increases as the price advances and decreases as the price declines. In a major down turn, the opposite happens; the volume of trading increases as the price declines and decreases as the price rallies.

Support and Resistance levels: Chartists assume that it is difficult for the price of a share to rise above a certain level called the resistance level and fall below a certain level called a support level. Why? The explanation for the first claim goes as follows. If investors find that prices fall after their purchases, they continue to hang on to their shares in the hope of a recovery. And when the price rebounds to the level of their purchase price, they tend to sell and heave sigh of relief as they break even. Such a behavioral tendency on the part of investors stimulates considerable supply when the price rebounds to the level at which substantial purchases were made by the investors. As a result, the share is not likely to rise above this level, the resistance level.

The level at which a declining share may evoke a substantial increase in demand is called the support level. This typically represents the level from which the share rose previously with large trading volumes. As the price falls to this level, there is a lot of demand from several quarters; those who 'missed the bus' on the previous occasion and have regrets for their failure to partake in the earlier advance; short-sellers who, having sold short, at higher levels, want to book profits by squaring their positions; and value-oriented investors.

The Dow Theory

Dow Theory is the oldest and best known theory of technical analysis. In the words of Charles Dow, "The market is always considered as having three movements, all going at the same time. The first is the narrow movement from day to day. The second is the short swing, running from two weeks to a month or more; the third is the main movement, covering at least four years in its duration."

Proponents of the Wow theory refer to the three movements as: (a) daily fluctuations that are random day-to-day wiggles; (b) secondary movements or corrections that may last for a few weeks to some months; and (c) primary trends representing bull and bear phases of the market.

An upward primary trend represents a bull market, whereas a downward primary trend represents a bear market. A major upward move is said to occur when the high point of each rally is higher than the high point of the preceding rally and the low point of each decline is higher than the low point of the preceding decline. Likewise, a major downward move is said to occur when the high point of each rally is lower than the high point of the preceding rally and the low point of each decline is lower than the low point of the preceding decline.

The secondary movement represents technical correction. They represent adjustments to the excesses that may have occurred in the primary movements. These movements are considered quite significant in the application of the Dow Theory.

The daily fluctuations are considered to be minus significance. Even zealous technical analysts do not usually try to forecast day-to-day movements in the market.

Figure 1 illustrates the concept of Dow Theory.

Fig. 1

Bar and Line Charts

The bar chart, one of the simplest and most commonly used tools of technical analysis, depicts the daily price range along with the closing price. In addition, it may show the daily volume of transactions. Figure 2 shows an illustrative bar chart. The upper end of each bar represents the day's highest price and the lower end the day's lowest price. The small cross across the bar marks the day's closing price.

A line chart, a simplification over the bar chart, shows the line connecting successive closing prices. Figure 3 shows the line chart.

Fig.2

Fig. 3

Technical analysts believe that certain formations or patterns observed on the bar chart or line chart have predictive value. The more important formations and their indications are described below.

Head and Shoulders Top (HST) formation has a left shoulder, a head, and a right shoulder. The HST formation represents a bearish development. If the price falls below the neckline (the line drawn tangentially to the left and right shoulders), a price decline is expected. Hence, it is a signal to sell.

Inverse Head and Shoulders Top (IHST) formation is the inverse of the HST formation. Hence, it reflects a bullish development. If the price rises above the neckline, a price rise is expected. Hence, it is signaling to buy.

Triangle or Coil Formation represents a pattern of uncertainty. Hence, it is difficult to predict which way the price will break out.

Flags and Pennants Formation typically signifies a pause after which the previous price trend is likely to continue.

Double Top Formation represents a bearish development, signaling that the price is expected to fall.

Double Bottom Formation reflects a bullish development, signaling that the price is expected to rise.

Fig.4

Point and Figure Charts

The point and figure charts are represented by Xs and Os. These are more difficult to calculate the stock prices than the line charts and bar charts. These are drawn by the technical analysts to make a forecast of prices and also to find out the trend in prices. It is usually the reversal in trend which can be found out by sub-charts. The price forecasts made by the point and figure charts are called price targets.

Fig. 5

Technical indicators

There are numerous technical indicators that collectively add up to organized confusion. Some of the major technical indicators are described in the following sections.

The Short Interest Ratio Theory: The short interest ratio is derived by dividing the reported short interest or the number of shares sold short, by the average volume for about 30 days. When short sales increase relative to total volume, the indicator rises. A ratio above 150per cent is considered bullish, and a ratio below 100 per cent is considered bearish.

The logic behind this ratio is that speculators and other investors sell stocks at high prices in anticipation of buying them back at lower prices. Thus, increasing short selling is viewed as a sign of general market weakness, and short covering (as evidenced by decreasing short positions) as a sign of strength. An existing large short interest is considered a sign of strength, since the covers (buyers) are yet to come; whereas an established slight short interest is considered a sign of weakness (more short sales are to come).

Confidence Index: It is the ratio of a group of lower-grade bonds to a group of higher-grade bounds. According to the theory underlying this index, when the ratio is high, investors' confidence is likewise high, as reflected by their purchase of relatively more of the lower- grade securities. When they buy relatively more of the higher grade securities, this is taken as an indication that confidence is low, and is reflected in a low ratio.

Spreads: Large spreads between yields indicate low confidence and are bearish; the market appears to require a large compensation for business, financial and inflation risks. Small spreads indicate high confidence and are bullish. In short, the larger the spreads, the lower the ratio and the less the confidence. The smaller the spreads, the greater the ratio, indicating greater confidence.

Advance-Decline Ratio: The index relating advances to decline is called the advance decline ratio. When advances persistently outnumber decline the ratio increases. A bullish condition is said to exist, and vice versa. Thus, advance decline ratio tries to capture the market's underlying strength by taking into account the number of advancing and declining issues.

Market Breadth Index is a variant of the advance decline ratio. To compute it, we take the net difference between the number of stocks rising and the number of stocks falling added (or subtracted) to the previous. For example, if in a given week 600 shares advanced, 200 shares declined, and 200 were unchanged, the breadth would be 2[(600-200)/200]. The figure of each week is added to previous weeks. These data are than plotted to establish the pattern of movement of advances and declines.

The purpose of the market breadth index is to indicate whether a confirmation of some index has occurred. If both the stock index and market breadth increase, the market is bullish; when the stock index increases but the breadth index does not, the market is bearish.

The Odd-Lot Ratio: Odd-lot transactions are measured by odd-lot changes in the index. Odd-lots are stock transactions of less than, say, 100 shares. The odd-lot ratio is sometimes referred to as a yardstick of uniformed sentiment or an index of contrary opinion because the odd- lot theory assumes that small buyers or sellers are not very bright especially at tops and bottoms when they nee to be brightest. The odd-lot short ratio theory assumes that the odd-lot short sellers are even more likely to be wrong than odd-lotters in general. This indicator relates odd-lot sales to purchases.

Insider Transactions: The hypothesis that insider activity may be indicative of future stock prices has received some support in the academic literature. Since insiders may have the best picture of how the firm is faring, some believers of technical analysis feel that these inside transactions offer a clue, to future earnings, dividend and stock price performance. If the insiders are selling heavily, it is considered a bearish indicator and vice versa. Stock holders do not like to hear that the president of a company is selling large blocks of stock of the company. Although the president's reason for selling the stock may not be related to the future growth of the company, it is still considered bearish as investors figure the president, as an insider, must know something bad about the company that they, as outsiders, do not know.

Moving Average is a smoothed presentation of underlying historical data. Each data point is the arithmetic average of a portion of the previous data. A ten-day moving average measures the average over the previous ten trading days; a twenty-day moving average measures average values over the previous twenty days, and so on. Regardless of the time period used, each day a new observation is included in the calculation and the oldest is dropped, so a constant number of points are always being averaged.

Advocates of moving averages in stock selection believe that changes in slope of the line are important. A stock twenty-day moving average line has been trending up might become a candidate for sale if the line turns downward.

Evaluation of Technical Analysis

The advocates of technical analysis offer the following interrelated arguments in support of their position.

1. Under the influence of crowd psychology, trends persist for quite sometime. Tools of technical analysis that help in identifying these trends early are helpful aids 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 a period of time. Hence, the price movement trends to continue in more or less the same direction till the information is fully assimilated in the stock price.
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.

The arguments against the technical analysis are,

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 uptrend or downtrend may have been signaled by technical analysis, it may already have taken place.
4. Ultimately, technical analysis must be self-defeating proposition. As more and more people employ it, the value of such analysis tends to decline.
5. The numerous claims that have been made for different chart patterns are simply untested assertions.
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.

Conclusion:

As an approach to investment analysis, technical analysis is radically different from fundamental analysis. Technical analysts don't evaluate a large number of fundamental factors relating to the company, the industry, and the economy. Instead they analyse market generated data like prices and volumes to determine the future direction of price movement. The technical analysts believe that their method was simple and give an investor a bird's eye on the future of security price by measuring the past moves of prices. The technical analysts predicted price behavior through line charts, bar charts and point and figure charts. They have a large number of patters which predict the upward and downward swing in the market. There are a large number of theories which also predict the future of prices.

Review Questions

1. Explain in detail the Dow Theory and how is it used to determine the direction of stock market?
2. How are odd lot and short sales index used to determine the direction of the market?
3. ‘Chart patterns are helpful in predicting the stock price movement’. Comment.
4. Discuss the relationship between fundamental analysis and efficient market hypotheses.
5. Technical analysis is based on Dow Jones Theory. Elucidate?
6. What are charts? How are they interpreted in technical analysis?

EFFICIENT MARKET THEORY

The efficient market hypothesis is a central idea of a modern finance that has profound implications. An understanding of the efficient market hypothesis will help to ask the right questions and save from a lot of confusion that dominates popular thinking in finance.

An efficient market is one in which the market price of a security is an unbiased estimate of its intrinsic value. Note that market efficiency does not imply that the market price equals intrinsic value at every point in time. All that it says is that the errors in the market prices are unbiased. This means that the price can deviate from the intrinsic value but the deviations are random and correlated with any observable variable. If the deviations of market price from intrinsic value are random, it is not possible to consistently identify over or under-valued securities.

Market efficiency is defined in relation to information that is reflected in security prices. In an efficient market, all the relevant information is reflected in the current stock price. Information cannot be used to obtain excess return: the information has already been taken into account and absorbed in the prices. In other words, all prices are correctly stated and there are no "bargains" in the stock market. James H. Lorie explained efficient security market as "Efficiency in this context means the ability of the capital markets to function so that prices of securities react rapidly to new information. Such efficiency will produce prices that are 'appropriate' in terms of current knowledge, and investors will be less likely to make unwise investments. A corollary is that investors will also be less likely to discover great bargains and thereby earn extraordinary high rates of return.

The requirements for a securities market to be efficient market are; (1) Prices must be efficient so that new inventions and better products will cause a firm's securities prices to rise and motivate investors to supply capital to the firm (i.e., buy its stock); (2) Information must be discussed freely and quickly across the nations so all investors can react to new information; (3) Transactions costs such as sales commissions on securities are ignored; (4) Taxes are assumed to have no noticeable effect on investment policy; (5) Every investor is allowed to borrow or lend at the same rate; and, finally, (6) Investors must be rational and able to recognize efficient assets and that they will want to invest money where it is needed most (i.e., in the assets with relatively high returns).

Forms of Efficient Market Hypothesis

Eugene Fama suggested that it is useful to distinguish three levels of market efficiency. They are 1) Weak-form efficiency - Prices reflect all information found in the record of past and volumes; 2) Semi-strong form efficiency - Prices reflect not only all information found in the record of past prices and volumes but also all other publicly available information; 3) Strong-form efficiency - Prices reflect all available information, public as well as private.

Weak form of EMH

The week form of market holds that present stock market prices reflect all known information with respect to past stock prices, trends, and volumes. This form of theory is just the opposite of the technical analysis because according to it, the sequence of prices occurring historically does not have any value for predicting the future stocks prices. The technical analysts rely completely on charts and past behavior of prices of stocks.

In the week form of the market no investor can use any information of the past to earn a return of portfolio which is in excess of the portfolio's risk. This means that the investor who develops the strategy based on past prices and chooses his portfolio on that basis cannot continuously out perform another investor who 'buys and holds' his investments over a long term period.

The question which has rapidly been studied is whether "security prices follow a random walk." A random walk when it is applied to security prices means that all price changes which have occurred today are completely independent of the prices prior to this day in all respects. The weak form of the efficient market theory takes into consideration only the average change of today's prices and states that they are independent of all prior prices. The evidence supporting the random walk behavior also supports the efficient market hypothesis and states that the large price changes are followed by larger price changes, but they do not change in any direction which can be predicated. This observation in a way violates the random walk behavior that it does not violate the weak form of the market efficiency. Researches have studied that the evidence which supports the efficient market behavior is based on the random walk behavior of security prices but there is evidence which contradicts the random walk hypothesis. This does not mean that it contradicts the efficient market hypothesis also.

Three types of tests have been commonly employed to empirically verify the weak-form efficient market hypothesis: (a) serial correlation tests; (b) runs tests; and (c) filter rules tests.

Serial Correlation Test: Serial Correlation is said to measure the association of a series of numbers which are separated by some constant time period. One way to test for randomness in stock price changes is to look at their serial correlations. Is the price change in one period correlated with the price change in some other period? If such auto-correlations are negligible, the price changes are considered to be serially independent. Numerous serial correlation studies, employing different stocks, different time-lags, and different time-periods, have been conducted to detect serial correlations. In general, these studies have failed to discover any significant serial correlations.

Moore measured correlation of the price change of one week with the price change of the next week with the price change of the next week. His research showed average serial correlation of -0.06 which indicated a very low tendency of security price to reverse dates. This means that a price rise did not show the tendency to follow the price fall or vice versa. Fama also tested the serial correlation of daily price changes in 1965. He studied the correlation for 30 firms which composed of the Dow Jones Industrial Averages for five years before 1962. His study showed an average correlation of -0.03. This correlation was also weak because it was not very far away from zero.

Run Test: Ren Test was also made by Fama to find out it price changes were likely to be followed by further price changes of the same sign. Run Test ignored the absolute values of numbers in the series and took into the research only the positive and negative signs. Given a series of stock price changes, each price (+) id it represents an increase or a minus (-) if it represents a decrease. A run occurs when there is not difference between the sign of two changes. When the sign of change differs, the run ends and a new run begin. To test a series of price changes for independence, the number of runs in that series is compared to see whether it is statistically different from the number of runs in a purely random series of the same size. Many studies have been carried out, employing the runs test of independence. They did not detect any significant relationship between the returns of security in one period and the returns in prior periods and made a conclusion that the security prices followed a random walk.

Filter Rules Test: The use of charts is essentially a technique for filtering out the important information from the unimportant. Alexander and Fama and Blume took the idea that price and volume data are supposed to tell the entire story we need to know to identify the important action in stock prices. They applied filter rules to see how well price changes pick up both trends and reverses – which chartists claim their charts do. If a stock moves up X per cent, buy it and hold it long; if it then reverses itself by the same percentage, sell it and take a short position in it. When the stock reverses itself again by X per cent cover the short position and buy the stock long.

The size of the filter varied from 0.5 to 50 percent. The results showed that the larger filter did not work well. The smaller ones worked better, since they were more sensitive to market swings. However, when trading costs are included in the analysis, no filter worked well. In fact, substantial losses would have been incurred using these filter rules.

In essence the result of using the filter technique turn out to be that stock prices do not have momentum from which one can make returns in excess of those warranted by the level of risk assumed. In fact, because of trading costs, we would have been substantially better off buying a random set of stocks and holding them during the same trading period.

Semi-Strong Form of EMH

The semi strong form of the efficient market hypothesis centers on how rapidly and efficiently market prices adjust to new publicly available information. In this state, the market reflects even those forms of information which may be concerning the announcement of a firm's most recent earnings forecast and adjustments which will have taken place in the prices of security. The investor in the semi-strong form of the market will find it impossible to earn a return on the portfolio which is based on the publicly available information in excess of the return which may be said to be commensurate with the portfolio risk. Many empirical studies have been made on the semi-strong form of the efficient market hypothesis to study the reaction of security prices to various types of information around the announcement time of the information.

Two studies commonly employed to test semi-strong form efficient market are event study and portfolio study.

Event Study examines the market reactions to and the excess market returns around a specific information event like acquisition announcement or stock split. The key steps involved in an event study are as follows:

1. Identify the event to be studied and pinpoint the date on which the event was announced.
2. Collect returns data around the announcement date. In this context two issues have to be resolved: What should be the period for calculating returns – weekly, daily, or some other interval? For how many periods should returns be calculated before and after the announcement date?
3. Calculate the excess returns, by period, around the announcement date for each firm in the sample. The excess return is calculated by making adjustment for market performance and risk.
4. Compute the average and the standard error of excess returns across all firms
5. Assess whether the excess returns around the announcement date are different from zero. To determine whether the excess returns around

the announcement date are different from zero, estimate the T statistic for each day.

The results of event studies are mixed. Most event studies support the semi-strong from efficient market hypothesis. Several event studies, however, have cast their shadow over the validity of the semi strong form efficient markets theory.

Portfolio study: In a portfolio study, a portfolio of stocks having the observable characteristic (low price earnings ratio or whatever) is created and tracked over time see whether it earns superior risk-adjusted returns. Steps involved in a portfolio study are as follows:

1. Define the variable (characteristic) on which firms will be classified. The proposed investment strategy spells out the relevant variable. The variable must be observable, but not necessarily numerical.
2. Classify firms into portfolios based upon the magnitude of the variable. Collect data on the variable for every firm in the defined universe at the beginning of the period and use that information for classifying firms into different portfolios.
3. Compute the returns for each portfolio on the returns for each firm in each portfolio for the testing period and calculate the return for each portfolio, assuming that the stocks included in the portfolio are equally weighted.
4. Calculate the excess returns for each portfolio. The calculation of excess returns earned by a portfolio calls for estimating the portfolio beta and determining the excess returns
5. Assess whether the average excess returns are different across the portfolios. Several statistical tests are available to test whether the

average excess returns differ across these portfolios. Some of these tests are parametric and some nonparametric.

Many portfolio studies suggest that it is not possible to earn superior risk-adjusted returns by trading on some observable characteristics. However, several portfolio studies have documented inefficiencies and anomalies.

Strong-Form of EMH

The strong-form efficient market hypothesis holds that all available information, public or private, is reflected in the stock prices. The strong form is concerned with whether or not certain individuals or groups of individuals possess inside information which can be used to make above average profits. If the strong form of the efficient capital market hypothesis holds, then and day is as good as any other day to buy any stock. This the most extreme form of the efficient market hypothesis. Most of the research work has indicated that the efficient market hypothesis in the strongest form does not hold good.

Market Efficiency and Anomalies

Anomalies are situations that appear to violate the traditional view of market efficiency, suggesting that it may be possible for careful investors to earn abnormal returns. Some stock market anomalies are

Low Price-Earnings Ratio:	Stock that are selling at price earnings ratios that are low relative to the market
Low Price-Sales Ratio:	Stocks that have price-to-sales ratios that are lower competed with other stocks in the same industry or with the overall market

Low Price-to Book value Ratio:	Stocks whose stock prices are less that their respective book values
High Divident Yield:	Stocks that pay high dividends relative to their respective share prices
Small companies:	Stock of companies whose market capitalization is less than 100 million
Neglected Stocks:	Stocks followed by only a few analysts and/or stocks with low percentages of institutional ownership
Stocks with High Relative Strength:	Stocks whose prices have risen faster relative to the overall market
January Effect:	Stock do better during January than during any other month of the year
Day of the Week:	Stock of poorer during Monday than during other days of the week

Most of these anomalies appear to revolve around four themes:

1. Markets tend to overreact to news, both good and bad.
2. Value investing is contrarians in nature and is beneficial because markets overreact.
3. The market consistently ignores certain stocks, especially small stocks.

Let's examine what anomalies mean for investors and the concept of market efficiency.

Financial Market Overreaction: One of the most intriguing issues to emerge in the past few years is the notion of market overreaction to new information (both positive and negative). Many practitioners have insisted for years that markets to overreact. Recent statistical evidence for both the market as a whole and individual security has shown errors in security prices that are systematic and therefore predictable. Overreactions are sometimes called reversals. Stocks that perform poorly in period suddenly reverse direction and start performing well in a subsequent period, and vice versa.

Several studies have found that stock returns over longer time horizons (in excess of one year) display significant negative serial correlation. This means that high returns in one time period tend to be followed by low returns in the next period, and vice versa.

Other studies have tested for market overreaction by forming portfolios of winners and losers based on performance over a specific time period and then measuring these portfolios performance records over subsequent periods of time. One study, for example, found that over the next year a portfolio of losers earned about 15 per cent more on average than did a portfolio of "winners".

Market overreaction may offer the best explanation for several of the anomalies. For example, low price-to-earnings ratio (P/E) stocks may be analogous to the losers we described above, or they may be the current investor favorites, or winners. As the market demonstrates almost daily, today's favorite stocks can fall from grace and reverse direction very quickly.

Profiting from Reversals: Market overreactions or reversals suggest several possible investment strategies to produce abnormal profits. Some possibilities include buying last year's worst performing stocks, avoiding stocks with high P/E rations, or buying on bad news. At the risk of oversimplifying, any investment strategy based on market overreaction represents a contrarian approach to invest, buying what appears to be out of favour with most investors. But does value investing work? Can you do better following the value oriented anomalies listed?

There are many studies, done by both academics and practitioners that suggest that buying stocks with low price-to-sales rations, low price-to-book ratios, or low P/E ratios produced returns that were higher, on average, than those from the overall market, even after adjusting for higher transactions costs. These findings support the notion that contrarian/value investing may indeed work.

Although value investing appears to work, it requires several caveats. First, stocks with low P/E ratios are not necessarily cheap, not are stocks with high P/E ratios necessarily expensive. The inverse relationship between value and P/E (or market-to-book value) ratios is far from perfect. Some stocks may have low (or high)P/E ratios for very good reasons. Further, value is definitely in the eye of the beholder; one person's bargain is another person's overvalued pariah.

For another caveat, remember that very good economic reason may drive some reversals. Reversing prices may be responding to new information and correcting an overreaction. Also, a poor performer may continue to perform poorly as the company continues to slide downhill. The fact that a company had a lousy year this year does not mean it will automatically have a good one next year. Further, the timing of a reversal can be very difficult to predict. Investors have shunned some individual stocks and groups of stocks for long periods of time, whereas other stocks have revered direction quickly.

Finally, think about what would happen if every investor suddenly became a contrarian. If contrarian investing really does offer abnormal profit opportunities, we would expect the wise investors to exploit opportunities aggressively. Soon competition would eliminate these opportunities.

Remember, apparent past success of value investing is no guarantee that it will work in the future.

Calendar-Based Anomalies: Are there better times to own stocks than others? Should you avoid stocks on certain days? The evidence seems to suggest that several calendar-based anomalies exist. The two best known, and widely documented, are the weekend effect and the January effect.

Weekend Effect*:* Studies of daily returns began with the goal of testing whether the markets operate on calendar time or trading time. In other words, are returns for Mondays (i.e., returns over Friday-to-Monday periods) different from the other day of the week returns? The answer to the question turned out to be yes, the trend was called the weekend effect. Monday returns were substantially lower than other daily returns. One study found that Mondays produced a mean return of almost-35 percent. By contrast, the mean annualized returns on Wednesdays was more than +25 per cent.

The January Effect: Stock returns appear to exhibit seasonal return patterns as well. In other words, returns are systematically higher in some months than in others. Initial studies found that returns were higher in January for all stocks (thus this anomaly was dubbed the January effect) whereas later studies found the January effect was more pronounced for small stocks than for large ones.

One widely accepted explanation for the January effect is tax-loss selling by the investors at the end of December. Because this selling pressure depresses prices at the end of the year, it would be reasonable to expect a bounce-back in prices during January. Small stocks, the argument goes, are more susceptible to the January effect because their prices are more volatile, and institutional investors (many of whom are tax-exempt) are less likely to invest in shares of small companies.

Calendar-Based Trading Strategies: Both seasonal and day-of-the-week affects are inconsistent with market efficiency because both suggest that historical information can generate abnormal profits. As will all anomalies, however, a more important issue is whether seasonal and/ or day-of-the-week effects can create profit opportunities for investors. Should you, for example, always buy stocks at the close of trading on Monday and sell them at the close of trading on Wednesdays?

Although differences in daily returns appear impressive, they are probably much too small to offset transaction costs. The January effect appears to have far more profit potential. However, once profitable investment strategies are recognized, it is reasonable to expect other investors to aggressively exploit them eventually eliminating the profit potential. This may be happening to the January effect. Entire books have been published about this widely recognized anomaly, and it may be disappearing.

Small-Firm Effect: Generally the stocks of small companies substantially outperform stocks of large companies. Of course, history has also shown that small stocks have exhibited more year-to-year variation than large stocks. However, even after correcting for differences in risk, some studies suggest that investors can earn abnormal profits by investing in shares of small companies, exploiting the small-firm effect.

Two explanations for the small-firm effect seem plausible to us. The first is that analysts have applied the wrong risk measures to evaluate returns from small stocks. Small stocks may well be riskier than these traditional risk measures indicate. If proper risk measures were used, the argument goes, the small-firm effect might disappear, and Small-firm stocks may not generate larger risk-adjusted returns than large stocks. Although the risk of small stocks may not be adequately captured by standard risk measures, it is hard to believe that better measures of risk would eliminate the entire small-firm effect.

Another explanation for the small-firm effect is that large institutional investors often overlook small-firm stocks. Consequently, less information is available on small companies. (They are also followed by fewer analysts.) One could argue that this information deficiency makes small-firm stocks riskier investments, but one could also argue that discovery of a neglected small-firm stock by the institutions could send its price rising as the institutions start buying it. The small-firm effect may arise from the continuous process of discovery of neglected small-firm stocks leading to purchases by institutional investors.

Whatever the explanation, small-firm stocks, although riskier than large-firm stocks, have historically provided substantial returns to investors, far higher than those produced by large-firm stocks. Of course, we can only speculate about whether this relationship will continue in the future.

Performance of Investment Professionals: Investment professionals such as mutual fund managers seem to have a difficult time beating the overall market. In a particular year, some professionals will beat the market, whereas others will not. The key question is whether some professionals can consistently outperform the market. Some evidence suggests that the answer to this question may be yes.

Conclusion

Despite the anomalies and puzzles and the challenge of behaviouralists and their sympathizers, the substantial evidence in favour of the efficient market hypothesis cannot be gainsaid. The advocates of efficient market hypothesis argue that it is not surprising that several anomalies and puzzles have been found. When data is mined extensively, one is bound to find a number of patterns. Even if inefficiencies exist, it is difficult to take advantage of them. The efficient market hypothesis, like all theories, is an imperfect and limited description of the stock market. However, at least for the present, there does not seem to be a better alternative.

Review Questions

1. What are the empirical evidences of the weak form of market efficiency?
2. Discuss the results of the studies that support the semi-strong form of EMH.
3. Explain the strong form of market efficiency with empirical evidences.
4. How does efficient market hypothesis differ from the technical analysis?
5 What is Random Walk theory? What does it project in its weak form, semi-strong form and strong form?
6. Discuss the empirical tests conducted on the different forms of the random walk.
7. The random walk hypothesis resembles the fundamental school of thought but is contrary to the technical analysis. Discuss?
8. Define the various forms of the market efficiency. What do they have in common?
9. "Indian stock market is efficient". Do you agree? Discuss.

PORTFOLIO ANALYSIS

Security analysis related to the analysis of individual securities within the framework of return and risk. Whereas, Portfolio analysis makes an analysis of securities in the combined form.

The portfolio analysis considers the determination of future risk and return in holding various blends of individual securities. Portfolio expected return is a weighted average of the expected return of individual securities but portfolio variance can be something less than a weighted average of security variances. As a result an investor can sometimes reduce portfolio risk by adding another security with greater individual risk than any other security in the portfolio. This result occurs because risk depends greatly on the covariance among returns of individual securities. Estimation of the expected return and expected risk level of a given portfolio of assets are discussed in the following paragraphs.

Returns

The expected return of a portfolio depends on the expected return of each of the security contained in the portfolio. It also seems logical that the amounts invested in each security should be important. Indeed, this is the case. The example of a portfolio with three securities shown in Table-1A illustrates this point. The expected holding period value-relative for the portfolio is clearly:

$$\frac{\text{Rs.}23,100}{\text{Rs.}20,000} = 1.155$$

giving an expected holding period return of 15.50%.

Table-1B combines the information in a different manner. The portfolio's expected holding-period value-relative is simply a weighted average of the expected value-relative of its component securities, using current market values as weights.Table-1C provides holding-period returns. It is simply 100 times the value obtained by subtracting one from the holding period value-relative. Thus a weighted average of the former will have the same characteristics as a weighted average of the former will have the same characteristics as a weighted average of the latter.

TABLE 1

(a) Security and Portfolio Values

Security	No. of Shares	Current Price Per Share	Current Value	Expected End-of-Period Share Price	Expected End-of-Period Share Value
1	2	3	4	5	6
A	100	Rs.15.00	1,500	Rs.18.00	Rs.1,800
B	150	20.00	3,000	22.00	3,300
C	200	40.00	8,000	45.00	9,000
D	250	25.00	6,250	30.00	7,500
E	100	12.50	1,250	15.00	1,500
			Rs.20,000		Rs.23,100

Security and Portfolio Values-Relatives

Security	Current Value	Proportion of Current value of Properties	Current Price Per Share	Expected End-of-Period Share Price	Expected Holding-Period value-Relative	Contribution to Portfolio Expected Holding-Period Value-Relative
1	2	3 = 2 Rs.20,000	4	5	6=5/4	7 = 3 x 6
A	1,500	.0750	Rs.15.00	Rs.18.00	1.200	0.090000
B	3,000	.1500	20.00	22.00	1.100	0.165000
C	8,000	.4000	40.00	45.00	1.125	0.450000
D	6,250	.3125	25.00	30.00	1.200	0.375000
E	1,250	.0625	12.50	15.00	1.200	0.075000
	Rs.20,000	1.0000				1.155000

(b) Security and Portfolio Holding-Period Returns

Security	Proportion of Current value of Properties	Current Price Per Share	Contribution to Portfolio Expected Holding Period Return (%)
1	2	3	4
A	.0750	Rs.15.00	1.50
B	.1500	20.00	1.50
C	.4000	40.00	5.00
D	.3125	25.00	6.25
E	.0625	12.50	1.25
	1.0000		15.50

Since portfolios expected return is a weighted average of the expected returns of its securities, the contribution of each security to the portfolio's expected returns depends on its expected returns and its proportionate share of the initial portfolio's market value. Nothing else is relevant. It follows that an investor who simply wants the greatest possible expected return should hold one security: the one which is considered to have the greatest expected return. Very few investors do this, and very view investment advisers would counsel such an extreme policy. Instead, investors should diversify, meaning that their portfolio should include more than one security. This is because diversification can reduce risk.

Risk

The probability of loss is the essence of risk. A useful measure of risk takes into account both the probability of various possible "bad" outcomes and their associated magnitudes. Instead of measuring the probability of a number of different possible outcomes, the measure of risk should somehow estimate the extent to which the actual outcome is likely to diverge from the expected.

Two measures used for this purpose are the mean absolute deviation and the standard deviation. Table 2A shows how the average absolute deviation can be calculated. First the expected return is determined; In this case it is 10.00 per cent. Next, each possible outcome is analyzed to determine the amount by which the value deviated from the expected amount. These figures shown in Column (5) of the table include both positive and negative values. As shown in Column (6), a weighted average, using probabilities as weights, will equal zero. This is a mathematical necessity, given the way expected value is calculated. To assess the risk the signs of deviations can simply be ignored. As shown in column (7), the weighted average of the absolute values of the deviations, using the probabilities as weights, is 10 per cent. This constitutes the first measure of "likely" deviation.

TABLE 2

A. Calculating the Mean Absolute Deviation

Event	Probability	Return %	Probability X Return	Deviation	Probability X Deviation	Probability X Absolute Deviation
1	2	3	4	5	6	7
a	.20	-10	-2.0	-25.0	-5.0	5.0
b	.40	25	10.0	10.0	4.0	4.0
c	.30	20	6.0	5.0	1.5	1.5
d	.10	10	-1.0	-5.0	-0.5	0.5
		Expected Return =	15.0		0	Average = 10.0 Absolute Deviation

B. Calculating the Standard Deviation

Event	Probability	Deviation	Deviation Squared	Probability X Deviation Squared
(1)	(2)	(3)	(4) = (3)2	(5) = (2) x (4)
a	.20	-25.0	625.0	125.0
b	.40	10.0	100.0	40.0
c	.30	5.0	25.0	7.5
d	.10	-5.0	25.0	2.4

Variation = Weighted average squared deviation = 175.0

Standard Deviation = square root of variance = 13.2287

Table 2B presents slightly more complex but preferably analytical measure. In this, the deviations are squared (making the value all positive); then a weighted average of these amounts is taken, using the probabilities as weights. The result is termed the variance. It is converted to the original units by taking the square root. The result is termed the standard deviation.

Although the two measures are often interchangeable in this manner, the standard deviation is generally preferred for investment analysis. The reason is simple. The standard deviation of a portfolio's return can be determined from (among other things) the standard deviations of the returns of its components securities, no matter what the distributions. No relationship of comparable simplicity exists for the average absolute deviations.

When an analyst predicts that a security will return 15% next year, he or she is presumably stating something comparable to an expected value. If asked to express the uncertainty about the outcome, he or she might reply that the odds are 2 out of 3 that the actual return will be within 10% of the estimate (i.e. 5% and 25%). The standard deviation is a formal measure of uncertainty, or risk, expressed in this manner, just as the expected value is a formal measure of a "best guess" estimate. Most analysts make such predictions directly, without explicitly assessing probabilities and making the requisite computations.

Portfolio Risk

In order estimate the total risk of a portfolio of assets, several estimates are needed: the variance of each individual asset under consideration for inclusion in the portfolio and the covariance, or correlation co-efficient, of each asset with each of the other assets.

Table 3A shows the returns on two securities and on a portfolio that includes both of them. Security X constitutes 60 per cent of the market value of the portfolio and security Y the other 40 per. The predicted return on the portfolio is simply a weighted average of the predicted returns on the securities, using the proportionate values as weights. Summary measures show values computed from the estimates in Table 3B. The expected return for the portfolio is simply the weighted average of the expected returns on its securities, using the proportionate values as weights (17.0% = 6 x 15% + 4 x 20%). However, this is not true for either the variance or the standard deviation of return for the portfolio smaller than the corresponding values for either of the component securities. This rather surprising result has a simple explanation. The risk of a portfolio depends not only on the risk of its securities, considered in isolation, but also on the extent to which they are affected similarly by underlying events. To illustrate this, two extreme cases are shown in Table 4. In the first case both

TABLE 3

Portfolio and Security Risks

A. RETURN

Event	Probability	Return on Security X	Return on Security Y	Return on Portfolio
(1)	(2)	(3)	(4)	(5) = 6 x (3) + 4 x (4)
a	.20	-10%	5.0%	-4.0%
b	.40	25	30.0	27.0
c	.30	20	20.0	20.0
d	.10	10	10.0	10.0

B. SUMMARY MEASURES

	Security X	Security Y	Portfolio
Expected Return	15.0	20.0	17.0
Variance of Return	175.0	95.0	135.8
Standard deviation of Return	13.2287	9.7468	11.65

C. COVARIANCE AND CORRELATIONS

Event	Probability	Deviation of Return for Security X	Deviation of Return for Security Y	Product of Deviation	Probability Times Product of Deviation
(1)	(2)	(3)	(4)	(5) = (3) x (4)	(6) = (2) x (5)
a	.20	-25.0%	-15.0%	375	75.00
b	.40	10.0	10.0	100	40.00
c	.30	5.0	0	0	0
d	.10	-5.0	-10.0	50	5.00
					Covariance = 120

$$\text{Correlation co-efficient} = \frac{120.00}{13.2287 \times 9.7468} = 0.9307$$

The variance and the standard deviation of the portfolio are the same as the corresponding values for the securities. Then diversification has no effect at all on risk. In the second case the situation is very different. Here the security's returns offset one another in such a manner that the particular combination that makes up this portfolio has no risk at all. Diversification has completely eliminated risk. The difference between these two cases concerns the extent to which the security's returns are correlated i.e., tend to "to-together". Either of two measures can be used to state the degree of such a relationship: the covariance or the correlation co-efficient.

TABLE 4

Risk and Return for a Two-Security Portfolio

A. TWO SECURITIES WITH EQUAL RETURNS

Even t	Probability	Return on Security X %	Return on Security Y %	Return on Portfolio
(1)	(2)	(3)	(4)	(5) = 6 x (3) + 4 x (4)
A	.20	-10.0	-10.0	-10.0
B	.40	25.0	25.0	25.0
C	.30	20.0	20.0	20.0
D	.10	10.0	10.0	10.0
Expected Return		15.0	15.0	15.0
Variance of Return		175.0	175.0	175.0
Standard deviation of Return		13.2287	13.2287	13.2287

B. TWO SECURITIES WITH OFFSETING RETURNS

Even t	Probability	Return on Security X %	Return on Security Y %	Return on Portfolio
(1)	(2)	(3)	(4)	(5)
A	.20	-10.	40.0	10.0
B	.40	25.0	-20.0	10.0
C	.30	20.0	-5.0	10.0
D	.10	10.0	10.0	10.0
Expected Return (%)		15.0	-0.5	10.0
Variance of Return		175.0	37.47	0
Standard deviation		13.228	6.1217	0

The computations required to obtain the covariance for the two securities are presented in Tab le 3C. The deviation of each security's return from its expected value is determined and the product of the two obtained (column 5). The variance is simply a weighted average of such products, using the probabilities of the events as weights. A positive value for the covariance indicates that the securities returns tend to go together – for example, a better-that-expected return for one is likely to occur along with a better-than-expected return for the other. A small or zero value for the covariance indicates that there is little or no relationship between the two returns. The correlation coefficient is obtained by dividing the covariance by the product of the two security's standard deviation. As shown in Table – 3C, in this case the value is 0.9307.

Correlation coefficients always lie between +1.0 and –1.0, inclusive. The former value represents perfect positive correlation, of the type shown in the example in Table – 4A. The latter value represents perfect negative correlation in Table – 4B. The relationship between the covariance and the correlation coefficient can be represented as follows:

$$C_{XY} = R_{XY}\, S_X\, S_Y \qquad (1)$$

or

$$R_{XY} = \frac{C_{XY}}{S_X\, S_Y} \qquad (2)$$

where :

C_{XY} = covariance between return on X and return on Y.

r_{XY} = coefficient of correlation between return on X and return on Y.

S_X = standard deviation of return on X.

S_Y = standard deviation of return on Y.

For two securities, X and Y, the relationship between the risk of a portfolio of two securities and the relevant variables, the formula is:

$$V_P = W^2_X V_X + 2W_X W_Y C_{XY} + W^2_Y V_Y \qquad (3)$$

where :

V_P = the variance of return for the portfolio.

V_X = the variance of return for the security X.

V_Y = the variance of return for the security Y.

C_{XY} = the covariance between the return on security X and the return On security Y.

W_X = the proportion of the portfolio's value invested in security X.

W_Y = the proportion of the portfolio's value invested in security Y.

For the case shown in Table-3

W_X = 0.6; W_Y= .4

V_X = 175.0 V_Y = 95.0 C_{XY} = 120.00

Inserting these values in formula (3), we get the variance of the portfolio as a whole:

$$V_P = (0.6)^2 \times 175.0 + 2 \times .6 \times .4 \times 120 + (0.4)^2 \times 95.0$$
$$= 63.00 + 57.60 + 15.20$$
$$= 135.80$$

The relationship that gives the variance for a portfolio with more than two securities is similar in nature but more extensive. Both the risks of the securities and all their correlations have to be taken into account. The formula is:

$$V_P = \sum_{x=1}^{N} \sum_{y=1}^{N} W_X W_Y C_{XY} \qquad (4)$$

$$= \sum_{x=1}^{N} \sum_{y=1}^{N} W_X W_Y r_{XY} \sigma_X \sigma_Y$$

where :

V_P = the variance of return for the portfolio.

W_X = the proportion of the portfolio's value invested in security X.

W_Y = the proportion of the portfolio's value invested in security Y.

C_{XY} = the covariance between the return on security X and the return On security Y.

N = the number of securities.

The two summation signs mean that every possible combination must be included in the total, with a value between 1 and N substituted where x appears and a value between 1 and N substituted where y appears. In those cases in which the values are the same, the relevant covariance is that between a security's return and itself.

Perfectly Positively Correlated Returns

The returns from two securities are perfectly positively correlated when a cross-plot gives points lying precisely on a upward-sloping straight line, as shown in Figure – 1A. Each point indicates the return on security A (horizontal axis) and the return on security B (vertical axis) corresponding to one event. The example shown in Table – 4A confirms to this pattern.

What is the effect on risk when two securities of this type are combined? The general formula is:

$$V_P = W^2_X V_X + 2W_X W_Y C_{XY} + W^2_Y V_Y$$

The covariance term can, of course, be replaced, using formula (1):

$$C_{XY} = R_{XY}\, S_X\, S_Y$$

However, in this case there is perfect positive correlation, so $r_{XY} = +1$ and $C_{XY} = S_X S_Y$. As always, $V_X = S^2_X$, $V_Y = S^2_Y$ and $V_P = S^2_P$

Substituting all these values in general formula gives:

$$S^2_P = W^2_X S^2_X + 2W_X W_Y S_X S_Y + W^2_Y S^2_Y$$

$$S^2_P = (W_X S_X + W_Y S_Y)^2$$

$$S^2_P = W_X S_X + W_Y S_Y \quad \text{when } r_{XY} = +1 \qquad (5)$$

This is an important result. When two securities returns are perfectly positively correlated, the risk of a combination, measured by the standard deviation of return, is just a weighted average of the risks of the component securities, using market value as weights. The principle holds as well if more than two securities are included in a portfolio. In such cases, diversification does not provide risk reduction but only risk averaging.

Perfectly Negatively Correlated Returns

Diversification can eliminate risk in case of perfectly negatively correlated returns. Since r_{XY} = -1, the general formula becomes:

$$S_P^2 = W_X^2 S_X^2 - 2W_X W_Y S_X S_Y + W_Y^2 S_Y^2$$

$$S^2_P = (W_X\, S_X - W_Y\, S_Y)^2 \quad \text{when } r_{XY} = -1 \qquad (6)$$

Assuming a portfolio, in which the proportionate holdings are inversely related to the relative risks of the two securities, i.e.:

$$\frac{W_X}{W_Y} = \frac{S_Y}{S_X} \quad \text{or } W_X = \frac{S_Y W_Y}{S_X}$$

For this combination the parenthesized term in formula (6) will be:

$$W_X S_X - W_Y S_Y = \frac{S_Y\ W_Y}{S_X} S_X - W_Y\ S_Y = 0$$

If this term is zero, of course, the portfolio's standard deviation of return must be zero as well. When two securities returns are perfectly negatively correlated, it is possible to combine them in a manner that will eliminate all risk. Figure – 1b shows the returns from two securities perfectly negatively correlated, a cross-plot gives points lying precisely on a downward-sloping straight line. The example shown in Table – 4b confirms to this pattern. This principle motivates all hedging strategies. This object is to take position that will offset each other with regard to certain kinds of risk, reducing or completely eliminating such sources of uncertainty.

Uncorrelated Returns

Some risks can be substantially reduced by pooling. This has crucial implications for investment management. Most importantly, it provides the basis for understanding the relationship between risk and return. A special case of extreme importance arises when a cross-plot of security returns shows no pattern that can be represented even approximately by an upward-sloping or downward-sloping line. (See Figure – 1c). In such an instance, the returns are uncorrelated. The correlation coefficient, , is zero, as is the covariance. In this situation, the general formula becomes:

$$S^2_P = W^2_X\, S^2_X + W^2_Y\, S^2_Y \quad \text{when } r_{XY} = 0 \qquad (7)$$

To illustrate the diversification effect, consider a portfolio divided equally between two securities of equal risk, say 20.0%. That is:

W_X= .5; W_Y=.5; S_X=20; S_Y=20

Substitution these values in equation (7) we get:

$$(.5)^2\,(20)^2 + (.5)^2\,(20)^2 = (.25)\,(400) + (.25)\,(400)$$

Thus:

$$S^2_P = 200 \text{ and } S_P = 14.14$$

Diversification has helped as the risk of the portfolio is less that the risk of either of its component securities. The result will remain same irrespective of the number of securities. However, when all returns are uncorrelated the complete formula becomes:

$S^2_P = W^2_1\ S^2_1 + W^2_2\ S^2_2 + \ldots\ldots\ldots + W^2_N\ S^2_N$

where:

S_P …… = The standard deviation of the return on portfolio.

W_1, W_2..= The proportions invested in securities 1,2, etc.

S_1, S_2 .. = The standard deviation of the returns for securities 1,2,etc.

N = The number of securities included.

This is an extremely important relationship for investment analysis and also provides the bases for insurance, or risk pooling. This can be seen by extending the previous example and assuming a portfolio of equal parts of a number of securities, each with a risk (standard deviation of return) of 20%. If two securities are included:

$$\begin{aligned} S^2_P &= (1/2)^2\ 20^2 + (1/2)^2\ 20^2 \\ &= 2(1/2)^2\ 20^2 \end{aligned}$$

If three securities are included:

$$S^2_P = (1/3)^2\ 20^2 + (1/3)^2\ 20^2 + (1/3)^2\ 20^2 = 3(1/3)^2\ 20^2$$

To generalize, represent the number of securities by N. Then:

$$\begin{aligned} S^2_P &= (1/N)^2\ 20^2 + (1/N)^2\ 20^2 + \ldots\ldots\ldots\ldots \\ &= N(1/N)^2\ 20^2 \end{aligned}$$

Simplifying:

$$\begin{aligned} S^2_P &= N/N^2\ 20^2 = 20^2/N \\ S_P &= 20/\sqrt{N} \end{aligned}$$

Diversification provides substantial risk reduction if the components of a portfolio are uncorrelated. In fact, if enough securities are included, the overall risk of the portfolio will be almost (but not quite) zero. This is why insurance companies attempt to write many individual policies and spread their coverage so as to minimize overall risk.

Figure 1

Combining Risky and Risk less Securities

What happens to risk when a risk less security is combined with a risky security (or portfolio). If security A return is certain, while that of security B is uncertain, $S_A = 0$, as does C_{AB}; and the relationship becomes :

$$S_P = W_A^2 0 + 2 W_A W_B 0 + W_B^2 S_B^2$$

Thus: $S_P = W_B S_B$ when $SA = 0$

In other words, when a risky security or portfolio is combined with a risk less one, the risk of the combination is proportional to the amount in vested in the risky component. An obvious case of this sort arises when an investor splits his funds between an equity portfolio and a savings account. Table – 5 shows some representative values, case C and D involve splitting funds between the risky alternative B and the risk less one A. Investing in a risk less security is equivalent to lending money.

TABLE 5

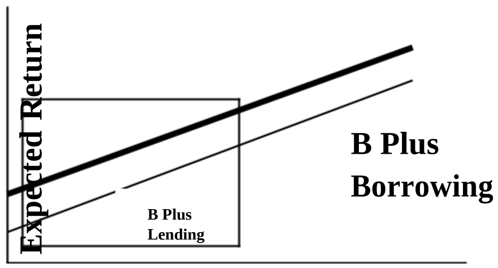
Combining A Risk less And A Risky Investment

	Security A (Savings Account)	Security B (Equity Portfolio)	Combination C	Combination D	Combination E
Proportion in A(W_A)	1.0	0	.7	.3	-.2
Proportion in B(W_B)	0	1.0	.3	.7	1.2
Expected return	8%	23%	12%	18%	26%
Standard deviation of return	0%	25%	6%	14%	30.0%

Along with the original alternatives A and B, Figure –2 portrays the combinations C and D. Each alternative shows the expected return and risk of an alternative combination. Since both risk and return will be proportion al to the investment proportions in C case of this sort, both point C and point D lie on the straight line connecting points A and B. All these alternatives have positive individual proportions except E. As shown in Table – 5 and Figure – 2, combination E and point E have W_A equal - .20 and W_B equal + 1.20.

What does this mean? Imagine an investor with Rs.10,000 to invest. But in order to take advantage of profitable opportunity, he may take additional risk and invest his own Rs.10,000 and borrow Rs.2000 at 8% interest. A total of Rs.12,000 could then be invested in the project. The effect of this sort of leverage may be favourable/unfavourable depending upon the circumstances. Table 6(a) shows the return on investor's capital may go up to 26%. The final column of the table showed a similar set of computations for combination.

Leverage increase the expected return on investor's capital if borrowed funds are invested in a risky alternative. Point E lies above point B in Figure 2. However, the expected return may decline with an unfavorable outcome. Return on investor's capital falls to 4.4 per cent from 26 per cent. The effect of leverage on risk is shown in the fourth line of the table. Borrowing increases risk. This is also shown in Figure 2 point E is to the right of point B.



Risk (Standard Deviation of Return)

Figure 2 : Risk and Return for Combination of a Risky and a Riskless Investment

TABLE 6

Effect of Leverage

A. With a Favourable Outcome:

Investment return		23%
Return on total investment	.23 x 12,000	= 2,760
Interest rate on loan		8%
Amount of interest	.08 x Rs.2000	= 160
	Net Proceeds	= 2,600
	Return on investor's capital	$= \frac{2,600}{10,000} = 26\%$

B. With an Unfavorable Outcome:

Investment return		5%
Return on total investment	.05 x Rs.12,000	= Rs.600
Interest rate on loan		8%
Amount of interest	.08 x Rs.2000	= 160
	Net Proceeds	= 440
	Return on investor's capital	$= \frac{Rs.440}{10,000} = 4.40\%$

Leverage generally increases both risk and expected return. It is commonly used by corporations. For example, point B in Figure 2 might represent the risk and return obtained by a firm on its total assets. If, however, the corporation has issued debt, both the risk and return of its investment should be greater than this. Combination E conforms to the example shown in Table 5 and Figure 2.

Like corporations, the individual investors can and do borrow from a number of sources. At any time the interest charged may depend on the borrower, the lender, the collateral, the purpose of loan, the length of time involved, the amount of money borrowed, etc. If there is chance that the loan will not be repaid in full and on time, the rate charged will, of course, be higher, and the loan will be risk less. But in these cases in which the leverage is used within the limits required to keep the loan risk less, the relationship will be shown in Figure 2. Margined or leveraged purchase of any risky investment (e.g., B) can be used to obtain a combination of risk and return plotting on the straight line connecting the points represent the two components (e.g., A and B). The prospect obtained in this manner will depend on the amount of leverage: the greater the leverage, the farther to the right of the risky investments point will be the point representing the new combination.

Review Questions

1. How is a portfolio managed? How is it revised?
2. What is an efficient frontier? How does it establish an optimum portfolio?
3. How can an individual make an analysis of different curves to get the most beneficial portfolio?
4. How can we arrive at the optimum portfolio?
5. What is meant by levered portfolio/ how is it constructed?
6. How would you calculate the systematic, unsystematic risk of a security and the portfolio risk?

MARKOWITZ THEORY

Traditional theory was based on the fact that risk could be measured on each individual security through the process of finding out the standard deviation and that security should be chosen where the deviation was the lowest. Greater variability and higher deviations showed more risk than those securities which had lower variation. The modern theory is of the view that by diversification, risk can be reduced. Diversification can be made by the investor either by having a large number of shares of companies in different regions, in different industries or those producing different types of product lines. Diversification is important but the modern theory states that there cannot be only diversification to achieve the maximum return. The securities have to be evaluated and thus diversified to some limited extent within which the maximum achievement can be sought by the investor. The theory of diversification was based on the research work of Harry Markowitz. He is of the view that a portfolio should be analyzed depending upon (a) the attitude of the investor towards risk and return, and (b) the quantification of risk.

Thus, traditional theory and modern theory are both framed under the constraints of risk and return, the former analyzing individual securities and the latter believing in the perspective of combination of securities.

Modern portfolio theory, as brought out by Markowitz and Sharpe, is the combination of the securities to get the most efficient portfolio. Combination of securities can be made in many ways. Markowitz developed the theory of diversification through scientific reasoning and method.

Dr. Harry M. Markowitz used mathematical programming and statistical analysis in order to arrange for the optimum allocation of assets within portfolio.

He considered the variance in the expected returns from investments and their relationship to each other in constructing portfolios. Markowitz's model is a theoretical framework for the analysis of risk return choices. Decisions are based on the concept of efficient portfolios. According to this theory, the effects of one security purchase over the effects of the other security purchase are taken into consideration and then the results are evaluated.

Assumptions

Markowitz theory is based on the modern portfolio theory under several assumptions. The assumptions are:

(a) The market is efficient and all investors have in their knowledge all the facts about the stock market and so an investor can continuously make superior returns.

(b) All investors before making any investments have a common goal. This is the avoidance of risk because they are risk averse.

(c) All investors would like to earn the maximum rate of return that they can achieve from their investments.

(d) The investors base their decisions on the expected rate of return of an investment.

(e) Markowitz brought out the theory that it was a useful insight to find out how the security returns are correlated to each other. By combining the assets in such a way that they give the lowest risk, maximum returns could be brought out by the investor.

(f) From the above, it is clear that every investor assumes that while making an investment, he will combine his investments in such a way that he gets a maximum return and is surrounded by minimum risk.

(g) The investor assumes that greater or larger the return that he achieves on his investments, the higher the risk factor that surrounds him. On the contrary, when risks are low, the return can also be expected to be low.

(h) The investor can reduce his risk if he adds investments to his portfolio.

Effect of Combining Two Securities

It is believed that holding two securities is less risky than having only one investment in a person's portfolio. When two stocks are taken on a portfolio and if they have negative correlation, then risk can be completely reduced, because the gain on one can offset the loss on the other. The effect of two securities can also be studied when one security is more risky when compared to the other security. The following example shows a return of 13%. A combination of A and E will produce superior results to an investor rather than if he was to purchase only Stock-A. If an investor constructs his portfolio in such a way that two-thirds of his stock consists of Stock-A and one-third of stock consists of Stock-B, the average return of the portfolio is the weighted average return of each security in the portfolio.

Example 1

Simple situation

When there are two securities in a portfolio:

Security	Expected Return R_1%	Proportion X_1%
1	10	25
2	20	75

The return on the portfolio on combining the two securities will be

$R_P = R_1 X_1 + R_2 X_2$

$R_P = 0.10\ (0.25) + 0.20\ (0.75)$

$= 17.5\%$

Example 2

---

portfolio analysis

Markowitz Two Security Analysis:

	Stock - A	Stock – B
Return %	7 or 11	13 or 5
Probability average	.4 each return	.4 each return
Expected Return %	7.2 +	7.20
Variance	4	16
Standard Deviation	2	4

\+ Expected Return = .4 x 7 +.4 x 11 = 7.2

Expected = .4 x 13 + .4 x 5 = 7.2

Rate of Return on Portfolio = 9

Formula:

$$R_P = \sum_{i=1}^{N} X_1 R_1$$

R_P = the expected return to portfolio

X_1 = proportion of total portfolio invested in security I

R_1 = expected return to security I

N = total number of securities in portfolio

Therefore, $R_P = (2/3)\ (7.2) + (1/3)\ (7.2) = 7.2$

The range of fluctuations in a portfolio will be calculated in the following manner, in the following situation:

(a) When Stock 'A' in a given investment is taken at 2/3 proportion during prosperity $R_P = (2/3) \times (7) + (1/3) \times (5) = 9.0$.

(b) When Stock 'A' in a given investment is taken at 2/3 proportion during depression $R_P = (2/3) \times (7) + (1/3) \times (13) = 9.0$.
(Higher return than expected)

Thus, by putting some part of the amount in stock which is riskier stock, i.e. 'B', the risk can be reduced rather than if the investor was to purchase only Stock 'A'. If an investor was to purchase only Stock 'A', his return would be according to his expectation an average of 7.2%, which becomes as low a 7% in depression periods and rises to 11% in boom periods. The standard deviation of this stock is as low 2%. The investor will make a return of higher than 7.2% by combining two-thirds of Stock 'A' and one-third of Stock 'B'. Thus, the investor is able to achieve a return of 9% and bring the risk to the minimum level. Thus, the effect of holding two securities in a portfolio does reduce risk but research studies have shown that it is important to know what proportion of the stock should be brought by the investor in order to get a minimum risk, the portfolio returns can be achieved at the higher point by setting of one variation against another. The investor should be able to find out two investments in such a way that one investment is giving a higher return whereas the other investment is not performing well even though one of the securities in more risky, and it will lead to a good combination. This is a difficult task because the investor will have to continue to find out two securities which are related to each other inversely like the example given for Stocks 'A' and 'B'. But securities should also be correlated to each other in such a way that maximum returns can be achieved.

Interactive Risk through Covariance

Apart from the measurement of securities through standard deviation and co-efficient of variation when two securities are combined, the investor should find out the co-variance of each security. Co-variance of the securities will help in finding out the inter-active risk. When the co-variance will be positive, then the rates of return of securities move together either upwards or downwards. Alternatively it can also be said that the interactive risk is positive. Secondly, co-variance will be zero on two investments if the rates of return are independent. Therefore, when two stocks are inversely related to each other, the co-variance will become negative. The following formula is given calculating co-variance.

When probabilities are equal:

$$Cov._{XY} = \frac{1N}{N} R_X - \overline{R}_X \quad R_Y - \overline{R}_Y$$

Cov. $_{XY}$ = covariance between two securities x and y.

R_X = return on security 'x'

R_Y = return on security 'y'

$\overline{R}_X$ = expected return on security 'x'

$\overline{R}_Y$ = expected return on security 'y'

N = number of observations

Example 3

Taking the above example of security A and B :

	Range of Return	Expected Return of Portfolio	Deviations
Stock 'A'	7	9.0	- .2
Stock 'B'	13	9.0	+ 4
Stock 'A'	11	9.0	+ 2
Stock 'B'	5	9.0	- 4

Cov. = ½(7-9)(13-9) + (11-9) (5-9)

= ½(-8) + (-8) = -16/2 = -8

In this example, the investment of stock A and B are taken at the same point of time to determine the variation of each stock from its expected value and the deviations are multiplied together. If each deviation is negative, their products will become positive. the co-variance will be an average of the positive values and the total values will be added. Alternatively, it can be said that when values of one variable will be higher and the value of the other variable will be small, then the resulting deviations will also show one positive and other negative. The co-variance will now turn to be negative. This is depicted in the above example.

Coefficient of Correlation

The coefficient of correlation is also designed to measure the relationship between two securities. It gives an indication of the variables being positively or negatively related to each other. This is represented by the following formula:

Example 4

$$_{XY} = \frac{\text{Cov.}_{XY}}{\theta_X \ \theta_Y}$$

$_{XY}$ = coefficient of correlation of x and y.

Cov. $_{XY}$ = covariance between x and y.

$_X$ = standard deviation of x.

$_Y$ = standard deviation of y.

In the above example, coefficient of correlation =

If $\theta_X = \theta 2 \ \theta_Y = 4$

V $_{XY}$ = -8/[(2)(4)] = -1

The coefficient of correlation indicates, as discussed above, the relationship between two securities and also determines the variation of security x and security y which helps in finding out the kind of proportion which can be combined and measured. It is measured by the standard deviation of two securities, namely x and y. The coefficient of correlation between the two securities is shown when it is + 1.0, which means that there is perfect positive correlation and if it shows – 1.0, it means that there is perfect negative correlation. If the coefficient correlation is zero, then it means that the return on securities are independent of one another. When the correlation is zero, an investor can expect deduction of risk by diversifying between two assets. When correlation coefficient is -1, the portfolio risk will be the minimum.

Markowitz has shown the effect of diversification by reading the risk of securities. According to him, the security with co-variance which is either negative or low amongst them, is the best manner to reduce risk. Markowitz has been able to show that securities which have less than positive correlation will reduce risk without, in any way, bringing the return down. According to his research study a low correlation level between securities in the portfolio will show less risk. According to him, investing in a large number of securities is not the right method of investment. It is the right kind of security which brings the maximum results. The following formula has been given by Harry Markowitz for a two security portfolio. The formula includes the standard deviation. It also includes variance and co-variance:

$$P = \text{Ö}\,\overline{X_i^2 \text{è}i^2 - X_j^2 \text{è}_j^2 + 2X_i X_j (r_x \text{è}_i \text{è}_j)}$$

$\text{è}^2{}_p$ = variance of the portfolio

X_i and X_j = weights of securities i and j

Vr_x = co-efficient of correlation i and j

$\text{è}_i\ \text{è}_j$ = standard deviation of times the security i and j

Example 5

The effect of the degree of risk on portfolio is illustrated in the following manner:

$è_p = Ö\overline{X_i^2 èi^2 - X_j^2 è_j^2 + 2X_i X_j r_x èi è_j}$

The risk of portfolio is measured in this example and when coefficient correlation are -1, 1.5, -0.5, è, + 1 when x = 1, the risk is the lowest, risk would be nil if the proportion of investment in security X_i and X_j are changed so that standard becomes 0 and x = -1.

When èi = 4

èj = 7

$X_i = 0.5$

$X_j = 0.5$

(1) When $r_x = -1$

$è_p = Ö\overline{(0.5)^2(4)^2 + (0.5)^2 (7)^2 + (2) (0.5) (0.5) (-1) (4) (7)}$

$è_p = 1.5$

(2) When $r_x = -0.5$

$è_p = Ö\overline{(0.5)^2(4)^2 + (0.5)^2 (7)^2 + (2) (0.5) (0.5) (-0.5) (4) (7)}$

$è_p = 3.041381$

(3) When $r_x = -0.0$

Then

$è_p = Ö\overline{(0.5)^2(4)^2 + (0.5)^2 (7)^2 + (2) (0.5) (0.5) (-1) (4) (7)}$

$è_p = 4.03$

(4) When $r_x = +1.0$

Then

$è_p = Ö\overline{(0.5)^2(4)^2 + (0.5)^2 (7)^2 + (2) (0.5) (0.5) (1) (4) (7)}$

$è_p = 5.5$

In this example, standard deviation is the lowest when correlation is negative-1.The standard deviation increases when the degree of correlation is positives. When co-efficient of correlation is +1, the advantage of diversifying becomes nullified. At this point of time, the standard deviation of the portfolio becomes equal to the weighted sum of standard deviations of each individual security.

To illustrate, the weighted sum of the standard deviations:

$$è_i\, è_j = X_i\, Ö\overline{(è_i)}^{2} + X_j\, Ö\overline{(è_j)}^{2}$$

$$= 0.5(4) + 0.5\,(7)$$

$$= 5.5$$

(a) When correlation is less than + 1, risk can be reduced by diversification. At this point, for a given return, risk will be reduced below the weighted sum of the standard deviation of each security.

(b) When two securities are positively correlated (perfectly + 1 positive), its standard deviation will be identical with the standard deviation of the securities when calculated independently.

(c) To find out the ideal combination.

$$X_x = è_y/è_{xy} + è_y$$

$$= 7/4+7$$

$$= .36$$

When X_i =.64

and X_i =.36

Now when rx = -1

$$= Ö\overline{(.64)^2(4)^2 + (.36)^2\,(7)^2 + 2(.64)\,(.36)\,(-1)\,(4)\,(7)}$$

$$= Ö\overline{.4096(16) + .1296(49) + (.2304)\,(-28)2}$$

$$= Ö\overline{12.90 – 12.90}$$

$$= Ö\overline{0}$$

Example 6

(a) Calculate risk from the coefficient of correlation given below with proportion of .50 and .50 for XY

(b) What would be the least risky combination if the correlation of the returns of the two securities is

(i) – 1.0, (ii) 0, (iii) 0.8 (iv) 1.0

Security Nos.	Expected Return.	Expected.
1	5	2
2	15	8

5(.50) + 15(.50)

2.50 + 7.50 = 10.00 returns

When r = -1

èp = ö $\overline{(0.5)^2(2)^2 + (0.5)^2\ (8)^2 + (2)\ (0.5)\ (0.5) + 0(2)\ (8)}$

= Ö $\overline{(.25)(4) + (2.5)(64) \text{ x } (2)\ (2.5)}$

= Ö $\overline{1.0 + 16.0 + 0}$

= Ö $\overline{17}$

èp = 3

When r = 0

èp = ö $\overline{(0.5)^2(2)^2 + (0.5)^2\ (8)^2 + (2)\ (0.5)\ (0.5) + (.8)\ (2)\ (8)}$

= Ö $\overline{(6.4)(4) + (0.4)(4) \text{ x } (.32) - 16}$

= ö $\overline{.17 + 6.4}$

= ö $\overline{23.4}$

èp = 4.2

When r = 0.8

èp = ö $\overline{(0.5)^2(2)(2)^2 + (0.5)\ (8)^2 + (2)\ (0.5) + (1.0)\ (2)\ (8)}$

= Ö $\overline{17+8}$

= Ö $\overline{25}$

= 4.7

When r = 1.0

$$è_p = Ö\overline{(0.8)^2 (2)^2 + (0.2)^2 (8)^2 + 2(.8) (.2) - 1(2) (8)}$$

$$= Ö\overline{\ 17+8}$$

$$= Ö\overline{25}$$

$$è_p = 5$$

The least risky portfolio combination is when correlation is –1.

(b) 80% X

(c) 20% Y

$$è_p = Ö\overline{(0.8)^2(2)^2 + (.02)^2 (8)^2 + 2 (.8) (.2) - 1(2) (8)}$$

$$= Ö\overline{(64)(4) + (.04)(4) + .32 - 16}$$

$$= Ö\overline{2.56 + 2.56 + 5.12}$$

$$= Ö\overline{5.12 – 5.12}$$

$$è_p = 0$$

The least risky combination is when standard deviation is 0.

To find out proportion:

(a) Weight of X_X = $è_y$ / $è_x$ + $è_y$

= 8/2+8

= 8/10

X = 80%

Y = 20%

Example 7

The data are as follows:

Year	Stock	Return
1	R	10
1	S	12
2	R	16
2	S	18

(a) What is Expected Return on a portfolio made up of 40% R and 60% S?

(b) What is the standard deviation of each stock? (c) What is the co-variance? of R and S? (d) Determine coefficient of correlation of Stocks R and S. (e) What is the portfolio risk made up of 40% R and 60% S?.

(a) To find out Expected Return:

$$40/100\frac{10+16}{2} + 60/10\frac{12+18}{2}$$

= 14.2

(b) R (x - x) (x^2) S (x – x) (x^2)

10 –3 912 –3 9

16+39 18+3 9

26 18 30 18

$$x = \frac{26}{2} = 13$$

$$\sqrt{\frac{Sx^2}{n}} = \sqrt{\frac{18}{2}} = \sqrt{9} = 3$$

R = 3

$$x = \frac{30}{2} = 15$$

$$= \sqrt{\frac{18}{2}} = \sqrt{9}$$

= 3

S = 3

(c) Covariance

	Return	Expected Return	Difference	Product
Stock R	10	14.2	-4.2	9.24
Stock S	12	14.2	-2.2	
Stock R	16	14.2	+1.8	6.84
Stock S	18	14.2	+3.8	

Co-variance = ½ (10) – 14.2) (12-14.2) + ½ (16 – 14.2) (18 – 14.2)

= ½ (-4.2)(-2.2)+ ½ (1.2)(3.2)

= ½ (9.24) + ½ (6.84)

= 4.62 +3.42

= + 8.04

(d) Correlation

r_{xy} = +8.04/(3)(3)

= 8.04/9 = 8.93

(e) Correlation co-efficient is positive to a high degree. The risk in such a portfolio is very high.

Markowitz's programme shows the combination of securities where standard deviation of the portfolio is the minimum. In this example, the programme is developed for a combination of two securities, but the basic purpose of this quadratic equation programme is to have a large number of combinations of portfolios which give the lowest risk between the limits of zero and infinity. To summaries the above, Markowitz's theory of portfolio diversification attaches importance to (a) standard deviation, i.e., when portfolio=0, risk is minimum, (b) co-variance – to show interactive risk, (c) coefficient of correlation, i.e., when x = - 1, the risk of investment should be the lowest, also r_x è$_x$ è$_y$ = co-variance, (d) the weights or proportion of each security in the total portfolio to give the ideal combination. It can be found by the formula.

X_x = è$_y$ è$_x$ + è$_y$

Thus, when

X_x = 3/6 + 3

= 3/9 =

.33 Y_x = .67

Sometimes, the total portfolio is changed. In this case, the effect is also on the change in the proportion of risk. The example given below will clarify this concept.

Example 8

Stock-X	Stock-Y	Portfolio Standard Deviation
100	0	2.0
80	20	0.8
66	34	0.0
20	80	2.8
0	100	4.0

In this example, the ideal combination is 66% and 34% and = 0.

When two securities are combined and one is in 50% proportion and the other in 50%, proportion and the co-efficient of correlation is positive, then the risk of the two securities which is the weighted sum of the individual standard deviations as shown below will be the same as the standard deviation of securities when calculated independently. Also, the smaller the correlation, the greater or better the results of diversifying two securities. Standard deviation of securities but correlation co-efficient should be less than the ratio of the smaller standard deviation compared by the larger standard deviation.

In situation 1

$$rxy < \frac{è_a}{è_b}$$

for example

$$-1.00 < \frac{2}{4}$$

$$-1.00 < +.50$$

In situation 2

$$rxy = +.80$$

$$+.80 > \frac{2}{4}$$

$$+.80 > +.50$$

There is no portfolio effect.

Risk Return in a Third Security

The portfolio effect of two securities is also applied to three securities to find out the effect on the portfolio. It is done through the method of standard deviation of returns, correlation coefficient and the proportion in which security which is invested. The following is the formula. It is similar to the two security formulae.

$$R_p = \underset{i=1}{\overset{N}{S}} X_i R_i$$

The standard deviation of the portfolio determines the deviation of the returns and the correlation co-efficient of the proportion of securities that are invested.

$$è^2_p = \underset{i=1}{\overset{N}{S}} \; \underset{j=1}{\overset{N}{S}} X_i X_j r_{ij} è_i è_j$$

$è^2_p$ = portfolio variance (expected) $\sqrt{\dfrac{è^2}{Ö\ p}}$ = portfolio standard deviation

X_i = proportion of portfolio which is invested in security i

X_j = proportion of portfolio which is invested in security j

r_{ij} = co-efficient of correlation between i and j

i = standard deviation of i, N = Total number of securities

j = standard deviation of j

Example 9

(a) What is the expected Return to a Portfolio composed of the following securities?

Security	Expected Return %	Proportion %
1	10	20
2	15	20
3	20	60

(b) What would be the expected return if the proportion of each security in the portfolio were 25, 25, 50% respectively?

(a) $R = R_1X_1 + R_2X_2 + R_3X_3$

$= 10(.20) + 15(.20) = 20(.60)$

$= 2.00 + 3.00 + 12.00$

$= 17\%$

(b) $R = R_1X_1 + R_2X_2 + R_3X_3$

$= 10(.25) + 15(.25) = 20(.50)$

$= 2.50 + 3.75 + 10.00$

$= 16.25\%$

Example 10

Compute the risk on each portfolio from the following information.

Security	Expected Return %	Proportion %
1	10	20
2	15	20
3	20	60

Standard Deviation	Co-efficient of Correlation
0=0.2	r 12 = 0.5
0=0.3	r 13 = 0.1
0=0.5	r 23 =-0.3
R=17%	

$è^2_p = X^2_1 Q^2_1 + X^2_2 è^2_2 + X^2_3 è^2_3 + 2X_1 X_2 r12 è_1 è_2$

$= 2X_2 X_3 r2.3 è_2 è_3 + 2X_1 X_3 r1.3 è_1 è_3$

$è^2_p = (.20)^2 (0.2)^2 + (.20)^2 (0.3)^2 + (.60)^2 (0.5)^2 + 2(.2) (.2) (.6)$

$(.2) (.3) + 2(.2) (.6) (.3) (.5) + 2(.2) (.6) (.2) (.5) (-.3)$

$= .0016 + .0036 + .09 + .00108 + .0024$

$= .097840 - .001080$

$= .096760$

$= .309$

Portfolio risk = +.31

Graph 1

(j) The example shows inverse relationship between T and Z. Risk is reduced to zero; T has higher return than Z with equal risk.

(ii) Securities at BOX provide better return than ACX when correlation is 0.

(iii) A and B are positively correlated and one cannot be offset against another to get minimum risk and maximum return.

Graph 2

(i) Shaded area = attainable portfolios.

(ii) Arc or budge abcd = efficient portfolios or efficient frontier.

(iii) All points on efficient frontier dominate other points to the right of the frontier portfolio b dominates portfolio f. Portfolio c dominates portfolio e because the return is the same but risk is greater at f and e for the same return.

(iv) Markowitz shows more than one portfolio on the efficient frontier. Any one can be selected by the investor depending on his preference for risk and return.

(v) According to Markowitz, there are a large number of portfolios which could be called feasible or attainable. Out of these portfolios only those were selected which were superior and dominated others in terms of risk and return characteristics. Through quadratic programming efficient set of portfolio can be selected. In this sense lies the difference between Markowitz efficient set and feasible or attainable set.

Markowitz theory is also applied in the case of more than three securities. His programme is a conclusion of the least portfolio risk at a particular level of return. According to the graphical representation of the securities which stand on the efficient line, are called the portfolios on the efficient frontier. Markowitz shows the efficient frontier by calculating the risk and return of all individual assets and by plotting them by means of data on a graph. Only portfolios which lie on the efficient frontier should be taken by an individual because this will gives the effect of diversification and will help in bringing down the risk on different assets. The efficient frontier will show a bulge towards the vertical axis. This is depicted in Graph 1 and 2.

The reason for this is that the correlation coefficient lies between zero and one. Only those assets which are perfectly positively correlated will generate an efficient frontier which is represented by means of a straight line. It is difficult to find negatively correlated assets. Therefore, the efficient frontier will very rarely occur in a curve over the vertical over the vertical axis.

All portfolios will not lie on the efficient frontier which is represented by a straight line. Some portfolios will dominate other portfolios. Selected through, the Markowitz diversification pattern, it will be planned and scientifically oriented. This will lie in a manner that they dominate port folios which are simply diversified. Markowitz model is useful but difficult to use as it requires a lot of information.

Conclusion

The Markowitz model showed the ideal combination of securities through the efficient frontier. It was also called the Full Co-variance Model. The problem faced by the model is the need of more information. Further Markowitz model is very tedious because when the number of investments increase, then the help of a computer is required because it is an arduous task to find out the securities which lie on the efficient frontier.

Review Questions

1. How does Markowitz Theory help in planning an investor's portfolio?
2. Define Markowitaz diversification. Explain the statistical method used by to obtain the risk reducing benefit?
3. What are the strength and weaknesses of the Morkowitz approach?
4. Explain how the efficient frontier is determined using the Morkowitz approach. Use a two-security approach.

PORTFOLIO SELECTION

All investors prefer those securities which have a high return but at the same time the risk attached to it is low. At the time of combining the securities and constructing a portfolio of different combinations of securities, an investor is faced with the same question of risk and return. There are three kinds of investors. An investor who wishes to take more return and least risk, more return with comparatively higher risk and high return with a high risk. These are depicted as desirable conditions for an investor through the use of utility curves called indifferent curves. Indifference curves are usually parallel and linear. When it is drawn on a graph, it shows that the higher the investor goes on the growth, the greater is his satisfaction. In Illustration 1, these utility graphs are drawn. These are positively sloped for a hypothetical investor 'X' and the indifference curves are from 1 to 6. The investor 'X' is faced with the problem of finding out the indifference curves or portfolio tangent which will give him the highest return. In Illustration 2, it shows that there is a combination of securities on the indifferent curves and the efficient frontier at point 'A' is the best portfolio in terms of efficiency and (b) that it represents a tangent to the indifferent line.

The investors are happy when they get a high return even though they have to take some additional risk with it. All indifferent curves which are given higher satisfaction and higher return will show positively sloped lines. Illustration 3 depicts (a) the positive sloping curves for a risk fearing investor 'Y'. The higher the curve, the greater the satisfaction of investor 'X'(positively sloped), higher return for greater risk . (a) 'A' portfolio is efficient b) The efficient frontier is tangent to the indifference curve (Line).

The investor 'Y' has positive sloping curves from U.1 to U.6 and his satisfaction shows that slopes are positive and the higher he goes, the greater the satisfaction. Illustration 4 depicts the indifferent curves of a risk lover investor 'K'. An investor of this type will have negative sloping curves with lines convex to the origin. Curves from U.1 to U.4 show the investment preference of a risk lover. Investor 'Z' in Illustration 5 is showing that he is less risk fearing and U.1 to U.5 show his indifferent curves and his investment preferences. An investor who is a risk averter is happy when his è$_p$ is low in his portfolio but an investor who enjoys taking a risk is happier when the è$_p$ is higher. The slope of the growth, that is the degree with which the indifferent curves are associated, show the kind of risk that an investor has in mind. Illustration 16.6 shows that there are different curves of three different kinds of slopes. There are three graphs— curve 'A' shows that the investor is a risk neutral and he has constant marginal utility is increasing. Curve 'B' shows that the investor is a risk neutral and he has constant marginal utility. Curve 'C' represents an average investor who would not like to take much risk and at the same time be able to get a return for his satisfaction. Most of the investors are categorized in Curve 'C'. Curve A = Increasing marginal utility – Risk Lover.

Curve B = Constant marginal utility – Risk Neutral.

Curve C = Decreasing marginal utility – Risk Averse.

Illustration 1
Illustration 2
Illustration 3
Illustration 4
Illustration 5
Illustration 6

Optimal Portfolio

Shape has identified the best portfolio ors the optimal portfolio through his research study and has called it the single index model. According to him, the 'beta ratios' is the most important in a person's portfolio. The optimal portfolio is said to relate directly to the beta. it is the excessive return to beta ratio.

$$\frac{R_i - R_F}{\beta_i}$$

Where Ri = expected return on stocks 'i',

R_F = return received from risk-less.

B_j = rate of return in expected change on stock 'i' with 1 % change market return rate. The cut-off rate consists of various subjects which have been constructed. The following subjects help in finding out the cut-off rate:

(a) finding out stocks of different return risk ratios.

(b) Ranking securities from higher excess return to β to less return to β.

(c) Selecting to high rank securities above the cut-off rate.

(d) making a comparison of $(R_i - R_F)\ \beta_i$ with 'C' and investor in all stocks in which $(R_i - R_F)\ \beta_i$ achieve the cut-off point 'C'

(e) find cut-off rate 'C' A portfolio of 'i' stocks C_i is calculated by:

$$C_i = \frac{\grave{e}_m\ \Sigma_j = 1 \dfrac{(R_j - R_F)\beta_i}{\grave{e}2_2}}{1 + \grave{e}_m\ \Sigma_j = 1\ \dfrac{\beta^2_i}{\grave{e}^2_{ef}}}$$

(f) after finding out the securities difference included in optimal portfolio, calculated according to the following formula:

$$X_i = \frac{Z_i}{\sum_{i=1}^{N} Z_j}$$

When

$$Z_i = \frac{\beta_i}{è^2_{ei}} \left| \frac{R_i - R_f}{\beta_i} - 'C' \right|$$

The first equation gives the rate of each security on adding the total sum should be equal to '1' to ensure full investment. The second equation gives the relative investment in each security.

The residual variance $è_{ei}$ determines the amount to be invested in each security. The desirability or satisfaction of an investor of any stock will always be the excess return to beta ratio.

Cut-off Rate and New Securities

An investor may either add new securities or remove from his investment some other security. In this case, the cut-off rate will changes and this would lead to a change in the optimum portfolio. Cut-off rate determines not only the value of the existing securities but also helps in assessing the new securities with the change in beta. An example may be given to illustrate this. If cut-off rate was equal to a given amount at the existing moment, with the change in the securities, the return to risk ratio may be more or less other than the previous cut-off rate. This may or may not enter in the optimum portfolio to determine whether it enters the portfolio again the same process or ranking the securities and finding out the excess to beta ratios above the cut-off rate would haves to be chosen to find out the optimum portfolio.

New security whenever it is introduced in a portfolio will have its importance. It will have the effect on either adding to the result to the result of the existing portfolio or making a change form it. The results will show whether with the addition of the new security, the optimum portfolio will also affect the change in those securities which were quite close to the existing cut-off rate.

Efficient Frontier and Portfolio Selection

The portfolio is selected by the introduction of a borrowing and lending line making the efficient frontier a straight line. Illustration 7 shows a risk-free security of 6% with a standard deviation of 6.90. The graph represents a portfolio return and risk and the best portfolio is the corner portfolio of '9'. The corner which is beyond '9' and to its left, i.e. from 10 to 17 can be introduced to a greater efficiency and made efficient by selecting '9'with an addition of the fact of leading. The choice of portfolio which are on the right side of '9'i.e.from 1 to 8 are seen to show borrowing and are in some way dominated by '9'.'9'is the stage in which the maximum benefit can be derived after using the formula (R_p – R_t /b_p).

Illustration 7

Sharpe finds the beta relationship to be the most significant in the portfolios. According to him, a portfolio has unsystematic risk as well as systematic risk but although unsystematic risk can be reduced to zero the systematic portion of the risk is determined by the behaviour of stocks in the market and can in no way be absolutely reduced or dominated to zero. Sharpe also gives importance to the presence of both beta coefficient (β) and systematic risk. In the selection of a portfolio, both negative and positive betas should be considered. While assessing a portfolio on beta, the negative beta should be preferred to positive beta. The presence of negative beta in a portfolio if efficient. Also, there is reduced or eliminated amount of risk when the negative betas are present.

Portfolio betas are used to measure risk in a portfolio but with proper diversification and elimination of unsystematic risk, the portfolio can become efficient. Betas on a portfolio are, therefore, the weighted average of the betas of each of the securities on the portfolio. Beta can be used to move systematic risk above or below and since beta is measure by the market movements, therefore, betas then the investor can be expected to be aggressive as this indicates an aggressive portfolio. When the market price rises and moves up the corner, portfolio '9' also shows a rise. But the value of the portfolio falls whenever the market prices fall.

Beta and its Significance in the Portfolio

Beta is a measure which has been used for reducing risk or determining the risk and return for stocks and portfolios. A number of research studies have been made to give indications of beta coefficient for selection of stock. When beta is used significantly for stock selection it is to be compared with the market. The investor can construct his portfolio by drawing the relationship of beta coefficient with the prices prevailing in the market. When there is buoyancy in the market, then beta coefficient which are large can be selected. These betas would also carry with them a high risk but during the boom period, high risk is expected. These betas would also carry with them a high risk but during the boom period, high risk is expected to give a maximum of return. If the market is bear market and the prices are falling, then it is possible to sell "short" stocks which have high positive beta coefficient. The stocks which have a negative beta would withstand the tag in the prices in the market. For example, when the beta is + 1.0, the volatility which is relative to the market would indicate an average stock. But when the beta changes to +2.0, it is excluding the value which is provided by alpha, the stock would be estimated to show a return of 20% when the market return is forecasted at 10%. This is in the case of a rising market. But when the prices show a decline and the future is expected to provide a decline of 10%, then a beta which shows + 2.0 would show that it is providing a negative return of 20% if the stock is held by the investor for very long. But if the investor sells 'short' stock, then he can plan to gain 20%. But if the beta is negatives 1.0, then there would be a gain of a positives 10%, i.e., (-1.0 x .10)

Although betas help in selecting stock, care should be taken to select the stock with the beta approach because selection of portfolio with beta is followed only when the following assumptions are considered:

(a) The market movement in positives and negatives directions haves to be carefully analyzed and
(b) The past historical considerations of beta must be analyzed for future prediction of beta.

If portfolios selection is not made by and accurate reading of the movement of markets, then the portfolios selection will be incorrect and will not determine the preferences of the investor. The market movements explain between 15 and 65% of the movement of the individual securities. The variability of returns is explained further between 75 and 95% in the measurement of betas. The technique of beta, therefore, although it is useful, has to be conducted with precision.

Beta has been found useful by Smith Barney research work and by a study conducted by Barr Rosenberg and also another study by Levy. All the three research studies have shown that beta can be used for prediction but it has to be analyzed very carefully. Levy's research study showed that beta was not good when securities were to be selected individually. They were partially useful in the selection of small portfolios but portfolio selection through beta was very useful in the case of large portfolios which were kept by the investor for a greater length of time. Smith Barney found that beta gives an indication for selection of stock but it must be predicted with care. They made a study of fifty-six stocks and found out the difference of movement of stocks during two-time periods. This proved that when portfolios of long-time and stable securities wee analyzed, then beta was found useful. Betas have also been found to change and the change is related to certain factors. One of the most important factors which have found to change or move betas are the economic factors in a country. The information has been found to be one of the factors which have caused changes in the beta. to find a result by predicting beta is found to be useful when beta is quantified and the changes of the returns of individual securities and the market have been related to the expected rate of inflation. It can be safely said that the relationship between market and security returns are an indicator for finding out the beta changes because return, as already studied, is related to risk and both these factors are linked with the market behaviour of stock. The relationship between the returns of security and changes in the economic activity of the country are related by finding out 'fundamental betas'.

The fundamental betas were found out by Barr Rosenberg's research study. According to him, the fundamental betas could be predicted by finding out "relative response coefficient." The relative response coefficient quantify between market return and security return.

(a) the sensitivity of the security to inflation;
(b) economics events as Market Index causes systematic change and
(c) Risk and return with portfolio.

The relative response coefficient depends on the events that are happening in the economy and a reaction in favour of inflation shows high relative response coefficient. Also, betas in order to be useful have to be predictive and cannot be upward looking. A well diversified portfolio is linked with securities with the market movement. But he market movement can be considered only when a survey of fundamental factors is taken into consideration. The fundamental factors are the following:

(a) the earning of a firm;
(b) the movements of the market;
(c) continuous valuation of stock;
(d) survey of stock, whether it represents large or small firms, old and established and new firms;
(e) growth of firms historically and
(f) The capital structure of the firm.

These factors are to be projected with the movements of the stock by assigning probabilities for the occurrence of the particular factors. There fundamental factors would also represent the changes in the returns of securities over the years, the variability in their structure of earnings and the kind of success that is made by each stock. When the stock is valued, a firm which has continuous high market valuation will be considered as a good stock. The small firm is risky or safe and the financial structure will be a means of finding out the kind of operations of a firm relating to its liquidity position and the coverage of fixed charges. Rosenberg found that these fundamental factors help in making and optimum portfolio. According to him, risks are not only systematic and unsystematic but the latter one can be also sub-divided as "specific risk and extra market co-variance "Specific risk which is a unique risk, is independent to particular firm. It comprises the risk and uncertainty of only one particular firm in isolation. The extra market co-variance is independent of the market and it shows a tendency of the stock to move together. It also shows the co-variance of a homogenous group of the finance group. It is in-between the systematic and specific risk. The specific risk covers about 50% of the total risk and the co-variance and systematic risk together comprise the other half of 50%. While systematic risk covers all the firms, the extra market co-variance is in-between and covers one group classification of industries. A portfolio which is properly selected and is well diversified usually consists of 80-90% of the systematic risk out of the total risk involved in those securities.

Review Questions

1. Discuss the significance of beta in the portfolio.
2. What is an efficient frontier? How does it establish an optimum portfolio?
3. Why are indifference curves of typical investors assumed to slope upward to the right?
4. Explain why an indifference curves cannot intersect.
5. What is beta? Is it a better measure of risk than the standard deviation?

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UNIT – V

PORTFOLIO MANAGEMENT

Objectives of the study:

The objectives of this unit are to help one understand, in general

- The Capital Market Theory
- The general frame work of Portfolio Theories in the Portfolio Management.
- Importance and working of Sharp Index, Treynor Index, Jensen's Model etc.

Syllabus

Capital Market Theories-CAPM-Management of Portfolios and Portfolio performance- Shape's Index-Treynor's Index-Jensen's Model

CONTENTS DESIGN:

5.1. INTRODUCTION

Small investors feel insecure in managing their own investment in securities at times, because they consider themselves inadequate to perform this delicate task successfully. Thus, they seek the help of professional portfolio managers to take up this job on behalf of them. Most often, the portfolio manager chosen takes the form of a mutual fund or investment company, the main reasons being: the diversification and liquidity. Managers trained in the techniques of security analysis devote their full time meeting the Funds investment objectives and also constantly monitor the securities in the portfolio

5.2.EFFICIENT MARKET HYPOTHESIS - EMH

An investment theory states that it is impossible to "beat the market" because stock market efficiency causes existing share prices to always incorporate and reflect all relevant information. According to the EMH, this means that stocks always trade at their fair value on stock exchanges, and thus it is impossible for investors to either purchase undervalued stocks or sell stocks for inflated prices. Thus, the crux of the EMH is that it should be impossible to outperform the overall market through expert stock selection or market timing, and that the only way an investor can possibly obtain higher returns is by purchasing riskier investments. Although it is a cornerstone of modern financial theory, the EMH is highly controversial and often disputed. Believers argue it is pointless to search for undervalued stocks or to try to predict trends in the market through either fundamental or technical analysis.

While academics point to a large body of evidence in support of EMH, an equal amount of dissension also exists. For example, investors such as Warren Buffet have consistently beaten the market over long periods of time, which by definition is an impossibility according to the EMH. Detractors of the EMH also point to events such as the 1987 stock market crash (when the DJIA fell by over 20% in a single day) as evidence that stock prices can seriously deviate from their fair values.

In an efficient market, all data are fully and immediately reflected in a stock price. Price changes in an efficient market are equally likely to be positive or negative. The hypothesis applies most directly to large companies trading on the major securities exchanges. The forms of the efficient stock market are weak, semi-strong, and strong.

In the weak form, no relationship exists between prior and future stock prices. The informational value of historical data is already included in current prices. Hence, studying previous stock prices is of no value.

In the semi-strong version, stock prices adjust immediately to new data; thus action after a known event results in randomness. All public information is reflected in a stock's value. Therefore, fundamental analysis is not usable in determining whether a stock is overvalued or undervalued.

In the strong form, stock prices reflect all information-public and private (insider). A perfect market exists. No group has access to information that would enable it to earn superior risk-adjusted returns.

Assumptions

Beyond the normal utility maximizing agents, the efficient market hypothesis requires the agents have rational expectations; that on average the population is correct (even if no one person is) and whenever new relevant information appears, the agents update their expectations appropriately.

Note that it is not required that the agents are rational (which is different from rational expectations; rational agents act coldly and achieve what they set out to do). EMH allows that when faced with new information, some investors may overreact and some may under react. All that is required by the EMH is that investors' reactions be random enough that the net effect on market prices cannot be reliably exploited to make an abnormal profit. Thus, anyone person can be wrong about the market--indeed, everyone can be--but the market as a whole is always right.

There are three common forms in which the efficient market hypothesis is commonly stated — **weak form efficiency**, **semi-strong form efficiency** and **strong form efficiency**, each of which have different implications for how markets work.

Weak-Form Efficiency

- No excess returns can be earned by using investment strategies based on historical share prices or other financial data.
- Weak-form efficiency implies that Technical analysis techniques will not be able to consistently produce excess returns, though some forms of fundamental analysis may still provide excess returns.
- In a weak-form efficient market current share prices are the best, unbiased, estimate of the value of the security. Theoretical in nature, weak form efficiency advocates assert that fundamental analysis can be used to identify stocks that are undervalued and overvalued. Therefore, keen investors looking for profitable companies can earn profits by researching financial statements.

Semi-Strong Form Efficiency

- Share prices adjust within an arbitrarily small but finite amount of time and in an unbiased fashion to publicly available new information, so that no excess returns can be earned by trading on that information.
- Semi-strong-form efficiency implies that Fundamental analysis techniques will not be able to reliably produce excess returns.
- To test for semi-strong-form efficiency, the adjustments to previously unknown news must be of a reasonable size and must be instantaneous. To test for this, consistent upward or downward adjustments after the initial change must be looked for. If there are any such adjustments it would suggest that investors had interpreted the information in a biased fashion and hence in an inefficient manner.

Strong-Form Efficiency

- Share prices reflect all information and no one can earn excess returns.
- If there are legal barriers to private information becoming public, as with insider trading laws, strong-form efficiency is impossible, except in the case where the laws are universally ignored.
- To test for strong form efficiency, a market needs to exist where investors cannot consistently earn excess returns over a long period of time. Even though many fund managers have consistently beaten the market, this does not necessarily invalidate strong-form efficiency. We need to find out how many managers in fact do beat the market, how many match it, and how many under perform it. The results imply that performance relative to the market is more or less normally distributed, so that a certain percentage of managers can be expected to beat the market. Given that there are tens of thousand of fund managers

worldwide, then having a few dozen star performers is perfectly consistent with statistical expectations.

Arguments Concerning The Validity Of The Hypothesis

Some observers dispute the notion that markets behave consistently with the efficient market hypothesis, especially in its stronger forms. Some economists, mathematicians and market practitioners cannot believe that man-made markets are strong-form efficient when there are prima facie reasons for inefficiency including the slow diffusion of information, the relatively great power of some market participants (e.g. financial institutions), and the existence of apparently sophisticated professional investors. The way that markets react to news surprises is perhaps the most visible flaw in the efficient market hypothesis. For example, news events such as surprise interest rate changes from central banks are not instantaneously taken account of in stock prices, but rather cause sustained movement of prices over periods from hours to months.

Another observed discrepancy between the theory and real markets is that at market extremes what fundamentalists might consider irrational behaviour is the norm: in the late stages of a bull market, the market is driven by buyers who take little notice of underlying value. Towards the end of a crash, markets go into free fall as participants extricate themselves from positions regardless of the unusually good value that their positions represent. This is indicated by the large differences in the valuation of stocks compared to fundamentals (such as forward price to earnings ratios) in bull markets compared to bear markets. A theorist might say that rational (and hence, presumably, powerful) participants *should* always immediately take advantage of the artificially high or artificially low prices caused by the irrational participants by taking opposing positions, but this is observably not, in general, enough to prevent bubbles and crashes developing. It may be inferred that many rational participants are aware of the irrationality of the market at extremes and are willing to allow irrational participants to drive the market as far as they will, and only take advantage of the prices when they have more than merely fundamental reasons that the market will return towards fair value. Behavioural finance explains that when entering positions market participants are not driven primarily by whether prices are cheap or expensive, but by whether they expect them to rise or fall. To ignore this can be hazardous: Alan Greenspan warned of "irrational exuberance" in the markets in 1996, but some traders who sold short new economy stocks that seemed to be greatly overpriced around this time had to accept serious losses as prices reached even more extraordinary levels. As John Maynard Keynes succinctly commented, "Markets can remain irrational longer than you can remain solvent."

5.3.CAPITAL ASSET PRICING MODEL (CAPM)

The capital asset pricing model (CAPM) is used in finance to determine a theoretically appropriate rate of return of an asset, if that asset is to be added to an already well-diversified portfolio, given that asset's non-diversifiable risk. The CAPM formula takes into account the asset's sensitivity to non-diversifiable risk (also known as systematic risk or market risk), referred to as beta (â) in the financial industry, as well as the expected return of the market and the expected return of a theoretical risk-free asset.

The model was introduced by Jack Treynor, William Sharpe, John Lintner and Jan Mossin independently, building on the earlier work of Harry Markowitz on diversification and modern portfolio theory.

Formula

The CAPM is a model for pricing an individual security or a portfolio. The security market line (SML) and its relation to expected return and systematic risk (beta) show how the market must price individual securities in relation to their security risk class. It enables to calculate the reward-to-risk ratio for any security in relation to the overall market's. Therefore, when the expected rate of return for any security is deflated by its beta coefficient, the reward-to-risk ratio for any individual security in the market is equal to the market reward-to-risk ratio, thus:

Individual security's = Market's securities (portfolio)

Reward-to-risk ratio Reward-to-risk ratio

$$\frac{E(R_i) - R_f}{\beta_i} = E(R_m) - R_f,$$

The market reward-to-risk ratio is effectively the market risk premium and by rearranging the above equation and solving for E(Ri), the Capital Asset Pricing Model (CAPM) is obtained.

$$E(R_i) = R_f + \beta_{im}(E(R_m) - R_f),$$

Where:

$E(R_i)$ is the expected return on the capital asset

R_f is the risk-free rate of interest

β_{im} (the *beta coefficient*) the sensitivity of the asset returns to market returns, or also $\beta_{im} = \frac{\mathrm{Cov}(R_i, R_m)}{\mathrm{Var}(R_m)}$,

$E(R_m)$ is the expected return of the market

$E(R_m) - R_f$ is sometimes known as the *market premium* or *risk premium* (the difference between the expected market rate of return and the risk-free rate of return).

Asset pricing

Once the expected return, $E(R_i)$-, is calculated using CAPM, the future cash flows of the asset can be discounted to their present value using this rate ($E(R_i)$-), to establish the correct price for the asset.

In theory, therefore, an asset is correctly priced when its observed price is the same as its value calculated using the CAPM derived discount rate. If the observed price is higher than the valuation, then the asset is overvalued

Asset-specific required return

The CAPM returns the asset-appropriate required return or discount rate - i.e. the rate at which future cash flows produced by the asset should be discounted given that asset's relative risk. Betas exceeding one signify more than average "risk"; betas below one indicate lower than average. Thus a more risky stock will have a higher beta and will be discounted at a higher rate; less sensitive stocks will have lower betas and be discounted at a lower rate. The CAPM is consistent with intuition - investors (should) require a higher return for holding a more risky asset.

Since beta reflects asset-specific sensitivity to non-diversifiable, i.e. market risk, the market as a whole, by definition, has a beta of one. Stock market indices are frequently used as local proxies for the market - and in that case (by definition) have a beta of one. An investor in a large, diversified portfolio (such as a mutual fund) therefore expects performance in line with the market.

Risk and diversification

The risk of a portfolio comprises systematic risk and specific risk. Systematic risk refers to the risk common to all securities - i.e. market risk. Specific risk is the risk associated with individual assets. Specific risk can be diversified away (specific risks "average out"); systematic risk (within one market) cannot. Depending on the market, a portfolio of approximately 15 (or more) well selected shares might be sufficiently diversified to leave the portfolio exposed to systematic risk only.

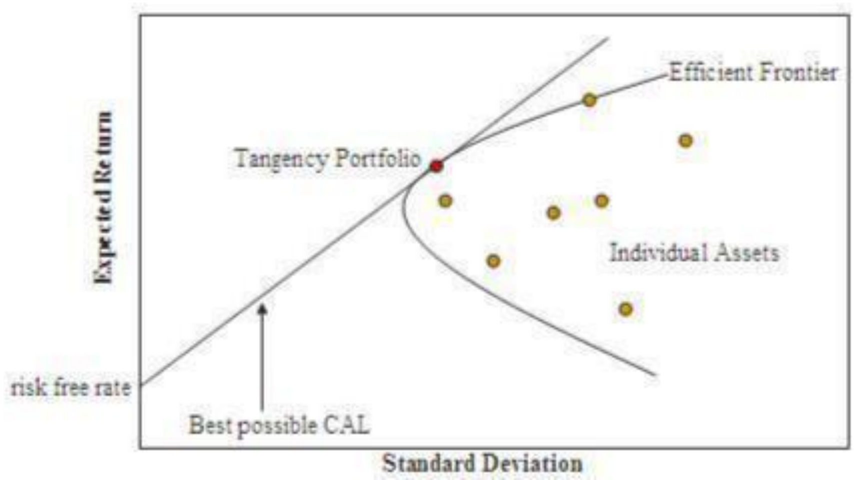
A rational investor should take only non-diversifiable risks, which are rewarded. Therefore, the return that compensates for risk taken must be linked to its riskiness in a portfolio context - i.e. its contribution to overall portfolio risk - as opposed to its "stand alone risk." In the CAPM context, portfolio risk is represented by higher variance i.e. less predictability.

The efficient (Markowitz) frontier

The CAPM assumes that the risk-return profile of a portfolio can be optimized - an optimal portfolio displays the lowest possible level of risk for its level of return. Additionally, since each additional asset introduced into a portfolio further diversifies the portfolio, the optimal portfolio must comprise every asset, (assuming no trading costs) with each asset value-weighted to achieve the above (assuming that any asset is infinitely divisible). All such optimal portfolios, i.e., one for each level of return, comprise the efficient (Markowitz) frontier.

Because the unsystematic risk is diversifiable, the total risk of a portfolio can be viewed as beta...

The market portfolio



An investor might choose to invest a proportion of his or her wealth in a portfolio of risky assets with the remainder in cash - earning interest at the risk free rate Here, the ratio of risky assets to risk free asset determines overall return - this relationship is clearly linear. It is thus possible to achieve a particular return in one of two ways:

By investing all of one's wealth in a risky portfolio,or by investing a proportion in a risky portfolio and the remainder in cash (either borrowed or invested).

For a given level of return, however, only one of these portfolios will be optimal (in the sense of lowest risk). Since the risk free asset is, by definition, uncorrelated with any other asset, option 2) will generally have the lower variance and hence be the more efficient of the two.

This relationship also holds for portfolios along the efficient frontier: a higher return portfolio plus cash is more efficient than a lower return portfolio alone for that lower level of return. For a given risk free rate, there is only one optimal portfolio which can be combined with cash to achieve the lowest level of risk for any possible return. This is the market portfolio.

All investors have rational expectations.

There are no arbitrage opportunities.

Returns are distributed normally.

Fixed quantity of assets.

Perfect capital markets.

Separation of financial and production sectors.

Thus, production plans are fixed.

Risk-free rates exist with limitless borrowing capacity and universal access.

No inflation and no change in the level of interest rate exists

The model assumes that asset returns are normally distributed random variables. It is however frequently observed that returns in equity and other markets are not normally distributed. As a result, large swings (3 to 6 standard deviations from the mean) occur in the market more frequently than the normal distribution assumption would expect.

The model assumes that the variance of returns is an adequate measurement of risk. This might be justified under the assumption of normally distributed returns, but for general return distributions other risk measures (like coherent risk measures) will likely reflect the investors' preferences more adequately.

The model does not appear to adequately explain the variation in stock returns. Empirical studies show that low beta stocks may offer higher returns than the model would predict.

The model assumes that given a certain expected return investors will prefer lower risk (lower variance) to higher risk and conversely given a certain level of risk will prefer higher returns to lower ones. It does not allow for investors who will accept lower returns for higher risk. Casino gamblers clearly pay for risk, and it is possible that some stock traders will pay for risk as well.

The model assumes that all investors have access to the same information and agree about the risk and expected return of all assets. (Homogeneous expectations assumption)

The model assumes that there are no taxes or transaction costs, although this assumption may be relaxed with more complicated versions of the model.

The market portfolio consists of all assets in all markets, where each asset is weighted by its market capitalization. This assumes no preference between markets and assets for individual investors, and that investors choose assets solely as a function of their risk-return profile. It also assumes that all assets are infinitely divisible as to the amount which may be held or transacted.

The market portfolio should in theory include all types of assets that are held by anyone as an investment (including works of art, real estate, human capital...) In practice, such a market portfolio is unobservable and people usually substitute a stock index as a proxy for the true market portfolio. Unfortunately, it has been shown that this substitution is not innocuous and can lead to false inferences as to the validity of the CAPM, and it has been said that due to the inoperability of the true market portfolio, the CAPM might not be empirically testable

Model: The CAP model (CAPM)[1[1]]

The CAP-model is a ceteris paribus model. It is only valid within a special set of assumptions. They are:

- Investors are risk averse individuals who maximize the expected utility of their end of period wealth. Implication: The model is a one period model.
- Investors have homogenous expectations (beliefs) about asset returns. Implication: all investors perceive identical opportunity sets. This is, everyone have the same information at the same time.
- Asset returns are distributed by the normal distribution.
- There exists a risk free asset and investors may borrow or lend unlimited amounts of this asset at a constant rate: the risk free rate (k_f).
- There is a definite number of assets and their quantities are fixed within the one period world.

[1[1]] This derivation draw on the derivation given in Copeland and Weston [1988, pages 194-198].

- All assets are perfectly divisible and priced in a perfectly competitive marked. Implication: e.g. human capital is non-existing (it is not divisible and it can't be owned as an asset).
- Asset markets are frictionless and information is costless and simultaneously available to all investors. Implication: the borrowing rate equals the lending rate.
- There are no market imperfections such as taxes, regulations, or restrictions on short selling.

Step 1. The derivation of the CAP-model starts by assuming that all assets are stochastic and follow a normal distribution. This distribution is described completely by its two parameters: mean value (μ) and variance (σ^2). The mean value is a measure of *location* among many such as median and mode. Likewise, the variance value is a measure of *dispersion* among many such as range, semi inter-quartile range, semi variance, mean absolute deviation.In the hypothetical world of the CAPM theory all that the investor bothers about is the values of the normal distribution. In the real world asset return are not normally distributed and investors *do* find other measures of location and dispersion relevant. However, the assumption may be seen as a reasonable approximation and it is needed in order to simplify matters.

As a result the mean and the variance of an asset X is defined as:

$$\mu_X = E[X] = \sum_{i=1}^{N} p_i X_i \tag{1}$$

$$\sigma_X^2 = VAR[X] = COV[X,X] = E\left[\left(X_i - E[X]\right)^2\right] = \sum_{i=1}^{N} p_i \left(X_i - E[X]\right)^2 \tag{2}$$

and the covariance and the correlation coefficient between two assets X and Y are:

N

COV [X,Y]= E[()TφXi-E[X/Φ4]()TφYi-E15[]Y./Φ4=766]åpi15()TφXTϕi.-766E[X]1/Φ40()TφYTϕi0-E[Y]15./Φ423607660.15Tϕ6.2867666911.0.32Tϕ890 691Tµ380.

i=1

$$r_{xy} \equiv \frac{COV[X,Y]}{\sqrt{VAR[X] \times VAR[Y]}} = \frac{COV[X,Y]}{\sigma_X \times \sigma_Y}$$

where p_i is the probability of a random event X_i,

and N is the total number of events.

Some mean and variance properties can be derived

Property 1: E[X + c] = E[X] + c

Property 2: E[cX] = cE[X]

Property 3: VAR[X + c] = VAR[X]

Property 4: VAR[cX] = c^2VAR[X] where c is a constant.

Consider a portfolio of two risky assets,

X and Y with a % in asset X and (1- a) % in asset Y.

They are both normally distributed. The return on this portfolio (using property 1 and 2) is:

m_p = E[k_p] = E[aX + (1- a)Y] =

E[aX] + E[(1- a)Y] = aE[X] + (1- a)E[Y] (3)

and the variance on this portfolio is:

s^2_p = VAR[R_p] = E[(k_p - E[k_p])^2] = E[({aX + (1- a)Y} - E[aX + (1- a)Y])^2] (using property 2)

= E[({aX + (1- a)Y} - {aE[X] + (1- a)E[Y]})^2]

= E[({aX - aE[X]} + {(1- a)Y - (1- a)E[Y]})^2]

= E[(a{X - E[X]} + (1- a){Y - E[Y]})^2]

= E[a^2(X - E[X])^2 + $(1- a)^2$(Y - E[Y])^2 + 2a(1- a)(X - E[X])(Y - E[Y])] (using property 2)

$= \alpha^2 E[(X - E[X])^2] + (1- \alpha)^2 E[(Y - E[Y])^2] + 2\alpha(1- \alpha)E[(X - E[X])(Y - E[Y])]$ (using property 4)

$= \alpha^2 VAR[X] + (1- \alpha)^2 VAR[Y] + 2\alpha(1- \alpha)COV[X,Y]$

$$= \alpha^2 VAR[X] + (1- \alpha)^2 VAR[Y] + 2\alpha(1- \alpha)\, r_{xy}\, \sigma_x \sigma_y \qquad (4)$$

Very important the equations (1) - (4) demonstrate the concept of portfolio diversification. In general it is true that $VAR[R_p] < \alpha VAR[X] + (1-\alpha)VAR[Y]$ if -1 r_{xy} < 1. In words, the variance of a portfolio is less than the simple average of variances of the assets in the portfolio if the assets are not perfectly correlated. This will not be demonstrated rigorously but set $r_{xy} = 0$, $VAR[X] = VAR[Y]$, and $\alpha = 0{,}5$ then $\{VAR[R_p] < \alpha VAR[X] + (1- \alpha)VAR[Y]\}$ becomes $\{0{,}5VAR[X] < VAR[X]\}$. Furthermore, if $r_{xy} = -1$ then $\{VAR[k_p] < \alpha VAR[X] + (1- \alpha)VAR[Y]\}$ becomes $\{0 = VAR[X] < VAR[X]\}$ a perfect hedge (the resulting portfolio is riskless) The diversification property implies that the minimum variance opportunity set will be convex, and this is a necessary condition for the existence of unique and efficient portfolio equilibrium. As will be seen this property is used for the derivation of the CAP-model. The minimum variance opportunity set is the locus of mean and variance combinations offered by portfolios of risky assets that yield the minimum variance for a given return. The locus is illustrated as the fat curve in figure I below. The convexity property holds for two risky assets or more. The area on and behind the locus (the oval) is sometimes refereed to as the portfolio production possibility area. Each point in this region represent the return and risk from some single asset available in the market, or some portfolio made on those assets.

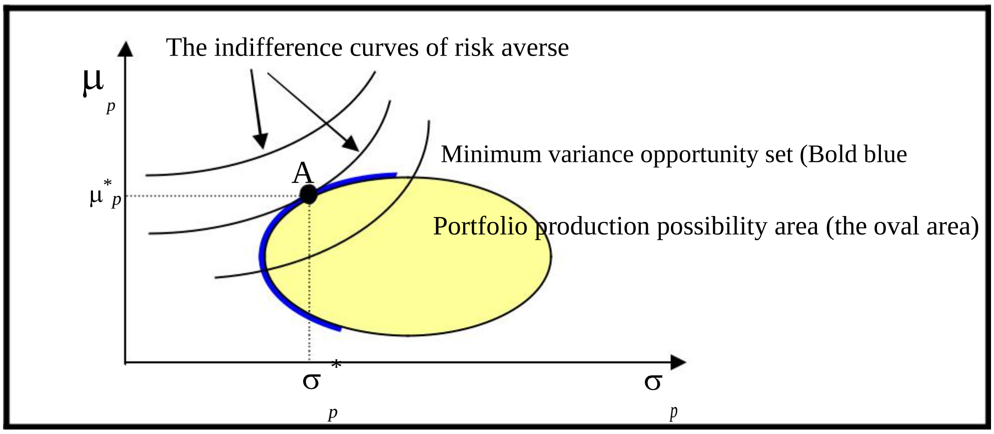
Step 2. The next assumption is that investors are risk averse and maximize expected utility.

They perceive variance as a bad and mean as a good.

This is also illustrated in figure I where tree risk-averse indifference curves are drawn. Now, the first conclusion is.

Proposition 1: An individual investor will maximize expected utility of his end of period wealth where his subjective marginal rate of substitution between risk and return represented by his indifference curves is equal to the objective marginal rate of transformation offered by the minimum variance opportunity set: $MRS\sigma_p\mu_p = MRT\sigma_p\mu_p$.

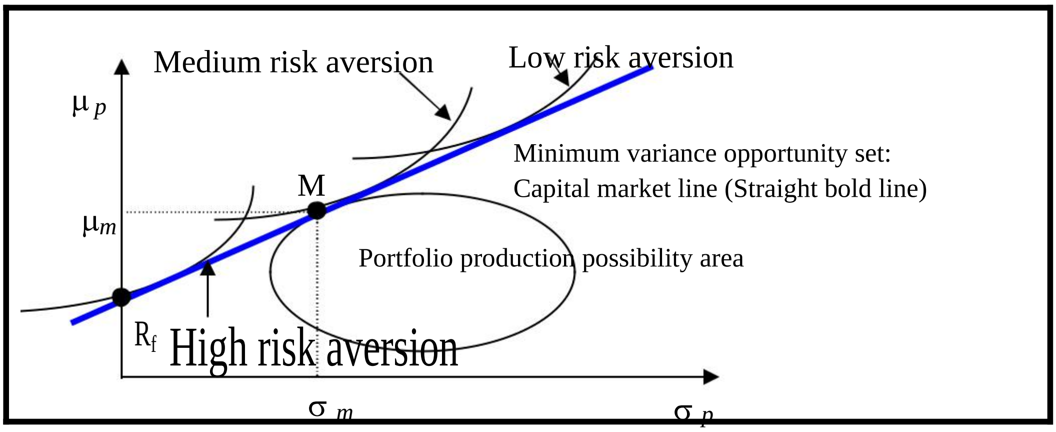
Figure I:
Optimal portfolio choice for a risk averse investor in a world with risky assets



Step 3. Assume now that there in addition to the many risky assets exist a risk free asset and that investors may borrow or lend unlimited amounts of this asset at a constant rate: the risk free rate (k_f). Furthermore, capital markets are assumed to be frictionless.

The effect on the shape of the portfolio production possibility area is profound as illustrated in figure II below.

Figure II: Optimal portfolio choice for a risk averse investor in a world with many risky assets and one risk free asset



The reason for this dramatic change is simple. With the existence of the risk free asset the mean and the variance for a portfolio consisting of the risk free asset and the portfolio M (see figure) will be:

$\mu_p = \alpha E[k_m] + (1 - \alpha)k_f$ (5)

$\sigma_p^2 = \alpha^2 VAR[k_m] + (1 - \alpha)^2 VAR[k_f] + 2\alpha(1 - \alpha)COV[k_m, k_f]$ using property 3

$= \alpha^2 VAR[k_m] + (1 - \alpha)^2 0 + 2\alpha(1 - \alpha)0 = \alpha^2 VAR[k_m]$

$\Leftrightarrow$

$\sigma_p = \alpha\sigma_m$ (6)

This shows that the new minimum varians opportunity

set will be linear in the (μ, σ_p)

space and consists of portfolios with some fraction α of portfolio M and $(1 - \alpha)$ of the risk free asset. In the following an equation for the linear minimum variance opportunity set is developed. Taking the derivative of (5) and (6) yields:

$\partial\mu_p/\partial\alpha = E[k_m] - k_f$

$\partial\sigma_p/\partial\alpha = \sigma_m$

Therefore the slope of the line is:

$\partial\mu_p/\partial\alpha\ /\partial\sigma_p/\partial\alpha = (E[k_m] - k_f)/\sigma_m$ (7) and since the intercept with the mean axle is

$(\sigma,\mu) = (0,k_f)$ the equation for the minimum variance portfolio is

$$\mu_p = k_f + [(E[k_m] - k_f)/\sigma_m]\sigma = R_f + (E[k_m] - k_f)\sigma/ \sigma_m \quad (8)$$

This equation has come to be known as the capital market line (CML). It is the fat line in figure II. This formula is referred to as the capital portfolio pricing model (CPPM), because it prices efficient portfolios. The following explains why.

Step 4. Assume that all investors have homogeneous beliefs about the expected distribution of returns offered by all assets. Also, capital markets are frictionless and information is costless and simultaneously available to all investors. Furthermore, there are no market imperfections. Taken together this implies that all investors calculate the same equation for the market capital line and that the borrowing rate equals the lending rate.

Within broad degrees of risk aversion each investor will maximize their utility by holding some combination of the risk free asset and the portfolio M. This property is known as the *two-fund separation principle*. It is illustrated in figure II by the tangency of the indifference curves on the CML for different degrees of risk.

Step 5. Assume further that all assets are perfectly divisible and priced in a perfectly competitive marked. Furthermore, there is a definite number of assets and their quantities are fixed within the one period world. Then the portfolio M turns out to be the market portfolio of all risky assets. The reason is that equilibrium requires all prices to be adjusted so that the excess demand for any asset is zero. That is, each asset is equally attractive to investors. Theoretically the reduction of variance from diversification increases as the number of risky assets included in the portfolio M rise. Therefore, all assets will be hold in the portfolio M in accordance to their market value weight: $w_i = V_i/\Sigma V_i$, where V_i is the market value of asset *i* and ΣV_i is the market value of all assets. Proposition 2 may now be stated:

Proposition 2: With all the above assumptions in mind (step 1-5) the capital market line (8) shows the relation between mean and variance of *portfolios* (consisting of the risk free asset and the market portfolio) that are efficiently priced and perfectly diversified.

The capital market line equation could rightly be called the capital portfolio pricing model (CPPM) since it prices efficient portfolios. What is more interesting is to develop an equation for pricing of individual assets. This is exactly what the capital asset pricing model (CAPM) does. The CAP-model does not requires any new assumptions only new algebraic manipulations within the framework of the CPP-model

Step 6. From CPPM to CAPM. What is wanted is a model for efficient pricing of capital for individual assets (E[k], the CAPM), not one for efficient cost of capital for portfolios (μ_p, the CPPM). Now, imagine a portfolio consisting of α% in a risky asset I and $(1 - \alpha)$% in the market portfolio M from the CPP-model. The mean and the variance of this portfolio is by definition

$$E[k_P] = \alpha E[k] + (1 - \alpha)E[k_m] \tag{9}$$

<=>

$$\sigma_{Rp} = \{\alpha^2 VAR[k] + (1-\alpha)^2 VAR[k_m] + 2\alpha(1-\alpha)COV[k,k_m]\}^{-0,5}$$

<=>

$$\sigma_{Rp} = \{\alpha^2 VAR[k]+ (1- \alpha)^2 VAR[k_m]+ 2\alpha COV[k,k_m] - 2\alpha^2 COV[k,k_m]\}^{-0,5} \quad (10)$$

Taking the derivative of (9) and (10) with respect to α yields

$$\partial E[k_P]/\partial\alpha = E[k] - E[k_m] \quad (11)$$

$$\partial\sigma_{Rp}/\partial\alpha = 0,5\{\alpha^2 VAR[k]+ (1- \alpha)^2 VAR[k_m]+ 2\alpha COV[k,k_m] - 2\alpha^2 COV[k,k_m]\}^{-0,5}$$

$$*\{2\alpha VAR[k] - 2(1-\alpha)VAR[k_m] + 2COV[k,k_m] - 4\alpha COV[k,k_m]\} \quad (12)$$

The basic insight that the Nobel laureate William Sharpe [the farther of the CAP-model,
1963, 1964] provided, was that he noted that in the CPP-model-equilibrium the market portfolio M already contains the risky asset I. If the risky asset I is added to the market portfolio M in any positive quantities it creates an excess demand for asset I by αI. Therefore, equations (11) and (12) must be evaluated at α = 0 for the equations to describe an equilibrium portfolio. This is done below:

$$\partial E[k_P]/\partial\alpha|_{\alpha=0} = E[k] - E[k_m] \quad (11)$$

$$\partial\sigma_{Rp}/\partial\alpha|_{\alpha=0} = 0,5(VAR[k_m])^{-0,5}*(- 2VAR[k_m] + 2COV[k,k_m])$$

$$\Leftrightarrow$$

$$\partial\sigma_{Rp}/\partial\alpha|_{\alpha=0} = (COV[k,k_m] - VAR[k_m])/(VAR[k_m])^{0,5}$$

$$\Leftrightarrow$$

$$\partial\sigma_{Rp}/\partial\alpha|_{\alpha=0} = (COV[k,k_m] - VAR[k_m])/\sigma_m \quad (13)$$

Now, the slope of an equilibrium portfolio evaluated at point M (α = 0) becomes:

$$\partial E[k_P]/\partial\alpha/\partial\sigma_{Rp}/\partial\alpha|_{\alpha=0} = (E[k] - E[k_m])/[(COV[k,k_m] - VAR[k_m])/\sigma_m] \quad (14)$$

The final insight is to note that this slope must be equal to the slope (7) of the CPP-model since the capital market line is tangent to the market portfolio M and the slope (14) is evaluated at M identical to M in the CPP-model and under the same assumptions. Therefore:

$(E[k_m] - k_f)/\sigma_m = (E[k] - E[k_m])/[(COV[k,k_m] - VAR[k_m])/\sigma_m]$ <=>

$(E[k_m] - k_f)/VAR[k_m] = (E[k] - E[k_m])/(COV[k,k_m] - VAR[k_m])$ <=>

$(E[k_m] - k_f)/ VAR[k_m]*(COV[k,k_m] - VAR[k_m]) = E[k] - E[k_m]$ <=>

$E[k] = E[k_m] + (E[k_m] - k_f)/ VAR[k_m]*(COV[k,k_m] - VAR[k_m])$ <=>

$E[k] = E[k_m] + (E[k_m] - k_f)*(COV[k,k_m]/VAR[k_m]) - (E[k_m] - k_f)$ <=>

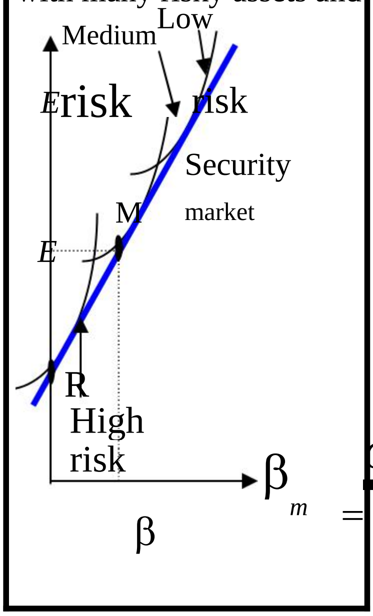
$E[k] = (E[k_m] - k_f)*(COV[k,k_m]/VAR[k_m]) + k_f$ <=>

$$E[k] = k_f + (E[k_m] - k_f)\beta_m, \text{ where } \beta_m = \frac{COV[k,k_m]}{VAR[k_m]}$$

Equation (15) is the CAP-model. It is also known as the security market line.

See figure III below.

Figure III: Optimal asset choice for risk averse investors in a world with many risky assets and



$$\beta_m = \frac{COV[k, k_m]}{VAR[k_m]}$$

Comparing the CAP-model (15) by the CPP-model (8) reveals that they are almost identical. They are both linear and they have the same measure for the price of risk ($E[k_m] - k_f$), but they measure the quantity of risk differently. Where the CAPM measures the quantity of risk by its normalised covariance ($\beta_m = COV[k,k_m]/VAR[k_m]$) the CPPM measures the quantity of risk by its normalised standard deviation ($\sigma/\sigma_m \approx VAR[k]/VAR[k_m]$). The reason to this difference is that investors only want to pay ($E[k_m] - k_f$) for undiversifiable risk. The CPPM prices portfolios that are perfectly diversified. Therefore, the appropriate measure for risk is the variance of that portfolio. Contrary, the CAPM prices an individual asset that will be diversified. Therefore, only the part of the variance that co-varies with a perfect diversified portfolio is relevant to pay for. The following argument helps making this clearer.

The variance of an equally weighted portfolio of N risky assets (weight: $w_i = 1/N$, for all $i \in [1,N]$) is

$$VAR[k] = \sum_{i=1}^{N} \sum_{j=1}^{N} \frac{1}{N}\frac{1}{N}\sigma_{ij}$$

<=>

$$VAR[k] = \left(\frac{1}{N}\right)^2 \sum_{i=1}^{N} \sum_{j=1}^{N} \sigma_{ij}$$

<=>

$$VAR[k] = \left(\frac{1}{N}\right)^2 \sum_{i=1}^{N} \sigma_{ii} + \left(\frac{1}{N}\right)^2 \sum_{i=1}^{N} \sum_{j=1}^{N \setminus j=i} \sigma_{ij}$$

As an approximation we may replace the individual variances and covariance’s with their mean values. This implies:

$$VAR[k] = \left(\frac{1}{N}\right)^2 \sum_{i=1}^{N} E[\sigma_{ii}] + \left(\frac{1}{N}\right)^2 \sum_{i=1}^{N} \sum_{j=1}^{N \setminus j=i} E[\sigma_{ij}]$$

<=>

$$VAR[k] = 1/N^2\, N*E[\sigma_{ii}] + 1/N^2*(N^2 - N)E[\sigma_{ij}]$$

$$VAR[k] = 1/N*E[\sigma_{ii}] + (1 - 1/N)E[\sigma_{ij}]$$

and

$$\lim_{N \to \infty} VAR[k] = E[\sigma_{ij}]$$

This demonstrates that as the portfolio becomes more diversified by letting the number of risky asset (N) in the portfolio rise, the covariance term becomes relatively more important. Indeed, in the limit it is the only thing that matters. Therefore, investors capable of creating perfect diversified portfolios will only be willing to pay the price of risk ($E[k_m] - k_f$) for an individual risky asset in accordance with its covariance with a perfect diversified portfolio M. The same could be said about the CPP-model. However, this model is pricing assets (portfolios) that are already perfectly diversified and they will by definition have the same characteristics as the market portfolio M. This implies that the covariance is equal to the variance: $\sigma^2{}_m = VAR[k_m] = COV[k_m,k_m]$ ad notam (2). In other words, the CPP-model is a special case of the more general CAP-model.

5.4.PORTFOLIO MANAGEMENT IN INDIA

In India until 1987 , except some banks and UTI, there was practically no portfolio activities carried out substantially. After the setting up of public sector mutual Funds backed by competent research staff and also the success of mutual Funds in Portfolio Management, a number of brokers and Investment Consultants some of whom are also professionally qualified have became Portfolio Managers. The SEBI has now imposed stricter rules, which include: registration, code of conduct and minimum infrastructure, experience and expertise etc., marking Portfolio Management a respectable and responsible professional service to be rendered by experts only.

Basically Portfolio Management involves: proper Investment decision-making; proper Money Management on assets investments; reduction of the risk with increased returns.

All investments bear risk with of course some risk free investments like bank deposits etc. Risk varies in direct proportion with return - higher the risk taken the higher will be the return and vice versa. Risk has two components - systematic market or related risk and unsystematic risk or company specific risk. The former cannot be eliminated but can be managed with the help of Beta (â), where

$$\hat{A} = \frac{\%\ \text{Change of Scrip return}}{\%\ \text{change of Market return}}$$

If â = I, the risk of the company is the same as that of the market and if â < I, , the company's risk is less than the market risk.

Types of Risk

Unsystematic Risk	*Systematic Risk*
Company related risks due to higher costs mismanagement defective sales or inventory, strategy., insolvency, fall in demand and company specific recession, labour problems etc.	Market related risk due to demand problems,Interest rates, inflation, raw materials, import and export policy, Tax, Policy etc., Business Risk, Market – Risk Financial Risk, Interest Rate Risk , inflation – Risk etc.

5.5.PERFORMANCE EVALUATION

In order to determine the risk-adjusted returns of investment portfolios, several eminent authors have worked since 1960s to develop composite performance indices to evaluate a portfolio by comparing alternative portfolios within a particular risk class. The most important and widely used measures of performance are:

Ø The Treynor Measure

Ø The Sharpe Measure

Ø Jenson Model

Ø Fama Model

The Treynor Measure

Developed by Jack Treynor, this performance measure evaluates funds on the basis of Treynor's Index. This Index is a ratio of return generated by the fund over and above risk free rate of return (generally taken to be the return on securities backed by the government, as there is no credit risk associated), during a given period and systematic risk associated with it (beta). Symbolically, it can be represented as:

Treynor's Index **(Ti) = (Ri - Rf)/Bi.**

Where, **Ri** represents return on fund, **Rf** is risk free rate of return and **Bi** is beta of the fund.

All risk-averse investors would like to maximize this value. While a high and positive Treynor's Index shows a superior risk-adjusted performance of a fund, a low and negative Treynor's Index is an indication of unfavorable performance.

The Sharpe Measure

In this model, performance of a fund is evaluated on the basis of Sharpe Ratio, which is a ratio of returns generated by the fund over and above risk free rate of return and the total risk associated with it. According to Sharpe, it is the total risk of the fund that the investors are concerned about. So, the model evaluates funds on the basis of reward per unit of total risk. Symbolically, it can be written as:

Sharpe Index **(Si) = (Ri - Rf)/Si**

Where, **Si** is standard deviation of the fund.

While a high and positive Sharpe Ratio shows a superior risk-adjusted performance of a fund, a low and negative Sharpe Ratio is an indication of unfavorable performance. **Comparison of Sharpe and Treynor**

Sharpe and Treynor measures are similar in a way, since they both divide the risk premium by a numerical risk measure. The total risk is appropriate when we are evaluating the risk return relationship for well-diversified portfolios. On the other hand, the systematic risk is the relevant measure of risk when we are evaluating less than fully diversified portfolios or individual stocks. For a well-diversified portfolio the total risk is equal to systematic risk. Rankings based on total risk (Sharpe measure) and systematic risk (Treynor measure) should be identical for a well-diversified portfolio, as the total risk is reduced to systematic risk. Therefore, a poorly diversified fund that ranks higher on Treynor measure, compared with another fund that is highly diversified, will rank lower on Sharpe Measure.

Jenson Model

Jenson's model proposes another risk adjusted performance measure. This measure was developed by Michael Jenson and is sometimes referred to as the Differential Return Method. This measure involves evaluation of the returns that the fund has generated vs. the returns actually expected out of the fund given the level of its systematic risk. The surplus between the two returns is called Alpha, which measures the performance of a fund compared with the actual returns over the period. Required return of a fund at a given level of risk (**Bi**) can be calculated as:

Ri = Rf + Bi (Rm - Rf)

Where, **Rm** is average market return during the given period. After calculating it, alpha can be obtained by subtracting required return from the actual return of the fund.

Higher alpha represents superior performance of the fund and vice versa. Limitation of this model is that it considers only systematic risk not the entire risk associated with the fund and an ordinary investor can not mitigate unsystematic risk, as his knowledge of market is primitive.

Fama Model

The Eugene Fama model is an extension of Jenson model. This model compares the performance, measured in terms of returns, of a fund with the required return commensurate with the total risk associated with it. The difference between these two is taken as a measure of the performance of the fund and is called net selectivity.

The net selectivity represents the stock selection skill of the fund manager, as it is the excess return over and above the return required to compensate for the total risk taken by the fund manager. Higher value of which indicates that fund manager has earned returns well above the return commensurate with the level of risk taken by him.

Required return can be calculated as: **Ri = Rf + Si/Sm*(Rm - Rf)**

Where, **Sm** is standard deviation of market returns. The net selectivity is then calculated by subtracting this required return from the actual return of the fund.

Among the above performance measures, two models namely, Treynor measure and Jenson model use systematic risk based on the premise that the unsystematic risk is diversifiable. These models are suitable for large investors like institutional investors with high risk taking capacities as they do not face paucity of funds and can invest in a number of options to dilute some risks. For them, a portfolio can be spread across a number of stocks and sectors. However, Sharpe measure and Fama model that consider the entire risk associated with fund are suitable for small investors, as the ordinary investor lacks the necessary skill and resources to diversified. Moreover, the selection of the fund on the basis of superior stock selection ability of the fund manager will also help in safeguarding the money invested to a great extent. The investment in funds that have generated big returns at higher levels of risks leaves the money all the more prone to risks of all kinds that may exceed the individual investors' risk appetite.

5.6. INVESTMENT COMPONENT

1. Stock Selection

Various methods have been developed to decompose total portfolio returns and attribute it to each component. Eugene Fama has provided a frame work for performance attribution. This is illustrated in Figure 14.1.

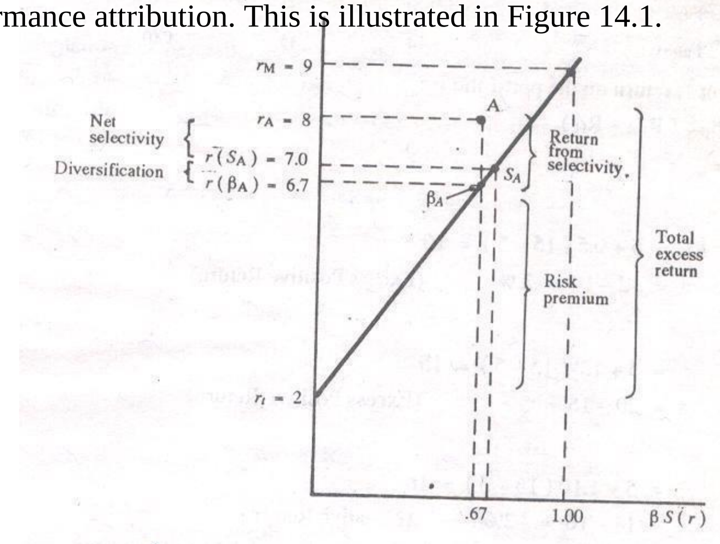


Fig.Decomposition of performance [Source : Engene : ZF . Fame components of Investment performance" Journal of Finance (June 1972), pp. 551 – 567.]

The vertical axis refers to return, the horizontal axis shows risk in terms of beta The diagonal line is the Security Market Line (SML). The Security Market Line links the risk-free rate of 2 percent and a market return of 9 per cent. It provides the benchmark for assessing whether the realised return is commensurate with the risk incurred. Fund A had a realised return of 8 percent and a market risk of 0.67. The Fund would have been expected to earn 6.7 percent at the market risk level of f3A. But it actually earned 8% (point A). Hence the excess return of 1.3 per cent (r_A -râA) is the incremental return to selectivity. Thus total excess return = selectivity + risk

rA -rf = rA -r (f3A) + r (f3A)-rf

8% - 2% = (8% - 6.7) + (6.7% - 2%)

4.7 per cent represents the premium for risk

2. Risk Taking

To earn excess return, portfolio manages bear additional risk. By using the Capital Market Line (CNL) we can determine the return commensurate with risk as measured he stand deviation of return. The standard deviation of the Fund is assumed to be 15 per cent and the standard deviation of the market 21 per cent; risk free rate is 2 per cent. The normal return for Fund A, using total risk would be

rf+ (rm -rf) Op/Om

i.e. 2 % + (9 % -2 %) 15 %/21 % = 7

The difference between this normal return of 7% and 6.7% that was expected pen only considering market risk is 1- 6.7 = 0.3

In the above figure it is the distance from r (âA) to r (SA).

Net selectivity is the overall selectivity less compensation for diversification risk.

Net Selectivity [rA – r(âA)] – [r (SA) – r (BA)]

= (8% - 6.7%) – 7% - 6.7%)

= 1.3%-0.3%=1%

Any funds overall performance can be thus decomposed into (1) due to selectivity and (ii) due to risk taking.

3. Market Timing

Portfolio manger can also achieve superior performance by picking up high beta stocks during a market upswing and moving out of equities and into cash in declining markets. To study market timing ability one could calculate the quarterly return for a fund and for the market like Bombay Stock Exchange's National Index of a 5 year period and plot them on a scatter diagram. Then a characteristic line can be fitted.

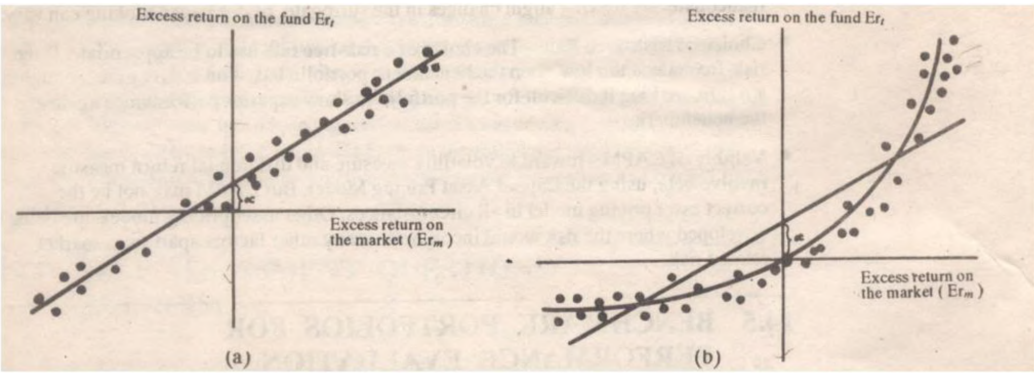


Fig (a,b) : Fund return vs, market return for (a) superior stock selection and (b) superior market timing [Source J.L.Treynor and K. Mazuy "Can Mutual Funds otuguse the Market" Harvard Business Review (July August 1966) pp. 131. 136.]

The above figures give the excess return of the fund of the Y axis and the excess return of the market index on the X axis. Both figures reveal positive ex-post alphas. The scatter diagram shows that all the point cluster close to the regression line indicating that the relationship between portfolio excess return and market excess return is linear. The average beta of the portfolio is fairly constant or the beta of the portfolio was roughly the same at all times. Since alpha is positive, it appears that the excess return is due to his stock selection abilities

In the second figure, the points in the middle lie below the regression line and those at the ends lie above the regression line, which suggests that the portfolio consisted of high beta securities when market return was high and low beta securities when the market return was low

To describe this relationship, one can fit a curve to the points plotted by adding a quadratic term to the simple linear relationship

$r_p \quad a + b r_m + c r^2 m$, where

$r^2 m$ = return on the market index squared rp E return on the

Fund a, b,-C = values to be estimated by regression analysis

The figure indicates that the curve becomes steeper as one move to the right of the diagram. The Fund movements are amplified on the upside and vice versa. This implies that the Fund Manager was anticipating market changes correctly and that the superior performance of the Fund can be attributed to skill in timing

The performance of 37 mutual funds was studied by Jack L. Treynor and Kay Mazuy over the period 1953 through 1962. Only one of the funds had a fitted quadratic term that was significantly different from zero, indicating market timing skills. The fitted relationship for other funds evidenced no curvilinear, indicating that the funds did! not demonstrate any skills in market timing. This entire period was one of rising market.

James Farrel covered market prices in both rising and falling markets (1957 -1975) and came to the conclusion that Funds as a group do not make substantial shifts in asset positioning to take advantage of market timing

5.7. SELF evaluation QUESTIONS

1. Discuss fully the Sharpe, Treynor and the Jensen measures of portfolio returns
2. How are the returns on managed portfolio attributed to stock selection and market timing? Discuss and illustrate
3. What is a portfolio? Why is it components?
4. Bring out the assumption of capital market Theory?
5. Explain the CAP model in pricing assets?

5.8.REFERENCES

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