Security Analysis and Portfolio Management

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UNIT I

LESSON

1

INVESTMENT

CONTENTS

1.0 AIMS AND OBJECTIVES

After studying this lesson, you will be able to:

- Know about meaning and different types of investment
- Understand the process of investment management

1.1 INTRODUCTION

Investment or investing is a term with several closely-related meanings in business management, finance and economics, related to saving or deferring consumption. An asset is usually purchased, or equivalently a deposit is made in a bank, in hopes of getting a future return or interest from it. The word originates in the Latin "vestis", meaning

garment, and refers to the act of putting things (money or other claims to resources) into others' pockets. The basic meaning of the term being an asset held to have some recurring or capital gains. It is an asset that is expected to give returns without any work on the asset *per se*.

1.1.1 Types of Investments

The term "investment" is used differently in economics and in finance. Economists refer to a real investment (such as a machine or a house), while financial economists refer to a financial asset, such as money that is put into a bank or the market, which may then be used to buy a real asset.

In business management the investment decision (also known as capital budgeting) is one of the fundamental decisions of business management: managers determine the assets that the business enterprise obtains. These assets may be physical (such as buildings or machinery), intangible (such as patents, software, goodwill), or financial. The manager must assess whether the net present value of the investment to the enterprise is positive; the net present value is calculated using the enterprise's marginal cost of capital.

A business might invest with the goal of making profit. These are marketable securities or passive investment. It might also invest with the goal of controlling or influencing the operation of the second company, the investee. These are called intercorporate, long-term and strategic investments. Hence, a company can have none, some or total control over the investee's strategic, operating, investing and financing decisions. One can control a company by owning over 50% ownership, or have the ability to elect a majority of the Board of Directors.

In economics, investment is the production per unit time of goods which are not consumed but are to be used for future production. Examples include tangibles (such as building a railroad or factory) and intangibles (such as a year of schooling or on-the-job training). In measures of national income and output, gross investment I is also a component of Gross Domestic Product (GDP), given in the formula GDP = C + I + G + NX, where C is consumption, G is government spending, and NX is net exports. Thus investment is everything that remains of production after consumption, government spending, and exports are subtracted I is divided into non-residential investment (such as factories) and residential investment (new houses). Net investment deducts depreciation from gross investment. It is the value of the net increase in the capital stock per year.

Investment, as production over a period of time ("per year"), is not capital. The time dimension of investment makes it a flow. By contrast, capital is a stock, that is, an accumulation measurable at a point in time (say December 31st).

Investment is often modeled as a function of Income and Interest rates, given by the relation I = f (Y, r). An increase in income encourages higher investment, whereas a higher interest rate may discourage investment as it becomes more costly to borrow money. Even if a firm chooses to use its own funds in an investment, the interest rate represents an opportunity cost of investing those funds rather than loaning them out for interest.

In finance, investment = cost of capital, like buying securities or other monetary or paper (financial) assets in the money markets or capital markets, or in fairly liquid real assets, such as gold, real estate, or collectibles. Valuation is the method for assessing whether a potential investment is worth its price. Returns on investments will follow the risk-return spectrum.

Types of financial investments include: shares, other equity investment, and bonds (including bonds denominated in foreign currencies). These financial assets are then expected to provide income or positive future cash flows, and may increase or decrease in value giving the investor capital gains or losses.

Trades in contingent claims or derivative securities do not necessarily have future positive expected cash flows, and so are not considered assets, or strictly speaking, securities or investments. Nevertheless, since their cash flows are closely related to (or derived from) those of specific securities, they are often studied as or treated as investments.

Investments are often made indirectly through intermediaries, such as banks, mutual funds, pension funds, insurance companies, collective investment schemes, and investment clubs. Though their legal and procedural details differ, an intermediary generally makes an investment using money from many individuals, each of whom receives a claim on the intermediary.

In personal finance, money is used to purchase shares, put in a collective investment scheme or used to buy any asset where there is an element of capital risk is deemed an investment. Saving within personal finance refers to money put aside, normally on a regular basis. This distinction is important, as investment risk can cause a capital loss when an investment is realized, unlike saving(s) where the more limited risk is cash devaluing due to inflation.

In many instances the terms saving and investment are used interchangeably, which confuses this distinction. For example many deposit accounts are labeled as investment accounts by banks for marketing purposes. Whether an asset is a saving(s) or an investment depends on where the money is invested: if it is cash then it is savings, if its value can fluctuate then it is investment.

In real estate, investment is money used to purchase property for the sole purpose of holding or leasing for income and where there is an element of capital risk. Unlike other economic or financial investment, real estate is purchased. The seller is also called a Vendor and normally the purchaser is called a Buyer.

In residential real estate investment, the property is purchased as other people's houses. In many cases the Buyer does not have the full purchase price for a property and must engage a lender such as a Bank, Finance company or Private Lender. Herein the lender is the investor as only the lender stands to gain returns from it. Different countries have their individual normal lending levels, but usually they will fall into the range of 70-90% of the purchase price. Against other types of real estate, residential real estate is the least risky.

Check Your Progress 1

Fill in the blanks:

1. In economics, investment is the production per unit time of _____.
2. The time dimension _____ makes it a flow.
3. _____ is a function of income and interest rates.
4. In real estate, investment is _____ used to purchase property.

1.2 PROCESS OF INVESTMENT MANAGEMENT

The process of investment management is the professional management of various securities (shares, bonds etc.) assets (e.g. real estate), to meet specified investment goals for the benefit of the investors. Investors may be institutions (insurance companies, pension funds, corporations etc.) or private investors (both directly via investment contracts and more commonly via collective investment schemes e.g. mutual funds) .

The term asset management is often used to refer to the investment management of collective investments, whilst the more generic fund management may refer to all forms of institutional investment as well as investment management for private investors. Investment managers who specialize in advisory or discretionary management on behalf of (normally wealthy) private investors may often refer to their services as wealth management or portfolio management often within the context of so-called "private banking".

The provision of investment management includes elements of financial analysis, asset selection, stock selection, plan implementation and ongoing monitoring of investments. Investment management is a large and important global industry in its own right responsible for caretaking of trillions of dollars, euro, pounds and yen. Coming under the remit of financial services many of the world's largest companies are at least in part investment managers and employ millions of staff and create billions in revenue.

Fund manager (or investment advisor) refers to both a firm that provides investment management services and an individual(s) who directs "fund management" decisions.

1.2.1 Process

In the process of Investment management, the 3-P's (Philosophy, Process and People) are often used to describe the reasons which the managers keep in mind while taking investment management decisions.

- "Philosophy" refers to the over-arching beliefs of the investment organization. For example: (i) Does the manager buy growth or value shares (and why)? (ii) Does he believe in market timing (and on what evidence)? (iii) Does he rely on external research or does he employ a team of researchers? It is helpful if any and all of such fundamental beliefs are supported by proof-statements.
- "Process" refers to the way in which the overall philosophy is implemented. For example: (i) Which universe of assets is explored before particular assets are chosen as suitable investments? (ii) How does the manager decide what to buy and when? (iii) How does the manager decide what to sell and when? (iv) Who takes the decisions and are they taken by committee? (v) What controls are in place to ensure that a rogue fund (one very different from others and from what is intended) cannot arise?
- "People" refers to the staff, especially the fund managers. The questions are, Who are they? How are they selected? How old are they? Who reports to whom? How deep is the team (and do all the members understand the philosophy and process they are supposed to be using)? And most important of all, How long has the team been working together? This last question is vital because whatever performance record was presented at the outset of the relationship with the client may or may not relate to (have been produced by) a team that is still in place. If the team has changed greatly (high staff turnover or changes to the team), then arguably the performance record is completely unrelated to the existing team (of fund managers).

1.2.2 Investment Managers and Portfolio Structures

At the heart of the investment management industry are the managers who invest and divest client investments.

A certified company investment advisor should conduct an assessment of each client's individual needs and risk profile. The advisor then recommends appropriate investments.

1.2.3 Asset Allocation

The different asset classes and the exercise of allocating funds among these assets (and among individual securities within each asset class) is what investment management firms are paid for. Asset classes exhibit different market dynamics, and different interaction effects; thus, the allocation of monies among asset classes will have a significant effect on the performance of the fund. Some research suggested that allocation among asset classes have more predictive power than the choice of individual holdings in determining portfolio return. Arguably, the skill of a successful investment manager resides in constructing the asset allocation, and separately the individual holdings, so as to outperform certain benchmarks (e.g., the peer group of competing funds, bond and stock indices).

1.2.4 Long-term Returns

It is important to look at the evidence on the long-term returns to different assets, and to holding period returns (the returns that accrue on average over different lengths of investment). For example, over very long holding periods (e.g. 10+ years) in most countries, equities have generated higher returns than bonds, and bonds have generated higher returns than cash. According to financial theory, this is because equities are riskier (more volatile) than bonds which are themselves more risky than cash.

1.2.5 Diversification

Against the background of the asset allocation, fund managers consider the degree of diversification that makes sense for a given client (given its risk preferences) and construct a list of planned holdings accordingly. The list will indicate what percentage of the fund should be invested in each particular stock or bond. The theory of portfolio diversification was originated by Markowitz and effective diversification requires management of the correlation between the asset returns and the liability returns, issues internal to the portfolio (individual holdings volatility), and cross-correlations between the returns.

1.2.6 Investment Styles

Investment Style selection depends upon risk appetite and return expectation. There are a range of different styles of fund management that the institution can implement. For example, growth, value, market neutral, small capitalisation, indexed, etc. Each of these approaches has its distinctive features, adherents and, in any particular financial environment, distinctive risk characteristics. For example, there is evidence that growth styles (buying rapidly growing earnings) are especially effective when the companies able to generate such growth are scarce; conversely, when such growth is plentiful, then there is evidence that value styles tend to outperform the indices particularly successfully.

1.2.7 Performance Measurement

Fund performance is the acid test of fund management, and in the institutional context accurate measurement is a necessity. For that purpose, institutions measure the performance of each fund (and usually for internal purposes components of each fund)

under their management, and performance is also measured by external firms that specialize in performance measurement.

1.3 COMMON MISTAKES/ERRORS IN INVESTMENT MANAGEMENT

It may be helpful to be aware of some common mistakes people make when approaching financial planning:

1. Don't set measurable financial goals.
2. Make a financial decision without understanding its effect on other financial issues.
3. Confuse financial planning with investing.
4. Neglect to reevaluate their financial plan periodically.
5. Think that financial planning is only for the wealthy.
6. Think that financial planning is for the time when they get older.
7. Think that financial planning is the same as retirement planning.
8. Wait until a monetary crisis to begin financial planning.
9. Expect unrealistic returns on investments.
10. Think that using a financial planner means losing control.
11. Believe that financial planning is primarily tax planning.

Check Your Progress 2

Indicate whether the following statements are true or false:

1. A certified company investment advisor should conduct an assessment of each client's individual needs and risk profile.
2. Investment Style selection depends upon risk appetite and return expectation.
3. The process of investment management is the professional management of various securities (shares, bonds etc) assets (e.g. real estate), to meet specified investment goals for the benefit of the investors.
4. The provision of investment management includes elements of financial analysis, asset selection, stock selection, plan implementation and ongoing monitoring of investments.
5. Investments are often made indirectly through intermediaries, such as banks, mutual funds, pension funds, insurance companies, collective investment schemes, and investment clubs.

1.3.1 Some Points to be considered for taking Successful Investment Decisions

A Selected list of Proverbs of Stock Markets

- "Don't invest your money on the advice of a poor man." *Spain*
- "A steady job and a mutual fund is still the best defence against social security." *Right on the Web*
- "When buying and selling are controlled by legislation, the first thing to be bought and sold are legislators." *P. J. O'Rourke*

- "Whoever controls the volume of money in any country is the absolute master of all industry and commerce." *President James A. Garfield*
- "That some should be rich shows that others may become rich, and hence is just encouragement to industry and enterprise." *Abraham Lincoln*
- "That's the American way. If little kids don't aspire to make money like I did, what the hell good is this country?" *Lee Iacocca*
- "When it is a question of money, everyone is of the same religion." *Voltaire*
- "I'd like to live like a poor man with lots of money." *Pablo Picasso*
- "If you make money your god, it will plague you like the devil." *Henry Fielding*
- "A banker warned the British poet Robert Graves that one could not grow rich writing poetry. He replied that if there was no money in poetry, there was certainly no poetry in money, and so it was all even." *Robert Graves*
- "A liberal is a man who is willing to spend somebody else's money." *Carter Glass*

1.4 LET US SUM UP

A good Investment Management's services focus on independent discretionary and advisory investment management as well as comprehensive financial advice, including inheritance tax and protection planning.

The Investment Strategy Group provides asset allocation services, a range of hand-selected investment products as well as comprehensive research and advice on multi-manager investing.

The Investment Strategy Group also advises on a number of asset classes and products, including equity funds, hedge funds, actual property and property funds, bond funds and tax shelter investments.

1.5 LESSON END ACTIVITY

Prepare a note on investment and the process of investment management.

1.6 KEYWORDS

Investment: Investment or investing is a term with several closely-related meanings in business management, finance and economics, related to saving or deferring consumption.

Financial Management: A study of decisions, including financial, investment = cost of capital, like buying securities or other monetary or paper (financial) assets in the money markets or capital markets, or in fairly liquid real assets, such as gold, real estate, or collectibles, etc.

Asset Management: The term asset management is often used to refer to the investment management of collective investments,

Fund Performance: Fund performance is the acid test of fund management, and in the institutional context accurate measurement is a necessity.

Process of Investment Management: It is the professional management of various securities (shares, bonds etc.) assets (e.g. real estate), to meet specified investment goals for the benefit of the investors.

1.7 QUESTIONS FOR DISCUSSION

1. What do you understand by the term investment?
2. What are different types of investment?
3. Define the process of investment.
4. What should be the steps involved in advising about the process of investment management?
5. What precautions and care should a finance manager take while taking decisions on investment matters?

Check Your Progress: Model Answers

CYP 1

1. Goods 2. Investment 3. Investment 4. Money

CYP 2

1. True 2. True 3. True 4. True 5. True

1.8 SUGGESTED READINGS

Sudhindra Bhat, *Security Analysis and Portfolio Management*, Excel Books, New Delhi.

Kevin, S., *Security Analysis and Portfolio Management*, Prentice-Hall of India.

Prasanna Chandra, *Investment Analysis and Portfolio Management*, Second Edition, Tata McGraw Hill.

Punithavathy Pandian, *Security Analysis and Portfolio Management*, Vikas.

V. K. Bhalla, *Investment Management.*

A. Davis, *Investors in a Changing Economy*, Prentice-Hall, 1968.

Williamson, J. Peter, *Investments: New Analytic Techniques*, London, Longman, 1970.

Cottle, CC., and Whitman, W.T., *Investment Timing: The Formula Plan Approach*, McGraw Hill.

LESSON

2

SPECULATION INVESTMENT AVENUES IN INDIA

CONTENTS

Contd....

2.0 AIMS AND OBJECTIVES

After studying this lesson you should be able to:

- Explain the advantages and disadvantages of equity shares
- Learn about the investment instruments of the money market
- Know about different speculation investment avenues in India

2.1 INTRODUCTION

In India, the household sector's investment in non-security forms constitutes a major portion of its total investment in financial assets. A large number of non-security forms of financial assets are available to investors. Non-security forms of investment include all those investments that are not quoted in any stock market and are not freely marketable. These include: corporate deposits, bank deposits, post office deposits, national savings and other small saving certificates—and schemes, insurance policies and provident funds. Another investment avenue is the investment in physical assets such as gold, silver, diamonds, real estate etc.

2.2 INVESTMENT ALTERNATIVES/ INVESTMENT AVENUES

Two basic investment avenues are:

(i) Financial assets

(ii) Physical assets (real assets)

(iii) Investment in financial assets consists of:

  (a) Securitized (i.e., security forms of) investments

  (b) Non-securitized investments.

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

(i) Shares, scrips, stocks, bonds, debentures, debenture stock or other marketable securities of alike 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 to be securities, and

(iv) Rights or interest 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 investment 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. The above investments are essentially forms of savings and should be treated as such. In India, nearly 33% of the household savings go into such savings schemes as Post office savings schemes, life insurance, provident funds, etc.

Another popular investment avenue is the investment in physical assets such as gold, silver, diamonds, real estate, antiques etc. Indian investors have always considered physical assets to be attractive investments and, particularly for hedging against inflation. India has a very long tradition in arts and crafts in jewellery, made of gold/silver and precious stones. Moreover, it has been observed that in times of high inflation, investors move away from financial assets into physical assets more particularly, real estate.

2.2.1 Investment Attributes

Some of the main investment attributes which envelope the investment decision are:

(a) Risk and return

(b) Liquidity of the investment

(c) Tax advantages

(d) Convenience

We have already covered risk and return in the proceeding section. We shall now look at the other attributes.

Liquidity of the investment is largely a function of its marketability. An investment is highly marketable if it can be bought/sold quickly without a loss or with a very minimum loss which is possible, again, only if the prices do not fluctuate widely. Further, marketability exists when the cost of transactions is low. Empirical evidence suggests that shares of small companies suffer from lack of liquidity, perhaps, on account of infrequent trading. In the case of non-security forms of investments, liquidity is not dependent on the physical marketability of the asset, because they are not transferable, but on their acceptability as collateral for borrowing.

The next important attribute is the tax advantage or tax shelter the investment enjoys. Many non-security forms of investment are attractive, despite their low rate of return, only because of the tax benefits they provide. The tax shelters are:

(i) ***Initial tax shelter:*** This is the tax benefit the investor gets when he makes the investment for the first time. Usually, many of the investments in non-security forms like contribution to Provident Fund, purchase of NSC etc. are eligible for initial tax shelter under Section 88 of the Income Tax Act.

(ii) ***On-going tax shelters:*** These are the tax benefits available for the interest or dividends earned on investments already made. These tax benefits are generally available under Sections 10 and SOL of the Income Tax Act.

(iii) ***Terminal tax shelters:*** These tax reliefs are available when the investment made in the past are liquidated or realized.

Finally, convenience is an important attribute of investment decision-making. Convenience refers to the procedural ease when the investment is made and also the ease with which the day-to-day management of the investment can be done. For instance, buying of a National Saving Certificate (VIII issue) may require only filling of a form initially. Thereafter, there is no need for the investor to manage the investment. On the other hand, in the case of equity shares, the investor will be required to analyze different shares, time the entry by technical analysis and place an order to buy. Thereafter, he needs to continuously track the price behaviour of the stock and also track the performance of the company so that he can quickly exit from the scrip if need be. From the point of view of convenience, the two ends of the spectrum are occupied by the equity shares on one end, which is the point of least convenience, and the bank deposits on the other end, which is the point of extreme convenience. Other investments require close attention from the investors, and the returns justify the time spent.

Investments that represent evidence of debt, ownership of a business or the legal right to acquirer sell an ownership interest in business are called securities. Two of the most common types of securities are bonds and shares. Another way of classifying securities, divided further into two main groups:

- Government obligations and
- Bonds and stock of corporations

There are four major ways of classifying the above mentioned securities:

- Short-term Money Market Securities
- Bonds Issued by Corporations
- Equity Shares
- Hybrid Instruments

Different types of investment avenues in financial assets, their characteristics and their risk-return features are described below:

2.3 EQUITY SHARES

Equity shares represent equity capital, which is the ownership capital because equity shareholders collectively own the company. The ownership of equity shares or stocks confers upon the shareholders the benefits of such ownership, which is a residuary claim on the profits and assets of the company after the claims of others have been satisfied. The shareholders are the last category of those with claims on the company to receive any of its earnings and if the company is dissolved, the last to receive any assets. Equity shareholders also enjoy the right to control the company through the board of directors and have the right to vote on 1 every resolution placed before the general body. Yet another right enjoyed by the equity shareholders is the pre-emptive right that obliges the company to give the existing equity shareholders the first opportunity to purchase, proportionately, additional equity shares called the 'right shares'.

Equity shares are the first security to be issued by a corporation and, in the event of bankruptcy, the last to be retired. Equity shares, also called common stock, represent a share in the ownership of a firm; they have the lowest-priority claim on earnings and assets of all securities issued.

Equity shares, however, possess an unlimited potential for dividend payments and price appreciation. In contrast, bonds and preference shares have a contract for fixed interest or dividend payments that equity shares do not have. A share certificate states the number of shares, their par value, the certificate number, distinctive numbers and the name of owner of the certificate.

Common stockholders or shareholders elect the board of directors and vote on major issues that affect the corporation because they are the owners of the corporation.

Par Value: It is the face value of a share of the stock. Companies are allowed to fix a par value; the minimum being Re. 1 per share.

Book Value: The book value is calculated by adding reserves to the equity capital of the company, multiplied by the face value and divided by the equity capital of the company. Book and market values might be equal on the day the stock in a new corporation is issued, but after that, it appears that only coincidence will ever make them equal at any given moment.

Stock Price Quotations: If you pick up any of the financial newspapers, they carry the quotations of the last day's trading on the major stock exchanges, including National Stock Exchange (NSE), Bombay Stock Exchange (BSE), etc. They normally carry open, high, low, close prices along with volumes of shares traded as well as the previous 52-week (1 year) high-low prices for each stock. The prices mentioned are for one share of the company.

Preferred Stock: Sandwiched between bondholders and common stockholders, preferred stocks have an assured dividend and assume less risk than that borne by common stockholders. They hardly have any voting rights in the corporation as compared to the common stockholders.

There are two types of companies:

1. Publicly held companies, and
2. Private companies.

Private companies are owned by the promoters (a small group of shareholders) while the publicly held ones have shareholding by the ordinary investors too. There are several advantages and disadvantages associated with going public:

Equity shares can be classified in different ways but we will use the terminology of 'Investors.' However, it should be noted that the lines of demarcation between the classes are not clear and such a classification is 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 mature 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 are growing 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, Spartek, ITW Signode, etc. The high growth stocks are often called 'glamour stocks' or 'high flyers.' If such companies can sustain their growth, they become emerging blue chips. Many of such emerging blue chips are in the hi-tech industries, particularly in the information technology segment. Notable examples of such shares are Infosys Technologies, Satyam Computers etc.

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. Usually, income stocks are not growth stocks and vice versa. Drug, food and public utility industry shares are regarded as income stocks, and their prices are not as volatile as those of growth stocks.

Cyclical Stocks: Cyclical stocks are companies whose earnings fluctuate with the business cycle. They are affected by economic and trade cycles like boom, recession, recovery, etc. Cyclical stocks generally belong to infrastructure or capital goods industries such as general engineering, auto, cement, paper, construction, steel, sugar etc. Their performance is good in the boom period but plunges in times of recession. Their share prices also rise and fall in tandem with the trade cycles.

Discount Stocks: Discount stocks are those, which are quoted or valued below their face values. These are the shares of sick units. Discount shares are different from under-valued or under-priced shares. Under-priced or under-valued shares are those, which have all the potential to become growth stocks; have very good future but somehow the market is yet to price the shares correctly. Discount shares are also different from the 'turnaround' shares.

Turnaround Stocks: Turnaround stocks are those that are not really doing well in the sense that their 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 new future. Turnaround stocks may resemble discount stocks and therefore require a very careful analysis and a keen eye to spot them. Turnaround stocks can fetch very attractive returns to the investors. Turning around a sick company can be done either with the help of the Board for Industrial and Financial Reconstruction (BIFR) or through the efforts of the management - by shedding losing products, financial restructuring, offering attractive voluntary retirement schemes to the employees, etc. For example, Parry in the 80s, Tata Tea (Tata Finlay), SPIC, Mukand Iron and Steel etc., are some examples of turnaround companies. Sometimes, a dynamic management taking over the company may turn around a sick company.

Advantages of Investing in Equity Shares:

(i) ***Capital appreciation:*** The stock price reflects the underlying fundamentals. Capital gains offer certain tax advantages.

(ii) ***Dividend payout:*** Companies can pay higher dividends and provide current cash flows to the investor.

(iii) ***Bonus shares:*** Enhance liquidity and ensure capital gains.

(iv) ***Rights shares:*** Shareholders may get additional shares for less than market price. If the investor does not want to invest in that company he can sell his rights in the market.

(v) ***Liquidity:*** Saleability and exit options are ensured in the case of actively traded stocks.

(vi) ***Security for pledging:*** Capital appreciation of equity shares makes them good securities for borrowing from the financial institutions and banks.

Check Your Progress 1

1. Equity shares represent equity capital, which is the ownership capital because equity _____ collectively own the company.
2. Equity shares are the first to be issued by a _____ and, in the event of bankruptcy, the last to be retired.
3. Par value is the face value of a share of the _____ .
4. Terminal tax shelters, tax reliefs are available when the investment made in the past are liquidated or _____ .

2.3.1 Advantages and Disadvantages of Equity Shares

Advantages

- Equity shares do not entail fixed charges. If the company does not generate the earnings, it does not have to pay equity share dividends. This is very much in contrast to interest on debt, which must be paid regardless of the level of earnings.
- Equity shares have no fixed maturity date – it is permanent capital that does not have to be "paid back".
- Since equity shares provide a cushion against losses to the firm's creditors, the sale of equity shares increases the creditworthiness of the firm.
- Equity shares can, at times, be sold more easily than debt. They appeal to certain investor groups because (1) they typically carry a higher expected return than do preferred stock or debt, (2) provide investors with a better hedge against inflation than bonds, and (3) returns from capital gains on equity shares are not equity shares and not taxed at a lower rate.

Disadvantages

- The sale of equity shares extends voting rights, or even control, to the additional new shareowners who are brought into the company. For this reason, small firms, whose owner-managers may be unwilling to share control, often avoid additional equity financing.
- The use of debt enables the firm to acquire funds at a fixed cost, whereas the use of equity shares means more share in the firm's net profits.

- The costs of underwriting and selling equity shares are usually higher than the costs of underwriting and selling preferred shares or debt.
- The sale of the new equity shares may be perceived by investors as a negative signal and hence may cause the share price to fall.

2.3.2 Money Market Securities

Highly liquid debt securities that have short-term maturity periods and involve little or no risk of default are known as money market securities. All money market securities are debts that mature within 364 days or less. Money market securities are frequently issued instead of longer-term debt securities in order to avoid long and costly formalities.

Money market securities pay continuously fluctuating rate of interest that overs somewhere between the rate of inflation and the rate paid by the long-term debt instruments.

Money market securities typically pay interest to their investors, as a discount from their face (or maturity) values. Indian Government Treasury Bills, for instance, with a face value of Rs. 1 cr. and a maturity of 90 days can be sold for Rs. 97 lacs, when issued by the Treasury Department. The buyer can either hold the security for 90 days or sell it in the active secondary market before it matures. Upon maturity, whosoever owns the T-bill can redeem it for its face value of Rs. 1 cr. The Rs. 3 lac difference between the discounted purchase price of Rs. 97 lac and the maturity value of Rs. 1 cr. is the interest paid to the T-bill's investor (or series of investors).

Certificates of Deposit (CD): One of the money market securities, CD's were innovated by Citibank, New York in 1961. A CD is a receipt from a commercial bank for a deposit of Rs. 10 lakh or more, with certain provisions attached. One of the provisions is that the deposit will not be withdrawn from the bank before a specific maturity date.

Banker's Acceptances: Securities that are written when a bank inserts itself between the borrower and the investor and accepts the responsibility for paying the loan, thereby shielding the investor from the risk of default.

Commercial Paper (CP): Refers to the short term promissory notes issued by “blue-chip” corporations - large, old, safe, well known, national companies like TISCO, ONGC, SAIL, etc. The maturities vary from 5 to 270 days, and the denominations are for Rs. 10 lakh or more - usually more. These notes are backed only by the high credit ratings of the issuing corporations.

Bonds Issued by Corporations

A bond is a marketable legal contract that promises to pay its investors a stated rate of interest and to repay the principal amount at the maturity date. Bonds differ according to their provisions for repayment, security pledged and other technical aspects. Bonds are the senior securities of a corporation in the respect that in the case of bankruptcy of the corporation, the law requires that the bondholders should be paid off before their stock investors.

A legal agreement, called a trust deed or in dentures, is drawn between the bondholders and the corporation. Every bond issued under it has, the same right and protection; however, bonds of the same issue may mature at different dates and carry different interest rates. Trust deed is a complicated legal document containing restrictions, pledges and promises. The trustee, usually a large bank or a financial institution, ensures that the issuing corporation keeps its promises and conforms to the terms and conditions of the contract. The trustee is the watchdog guarding the bondholder's interests.

Term Loans are long-term debt contracts under which a borrower agrees to make a series of interest and principal payments on the specific dates to the lender. While this is true for bonds too, term loans differ in one significant aspect: they are generally sold to one or a consortium of lenders, especially financial institutions and banks, while bonds (term debentures used interchangeably) are typically offered to the public. Another significant difference is that the loan is repaid in monthly/ quarterly/ half yearly/ annual installments, which also include the interest accrued for the specified period. In bonds, however, repayment is usually made by one lump-sum payment although interest may be paid at periodic intervals.

Interest Payments: Bond interest is usually paid semi-annually, though annual payments are also popular. The method of payment depends on whether the bond is a registered or coupon bond. The interest on registered bonds is paid to the holder by cheque. Coupon bonds have a series of attached coupons that are clipped off at the appropriate times and sent through banking channels for collection of the interest.

Coupon Rate: The coupon rate is the stipulated interest rate to be paid on the face value of a bond. It represents a fixed annual rupee amount that is paid as long as the debtor is solvent. The coupon rate is fixed after the issuing corporation's investment banker has weighed the risk of default, the credit standing of the issuer, the convertibility options, the investment position of the industry, the security backing of the bond and the appropriate market rate of interest for the firm's industry, size, and class of risk. The goal is to pick a coupon rate that is just high enough to attract investors.

Yield to Maturity: Riskier bonds must pay higher yield-to-maturity (YTM) to attract investors. The YTM is more significant than the coupon rate to bond investors. If the bond is selling at a discount, its market price is below its face value. In this case the bond's YTM exceeds its coupon rate. If it is selling at a premium, the market price of the bond is above its face value and the coupon rate is higher that the YTM.

Maturities vary widely: Bonds are sometimes grouped by the length of time until maturity that existed on the date the bond was first issued. Money market securities mature in 364 days or less. Short-term bonds are any bonds maturing within about 1 to 5 years. They are common in industrial financing and may be secured and unsecured. Medium-term bonds mature between 5 to 10 years and long-term bonds are the ones who have a maturity life of more than 10 years.

There are various types of bonds:

Bearer Bonds: If the coupon interest may be paid to whoever holds the bond, the bonds are called bearer bonds. Unlike registered bonds, the ownership of bearer bonds may be transferred by simply handling them over, like cash.

Deep Discount Bonds: Like money market securities, these bonds are issued at a discount to their face values. Long-term bonds with maturities exceed 10 years, and blue chip corporations or financial institutions normally issue these bonds.

Non-Convertible Debentures: NCDs are medium-term bonds issued by corporations, with maturity periods varying between 5 to 8 years. They are normally secured and have to be credit-rated by one of the credit rating agencies if the maturity period exceeds 18 months.

Secured Premium Notes (SPNs): SPNs are medium-term bonds issued by corporations and mature between 3 to 8 years. Their distinctive feature is the flexibility they offer in yielding returns either in the form of premium or interest payments, depending on holder's preferences.

Call Provision: A call provision may be included in the trust deed. This provision allows both the issuing corporation and the investor to call or redeem the bonds at a specified amount before the maturity date. The issuing corporation will use the provision if the interest rates fall substantially below the specified coupon rates.

Sinking Fund: It is a provision that requires the corporation to set aside a fixed amount each year towards the orderly retirement of the issue.

Credit Rating: It is approved credit rating by agencies, which is mandatory before corporations are allowed to issue bonds or debentures. Rating reflects the probability of the corporations going into default. The higher the bond's rating, the lower the risk of default and the lower the interest rate.

Refunding Analysis: It is performed by the issuer to determine: (1) whether it is currently profitable to call an outstanding debt issue, and (2) whether it might be even more profitable to delay the call until some time in the future; for example, in a scenario where interest rates are rising steadily.

Advantages and Disadvantages of Long-Term Debt Financing

From the issuer's viewpoint, the major advantages are as follows:

- The cost of debt is independent of earnings, so debt-holders do not participate if profits soar. There is, however, a flip side to this - even if profits fall, the debt-holders must still be paid their interest.
- Because of tax effects, the risk-adjusted component cost of debt is lower than that of common stock.
- The owners of the corporation do not have to share control.

The major disadvantages are as follows:

- Since debt service (interest plus scheduled principal repayments) is a fixed charge, a reduction in revenues may result in insufficient cash flow to meet debt service requirements. This can lead to bankruptcy.
- Financial leverage increases the firm's risk exposure, hence the cost of both debt and equity also rise accordingly.
- Debt normally has a fixed maturity; hence the firm has to repay the principal on a fixed date. It cannot be deferred.
- In a long-term contractual relationship, it is necessary for the indenture provisions to be much more stringent than in a short-term credit agreement. Thus, the firm will be subject to more restrictions than if it had borrowed on a short-term basis or had issued equity shares.
- There is a limit to the amount of funds that can be raised at a 'reasonable' rate. Widely accepted lending standards dictate that the debt ratio should not exceed certain limits, and when debt goes beyond these limits, its costs become exorbitant.

Some recent innovations in long-term financing include floating rate debt, whose interest payments fluctuate with changes in the general level of interest rates; junk bonds (junk FDs in India), which are high-yield instruments used by firms that are poor credit risks.

A firm's long-term financing decisions are influenced by its target capital structure, the maturity of assets, current and projected interest rates levels, the firm's current and projected financial conditions, and the suitability of its assets for use as collateral.

2.3.3 Advantages of Going Public

Permits Diversification: As a company grows and becomes more valuable, its founders often have most of their wealth tied up in the company. By selling some of their stock in a public offering, they can diversify their holdings, thereby reducing the risk element of their personal portfolios.

Increases liquidity: The stock of a closely held firm is non-liquid; it has no ready market. If one of the owners wants to sell some shares to raise cash, it is hard to find a ready buyer, and even if a buyer is located, there is no established price on which to base the transaction. These problems do not exist with publicly held company.

Facilitates raising new corporate cash: If a privately held company wants to raise cash by a sale of new stock, it must either go to its existing owners, who may not have any money or not want to put any more eggs in this particular basket, or to shop around elsewhere for wealthy investors. However, it is usually quite difficult to get outsiders to put money into a closely held company, because if the outsiders do not have voting control, insider stock holders/managers can put them to severe disadvantages.

Discover and establish a value for the firm: As the book value is not the real value, such value put forth by any one entity will merely reflect his personal opinion. The best way is to get the valuation of the business done by the market valuation. This will reflect the collective opinion of all the persons who are participating in the market. The book-building system in vogue for the purpose provides a reliable, workable mechanism for such fixation of a company's share price.

2.3.4 Disadvantages

Cost of Reporting: A publicly owned company must file quarterly, semi-annual and annual reports with stock exchanges on which it is listed. These reports can be costly, especially for small firms.

Disclosure: The management may not like the idea of reporting operating data because such data will then be available to competitors. Similarly, the owners of the company may not want people to know their net worth, and since a publicly owned company must disclose the number of shares owned by its officers, directors and major shareholders, it is easy enough for anyone to multiply shares held by price per share to estimate the value of an insider's investment.

Self-Dealings: The owners/managers of closely held companies have many opportunities for various types of questionable but legal self-dealings, including the payment of high salaries, nepotism, personal transactions with the business (such as a leasing arrangement), and not-truly-necessary fringe benefits. Such insider dealings, which are often designed to minimize taxes, are much harder to arrange if a company is publicly owned.

Inactive market/low price: If the firm is small, and if its shares are not frequently traded, its stock will not really be liquid, and the market price may not be representative of the stock's true value. Security analysts and stockbrokers simply will not follow the stock, because there will just not be sufficient trading activity to generate enough sales commissions to cover the cost of following the stock.

Control: Because of the dramatic increase in tender offers, proxy fights, and institutional investor activism, the mangers of publicly owned firms who do not have voting control must be concerned about maintaining control. Further, there is pressure on such managers to repeatedly generate higher profits every year, even when it might be in the shareholders' best long-term interests to adopt a strategy that sacrifices short-term earnings in favour of higher earnings in future years. Moreover, this relentless pressure to keep giving

higher returns can force managers to adopt questionable practices that can one day severely damage the company's reputation.

There are five different ways of offering equity shares: public issues, right issues, preferential allotments, and international offerings like GDRs/ADRs.

(i) *Public Issues* could be the first or the subsequent issues by the company to the general investor who may not be an existing shareholder in the company. The value of the shares held by existing shareholders could fluctuate depending upon the price at which the shares are offered to potential shareholders.

(ii) *Right Issue* is issued to the existing shareholders as a matter of pre-emptive right, in certain ratio relative to the existing holdings in the company. If the shareholders subscribe to their rights or sell the rights entitlement in the market, the value of the shares held by them does not change. The value changes only if the shares offered as a right are not subscribed to.

(iii) *Preferential Allotments* are just like public issues, with two major differences: One, the shares are offered at prices practically at par with market prices, unlike public issues, where the issue is usually below market prices. Two, the offer is specifically targeted at a select group of individuals, whether promoters or the institutional investors.

(iv) *Global Depository Receipts (GDRs) and American Depository Receipts (ADRs)* issues are the same as public issues, the only difference being that the issue is offered to international investors (including FIIs) at or around market prices prevailing in the domestic markets.

(v) *Bonus Issue* is an issue in which free shares are given to the existing shareholders in a predetermined ratio. No cash exchange takes place, and value of the shares held by the shareholders does not change.

2.4 HYBRID INSTRUMENTS

A warrant is a long-term call option issued along with a bond or on a stand-alone basis. Warrants are generally detachable from the bond, and they trade separately. When warrants are exercised, the firms receive additional equity capital and the original bonds remain outstanding. Warrants are ‘sweeteners’ that are used to make the underlying debt or preferred share issue more attractive to investors.

Fully Convertible Debentures (FCDs) are bonds issued by corporations which are convertible into common stock not too far in to the future. In order to avoid the credit rating process, these bonds are normally converted into common stock in less than 18 months with 6, 12 and 18 months being the normal converse periods. Rate of conversion is usually decided at the time of the issue but a price band can also be specified.

Partly convertible debentures are a combination of non-convertible debentures and fully convertible debentures.

Optionally convertible debentures provide an option to the debenture holder, to convert or not to convert. They usually carry an interest rate that they keep on paying if the investor decides not to convert these into equity shares because the market price of the shares is less than the conversion price.

Foreign Currency Convertible Bonds (FCCBs) are exactly like optionally convertible debentures with the difference that these are offered only to overseas investors.

2.5 INVESTMENT INSTRUMENTS OF THE MONEY MARKET

A money market is a mechanism that makes it possible for borrowers and lenders to come together. Essentially it refers to a market for short-term funds. It meets the short-term requirements of the borrowers and provides liquidity of cash to the lenders.

A money market is the market in which short-term funds are borrowed and lent. The money market does not deal in cash or money but in trade bills, promissory notes and government papers, which are drawn for short periods. These short-term bills are known as near money.

The major short-term credit instruments dealt with in a money market include:

- ***Trade Bills:*** These are bills exchange arising out of *bona fide* commercial transactions. They include both inland bills and foreign bills.
- ***Bankers' Acceptances:*** These are bills of exchange accepted by commercial banks on behalf of their customers. The fact that a bank of repute accepts a bill increases its creditworthiness, which, in turn, means that it can easily be discounted.
- ***Treasury Bills:*** These are promissory notes of short-term maturity issued by the government to meet its short-term financial needs.
- ***Short-dated Government Securities:*** These are securities issued by the government for short periods. Long-term government securities that are nearing maturity are also sometimes included in this category.
- ***Commercial Papers:*** These are short-term credit instruments dealt with in the Indian money market. They refer to promissory notes issued by certain well-known business houses to the specialized institutions known as 'commercial paper houses'. Their maturity period ranges between 90 to 180 days.
- ***Hundis:*** These are short-term credit instruments dealt with in the Indian money market. They refer to indigenous bills of exchange drawn in vernacular languages and under various circumstances.

2.5.1 New Instruments Introduced

- Zero Coupon Bonds (ZCBs)
- Non-Convertible Debentures (NCBs)
- Zero Interest Fully Convertible Debentures
- Equity Shares with Detachable Warrants
- Fully Convertible Cumulative Preference Shares
- Preference Shares with Warrants
- Fully Convertible Bonds with Interest
- Floating Rate Notes or Debentures
- Naked Debentures
- Debentures or Equity with Loyalty Coupons
- Discount Bonds
- Deep Discount Bonds

2.5.2 Issuers

- Government of India and other sovereign bodies
- Banks and development financial institutions
- Public sector undertakings
- Private sector companies
- Government or quasi-government owned non-corporate entities

2.5.3 Money Market Mutual Funds

- In April 1992, the Government of India announced the setting up of money market mutual funds with the purpose of bringing money market instruments within the reach of individuals. Only commercial banks and public sector financial institutions are permitted to set up MMMFs.
- In 1995, the RBI permitted private sector institutions to set up MMMFs.

Check Your Progress 2

Fill in the blanks:

1. A money market is a mechanism that makes it possible for borrowers and lenders to _____ .
2. A money market is a market where short-term funds are borrowed and _____ .
3. Trade bills include both inland bills and _____ .
4. The money market does not deal in cash or money but in trade bills, promissory notes and _____ .

2.6 NON-SECURITY FORM OF INVESTMENT

In India, the household sector's investment in non-security forms constitutes a major proportion of its total investment in financial assets. One of the basic channels of influence of financial development on growth is the saving rate. The primary mode through which this occurs is financial savings and in particular, intermediated financial savings. In fact, a distinction should be made between the determinants of the capacity to save and the willingness to save. While the capacity to save is dependent on the level and growth of per capita income, the willingness to save is influenced by a number of financial variables, such as, rate of interest and financial deepening. However, the effect of interest rate on saving in developing economies is not clear, partly because of the presence of either administered interest rates or some rigidities in the working of interest rate mechanism. After all, a change in interest rate could cause a variation in the portfolio composition of the household sector's saving without perceptible impact on the total quantum of saving. Financial deepening, on the other hand, is capable of increasing the total quantum of saving.

Table 2.1: Trends in Gross Domestic Saving

(as percentage of GDP at current market prices)

S.No.	Item	1990-91 to 1994-95	1995-96 to 2000-03	2003-2004 to 2006-07
	1	2	3	4
1.	Household sector (a + b)	14.1	17. 2	18.6
	(a) Financial Saving	6.7	8.4	10.6
	(b) Saving in Physical Assets	7.4	8.8	8.0
2.	Private Corporate Sector	1.6	2.4	4.1
3.	Public Sector	3.7	2.0	1.2
4.	Gross Domestic Saving (1+2+3)	19.4	21.6	23.9

There are a large number of non-security forms of financial assets that are available to investors in India. As stated earlier, these are more in the nature of savings of individuals and households, particularly for the benefit of small savers. These investments are guided more by conveniences safety and tax benefits rather than a strong desire to earn a very attractive rate of return. Most of the investments are illiquid but are generally accepted as good collateral for borrowing from banks. The following table describes the main features of these investments.

Table 2.2: Non-Security Forms of Investment Avenues

S. No.	Name of Investment	Rate of interest per annum	Term	Income tax deduction
1.	Bank Deposits:			
	Savings bank a/c	5%	short	u/s 80L
	Fixed/Recurring deposites	9-12%	medium	u/s 80L
2.	Post Office Schemes:			
	P.O.Savings bank	5.5%	short	tax free
	Public Provident fund	12%	Long	sec.88 rebate + int.tax free
	Recurring deposites	11%	long	sec.80L
	Time deposites	9-11%	long	sec.80L
	Monthly income scheme	13%		sec.80L
	NSS	11%	Long	sec.88 rebate + sec.80L

Contd....

3.	Small Savings Certificates:			
	NSC	12%	long	sec.88,sec.80L
4.	UTI/Mutual Funds:			
	US 64	variable	long	sec.80L
	Units of Mutual Funds	variable	long	sec.80L
	ELSS	variable	long	sec.88+sec.80L
5.	Others:			
	Life Insurance Policy	variable		
	Premium	bonus	long	sec.88

Other Forms of Non-Marketable Securities

- Bank Deposits
- Post Office Time Deposits (POTDs)
- Monthly Income Scheme of the Post Office (MISPO)
- Kisan Vikas Patra (KVP)
- National Savings Certificate
- Company Deposits
- Employees Provident Fund Scheme
- Public Provident Fund Scheme

2.7 UNITS

The units of the Unit Trust of India provide investment facilities to small investors for giving them a good current income and also capital appreciation. As in the case of a share, a unit earns a dividend, usually declared in July, for the preceding accounting year ending on 30th June. The UTI is required by law to distribute not less than 90% of its income. Individuals, companies, corporate bodies, etc. through direct agency, bank or post offices can open accounts. Investments in units enjoy tax benefits. Units can be considered as a channel of investment on a very moderate scale. So long as the special tax concession is available, it is attractive to high-income investors.

2.7.1 Unit-linked Insurance Plan (1971)

This is a ten-year scheme, designed to give double benefit of life cover and substantial tax concessions. A man or a working woman between the ages of 18 to 55 years can join the plan for any 'target' amount between Rs. 3,000 to Rs. 60,000. Contributions to the UTI should be paid half-yearly or annually for 10 years. The contributions will range from Rs. 300 to Rs. 1,200. Out of the individual's contribution a small amount (from 2.5% - 8.4%) is passed on to the LIC, for the first seven years, by way of premium. The balance will be invested in units. There is no medical examination and insurance cover is available for the entire 10 years. The application can be in the names of two persons. While insurance cover is only for the first person, in the event of death, the second person will be the beneficiary.

2.7.2 Reinvestment Plan (1966)

This plan provided for automatic reinvestment of dividend income at the special offer price prevailing in July every year. Suppose a person had 1,000 units, the dividend is 90 paise per unit and the special sale price is Rs. 11.50 per unit (par value Rs. 10) then the investor would automatically be credited with 78.26 units (Rs. 900/11.5).

2.7.3 Children Gift Growth Fund, 1986 (Interest 12.5% p.a.)

Under this plan, any minor child below the age of 15 can be gifted with 50 units and upwards in multiples of 10. The dividend income is reinvested every year, at the special price prevailing in July, until the child reaches the age of 21 years (optional up to 18 years for girls). Bonus dividend is paid every five years and the amount in gifted multiplies rises to about 12 times (excluding bonus and dividend) in 21 years.

2.8 SOCIAL SECURITY FUNDS

Household sector savings in the form of social security funds, which include savings in insurance and in provident and pension funds, constitute the second major category of financial savings next only to deposits.

Household sector savings in the form of insurance comprise of the life funds of Life Insurance Corporation of India (LIC), Postal Insurance, State Insurance Fund and Central Government Group Insurance Funds.

Various National Savings Schemes have been introduced from time to time to mobilise public savings for financing the economic development plans. These schemes have been very popular in view of tax benefits enjoyed by them. Unlike commercial bank schemes, these schemes are uniform all over the country. Again, the interest is paid on completed years, no payment being admissible for broken periods of a year. Premature encashment is discouraged. Some of the schemes are offered through the State Bank of India/nationalised banks. The national savings certificates sold through the SBI are designated as "Bank Series". Unlike commercial banks schemes, nomination facility is available for all the National Savings Schemes. Accounts can also be transferred from one post office to another. Further, many of these savings certificates can be pledged as security, towards loan guarantee.

2.8.1 National Savings Scheme - VIII Series

This is a tax saving scheme in the sense that the amounts deposited under it are exempt from tax.

Under this scheme, no withdrawal is permitted in the first three years. Thereafter, the depositor can withdraw once in a year and the amount shall not exceed the balance at the end of the 4th preceding financial year. Another attractive feature in this scheme is that the amount payable to nominee or legal heirs is totally tax-free.

2.8.2 10 Years Social Security Certificates

Persons in the age group of 18-45 years can purchase these certificates. The minimum investment amount is Rs. 500. The maturity period of these instruments is 10 years and the rate of interest is 11.3% p.a. compounded annually. These certificates can be encashed pie-mature after three years from the date of issue. In case of the death of the certificate holder before expiry of two years from the date of issue due to non-natural causes (excepting suicide), the legal heir/nominee is entitled to receive an amount equal to 3 times the face value of the certificates.

2.8.3 Kisan Vikas Patras

Such instruments are available at post offices and can be obtained in denominations of Rs. 1,000, Rs. 5,000 and Rs. 1,0000. The maturity period here is around 7 to 8 but premature encashment is possible. The interest payable on Kisan Vikas Patras is compounded annually but is taxable.

2.8.4 Indira Vikas Patras

These instruments are available at post offices and can be purchased by any person. Minimum investment in Indira Vikas Patras is Rs. 100. and there is no maximum limit. These are available in the maturity denominations of Rs. 200, 500, 1000 and Rs. 5000 and the investor has to pay half the face value. The initial amount is doubled in around 7 to 8 years and these patras cannot be encashed prematurely.

The interest on Indira Vikas Patras is compounded annually, is payable on maturity only and is taxable. These instruments are like bearer bonds and hence have to be carefully preserved.

2.8.5 National Savings Certificates (VIII Issue)

Such certificates are available in denominations of Rs. 100, 500, 1000, 5000 and Rs. 10,000. The interest on it is compounded half-yearly. Premature encashment is not generally possible. The National Savings Certificates can be purchased from the post office, can be pledged as security for loan and provide nomination facility.

2.8.6 Twelve-Year National Savings Annuity Certificates

This provides for a retirement plan. The rate of interest is the same as in NSC II Issue, though the manner of payment of interest is different. The annuity certificates are available only in higher denominations of Rs. 3,200 and Rs. 6,400. The deposit amount can be made either in lump sum or in periodic installments, spread over a period of two years. From the 61st month onwards, the depositor starts receiving a monthly annuity (Rs. 50 for a certificate of Rs. 3,200. and Rs. 100. for a certificate of Rs. 6,400) for seven years, at the end of which the holder gets Rs. 4,320 and Rs. 8,640 respectively. These figures are calculated with old rate of 10.25%.

In case of any default in payment of installment, either the period is extended by one year, till the installments have been paid, or the defaulter installments are paid in a lump sum along with simple interest at 12% per annum. The amount deposited is also, refunded, if required during the period of deferment with simple interest 5% per annum. The payments received in respect of these certificates are liable to income tax.

2.9 POST OFFICE TIME DEPOSIT

(i) ***Post-Office Savings Bank:*** Withdrawal from the account is by cheques and there is no restriction on withdrawals, unlike in a commercial bank. Accounts having minimum balance of Rs. 200 during April-September and October-March qualify for six monthly prize draws in the next January and July. The interest is tax-free and is ½% more than that offered on savings bank account by commercial banks.

(ii) ***Post Office Recurring Deposit:*** The scheme covers free life insurance cover after receiving contributions for 24 months on account of denomination of Rs. 5, Rs. 10, Rs. 15 or Rs. 20. In the event of death of the depositor after a minimum period of two years, from the date of opening the account, the heir or nominee will get the full maturity value of the account provided the depositor's age was between

8 and 53 years and there have been no withdrawals or defaults during the first two years and the account remains current at the time of death.

2.10 FIXED INCOME INVESTMENTS

Fixed income securities consist of government securities, corporate securities and PSU bonds. Securities issued by the Central Government, State Governments, semi-government authorities, autonomous institutions like part trusts, electricity boards, public sector financial institutions and other public sector units are broadly known as gilt-edged securities. Gilt-edged securities include treasury bills and dated securities.

Treasury bills are the short-term securities issued by the Central Government having maturity periods of 91, 182 and 364 days. Of late, the government commonly issues the 91 and 364 days Treasury bills. Typically, the Treasury bills do not carry any coupon rate but are sold at a discount. The difference between the face value and the discounted value constitutes the income to the investor. The discount rates on Treasury bills are low and hence the rates of return offered by the bills are not very attractive. Most of the buyers of Treasury bills are banks who purchase them to satisfy their liquidity requirements. Other buyers include institutional investors and provident funds. Individual investor interest in Treasury bills is almost nil. Treasury bills are the safest and hence their return is low. The Central Government also issues Ad hoc Treasury bills to meet its short-term resource requirements. These bills are taken up by the RBI and hence are not available to other buyers. The Finance Minister, in his 1995 budget speech, announced that government borrowing from the RBI through Ad-hoc Treasury bills would be gradually stopped.

Dated government securities have a maturity period longer than one year and carry a fixed coupon rate. Interest is generally paid semi-annually through encashable coupons. These securities may be issued at par or below par but are redeemed at par. The dated securities are either in the form of promissory notes or in the form of stock certificates. While the government promissory notes are negotiable freely by a simple endorsement, the stock certificates are transferable only through transfer deed, copies of which should be filed with the RBI. The RBI will make appropriate entries in its books and issue a new certificate to the transferee. The secondary market for Government securities is very narrow and the major individual investor interest in these securities is again very low on account of largeness of the size of each transaction. The rates of return on dated government securities are higher than those on treasury bills and the only risks are the risk of unexpected inflation and the interest rate risk.

Semi-government dated securities are those issued by government undertakings and guaranteed by the Central/State Governments. These are promissory notes and are similar to the government-dated securities in all respects. They carry a slightly higher rate of interest than dated government securities. The risks involved in these securities are the risk of unexpected inflation, interest rate of risk and a possible default risk.

Corporate securities, excluding equity shares, consist of Debentures and Commercial Paper (CP). The latter is more like a Treasury bill (no coupon rate and issued at a discount to the face value) and is raised by the corporate to meet their working capital needs. Transactions in CP are limited to a small set of players like banks and financial institutions. Common investors are not interest in CP.

Corporate entities desirous of issuing CPs should have a minimum net worth of Rs. 5 crores and should get the CP credit rates. Further, the company should be a listed company and should maintain a current ratio of 1.33 : 1. The CPs can be issued for a term of 3 to 6 months and should be of a minimum size of Rs. 50 lakhs. The CPs should be issued in trading lots of Rs.5 lakhs each.

Corporate Debentures are the promissory notes issued by the companies in the private sector. These debentures have a maturity period of 7 to 10 years. They carry a fixed coupon rate and may be issued at par or below par. They may be redeemed at a par or above par. Debentures are issued to the investing public subject to the conditions laid down in the agreement, between the company and the debenture holders, called the indenture. A public trustee is appointed to ensure that the interests of the debenture-holders are not compromised by the corporates. However, in case the debentures are privately placed, an indenture is not created and no trustee is appointed. Prior to 1991, the interest rates of corporate debentures were regulated with a ceiling on coupon rates of 12.5% for the convertible debentures and 14% for the non-convertible debentures. In July 1991, the government removed all restriction on interest rates. Debentures can be classified as follows:

(I) ***On the basis of security:*** secured debentures and unsecured debentures. Unsecured debentures, called naked debentures, are not permitted to be issued by the corporates. Secured debentures carry a fixed or floating charge on the assets of the corporate.

(II) ***On the basis of transferability:*** registered or unregistered debentures. Registered debentures can be transferred only through a transfer deed, which has to be registered with the company and stamp duty is payable at the transfer. Stamp duty varies from state to state. Unregistered debentures are bearer bonds, which can be freely transferred by a mere endorsement. There is no need for a transfer deed and hence no stamp duty. However, unregistered debentures are not issued because of many practical problems.

(III) ***On the basis of redeem ability:*** redeemable and unredeemable debentures. Redeemable debentures are those repayable after a fixed maturity period or by annual installments. The unredeemable debentures are those that are not redeemed till the company is liquidated. At present, they are not issued by the corporates.

(IV) ***On the basis of convertibility:*** convertible and non-convertible debentures. Convertible debentures are in turn classified into two types - fully convertible and partly convertible debentures. Fully convertible debentures are converted into equity shares on a specified date or dates at a specified price. The conversion ratio, conversion price and the period when conversion option could be exercised are indicated in the offer document. Conversion of debentures into equity shares is optional to the investor, but not compulsory. Partly convertible debentures have two portions - the convertible portion and the non-convertible portion. While the convertible portion is convertible into equity shares at the option of the investor, the non-convertible portion carries fixed interest and is redeemable after the maturity period. The non-convertible portion is called khokha, traded in the secondary market like any other non-convertible debentures. Non-Convertible Debentures (NCD), on the other hand, do not carry any option for conversion into equity shares. These NCD generally carry a coupon rate of 14-17% and a much higher effective current yield. NCDs are traded in the secondary market at a discount because of which the effective yield will be higher than the coupon rates. For example, if NCD of a face value of Rs. 100 carrying coupon rate of 15% is traded at Rs. 80 in the secondary market, the nominal interest for one year will be Rs. 15. If an investor buys the NCD in the market at Rs. 80, his current yield will be:

$$\frac{\text{Nominal interest}}{\text{Current price}} = \frac{15}{80} = 0.1875 \text{ i.e., } 18.75$$

The corporate debentures are affected by such risk factors as the inflation risk, interest rate risk and default risk. They are also subject to certain degree of liquidity risk. In spite of several attractive features of debentures, the secondary market in corporate debentures has remained out of bounds for individual investors. At present the institutional investors dominate the market, but of late, it is becoming broad-based with the commencement of trading in corporate debentures in the National Stock Exchange and the OTCEI. Another interesting feature that is emerging is to attach 'Equity Warrants' as sweeteners to the NCDs at the time of issue. These warrants can be converted into equity shares at a predetermined time and pre-set price. Some corporate entities have started innovative practices in designing debt instruments; most prominent among them are the 'Zero Coupon Bonds', 'Zero Coupon Convertible Bonds and 'Deep Discount Bonds'. Zero Coupon Bond is a debenture without any coupon rate and is issued at a discount to the face value. After the maturity period, the face value of the instrument is paid to the investor. These bonds take care of re-investment risk because the interest earned is deemed to be reinvested. When the zero coupon bonds come with the option of conversion into equity shares they are called the Zero Coupon Convertible Bonds. Deep discount bonds, for example, the bond issued by the IDBI in 1992, are similar to zero coupon bonds except that they have a very long maturity period such as 15 to 25 years.

Sometimes, debentures are issued by the corporates with a call option embedded into them. Such debentures can be called for redemption by the corporate at a specified price before the maturity date.

The prices of bonds change to reflect interest rate movements. For example, if there is an increase in interest rates, the current yield can remain constant only if the market price of the debentures goes down. In case, interest rates were to decline, the market values of the securities appreciate, so that the investor would continue to obtain current yield. This leads to capital gains or loss even on debt securities, as prices move up or down in relation to changes in interest rates. Hence, the concept of Yield-to-Maturity takes into account not only current yield, but also capital appreciation on the residual life of security.

Advantages of Fixed Income Securities

1. Source of relatively safe regular income.
2. Legally binding agreement to pay interest and principal.
3. Generally secured by the assets of the issuing company.
4. If a fund is created for redeeming the bonds, like Debenture Redemption Fund, there is an assurance of timely repayment of interest and principal.
5. Bonds that can be converted into equity shares have built-in potential for capital gains.
6. Comparatively less volatile in price fluctuation.
7. Many bonds issued by the government, public sector companies and other companies are eligible for tax concessions.
8. Act as better collateral for borrowing purposes.
9. The degree of risk involved can be evaluated by independent professional rating agencies before the issue. Hence the investor can ascertain whether the investment is sale or not. Periodical review by the rating agency affords investor protection.

2.11 GOVERNMENT SECURITIES

Government securities (G-secs) or gilts are sovereign securities, which are issued by the Reserve Bank of India (RBI) on behalf of the Government of India (GOI). The GOI uses these funds to meet its expenditure commitments.

2.11.1 Treasury Bills

Treasury bills are short-term money market instruments, which are issued by the RBI on behalf of the GOI. The GOI uses these funds to meet its short-term financial requirements of the government. The salient features on T-Bills are:

- These are zero coupon bonds, which are issued at discount to face value and are redeemed at par.
- No tax is deducted at source and there is minimal default risk.
- The maximum tenure of these securities is one year.

Different types of Government Securities

Following are the different types of government securities:

(a) ***Dated Securities:*** These securities generally carry a fixed coupon (interest) rate and have a fixed maturity period. e.g. an 11.40% GOI 2008 G-sec. In this case, 11.40% is the coupon rate and it is maturing in the year 2008. The salient features of dated securities are:

- ❖ These are issued at the face value.
- ❖ The rate of interest and tenure of the security is fixed at the time of issuance and does not change till maturity.
- ❖ The interest payment is made on half yearly rest.
- ❖ On maturity the security is redeemed at face value.

(b) ***Zero coupon bonds:*** These securities are issued at a discount to the face value and redeemed at par i.e. they are issued at below face value and redeemed at face value. The salient features of zero coupon bonds are:

- ❖ The tenure of these securities is fixed.
- ❖ No interest is paid on these securities.
- ❖ The return on these securities is a function of time and the discount to face value.

(c) ***Partly paid stock:*** In these securities, the payment of principal is made in installments over a given period of time. The salient features of Partly Paid Stock are:

- ❖ These types of securities are issued at face value and the principal amount is paid in installments over a period of time.
- ❖ The rate of interest and tenure of the security is fixed at the time of issuance and does not change till maturity.
- ❖ The interest payment is made on half yearly rest.
- ❖ These are redeemed at par on maturity.

(d) ***Floating rate bonds:*** These types of securities have a variable interest rate, which is calculated as a fixed percentage over a benchmark rate. The interest rate on these securities changes in sync with the benchmark rate. The salient features of Floating Rate Bonds are:

- ❖ These are issued at the face value.
- ❖ The interest rate is fixed as a percentage over a predefined benchmark rate. The benchmark rate may be a bank rate, Treasury bill rate etc.
- ❖ The interest payment is made on half yearly rests.
- ❖ The security is redeemed at par on maturity, which is fixed.

(e) ***Capital indexed bonds:*** These securities carry an interest rate, which is calculated as a fixed percentage over the wholesale price index. The salient features of Capital Indexed Bonds are:

- ❖ These securities are issued at face value.
- ❖ The interest rate changes according to the change in the wholesale price index, as the interest rate is fixed as a percentage over the wholesale price index.
- ❖ The maturity of these securities is fixed and the interest is payable on half yearly rates.
- ❖ The principal redemption is linked to the wholesale price index.

2.11.2 Invest in Government Securities

Entities registered in India including banks, financial institutions, primary dealers, partnership firms, institutions, mutual funds, Foreign Institutional Investors (FIIs), State Governments, provident funds, trusts, research organizations, Nepal Rashtra Bank and individuals can invest in government securities.

2.11.3 Advantages and Disadvantages of Investing in Gilts

Advantages

1. The main advantage of investing in G-secs is that there is a minimal default risk, as the instrument is issued by the GOI.
2. G-secs, especially dated securities, offer investors the opportunity to invest in very long-term debt (at times with maturity over 20 years), which is usually not available from the private sector.
3. Although some issues of G-secs tend to be illiquid, there is adequate liquidity in most other issues. In fact, buying and selling from/to a primary dealer can take care of the liquidity risk.

Disadvantages

The main disadvantage of investing in G-secs is the same as in the case of investing in any other debt instrument i.e. possibility of higher interest rates and inflation. While higher interest rates will lead to erosion in value of the bond, a rise in inflation will eat into the real return (though this can be taken care of by buying capital indexed bonds, for example).

Tax benefits by investing in gilts

There is no tax deducted at source and the investor can avail tax benefit u/s 80L i.e. Rs. 3,000/-.

Minimum amount for investing in gilts

The minimum amount for investing in gilts varies depending on the primary dealer. For example, in case of IDBI Capital markets, which are primary dealers, the minimum amount for investing in gilts is Rs 10,000.

Hold these instruments in a demat form

The Reserve Bank of India maintains a Subsidiary General Ledger (SGL) Account for holding and trading gilts and treasury bills in dematerialised form. Banks and primary dealers are allowed to open SGL accounts with RBI. These primary dealers in turn are permitted to offer the facility of Constituent SGL account to other non-bank clients to hold these securities in a demat form.

What are Gilt accounts?

Accounts maintained by investors with the primary dealers for holding their government securities and Treasury bills in the demat form are know as gilt accounts. The salient features of gilt accounts are:

- It is like a bank, which debits or credits the holders account on withdrawal or deposit of the money. Similarly in a gilt account the holder's account is debited or credited on the sale or purchase of the securities.
- The account holder receives a statement at periodic intervals showing the balance of securities in his account.
- All the securities are maintained in demat mode, which can be converted into physical mode whenever required by the gilt account holder.

Commonly used terms

Coupon rate: Every government security carries a coupon rate also called interest rate, which is fixed. e.g. 12.00% GOI 2008, where 12.00% is the coupon rate payable on the face value, which matures in the year 2008.

Face value: The par value of the security (the issue price may be at a discount or a premium to the par value).

Current price: As these G-secs are traded in the secondary market, the price of these G-secs fluctuates according to the demand/supply in the market for that security. The current price is the prevailing price in the secondary market.

Wholesale price index: A wholesale price index is an index of prices of select commodities. The percentage in the index reflects the inflation/deflation.

Primary dealer: Primary dealer is an intermediary who buys and sells government securities and treasury bills. He is authorised by the RBI.

Secondary market: Like the stock market where stocks are traded there is a secondary market where the debt instruments like gilts, bonds and treasury bills can be bought and sold.

Yield: Yield is the actual return on the investments. There are different types of yields:

- Coupon yield: Coupon yield is the fixed interest rate on a government security or bond e.g. 12.00% GOI 2008, where 12.00% is the coupon yield. This yield does not reflect the change in the interest rate, inflation rate or any other economic factor.

- ***Current yield:*** Current yield is the return on the government security or bond depending on its purchase price. For example, an investor 'A' purchases 12.00% GOI 2008 at Rs 100 and an other investor 'B' purchases the same instrument at Rs 110. The current yield of investor 'A' will be 12.00%. The current yield of investor 'B' will be 10.91% .
- ***Yield-to-Maturity (YTM):*** Yield-to-maturity is the discount rate that equates present value of all the cash inflows to the cost price of the government security or bond. This is actually the Internal Rate of Return (IRR) of the government security or bond.

Check Your Progress 3

1. _____ bills are short-term money market instruments, which are issued by RBI on behalf of GOI.
2. _____ securities generally carry a fixed coupan (interest) rate and have a fixed maturity period.
3. Capital indexed bonds carry an interest rate, which is calculated as a fixed percentage over the wholesale _____ .
4. The interest rate changes according to the change in wholesale _____ .

2.12 DEPOSIT WITH COMPANIES

These deposits are accepted by the companies under relevant government regulations. But these regulations do not mean any great safety to the depositor. The interest rates (ranging from 6 -12%) are quite attractive but there is no tax exemption on interest earned. The interest income is subject to tax deduction at source, at the rates in force under Section 194-A of the Income Tax Act.

While investing in reputed companies may be safe to a great extent, an investor must be doubly cautious while investing in less reputed companies, particularly private limited companies who may misguide the public by advertising a return of 66.67% for a deposit of three years. In fact, there are not many companies in which the public can deposit their money without anxiety.

In company deposits, the element of risk is the real problem as these deposits are unsecured loans. Of course, companies are required to fulfill certain norms such as deposits for a period of 3-6 months should not exceed 10% of the aggregate paid up share capital and free reserves of the company. According to Section 58-A and 58-B of Companies Amendment Act of 1974 and the Companies (Acceptance of Deposits) Rules 1975 as amended in April 1979, a company has to reveal certain required information while inviting deposits from the public. An investor should go through that information very carefully.

2.13 BULLION/GOLD, SILVER, PLATINUM

From times immemorial gold and silver have constituted important media for investment from the points of view of both capital appreciation and liquidity. But these precious metals do not yield any current return. In fact, there is a cost, even if modest, in holding bullion, capital appreciation could also be on some equity shares besides a current return.

2.13.1 Gold

The monthly average price of gold in the Mumbai market recorded a sharp rise of Rs. 9,200 per 10 grams in March 2007 as compared to 27 years ago. Presently, investment on gold (not in jewellery) is a good investment.

The rally in gold prices during the second half of 2006-07 in the national and international markets could be largely attributed to supply-demand imbalances. On the supply side, a deceleration in gold production in major gold producing countries and a virtual stoppage of sale of official gold holding by central banks reduced the supply in the market. On the demand side, investors' disappointment with global equity markets and apprehension regarding future inflation following the Federal Reserve's lowering of the short-term lending rate led to a sharp increase in demand for the yellow metal.

2.13.2 Silver/Platinum

Silver prices in the domestic market in Mumbai fluctuated in a narrow range during April-December 2006, but soared during January through early April 2007. It increased thereafter and this trend continued till May 2007. Silver and Platinum became major investment avenues in our country.

2.14 REAL ESTATE INVESTMENT

Real estate has historically been useful in a portfolio for both income and capital gains. Home ownership, in itself, is a form of equity investment, as is the ownership of a second or vacation home, since these properties generally appreciate in value. Other types of real estate, such as residential and commercial rental property, can create income streams as well as potential long-term capital gains.

Real estate investments can be made directly, with a purchase in your own name or through investments in limited partnerships, mutual funds, or Real Estate Investment Trusts (REIT). REIT is a company organized to invest in real estate. Shares are generally traded in the organized exchanges.

Also, there are many kinds of investments. Some are very speculative while others are more conservative. The major classifications are:

- Residential house
- Sources of housing finance
- Features of housing loans
- Guidelines for buying a flat
- Commercial property
- Agricultural land
- Suburban land
- Time share in a holiday resort
- Unimproved land
- Improved real estate
- New and used residential property
- Vacation homes
- Low income housing

- Certified historic rehab structures
- Other income-producing real estate such as office buildings, shopping centres and industrial or commercial properties
- Mortgages such as through certificates packaged and sold through entities.

2.14.1 Advantages

1. The potential for high return in real estate exists due, in part to the frequent use of financial leverage. Financial leverage is the use of borrowed funds, as in a long-term mortgage, to try to increase the rate of return that can be earned on the investment. When the cost of borrowing is less than what can be earned on the investment, it is considered 'favourable' leverage, but when the reverse is true, it is considered 'unfavourable' leverage.
2. There are potential tax advantages in real estate, as well. First, for personal use residential property, there is the opportunity to deduct interest paid (first and second homes, within limitations) There may also be a deduction for property taxes. If the property is income producing, other expenses may be deductible as well, such as depreciation, insurance, and repairs. Also, real estate can be traded or exchanged for similar kind of property on a tax-free basis. And lastly, if the sale of investment real estate results in a profit, the gain is normally a capital gain. (Note: real estate investment was dealt a blow under the Tax Reform Act of 1986, and the related rules are somewhat complex, as it relates to passive business activities, so your tax adviser should be consulted concerning any tax implications for your specific situation.)
3. Some consider real estate a good hedge against inflation.
4. Good quality carefully selected income property will generally produce a positive cash flow.
5. As a real estate owner, you may be in a position to take your gains from real estate through refinancing the property without having to sell the property, therein triggering a taxable capital gain. Real estate is advantageous in this respect, because good quality properties can be used to secure mortgage loans up to a relatively high percentage of current value.

2.14.2 Disadvantages

1. There is generally limited marketability in real estate (depending on the nature and location of the property).
2. There is also a lack of liquidity, in that there is no guarantee that the property can be disposed of at its original value, especially if it must be done within a short period of time.
3. A relatively large initial investment often is required to buy real estate.
4. If ownership in investment property is held directly by the investor, there are many “hands-on” management duties that must be performed.
5. Real estate is often considered high risk because it is fixed in location and character. It is particularly vulnerable to economic fluctuations such as interest rate changes and/or recession.
6. The Tax Reform Act of 1986 eliminated many of the previously-available tax advantages relating to real estate.

2.15 NEW AVENUES FOR INVESTMENT

2.15.1 ULIP

Take charge of your returns with ULIP

Unit-linked plans have gained popularity in a very short time and they seem to shine in comparison with traditional endowment product from insurers and ELSS schemes from mutual funds. But are they really as good as they claim to be and are there any downsides in investing in ULIPs? This is something investors are eager to know. Unit-Linked Insurance Plan (ULIP) is a life insurance solution that provides the benefits of protection the benefits of protection and flexibility in investment. It is prime facie an insurance policy. The investment is denoted as units and is represented by the value that it has attained, called Net Asset Value (NAV). The policy value at any time varies according to the value of the underlying assets at the time. IRDA in its recent pronouncement has, however, fixed the minimum sum assured for ULIPs.

Freedom to Choose

Normally in an insurance policy like endowment policies, returns accrue to you in the form of bonuses declared by the insurer form out of the profits earned on investments made on your behalf by the insurers. You had no choice over where your insurer will invest on your behalf. ULIPs let you take change and decide which class of investments your money should go; whether to invest in equity, debt and so on rests with you. If you want totally risk-free return, you can choose an investment option of 100% debt securities. Conversely, if you are totally comfortable with risk, you can choose a 100 percent equity potion. Various options with differing equity and debt mix are also available. This gives you greater control over your investments and you can choose the one which best suits your risk-taking ability. A thumb rule followed in the field of investment for asset allocation between equity and debt is that the equity exposure should be 100 less the age of the investor.

You can switch from one portion to another, subject to some limitations. For example, if you are invested in a 70% equity and 30% debt option you can feel bullish, or to 100& debt if your view on equity markets is bearish. Most insurance offer some switches a year for free. Thereafter, you will have to pay a switching fee. Others may not change a switching fee but apply a spread between buy and sell quotes of NAVs .

Risks

The sense of empowerment comes with a price. The price is the ability to predict the future performance of the stock and debt markets. The purpose of investing in ULIPs will defeated if the returns you get is lower than the bonuses received on an ELSS scheme. So you will have to acquire sufficient expertise over risk-return on these asset classes or get sound advice from experts. Principally, you need to understand that exposure to equity investment is not without risk and that risk is being borne by you.

Factors to Evaluate

Cost is a major factor in case of ULIPs. Typically, all the costs are frontloaded and it could be as high as 25% in the first two years as the insurance companies recover all the costs of the policy in the beginning itself. The costs even out and are comparable to a mutual fund investment only in the long term. Consistency of a performance quality of the promoters of the insurance company and their track record in insurance are the factors to consider before deciding on a ULIP. If you are committed to investing for

the long-term and are comfortable with the risk that comes with unit-linked products, you can look at this class of investment.

2.15.2 New Insurance Policies

Mix and Match based on Need

Investments in life insurance have always been an important part of everyone's investment planning exercise. It is important that people buy insurance keeping both their long-term financial goals and their tax planning in mind. The insurance sector has come into the limelight since the last few years after the government opened it for private players, who brought in a lot of innovative products, thereby increasing competition and aggressive marketing in this sector. This is good for investors as they have more options/variety of investing their money.

Every insurance product has its own positives and negatives. Investors should carefully weigh the pros and cons before making an investment decision. Diversification and building a portfolio of multiple products is one way to deal with this confusing situation. First of all, investors need a little bit of understanding of various insurance products (categories) available in the market and the positive and negatives of those products.

Endowment Plans

These are traditional insurance plans that provide insurance covers as well as gives return on maturity. These plans invest most of their corpus in corporate bonds, G-secs and money market instruments. They provide a safe/guaranteed return in the range of 4-7%. Child plans and money-back plans are variants of endowment plans. Such plans purport to give the individual either a certain sum at regular intervals (in case of money-back plans) or as a lump sum on maturity.

Term Plans

Term insurance is a basic pure insurance plan. The premium in this plan covers the risk element (mortality charges), sales and administration expenses. That is why the premium charged in term insurance plans is much lower then in endowment plans. The premium charged in term insurance does not have any savings element and hence the individual does not receive any maturity benefit. A term plan should form a part of every individual's investment plan and provide more risk coverage for small investment. Individuals with younger age (more responsibilities) can opt for more coverage by buying more term policies and as their risk component reduces with time, they can slowly drop some part of term policies. A term plan should be part of every individual’s insurance portfolio.

Unit-linked Plans

Unit-Linked Insurance Plans (ULIP) have been in the limelight from last few moths as the stock market is presently soaring. A ULIP is linked to a mutual fund with a life cover added to it. They invest the corpus in market-linked instruments like stocks, corporate bonds and government securities (G-secs) etc. Investing in the stock is the basic difference between ULIPs and traditional insurance plans. Although stock markets give better returns in a long period of time as compared to other investment option, they bring in a certain degree of risk of losing the money. Investments in ULIPs should be related to the individual's appetite for risk. Individuals who can task higher risk (younger investors) could consider buying ULIPs with a higher equity component. ULIP should also be part of every insurance portfolio. The percentage can vary based on the individual's risk appetite.

Investors should look for building an insurance portfolio, which maximizes their returns and also offers the required risk cover to them. Investors should make a proper evaluation of their needs and then carefully build a life insurance portfolio. They should analyse the facts and their needs carefully before making investment decision.

Invest in Gold without Buying it

Gold mutual funds offer investor a new, innovative relatively cost-efficient and secure way to access the gold market. Gold units are intended to offer investors a mean of participating in the gold bullion market without the necessity of taking physical delivery of gold. Investors can buy and sell their interest through the trading of a security on a regulated stock exchange.

The Securities and Exchange Board of India had permitted introduction of gold exchange traded fund scheme by mutual funds in 2006. These schemes are permitted to invest primarily in gold and gold-related instruments, i.e. specified instruments having gold as underlying.

GTF scheme means a mutual fund scheme that invests primarily in gold or gold-related instruments.

The assets of the scheme are gold or gold-related instruments kept in the custody of a bank, which is registered as a custodian with SEBI.

A GTF scheme is subject to these investment restrictions:

- The initial issue expenses should not exceed 6% of the fund raised under that scheme.
- The fund of the scheme should be invested only in gold or gold-related instruments in accordance with its investment objective, except to the extent necessary to meet the liquidity requirements for honouring repurchase or redemption, as disclosed in the offer documents.
- Pending deployment of funds as mentioned above the mutual fund may invest in short-term deposit of scheduled commercial banks.

The Net Asset Value (NAV) of units under the scheme is calculated by dividing the market or fair value of the scheme's investments and current assets, minus current liabilities and provisions, by the number of units outstanding under the scheme on the valuation date.

The NAV is calculated up to four decimals. For a GETF, the limit applicable to equity scheme is applicable. So there are no indices catering to the gold selector/security linked to gold. Currently, GTF is benchmarked against the price of gold.

SEBI has recently specified the methodology for valuation of gold by the Gaffs. The gold had by a GTF is valued at the AM fixing price of London Bullion Market Association (LBMA) in US dollar per troy ounce for gold having a fineness of 995.0 parts per thousand.

The valuation is subject to:

- Adjustment for conversion to metric measures as per standard conversion rates.
- Adjustment for conversion of US dollars into Indian rupees as per the RBI reference rate declared by the Foreign Exchange Dealers Association of India (FEDAI).

- Addition for transportation and other charges that may be normally incurred in bringing gold from London to the place where it is actually stored on behalf of the mutual fund, and national customer duty and other applicable taxes and levies that may be normally incurred to bring the gold from London.

Also, it has been specified that where the gold held by a GTF scheme has a greater finance, the relevant LBMA price of AM fixing will be taken as the reference price. In case the gold required by the fund is not in the forms of standard bars, it will be converted into standard bars, which comply with the good delivery norms of the LBMA thereafter valued as per the above guidelines.

The introduction of gold funds is intended to lower of many barriers like access, custody, and truncation costs. A GTF will represent gold as the underlying security, which will be traded at the exchange. Investment through this mode is efficient, cost-effective and convenient. Investors get instruments to invest and thereby reduce their risks while increasing their returns.

Check Your Progress 4

State true and false for the following statements:

1. Equity shares do not represent equity capital.
2. Cyclical stocks are companies whose earnings fluctuate with the business cycle.
3. Discount stocks are companies which are quoted or valved below their face value.
4. A company that pays a large dividend relative to the market price is called an income stock.
5. The stocks which are not doing well in the sense that their market price is well below the intrinsic value, are called Turnaround stocks.

2.15.3 Art

Investing in arts – Cashing in on the Future

As art is increasingly being seen as lucrative avenue for investments, a large number of people have started buying art as a part of their investment portfolio. The Indian art market is doing extremely well internationally and there has been a marked increase in the number of foreign buyers.

However, there are various factors that govern the pricing of a work of art in the primary and the secondary markets. According to experts "Investment in art does not have the ease of liquidity that stocks and shares have. You cannot take it to the market and trade in it immediately. Just as real estate is a long-term investment opportunity, art is an even longer term investment option". It is still a good investment option to add to one's portfolio, apart from conventional assets such as stocks, gold and real estate.

It is estimated that currently the art market is growing at around 30% per annum. However, many artists' works have appreciated at 200% as well. We advise investors to begin with an amount of approximately Rs. 20 lakhs to be able to buy a good collection of work that comprise a judicious mix of established and upcoming artists. An amount of Rs. 1-21 lakhs is an optimal sum to buy art for its decorative value, which may eventually turn in the long run. However the percentage of risk is always higher when buying upcoming or lesser-known artists.

The ET art index provides a quantitative of price trends and is computed on the basis of the average square inch rate of works of art of India's leading 51 contemporary artists. Manjit Bawa, M.F. Husain, F.N. Souza, Tyeb Mehta, V.S. Gaitonde, Akbar Padamsee, Ganesh Pyne, Paristosh Sen and Raja Ravi Verma are some of the well-known artists listed in this category. Investing in any one of these artists is a safe option. However, their prices are already beyond the range of many small investors.

The mid-segment bracket comprises work of artists who are fairly established and could possibly be in a rice range of Rs. 5-15 lakhs for an average-sized work. These are the next group of artists who are most likely to hit the top league in the near future. The under Rs. 3 lakhs category would comprise works by promising artists who are in the process of getting established and are beginning to make a name for themselves. Remember, investing in this group carries the highest risk, but returns can also be spectacular in the long-term provided the artist sustains himself and the Indian art market continues to grow at the present rate. Prices mentioned are indicative and depend on the size and the medium of the work of art.

A few points for investors to remember:

1. Do a through assessment of the artists past performance and price trends.
2. Always buy from reputed dealer or art gallery.
3. The gallery price of an artist is much lower than his auction rates.
4. Make sure you get a provenance certificate (a letter of authenticity) from the seller.
5. Take good care of your work of art you have purchased. Prices are directly related to the condition of the artwork. For instance, keep away from direct sunlight, focused light and dampness.

When reselling your work of art, remember, there are gallery commissions, current price of the artist and tax implications, which will affect the profit margin.

2.16 LET US SUM UP

Non-security forms of investment include all those investments that 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. The above investments are essentially forms of savings and should be treated as such. In India nearly 33% of the household savings go into such savings schemes as post office savings schemes, life insurance, provident funds etc.

Another popular investment avenue is the investment in physical assets such as gold, silver, diamonds, real estate, antiques etc. Indian investors have always considered the physical assets to be attractive investments and particularly, for hedging against inflation, India has a very long tradition in arts and crafts in jewellery, made of gold/silver and precious stones. Moreover, it has been observed that in times of high inflation, investors move away from financial assets into physical assets more particularly, real estate.

The bewildering range of investment alternatives fall into two broad categories. These are financial assets and real assets.

A good portion of the financial assets of individual investors is held in the form of non-marketable financial assets such as bank deposits.

Debt instruments that have a maturity of less than one year at the time of issue are called money market instruments. Bonds or debentures represent long-term debt instruments.

Preference shares represent a hybrid security. Equity shares represent ownership capital.

A mutual fund represents a vehicle for collective investment. Mutual fund schemes are broadly classified as equity schemes, balanced schemes, and debt schemes. Endowment assurance policies, money-back policy, whole life policy, unit linked plan, and term policy are popular life insurance policies in India. As a category, real estate is an attractive investment proposition.

Precious objects are items that are generally small in size but highly valuable in monetary terms.

2.17 LESSON END ACTIVITY

Suppose you are a financial advisor of a reputed company; how would you provide information to the management about different speculation investment avenues in India.

2.18 KEYWORDS

Capital appreciation: The stock price reflects the underlying fundamentals. Capital gains offer certain tax advantages.

Dividend payout: Companies can pay higher dividends and provide current cash flows to the investor.

Bonus shares: Enhance liquidity and ensure capital gains

Rights shares: Shareholders may get additional shares for less than market price. If the investor does not want to invest in that company he can sell his rights in the market.

Liquidity: Saleability and exit options are ensured in the case of actively traded stocks.

Security for pledging: Capital appreciation of equity shares makes them good securities for borrowing from the financial institutions and banks.

Coupon rate: Every government security carries a coupon rate also called interest rate, which is fixed. e.g. 12.00% GOI 2008, where 12.00% is the coupon rate payable on the face value, which matures in the year 2008.

Face value: The par value of the security (the issue price may be at a discount or a premium to the par value).

Current price: As these G-secs are traded in the secondary market, the price of these G-secs fluctuates according to the demand/supply in the market for that security. The current price is the prevailing price in the secondary market.

Wholesale price index: A wholesale price index is an index of prices of selected commodities. The percentage in the index reflects the inflation/deflation.

Primary dealer: Primary dealer is an intermediary who buys and sells government securities and treasury bills. He is authorised by the RBI.

Secondary market: Like the stock market where stocks are traded there is a secondary market where the debt instruments like gilts, bonds and treasury bills can be bought and sold.

- ***Bankers' Acceptances:*** These are bills of exchange accepted by commercial banks on behalf of their customers. The fact that a bank of repute accepts a bill increases its creditworthiness, which, in turn, means that it can easily be discounted.
- ***Treasury Bills:*** These are promissory notes of short-term maturity issued by the government to meet its short-term financial needs.
- ***Short-dated Government Securities:*** These are securities issued by the government for short periods. Long-term government securities that are nearing maturity are also sometimes included in this category.
- ***Commercial Papers:*** These are short-term credit instruments dealt with in the Indian money market. They refer to promissory notes issued by certain well-known business houses to the specialized institutions known as 'commercial paper houses'. Their maturity period ranges between 90 to 180 days.
- ***Hundis:*** These are short-term credit instruments dealt with in the Indian money market. They refer to indigenous bills of exchange drawn in vernacular languages and under various circumstances.

2.19 QUESTIONS FOR DISCUSSION

1. Discuss the various saving schemes promoted by post office, which are presently available to investors.
2. Should an investor commit his funds in bullion? What are the advantages and disadvantages of such an investment?
3. Discuss the role of social security funds in the mobilizing financial savings.
4. Why should you invest on money market instruments? What are the different money market instruments? Explain in detail.
5. Why should an investor include non-security forms of investment in his portfolio.

Check Your Progress: Model Answers

CYP 1

1. shareholders 2. corporation 3. stock 4. realized

CYP 2

1. come together 2. lent 3. foreign bills 4. government papers

CYP 3

1. treasury 2. dated 3. price-index 4. price-index

CYP 4

1. F 2. T 3. T 4. T 5. T

2.20 SUGGESTED READINGS

Sudhindra Bhat, *Security Analysis and Portfolio Management*, Excel Books, Delhi.

Kevin, S., *Security Analysis and Portfolio Management*, Printice Hall of India.

Prasanna Chandra, *Investment Analysis and Portfolio Management*, Second Edition, Tata McGraw Hill.

Punithavathy Pandian, *Securities Analysis and Portfolio management*, Vikas.

Investment Management, V. K. Bhalla.

A. Davis, *Investors in a Changing Economy*, Printice -Hall, 1968.

Williamson, J. Peter, *Investments: New Analytic Techniques*, London, Longman, 1970.

Cottle, CC., and Whitman, W.T., *Investment Timing: The Formula Plan Approach*, McGraw Hill.

UNIT II

LESSON

3

RISK AND RETURN

CONTENTS

3.0 AIMS AND OBJECTIVES

After studying this lesson, you should be able to:

- Understand historical and expected return
- Know about risk measurement
- Learn about systematic and unsystematic risk
- Have knowledge about different types of risk

3.1 INTRODUCTION

Unlike natural science and like medicine, law and economics, investing lies somewhere between an art and a science. Certain aspects of investing lend themselves to a scientific approach. The creation of computer skills has accelerated the use of scientific methods.

However, corporations are managed by people and therefore open to problems associated with their faulty judgments. Moreover, the corporations operate in a highly dynamic and competitive environment, and many operate both nationally and internationally. As a result, the judgment factor still dominates investment decisions.

Whether investing will ever be classified as a science is doubtful, but research, training and experience have developed investing into a discipline. Discipline means a structured, consistent and orderly process without rigidity in either concept or methods.

3.1.1 Financial Analysis

Financial analysis is the informative and predictive function in investing. It provides information about the past and present, and it quantifies expectations for the future. Capital budgeting decisions, corporate financial polices, and informed selections of securities for investment are all products of financial analysis. Analytical resources mobilized for these purposes include economic, capital market, sector and specific security analyses.

3.1.2 Economic Analysis

Economic analysis provides both near-term and longer-term projections for the total economy in terms of the nation's output of goods and services, inflation, profits, monetary and fiscal policy, and productivity. It, thus, provides the foundation for capital market, sector, industry and company estimates of the future.

3.1.3 Capital Market Analysis

Capital market analysis examines the industries and securities of individual companies primarily to develop value and return expectations for securities and thus to distinguish over-priced securities from under-priced ones.

Between capital market analysis and security analysis, incorporating some characteristics of each is sector analysis. Broader than industry and company analysis, sector analysis may be viewed as a bridge between capital market context; sectors consist of major groupings of stocks (i.e. according to economic sector, growth rate, or cyclically in earnings) that either cut across or combine several industries.

3.1.4 Comparative Selection of Securities

Selection among alternative investment opportunities requires appraisal of securities so that their relative attractiveness in terms of return and risk can be judged at any time. This purpose can be accomplished only if consistent analytical procedures are employed and industry and company forecasts are based on an internally consistent set of economic and capital market projections.

If Hindalco is considered for purchase, it must be considered more attractive than Nalco, Indian Aluminium, or other issues with comparable investment characteristics. Thus, isolated analysis and evaluation of an individual security are impractical and inappropriate. One security cannot be effectively appraised apart from other securities, or apart from the general investment climate.

Consistency and comparability are so important that they should be the twin goals of the investment analysis process. Consistency applies to data for an individual company across time, whereas comparability seeks valid data on companies for each time period. Without consistency and comparability, the investor cannot exercise sound judgment in identifying instances of overvaluation and under-valuation.

3.1.5 Investment Decision-making

Investment decision-making can best be viewed as an integrated process to which security analysis makes its unique contribution. Portfolio management requires the consistent application of economic, capital market and sector analysis to the definition of objectives and the measurement of performance. Security analysis serves the investment decision-maker by identifying the fairly priced or under-priced securities that are most likely to produce the desired results.

Investment policies and asset allocation strategies are developed based on the following objectives:

- To earn a sufficient “real” rate of return and maintain the purchasing power of its assets adjusted for inflation in perpetuity.
- To control portfolio risk and volatility in order to provide as much year-to-year spending stability as possible and still meet.

3.2 RISK DEFINED

Risk can be defined as the probability that the expected return from the security will not materialize. Every investment involves uncertainties that make future investment returns risk-prone. Uncertainties could be due to the political, economic and industry factors.

Risk could be systematic in future depending upon its source. Systematic risk is for the market as a whole, while unsystematic risk is specific to an industry or the company individually. The first three risk factors discussed below are systematic in nature and the rest are unsystematic. Political risk could be categorised depending on whether it affects the market as whole, or just a particular industry.

3.2.1 Types of Investment Risk

Modern investment analysis categorizes the traditional sources of risk 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 into its two components, a general (market) component and a specific (issuer) component, we have systematic risk and non-systematic risk, which are additive:

Total risk = General risk + Specific risk

= Market risk + Issuer risk

= Systematic risk + Non-systematic risk

Systematic Risk: An investor can construct a diversified portfolio and eliminate part of the total risk, the diversifiable or non-market part. What is left is the non- diversifiable portion or the market risk. Variability in a security's total returns that is directly associated with overall movements in the general market or economy is called systematic (market) risk.

Virtually all securities have some systematic risk, whether bonds or stocks, because systematic risk directly encompasses interest rate, market, and inflation risks. 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 stocks will be adversely affected; if it rises strongly, as in the last few months of 1982, most stocks will appreciate in value. These movements occur regardless of what any single investor does. Clearly, market risk is critical to all investors.

Non-systematic Risk: The variability in a security's total returns not related to overall market variability is called the non- 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 non-systematic risk, it is generally connected with common stocks.

Remember the difference: Systematic (market) risk is attributable to broad macro factors affecting all securities. Non-systematic (non-market) risk is attributable to factors unique to a security. Different types systematic and unsystematic risk are explained as under:

1. ***Market Risk:*** The variability in a security's returns resulting from fluctuations in the aggregate market is known as market risk. All securities are exposed to market risk including recessions, wars, structural changes in the economy, tax law changes and even changes in consumer preferences. Market risk is sometimes used synonymously with systematic risk.

2. ***Interest Rate Risk:*** The variability in a security's 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 prices move inversely to interest rates. The reason for this movement is tied up with the valuation of securities. Interest rate risk affects bonds more directly than common stocks and is a major risk that all bondholders face. As interest rates change, bond prices change in the opposite direction.

3. ***Purchasing Power Risk:*** A factor affecting all securities is purchasing power risk, also known as inflation risk. This is the possibility that the purchasing power of invested dollars will decline. With uncertain inflation, the real (inflation-adjusted) return involves risk even if the nominal return is safe (e.g., a Treasury bond). This risk is related to interest rate risk, since interest rates generally rise as inflation increases, because lenders demand additional inflation premiums to compensate for the loss of purchasing power.

4. ***Regulation Risk:*** Some investments can be relatively attractive to other investments because of certain regulations or tax laws that give them an advantage of some kind. Municipal bonds, for example, pay interest that is exempt from local, state and federal taxation. As a result of that special tax exemption, municipals can price bonds to yield a lower interest rate since the net after-tax yield may still make them attractive to investors. The risk of a regulatory change that could adversely affect the stature of an investment is a real danger. In 1987, tax law changes dramatically lessened the attractiveness of many existing limited partnerships that relied upon special tax considerations as part of their total return. Prices for many limited partnerships tumbled when investors were left with different securities, in effect, than what they originally bargained for. To make matters worse, there was no extensive secondary market for these illiquid securities and many investors found themselves unable to sell those securities at anything but 'firesale' prices if at all.

5. ***Business Risk:*** The risk of doing business in a particular industry or environment is called business risk. For example, as one of the largest steel producers, U.S. Steel faces unique problems. Similarly, General Motors faces unique problems as a result of such developments as the global oil situation and Japanese imports.

6. ***Reinvestment Risk:*** The YTM calculation assumes that the investor reinvests all coupons received from a bond at a rate equal to the computed YTM on that bond, thereby earning interest on interest over the life of the bond at the computed YTM rate. In effect, this calculation assumes that the reinvestment rate is the yield to maturity.

   If the investor spends the coupons, or reinvests them at a rate different from the assumed reinvestment rate of 10%, the realized yield that will actually be earned at the termination of the investment in the bond will differ from the promised YTM. And, in fact, coupons almost always will be reinvested at rates higher or lower than the computed YTM, resulting in a realized yield that differs from the promised yield. This gives rise to reinvestment rate risk. This interest-on-interest concept significantly affects the potential total dollar return. Its exact impact is a function of coupon and time to maturity, with reinvestment becoming more important as either coupon or time to maturity, or both, rise. Specifically:

   (a) Holding everything else constant, the longer the maturity of a bond, the greater the reinvestment risks.

   (b) Holding everything else constant, the higher the coupon rate, the greater the dependence of the total dollar returns from the bond on the reinvestment of the coupon payments.

   Let’s look at realized yields under different assumed reinvestment rates for a 10% non-callable 20-year bond purchased at face value. If the reinvestment rate exactly equals the YTM of 10%, the investor would realize a 10% compound return when the bond is held to maturity, with $4,040 of the total dollar return from the bond attributable to interest on interest. At a 12% reinvestment rate, the investor would realize an 11.14% compound return, with almost 75% of the total return coming from interest-on-interest ($5,738/$7,738). With no reinvestment of coupons (spending them as received), the investor would achieve only a 5.57% return. In all cases, the bond is held to maturity.

   Clearly, the reinvestment portion of the YTM concept is critical. In fact, for long-term bonds the interest-on-interest component of the total realized yield may account for more than three-fourths of the bond's total dollar return.

7. ***Bull-Bear Market Risk:*** This risk arises from the variability in the market returns resulting from alternating bull and bear market forces. When security index rises fairly consistently from a low point, called a trough, over a period of time, this upward trend is called a bull market. The bull market ends when the market index reaches a peak and starts a downward trend. The period during which the market declines to the next trough is called a bear market.

8. ***Management Risk:*** Management, all said and done, is made up of people who are mortal, fallible and capable of making a mistake or a poor decision. Errors made by the management can harm those who invested in their firms. Forecasting errors is difficult work and may not be worth the effort and, as a result, imparts a needlessly sceptical outlook.

   An agent-principal relationship exists when the shareholder owners delegate the day-to-day decision-making authority to managers who are hired employees rather than substantial owners. This theory suggests that owners will work harder to maximize the value of the company than employees will. Various researches in the field indicate that investors can reduce their losses to difficult-to-analyse management errors by buying shares in those corporations in which the executives have significant equity investments.

9. ***Default Risk:*** It is that portion of an investment's total risk that results from changes in the financial integrity of the investment. For example, when a company that issues securities moves either further away from bankruptcy or closer to it, these changes in the firm's financial integrity will be reflected in the market price of its securities. The variability of return that investors experience, as a result of changes in the credit worthiness of a firm in which they invested, is their default risk.

   Almost all the losses suffered by investors as a result of default risk are not the result of actual defaults and/or bankruptcies. Investor losses from default risk usually result from security prices falling as the financial integrity of a corporation's weakness - market prices of the troubled firm's securities will already have declined to near zero. However, this is not always the case - 'creative' accounting practices in firms like Enron, WorldCom, Arthur Anderson and Computer Associates may maintain quoted prices of stock even as the company's net worth gets completely eroded. Thus, the bankruptcy losses would be only a small part of the total losses resulting from the process of financial deterioration.

10. ***International Risk:*** International risk can include both country risk and exchange rate risk.

    Exchange Rate Risk: All investors who invest internationally in today's increasingly global investment arena face the prospect of uncertainty in the returns after they convert the foreign gains back to their own currency. Unlike the past, when most US investors ignored international investing alternatives, investors today must recognize and understand exchange rate risk, which can be defined as the variability in returns on securities caused by currency fluctuations. Exchange rate risk is sometimes called currency risk.

    For example, a US investor who buys a German stock denominated in marks (German currency), must ultimately convert the returns from this stock back to dollars. If the exchange rate has moved against the investor, losses from these exchange rate movements can partially or totally negate the original return earned. Obviously, US investors who invest only in US stocks on US markets do not face this risk, but in today's global environment where investors increasingly consider alternatives from other countries, this factor has become important. Currency risk

affects international mutual funds, global mutual funds, closed-end single country funds, American Depository Receipts, foreign stocks, and foreign bonds.

Country Risk: Country risk, also referred to as political risk, is an important risk for investors today. With more investors investing internationally, both directly and indirectly, the political, and therefore economic stability and viability of a country's economy need to be considered. The United States has the lowest country risk, and other countries can be judged on a relative basis using the United States as a benchmark. Examples of countries that needed careful monitoring in the 1990s because of country risk included the former Soviet Union and Yugoslavia, China, Hong Kong, and South Africa.

Liquidity Risk: Liquidity risk is the risk associated with the particular secondary market in which a security trades. An investment that can be bought or sold quickly and without significant price concession is considered liquid. The more uncertainty about the time element and the price concession, the greater the liquidity risk. A Treasury bill has little or no liquidity risk, whereas a small OTC stock may have substantial liquidity risk.

Liquid Assets Risk: It is that portion of an asset's total variability of return which results from price discounts given or sales concessions paid in order to sell the asset without delay. Perfectly liquid assets are highly marketable and suffer no liquidation costs. Illiquid assets are not readily marketable and suffer no liquidation costs. Either price discounts must be given or sales commissions must be paid, or the seller must incur both the costs, in order to find a new investor for an illiquid asset. The more illiquid the asset is, the larger the price discounts or the commissions that must be paid to dispose of the assets.

Political Risk: It arises from the exploitation of a politically weak group for the benefit of a politically strong group, with the efforts of various groups to improve their relative positions increasing the variability of return from the affected assets. Regardless of whether the changes that cause political risk are sought by political or by economic interests, the resulting variability of return is called political risk, if it is accomplished through legislative, judicial or administrative branches of the government.

Domestic political risk arises from changes in environmental regulations, zoning requirements, fees, licenses, and most frequently, taxes. Taxes could be both direct and indirect. Some types of securities and certain categories of investors enjoy a privileged tax status.

International political risk takes the form of expropriation of non-residents' assets, foreign exchange controls that won't let foreign investors withdraw their funds, disadvantageous tax and tariff treatments, requirements that non-residents investors give partial ownership to local residents, and un-reimbursed destruction of foreign-owned assets by hostile residents of the foreign country.

Industry Risk: An industry may be viewed as group of companies that compete with each other to market a homogeneous product. Industry risk is that portion of an investment's total variability of return caused by events that affect the products and firms that make up an industry. For example, commodity prices going up or down will affect all the commodity producers, though not equally.

The stage of the industry's life cycle, international tariffs and/or quotas on the products produced by an industry, product/industry related taxes (e.g. cigarettes), industry-wide labour union problems, environmental restrictions, raw material

availability, and similar factors interact with and affect all the firms in an industry simultaneously. As a result of these common features, the prices of the securities issued by the competing firms tend to rise and fall together.

These risk factors do not make up an exhaustive list, but are merely representative of the major classifications involved. All the uncertainties taken together make up the total risk, or the total variability of return.

Check Your Progress 1

1. International risk can include both country risk and _____ risk.
2. _____ risk is that portion of an investment's total risk that results from changes in the financial integrity of investment.
3. Exchange rate risk is sometimes called _____ risk.
4. Market risk is sometimes used synonymously with _____ risk.

3.3 MEASUREMENT OF RISK

3.3.1 Volatility

Of all the ways to describe risk, the simplest and possibly most accurate is "the uncertainty of a future outcome." The anticipated return for some future period is known as the expected return. The actual return over some past period is known as the realized return. The simple fact that dominates investing is that the realized return on an asset with any risk attached to it may be different from what was expected. Volatility may be described as the range of movement (or price fluctuation) from the expected level of return. For example, the more a stock goes up and down in price, the more volatile that stock is. Because wide price swings create more uncertainty of an eventual outcome, increased volatility can be equated with increased risk. Being able to measure and determine the past volatility of a security is important in that it provides some insight into the riskiness of that security as an investment.

3.3.2 Standard Deviation

Investors and analysts should be at least somewhat familiar with the study of probability distributions. Since the return an investor will earn from investing is not known, it must be estimated. An investor may expect the TR (total return) on a particular security to be 10% for the coming year, but in truth this is only a "point estimate."

3.3.3 Probability Distributions

To deal with the uncertainty of returns, investors need to think explicitly about a security's distribution of probable TRs. In other words, investors need to keep in mind that, although they may expect a security to return 10%, for example, this is only a one-point estimate of the entire range of possibilities. Given that investors must deal with the uncertain future, a number of possible returns can, and will, occur.

In the case of a Treasury bond paying a fixed rate of interest, the interest payment will be made with 100 per cent certainty, barring a financial collapse of the economy. The probability of occurrence is 1.0, because no other outcome is possible. With the possibility of two or more outcomes, which is the norm for common stocks, each possible likely outcome must be considered and a probability of its occurrence assessed. The result of

considering these outcomes and their probabilities together is a probability distribution consisting of the specification of the likely returns that may occur and the probabilities associated with these likely returns.

Probabilities represent the likelihood of various outcomes and are typically expressed as a decimal (sometimes fractions are used). The sum of the probabilities of all possible outcomes must be 1.0, because they must completely describe all the (perceived) likely occurrences. How are these probabilities and associated outcomes obtained? In the final analysis, investing for some future period involves uncertainty, and therefore subjective estimates. Although past occurrences (frequencies) may be relied on heavily to estimate the probabilities, the past must be modified for any changes expected in the future. Probability distributions can be either discrete or continuous. With a discrete probability distribution, a probability is assigned to each possible outcome. With a continuous probability distribution, an infinite number of possible outcomes exists. The most familiar continuous distribution is the normal distribution depicted by the well-known bell-shaped curve often used in statistics. It is a two-parameter distribution in that the mean and the variance fully describe it.

To describe the single-most likely outcome from a particular probability distribution, it is necessary to calculate its expected value. The expected value is the average of all possible return outcomes, where each outcome is weighted by its respective probability of occurrence. For investors, this can be described as the expected return.

We have mentioned that it's important for investors to be able to quantify and measure risk. To calculate the total risk associated with the expected return, the variance or standard deviation is used. This is a measure of the spread or dispersion in the probability distribution; that is, a measurement of the dispersion of a random variable around its mean. Without going into further details, just be aware that the larger this dispersion, the larger the variance or standard deviation. Since variance, volatility and risk can, in this context, be used synonymously, remember that the larger the standard deviation, the more uncertain the outcome.

Calculating a standard deviation using probability distributions involves making subjective estimates of the probabilities and the likely returns. However, we cannot avoid such estimates because future returns are uncertain. The prices of securities are based on investors' expectations about the future. The relevant standard deviation in this situation is the ex ante standard deviation and not the ex post based on realized returns.

Although standard deviations based on realized returns are often used as proxies for ex ante standard deviations, investors should be careful to remember that the past cannot always be extrapolated into the future without modifications. Ex post standard deviations may be convenient, but they are subject to errors. One important point about the estimation of standard deviation is the distinction between individual securities and portfolios. Standard deviations for well-diversified portfolios are reasonably steady across time, and therefore historical calculations may be fairly reliable in projecting the future. Moving from well-diversified portfolios to individual securities, however, makes historical calculations much less reliable. Fortunately, the number one rule of portfolio management is to diversify and hold a portfolio of securities, and the standard deviations of well-diversified portfolios may be more stable.

Something very important to remember about standard deviation is that it is a measure of the total risk of an asset or a portfolio, including, therefore, both systematic and unsystematic risk. It captures the total variability in the asset's or portfolio's return, whatever the sources of that variability. 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 portfolios of securities using total returns 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.

The standard deviation, combined with the normal distribution, can provide some useful informations about the dispersion or variation in returns. In a normal distribution, the probability that a particular outcome will be above (or below) a specified value can be determined. With one standard deviation on either side of the arithmetic mean of the distribution, 68.3% of the outcomes will be encompassed; that is, there is a 68.3% probability that the actual outcome will be within one (plus or minus) standard deviation of the arithmetic mean. The probabilities are 95% and 99% that the actual outcome will be within two or three standard deviations, respectively, of the arithmetic mean.

3.3.4 Beta

Beta is a measure of the systematic risk of a security that cannot be avoided through diversification. Beta is a relative measure of risk-the risk of an individual stock relative to the market portfolio of all stocks. If the security's returns move more (less) than the market's returns as the latter changes, the security's returns have more (less) volatility (fluctuations in price) than those of the market. It is important to note that beta measures a security's volatility, or fluctuations in price, relative to a benchmark, the market portfolio of all stocks.

Securities with different slopes have different sensitivities to the returns of the market index. If the slope of this relationship for a particular security is a 45-degree angle, the beta is 1.0. This means that for every one per cent change in the market's return, on average this security's returns change 1%. The market portfolio has a beta of 1.0. A security with a beta of 1.5 indicates that, on average, security returns are 1.5 times as volatile as market returns, both up and down. This would be considered an aggressive security because when the overall market return rises or falls 10%, this security, on average, would rise or fall 15%. Stocks having a beta of less than 1.0 would be considered more conservative investments than the overall market.

Beta is useful for comparing the relative systematic risk of different stocks and, in practice, is used by investors to judge a stock's riskiness. Stocks can be ranked by their betas. Because the variance of the market is constant across all securities for a particular period, ranking stocks by beta is the same as ranking them by their absolute systematic risk. Stocks with high betas are said to be high-risk securities.

Check Your Progress 2

1. The standard deviation of return measures the total risk of one security or the total risk of a portfolio of _____ .
2. The standard deviation combined with the _____ distribution, can provide some useful information about the dispersion or variations in returns.
3. _____ is a measure of the systematic risk of a security that can not be avoided through diversification.
4. Stock can be ranked by their _____ .

3.4 RISK AND EXPECTED RETURN

Risk and expected return are the two key determinants of an investment decision. Risk, in simple terms, is associated with the variability of the rates of return from an investment; how much do individual outcomes deviate from the expected value? Statistically, risk is measured by any one of the measures of dispersion such as co-efficient of range, variance, standard deviation etc.

The risk involved in investment depends on various factors such as:

(i) The length of the maturity period - longer maturity periods impart greater risk to investments.

(ii) The credit-worthiness of the issuer of securities - the ability of the borrower to make periodical interest payments and pay back the principal amount will impart safety to the investment and this reduces risk.

(iii) The nature of the instrument or security also determines the risk. Generally, government securities and fixed deposits with banks tend to be riskless or least risky; corporate debt instruments like debentures tend to be riskier than government bonds and ownership instruments like equity shares tend to be the riskiest. The relative ranking of instruments by risk is once again connected to the safety of the investment.

(iv) Equity shares are considered to be the most risky investment on account of the variability of the rates of returns and also because the residual risk of bankruptcy has to be borne by the equity holders.

(v) The liquidity of an investment also determines the risk involved in that investment. Liquidity of an asset refers to its quick saleability without a loss or with a minimum of loss.

(vi) In addition to the aforesaid factors, there are also various others such as the economic, industry and firm specific factors that affect the risk an investment. A detailed analysis of these risk factors will be taken up in the next chapter.

Another major factor determining the investment decision is the rate of return expected by the investor. The rate of return expected by the investor consists of the yield and capital appreciation.

Before we look at the methods of computing the rate of return from an investment, it is necessary to understand the concept of the return on investment. We have noted earlier that an investment is a postponed consumption. Postponement of consumption is synonymous with the concept of 'time preference for money'. Other things remaining the same, individuals prefer current consumption to future consumption. Therefore, in order to induce individuals to postpone current consumption they have to be paid certain compensation, which is the time preference for consumption. The compensation paid should be a positive real rate of return. The real rate of return is generally equal to the rate of return expected by an investor from a risk-free capital asset assuming a world without inflation. However, in real life, inflation is a common feature of a capitalist economy. If the investor is not compensated for the effects of inflation, the real rate of return may turn out to be either zero or negative. Therefore, the investors, generally, add expected inflation rate to the real rate of return to arrive at the nominal rate of return.

For example, assume that the present value of an investment is Rs. 100; the investor expects a real time rate of 3% per annum and the expected inflation rate is 3% per annum. If the investor were to receive only the real time rate, he would get back Rs. 103

at the end of one year. The real rate of return received by the investor would be equal to zero because the rime preference rate of 3% per annum is matched by the inflation of 3% per annum. If the actual inflation rate is greater than 3% per annum, the investor would suffer negative returns.

Thus, nominal rate of return on a risk-free asset is equal to the time preference real rate plus expected inflation rate.

If the investment is in capital assets other than government obligations, such assets would be associated with a degree of risk that is idiosyncratic to the investment. For an individual to invest in such assets, an additional compensation, called the risk premium will have to be paid over and above the nominal rate of return.

Determinants of the rate of return

Therefore, three major determinants of the rate of return expected by the investor are:

(i) The time preference risk-free real rate

(ii) The expected rate of inflation

(iii) The risk associated with the investment, which is unique to the investment.

Hence,

Required return = Risk-free real rate + Inflation premium + Risk premium

It was stated earlier that the rate of return from an investment consists of the yield and capital appreciation, if any. The difference between the sale price and the purchase price is the capital appreciation and the interest or dividend divided by the purchase price is the yield. Accordingly

$$\text{Rate of return } (R_t) = \frac{I_t + [P_t - P_{t-1}]}{P_{t-1}} \qquad ...(1)$$

Where R_t = Rate of return per time period 't'

I_t = Income for the period 't'

P_t = Price at the end of time period 't'

P_{t-1} = Initial price, i.e., price at the beginning of the period 't'.

In the above equation 't' can be a day or a week or a month or a year or years and accordingly daily, weekly, monthly or annual rates of return could be computed for most capital assets.

The above equation can be split in to two components. Viz.,

$$\text{Rate of return } (R_t) = \frac{I_t}{P_{t-1}} + \frac{P_t - P_{t-1}}{P_{t-1}} \qquad ...(2)$$

Where $\frac{I_t}{P_{t-1}}$ is called the current yield, and $\frac{P_t - P_{t-1}}{P_{t-1}}$ is called the capital gain yield.

Or ROR = Current yield + Capital gain yield

Illustration 1:

The following information is given for a corporate bond. Price of the bond at the beginning of the year: Rs. 90, Price of the bond at the end of the year: Rs. 95.40, Interest received for the year: Rs. 13.50. Compute the rate of return.

Solution:

The rate of return can be computed as follows:

$$\frac{13.50 + (95.40 - 90)}{90} = 0.21 \text{ or } 21\% \text{ per annum}$$

The return of 21% consists of 15% current yield and 6% capital gain yield.

There is always a direct association between the rates of return and the asset prices. Finance theory stipulates that the price of any asset is equal to the sum of the discounted cash flows, which the capital asset owner would receive. Accordingly, the current price of any capital asset can be expected, symbolically, as

$$P_0 = \sum_{t=1}^{n} \frac{E(I_t)}{(1+r)^t} + \frac{P_n}{(1+r)^n} \qquad ...(3)$$

Where $E(R_t)$ = Expected income to be received in year 't'

P_0 = Current price of the capital asset

P_n = Price of the asset on redemption or on liquidation

R = The rate of return investors expect given the risk inherent in that capital asset.

Thus, 'r' is the rate or return, which the investors require in order to invest in a capital asset that is used to discount the expected future cash flows from that capital asset.

Illustration 2:

Mr. Amirican has purchased 100 shares of Rs. 10 each of Kinetic Ltd. in 2005 at Rs. 78 per share. The company has declared a dividend @ 40% for the year 2006-07. The market price of share as on 1-4-2006 was Rs. 104 and on 31-3-2007 was Rs. 128. Calculate the annual return on the investment for the year 2006-07.

Dividend received for 2004 – 05 = Rs. 10 × 40/100 = Rs. 4

Solution:

Calculation of annual rate of return on investment for the year 2006-07

$$R = \frac{d_1 + (P_1 - P_0)}{P_0} = \frac{4 + (128 - 104)}{104} = 0.2692 \text{ or } 26.92\%$$

3.5 RISK-RETURN RELATIONSHIP

The most fundamental tenet of finance literature is that there is a trade-off between risk and return. The risk-return relationship requires that the return on a security should be commensurate with its riskiness. If the capital markets are operationally efficient, then all investment assets should provide a rate or return that is consistent with the risks associated with them. The risk and return are directly variable, i.e., an investment with higher risk should produce higher return.

The risk/return trade-off could easily be called the "ability-to-sleep-at-night test." While some people can handle the equivalent of financial skydiving without batting an eye, others are terrified to climb the financial ladder without a secure harness. Deciding what amount of risk you can take while remaining comfortable with your investments is very important.

In the investing world, the dictionary definition of risk is the possibility that an investment's actual return will be different than expected. Technically, this is measured in statistics by standard deviation. Risk means you have the possibility of losing some, or even all, of your original investment.

Low levels of uncertainty (low risk) are associated with low potential returns. High levels of uncertainty (high risk) are associated with high potential returns. The risk/ return trade-off is the balance between the desire for the lowest possible risk and the highest possible return. This is demonstrated graphically in the chart below. A higher standard deviation means a higher risk and higher possible return. The figure below represents the relationship between risk and return.

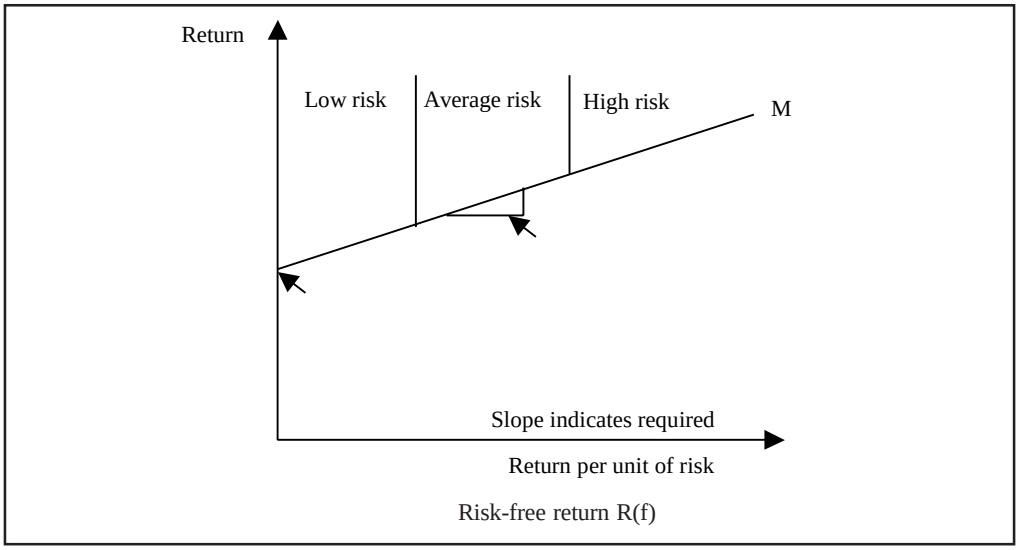


Figure 3.1: Risk and Return Relationship

The slope of the Market Line indicates the return per unit of risk required by all investors. Highly risk-averse investors would have a steeper line, and vice versa. Yields on apparently similar stocks may differ. Differences in price, and therefore yield, reflect the market's assessment of the issuing company's standing and of the risk elements in the particular stocks. A high yield in relation to the market in general shows an above average risk element.

This is shown in the figure below.

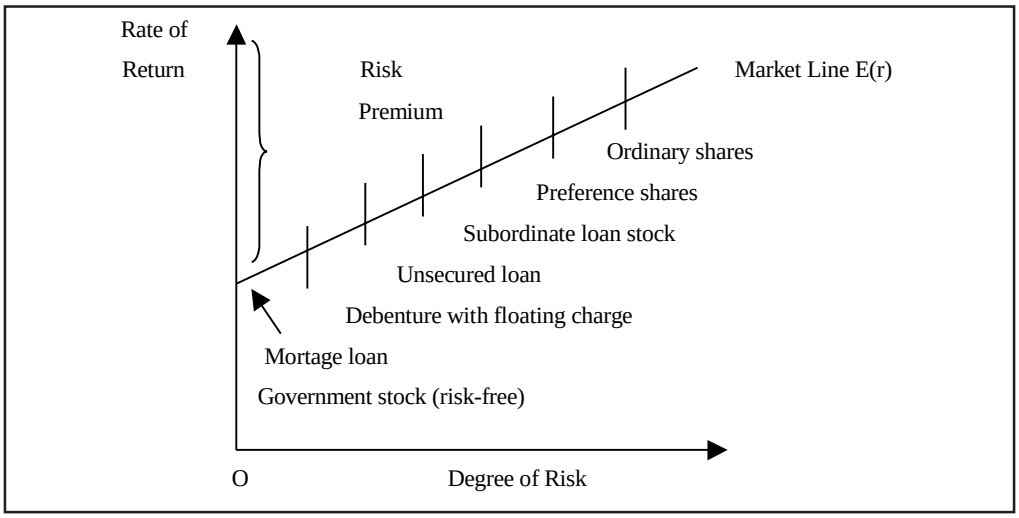


Figure 3.2: Risk Return Relationship of different Stocks

Given the composite market line prevailing at a point of time, investors would select investments that are consistent with their risk preferences. Some will consider low-risk investments, while others prefer high-risk investments.

A common misconception is that higher risk equals greater return. The risk/return trade-off tells us that the higher risk gives us the possibility of higher returns. But there are no guarantees. Just as risk means higher potential returns, it also means higher potential losses.

On the lower end of the scale, the risk-free rate of return is represented by the return on Treasury Bills of government securities, because their chance of default is next to nil. If the risk-free rate is currently 8 to 10 %, this means, with virtually no risk, we can earn 8 to 10 % per year on our money.

The common question arises: who wants to earn 6% when index funds average 12% per year over the long run? The answer to this is that even the entire market (represented by the index fund) carries risk. The return on index funds is not 12% every year, but rather -5% one year, 25% the next year, and so on. An investor still faces substantially greater risk and volatility to receive an overall return that is higher than a predictable government security. We call this additional return the risk premium, which in this case is 8% (12% - 8%).

Determining what risk level is most appropriate for you isn't an easy question to answer. Risk tolerance differs from person to person. Your decision will depend on your goals, income and personal situation, among other factors.

3.6 PORTFOLIO AND SECURITY RETURNS

A portfolio is a collection of securities. Since it is rarely desirable to invest the entire funds of an individual or an institution in a single security, it is essential that every security be viewed in a portfolio context. Thus, it seems logical that the expected return of a portfolio should depend 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 A illustrates this point.

The expected holding period value - relative for the portfolio is clearly shown:

$$\frac{\text{Rs. } 23{,}100}{\text{Rs. } 20{,}000} = 1.155$$

Giving an expected holding period return of 15.50%.

(a) ***Security and Portfolio Values***

Security	No. of Shares (Rs.)	Current Price Per Share (Rs.)	Current Value (Rs.)	Expected End-of-Period Share Value (Rs.)	Expected End-of-Period Share Value (Rs.)
1	2	3	4	5	6
XYZ	100	15.00	1,500	18.00	1,800
ABC	150	20.00	3,000	22.00	3,300
RST	200	40.00	8,000	45.00	9,000
KNF	250	25.00	6,250	30.00	7,500
DET	100	12.50	1,250	15.00	1,500
			20,000		23,100

(b) ***Security and Portfolio Value-Relative***

Security	Current Value	Proportion of current value of Properties	Current Price Per Share	Expected End-of-Period Value Per Share	Expected Holding-Period Value-Relative	Contribution to Portfolio Expected Holding-Period Value-Relative
(1)	(2) (Rs.)	3 = (2) Rs. 20,000	(4) (Rs.)	(5) (Rs.)	(6) = (5) / (4)	(7) = (3) × (6)
XYZ	1,500	.0750	15.00	18.00	1,200	0.090000
ABC	3,000	.1500	20.00	22.00	1,100	0.165000
RST	8,000	.4000	40.00	45.00	1,125	0.450000
KNF	6,250	.3125	25.00	30.00	1,200	0.375000
DET	1,250	.0625	12.50	15.00	1,200	0.075000
	20,000	1.0000				1.155000

(c) ***Security and Portfolio Holding-period Returns***

Security	Proportion of Current Value of Portfolio	Expected Holding Period Return (%)	Contribution to Portfolio Expected Holding Period Return (%)
1	2	3	4
XYZ	.0750	20.00	1.50
ABC	.1500	10.00	1.50
RST	.4000	12.50	5.00
KNF	.3125	20.00	6.25
DET	.0625	20.00	1.25
	1.0000		15.50

Since the portfolio's 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. This should be the one that is considered to have the greatest expected return. Very few investors do this, and very few 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.

Illustration 3:

The average market prices and dividend per share of Asian CERC Ltd. for the past 6 years are given below:

Year	Average market price (Rs.)	Dividend per share (Rs.)
2007	68	3.0
2006	61	2.6
2005	50	2.0
2004	53	2.5
2003	45	2.0
2002	38	1.8

Solution:

Calculate the average rate of return of Asian CERC Ltd.'s shares for past 6 years.

Year	Average market price per share (Rs.)	Capital gain (%)	Dividend per share (Rs.)	Dividend yield (%)	Rate of return (%)
2002	38	-	1.8	4.74	-
2003	45	18.42	2.0	4.44	22.86
2004	53	17.78	2.5	4.72	22.50
2005	50	-5.66	2.0	4.00	-1.66
2006	61	22.00	2.6	4.26	26.26
2007	68	11.48	3.0	4.41	15.89

$$R = 1/5\ (22.86 + 22.50 - 1.66 + 26.26 + 15.89)$$

$$= 1/5(85.85) = 17.17\%$$

3.6.1 Risk

All possible questions which the investor may ask, the most important one is concerned with the probability of actual yield being less than zero, that is, with the probability of loss. This is the essence of risk. A useful measure of risk should somehow take 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 are used for this purpose: the average (or mean) absolute deviation and the standard deviation.

Illustration 4:

The rate of return of equity shares of Wipro Ltd., for past six years are given below:

Year	01	02	03	04	05	06
Rate of return (%)	12	18	-6	20	22	24

Calculate the average rate of return, standard deviation and variance.

Solution:

Calculation of Average Rate of Return $(\bar{R})$

$$\bar{R} = \frac{\Sigma R}{N} = \frac{12+18-6+20+22+24}{6} = 15\%$$

$$\sigma^2 = \frac{\Sigma(R-\bar{R})^2}{N}$$

Year	Rate of Return (%)	$(R - \bar{R})$	$(R - \bar{R})^2$
2001	12	-3	9
2002	18	3	9
2003	-6	-21	441
2004	20	5	25
2005	22	7	49
2006	24	9	81
		$\Sigma(R - \bar{R})^2$	**614**

$$\text{Variance } (\sigma^2) = \frac{614}{6} = 102.33$$

$$\sigma = \sqrt{\sigma^2} = \sqrt{\text{Variance}}$$

$$\sqrt{102.33} = 10.12\%$$

Illustration 5:

Mr. RKV invested in equity shares of Wipro Ltd., its anticipated returns and associated probabilities are given below:

Return (%)	-15	-10	5	10	15	20	30
Probability	0.05	0.10	0.15	0.25	0.30	0.10	0.05

You are required to calculate the expected rate of return and risk in terms of standard deviation.

Solution:

Calculation of expected return and risk in terms of standard deviation.

Return (R)	Probability (P)	$(P \times R)$	$(R - \bar{R})$	$(R - \bar{R})^2$	$(R - \bar{R})^2$ x P
-15	0.05	- 0.75	-5.5	30.25	1.5125
-10	0.10	-1.0	-0.5	0.25	0.0250
5	0.15	0.75	-4.5	20.25	3.0375
10	0.25	2.50	0.5	0.25	0.625
15	0.30	4.50	5.5	30.25	9.0750
20	0.10	2.00	10.5	110.25	11.0250
30	0.05	1.50	20.5	420.25	21.0125
	1.00	$\bar{R}$ =9.5%			$\Sigma(R - \bar{R})^2 P$ = 45.75

$$\text{Expected Return} = \bar{R} = \Sigma(P \times R) = 9.5\%$$

$$\text{Standard Deviation} = \Sigma(R - \bar{R})^2 P = \sqrt{45.75} = 6.764$$

The risk in the above illustration can be measured by taking the range of 45% (i.e. 30%- (-) 15%) and standard deviation of 6.764. The investment carries greater risk in terms of high variation in return.

Illustration 6:

The probabilities and associated returns of Modern Foods Ltd., are given below:

Return (%)	12	15	18	20	24	26	30
Probability	0.05	0.10	0.24	0.26	0.18	0.12	0.05

Calculate the standard deviation.

Solution:

Return (R)	**Probability (P)**	**(P x R)**	**$(R - \bar{R})^2$**	**$(R - \bar{R})^2$ x P**
12	0.05	0.60	- 8.56	3.664
15	0.10	1.50	- 5.56	3.091
18	0.24	4.32	- 2.56	1.573
20	0.26	5.20	- 0.56	0.082
24	0.18	4.32	3.44	2.130
26	0.12	3.12	5.44	3.551
30	0.05	1.50	9.44	4.456
	1.00	$\bar{R}$ = 20.56%	$\Sigma(R - \bar{R})^2$ x P = 18.547	

$$\text{Expected Return} = \bar{R} = \Sigma(P \times R) = 20.56\%$$

$$\text{Standard Deviation} = \Sigma(R - \bar{R})^2 P = \sqrt{18.547} = 4.31\%$$

The expected return is greater at 20.56%, the range of returns is 18% (i.e. 30% - 12%) and the standard deviation is lower at 4.31%. The investment carries lesser risk in terms of low variation in return.

Illustration 7:

Mr. Marin provides the following informations, from the same compute his expected return and standard deviation and variance.

Events	1	2	3	4
Probability	.20	.40	.30	.10
Return (%)	–10	25	20	10

Solution:

A. Calculating the Mean Absolute Deviation:

Event	Probability	Return (%)	P 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	.0	1.5	1.5
D	.10	10	-1.0	-5.0	-0.5	0.5
			Expected Return = 5.0		0	Average Absolute Deviation = 10.0

B. Calculating the Standard Deviation

Event	Probability	Deviation	Deviation squared	Probability x Deviation
(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		

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 uncertainly 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.

Illustration 8:

The possible returns and associated probabilities of Securities X and Y are given below:

Security X		Security Y	
Probability	Return (%)	Probability	Return (%)
0.05	6	0.10	5
0.15	10	0.20	8
0.40	15	0.30	12
0.25	18	0.25	15
0.10	20	0.10	18
0.05	24	0.05	20

Calculate the expected return and standard deviation of securities X and Y.

Solution:

Calculation of expected return and standard deviation of Security X:

Probability (P)	Return (%) (R)	(P x R)	$(R - \bar{R})$	$(R - \bar{R})^2 P$
0.05	6	0.30	- 9.5	4.5125
0.15	10	1.50	-5.5	4.5375
0.40	15	6.00	-0.5	0.1000
0.25	18	4.50	2.5	1.5625
0.10	20	2.00	4.5	2.0250
0.05	24	1.20	8.5	3.6125
1.00		$\bar{R}$ = 15.5	$\sum(R - \bar{R})^2 P$ = 16.35	

Expected return of Security $X(\bar{R})$ = 15.5%

Standard Deviation of Security X

$$\sigma_y^2 = 16.35$$

$$\sigma_y = \sqrt{16.35} = 4.04\%$$

Calculation of expected return and standard deviation of Security Y

Probability (P)	Return (%) (R)	(P x R)	$(R - \bar{R})$	$(R - \bar{R})^2 P$
0.10	5	0.50	-7.25	5.2563
0.20	8	1.60	-4.25	3.6125
0.30	12	3.60	-0.25	0.0188
0.25	15	3.75	2.75	1.8906
0.10	18	1.80	5.75	3.3063
0.05	20	1.00	7.75	3.0031
		$\bar{R}$ = 12.25	$\sum(R-\bar{R})^2 P$ = 17.086	

Expected Return Security$Y(\bar{R})$ = 12.25%

Standard Deviation of Security Y

$$\sigma_y^2 = 17.086$$

$$\sigma_y = \sqrt{17.0876} = 4.134\%$$

Analysis - Security X has higher expected return and lower level of risk as compared to Security Y.

3.7 RETURN AND RISK OF PORTFOLIO

3.7.1 Return of Portfolio (Two Assets)

The expected return from a portfolio of two or more securities is equal to the weighted average of the expected returns from the individual securities.

$$\Sigma(R_p) = W_A(R_A) + W_B(R_B)$$

Where,

$\Sigma(R_p)$ = Expected return from a portfolio of two securities

W_A = Proportion of funds invested in Security A

W_B = Proportion of funds invested in Security B

R_A = Expected return of Security A

R_B = Expected return of Security B

$W_A + W_B = 1$

Illustration 9:

A Ltd.'s share gives a return of 20% and B Ltd.'s share gives 32% return. Mr. Gotha invested 25% in A Ltd.'s shares and 75% of B Ltd.'s shares. What would be the expected return of the portfolio?

Solution:

Portfolio Return = 0.25(20) + 0.75 (32) = 29%

Illustration 10:

Mr. RKV's portfolio consists of six securities. The individual returns of each of the security in the portfolio are given below:

Security	Proportion of investment in the portfolio	Return
Wipro	10%	18%
Latham	25%	12%
SBI	8%	22%
ITC	30%	15%
RNL	12%	6%
DLF	15%	8%

Calculate the weighted average of return of the securities consisting the portfolio.

Solution:

Security	Weight (W)	Return (%) (R)	(W x R)
Wipro	0.10	18	1.80
Latham	0.25	12	3.00
SBI	0.08	22	1.76
ITC	0.30	15	4.50
RNL	0.12	6	0.72
DLF	0.15	8	1.20
			12.98

∴ Portfolio return is 12.98%

3.7.2 Risk of Portfolio (Two Assets)

The risk of a security is measured in terms of variance or standard deviation of its returns. The portfolio risk is not simply a measure of its weighted average risk. The securities that a portfolio contains are associated with each other. The portfolio risk also considers the co-variance between the returns of the investment. Covariance of two securities is a measure of their co-movement; it expresses the degree to which the securities vary together. The standard deviation of a two-share portfolio is calculated by applying formula given below:

$$p = W_A^2\sigma_A^2 + W_B^2\sigma_B^2 + 2W_A W_B \rho_{AB}\sigma_A\sigma_B$$

Where,

σ_p = Standard deviation of portfolio consisting securities A and B

W_A W_B = Proportion of funds invested in Security A and Security B

σ_A σ_B = Standard deviation of returns of Security A and Security B

ρ_{AB} = Correlation coefficient between returns of Security A and Security B

The correlation coefficient (AB) can be calculated as follows:

$$AB = \frac{Cov_{AB}}{\sigma_A\sigma_B}$$

The covariance of Security A and Security ( ) can be presented as follows:

$$Cov_{AB} = \sigma_A\ \sigma_B\ \rho_{AB}$$

The diversification of unsystematic risk, using a two-security portfolio, depends upon the correlation that exists between the returns of those two securities. The quantification of correlation is done through calculation of correlation coefficient of two securities (ρ_{AB}). The value of correlation ranges between –1 to 1; it can be interpreted as follows:

If ρ_{AB} = 1, No unsystematic risk can be diversified.

If ρ_{AB} = –1, All unsystematic risks can be diversified.

If ρ_{AB} = 0, No correlation exists between the returns of Security A and Security B.

Illustration 11:

The returns of Security of Wipro and Security of Infosys for the past six years are given below:

Year	Security of Wipro Return (%)	Security of Infosys Return (%)
2003	9	10
2004	5	-6
2005	3	12
2006	12	9
2007	16	15

Calculate the risk and return of portfolio consisting.

Solution:

Calculation of Mean Return and Standard Deviation of Security A:

Year	Return (%) R	$(R - \bar{R})$	$(R - \bar{R})^2$
2003	9	0	0
2004	5	-4	16
2005	3	-6	36
2006	12	3	9
2007	16	7	49
	45		110

Mean Return $(\bar{R})$ = 45/5 = 9%

Standard Deviation (σ_A) = $\sqrt{110}$ = 10.49%

Calculation Mean Return and Standard Deviation of Security A:

Year	Return (%)	$(R - \bar{R})$	$(R - \bar{R})^2$
2001	10	2	4
2002	-6	14	196
2003	12	4	16
2004	9	1	1
2005	15	7	49
	40		266

Mean Return $(\bar{R})$ = 40/5 = 8%

Standard Deviation (σ_B) = $\sqrt{266}$ = 16.31%

Analysis – Security A has a higher historic level of return and lower risk as compared to Security B. Correlation Coefficient (ρ_{AB}).

$$= \frac{N\Sigma XY - (\Sigma X)(\Sigma Y)}{\sqrt{N\Sigma X^2 - (\Sigma X)^2}\sqrt{N\Sigma Y^2 - \Sigma Y^2}}$$

A's return (%)		B's return (%)		
X	X^2	Y	Y^2	XY
9	81	10	100	90
5	25	-6	36	-30
3	9	12	144	36
12	144	9	81	108
16	256	15	225	240
$\Sigma X = 45$	$\Sigma X^2 = 515$	$\Sigma Y = 40$	$\Sigma Y^2 = 586$	$\Sigma XY = 444$

$$= \frac{(5\times 5)-(45)^2\sqrt{5\times 586-(40)^2}}{\sqrt{(5\times 515)-(45)^2}\sqrt{5\times 586)-(40)^2}}$$

$$= \frac{2,220-1800}{\sqrt{2575-2025}\sqrt{2930-1600}} = \frac{420}{\sqrt{550}\sqrt{1330}}$$

$$= \frac{420}{23.452\times 36.469} = \frac{420}{855.271} = 0.491$$

Verification:

Calculation of Covariance of Returns of Securities A and B

Year	Returns (%)		$(R_A - \bar{R}_A)$	$(R_B - \bar{R}_B)$	$(R_A - \bar{R}_A) \times (R_B - \bar{R}_B)$
	A	B			
2001	9	10	0	2	0
2002	5	-6	-4	-14	56
2003	3	12	-6	4	-24
2004	12	9	3	1	3
2005	16	15	7	7	49
					$Cov_{AB} = 84$

$$\rho_{AB} = \frac{Cov_{AB}}{\sigma_A \sigma_B} = \frac{84}{10.49\times 16.31} = 0.491$$

$Cov_{AB} = \sigma_A\ \sigma_B\ \rho_{AB} = 10.49 \times 16.31 \times 0.491 = 84$

Return of portfolio (R_p)

$= (0.80 \times 9) + (0.20 \times 8) = 7.2 + 1.6 = 8.8\%$

Risk of portfolio (σ_p)

$= (0.80^2 \times 10.49^2) + (0.20^2 \times 16.31^2) + (2 \times 0.80 \times 0.20 \times 10.49 \times 16.31 \times 0.491)$

$= (0.64 \times 110.04) + (0.04 \times 266.02) + 26.88$

$= 70.43 + 10.64 + 26.88 = 107.95$

$$\sigma_p = \sqrt{107.95} = 10.39\%$$

3.7.3 Risk and Return of Portfolio (Three Assets)

Formula for calculating risk of portfolio consisting three securities

$$\sigma_P^2 = W_x^2\sigma_x^2 + W_y^2\sigma_y^2 + W_z^2\sigma_z^2 + 2W_x W_y \rho_{yz}\sigma_y\sigma_z + W_x W_z \rho_{xz}\sigma_x\sigma_z$$

Where,

W_1, W_2, W_3 = Proportion of amount invested in securities X, Y and Z

$\sigma_x, \sigma_y, \sigma_z$ = Standard deviations of securities X, Y and Z

ρ_{xy} = Correlation coefficient between securities X and Y

ρ_{yz} = Correlation coefficient between securities Y and Z

ρ_{xz} = Correlation coefficient between securities X and Z

Illustration 12:

A portfolio consists of three securities P, Q and R with the following parameters:

	Security			Correlation coefficient
	P	Q	R	
Expected return (%)	35	22	20	
Standard deviation (%)	20	26	24	
Correlation coefficient:				
PQ				-0.5
QR				+0.4
PR				+0.6

If the securities are equally weighted, how much is the risk and return of the portfolio of these three securities?

Solution:

Expected Portfolio Return

$$= (25 \times 1/3) + (22 \times 1/3) + (20 \times 1/3) = 22.33\%$$

$$\sigma_P^2 = (30)^2(1/3)^2 + (26)^2 + (24)^2(1/3)^2 + 2(1/3)(-0.5)(30)(26)$$

$$+ 2(1/3)(1/3)(0.4)(26)(24) + 2(1/3)(1/3)(0.6)(30)(24)$$

$$\sigma_P^2 = 100 + 75.11 + 64 - 86.67 + 55.47 + 96 = 303.91$$

$$\sigma_P = \sqrt{303.91} = 17.43\%$$

3.7.4 Optimal Portfolio (Two Assets)

The investor can minimise his risk on the portfolio. Risk avoidance and risk minimisation are the important objectives of portfolio management. A portfolio contains different securities; by combining their weighted returns we can obtain the expected return of the portfolio. A risk-averse investor always prefers to minimise the portfolio risk by selecting the optimal portfolio. The minimum risk portfolio with two assets can be ascertained as follows:

$$W_A = \frac{\partial_B^{\,2} - Cov_{AB}}{\partial_A^{\,2} + \partial_B^{\,2} - Cov_{AB}}$$

In continuation to illustration 10 we can calculate the proportion to be invested (W_A) in Security A.

$$= \frac{16.31^2 - 84}{(10.49^2 + 16.31^2) - (2 \times 84)} = \frac{182.02}{208.06} = 0.875$$

Therefore, 87.5% of funds should be invested in Security A and 12.5% should be invested in Security B, which represents the optimal portfolio.

3.8 PORTFOLIO DIVERSIFICATION AND RISK

In an efficient capital market, the important principle to consider is that, investors should not hold all their eggs in one basket; investor should hold a well-diversified portfolio. In order to understand portfolio diversification, one must understand correlation. Correlation is a statistical measure that indicates the relationship, if any, between series of numbers

representing anything from cash flows to test data. If the two series move together, they are positively correlated; if the series move in opposite directions, they are negatively correlated. The existence of perfectly correlated especially negatively correlated-projects is quite rare. In order to diversify project risk and thereby reduce the firm's overall risk, the projects that are best combined or added to the existing portfolio of projects are those that have a negative (or low positive) correlation with existing projects. By combining negatively correlated projects, the overall variability of returns or risk can be reduced. The figure illustrates the result of diversifying to reduce risk.

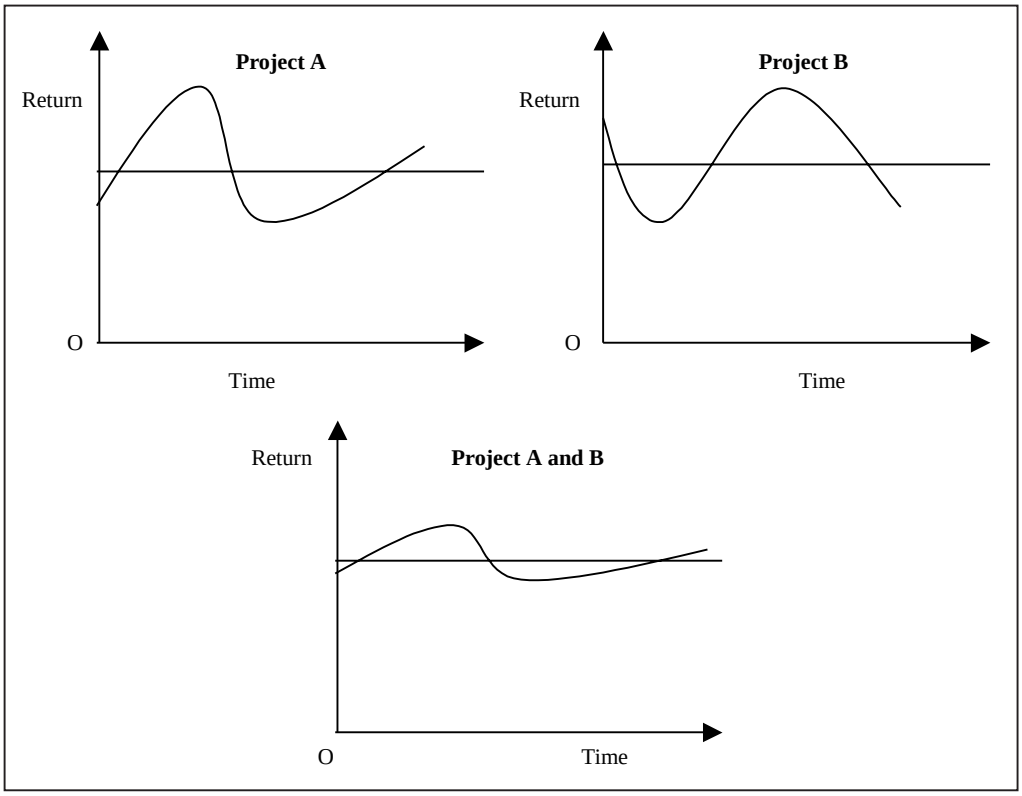


Figure 3.3: Reduction of Risk through Diversification

It shows that a portfolio is containing the negatively corrected projects A and B, both having the same expected return, E, but less risk (i.e. less variability of return) than either of the projects taken separately. This type of risk is sometimes described as diversifiable or alpha risk. The creation of a portfolio by combining two perfectly correlated projects cannot reduce the portfolio's overall risk below the risk of the least risky project, while the creation of a portfolio combining two projects that are perfectly negatively correlated can reduce the portfolio's total risk to a level below that of either of the component projects, which in certain situations may be zero.

3.9 BENEFITS OF DIVERSIFICATION

The gains in risk reduction from portfolio diversification depend inversely upon the extent to which the returns on securities in a portfolio are positively correlated. Ideally, the securities should display negative correlation. This implies that if a pair of securities has a negative correlation of returns, then in circumstances where one of the securities is performing badly, the other is likely to be doing well and vice versa in reverse circumstances. Therefore the average return on holding the two securities is likely to be much 'safer' than investing in one of them alone.

3.9.1 Utility Function and Risk Taking

Common investors will have three possible attitudes to undertake risky course of action (i) an aversion to risk (ii) a desire to take risk, and (iii) an indifference to risk.

The following example will clarify the risk attitude of the individual investors.

Illustration 13:

The possible outcomes of two alternatives A and B, depending on the state of economy, are as follows:

State of economy	Possible outcome (Rs.)	
	A	B
Normal	100	100
Boom	110	200

If we assume that the three states of the economy are equally likely, then expected value for each alternative is Rs. 100.

- A risk-seeker is one who, given a choice between more or less risky alternatives with identical expected values, prefers the riskier alternative i.e. alternative B.
- A risk averted would select the less risky alternative i.e. alternative A.
- The person who is indifferent to risk (risk neutral) would be indifferent to both alternative A and B, because they have same expected values.

The empirical evidence shows that majority of investors are risk-averse. Some generalisations concerning the general shape of utility functions are possible. People usually regard money as a desirable commodity, and the utility of a large sum is usually greater than the utility of a smaller sum. Generally a utility function has a positive slope over an appropriate range of money values, and the slope probably does not vary in response to small changes in the stock of money. For small changes in the amount of money going to an individual, the slope is constant and the utility function is linear. If the utility function is linear, the decision-maker maximises expected utility by maximising expected monetary value. However, for large variations in the amount of money, this is likely to be the case. For large losses and large gains, the utility function often approaches upper and lower limits. The slope of the curve will usually increase sharply as the amount of loss increases, because the disutility of a large loss is proportionately more than the disutility of a small loss, but the curve will flatten as the loss becomes very large. For a risk-averse decision-maker, the expected utility of a function is less than the utility of the expected monetary value. It is also possible for the decision-maker to be risk preferring, at least over some range of the utility function. In this case, the expected utility of a function is more than the utility of the Expected Monetary Value (EMV).

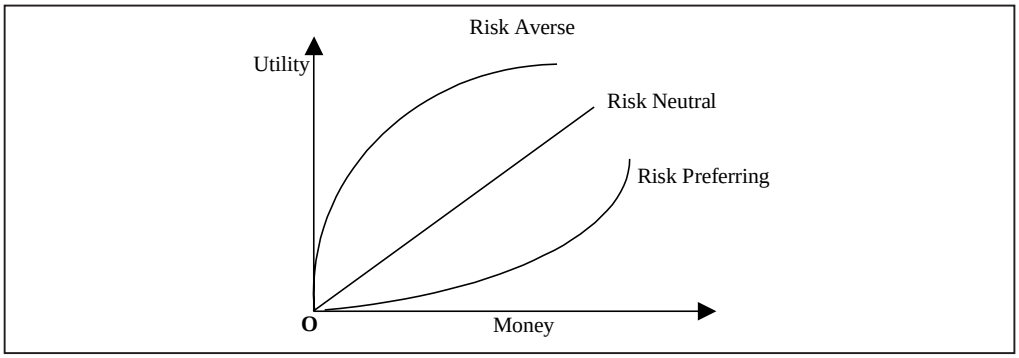


Figure 3.4: Utility Function and Risk Taking

Illustration 14:

Stocks A and B have the following historical returns:

Year	Stock A's Return (K_A) (%)	Stock A's Return (K_B) (%)
2003	-12.24	-5.00
2004	23.67	19.55
2005	35.45	44.09
2006	5.82	1.20
2007	28.30	21.16

You are required to calculate the average rate of return for each stock during the period 2003 through 2007. Assume that someone held a portfolio consisting 50% of stock A and 50% of stock B. What would have been the average return on the portfolio during the period? (You may assume that the year ended on 31st March.)

Solution:

Calculation of Average Rate of Return on Portfolio during 2003-2007:

Year	Stock A's Return (%)	Stock A's Return (%)
2003	-12.24	-5.00
2004	23.67	19.55
2005	35.45	44.09
2006	5.82	1.20
2007	28.30	21.16
	81.00	81.00
Average Rate of Return	81/5 years =16.20%	81/5 years = 16.20%

Calculation of Realised Rate of Return on Portfolio during 2003-2007:

Year	Stock A			Stock B			Total Net return (a) + (b)
	Proportion	Return	Net return (a)	Proportion	Return	Net return (b)	
2003	0.50	-12.24	-6.12	0.50	-5.00	-2.50	-8.62
2004	0.50	23.67	11.83	0.50	19.55	9.77	21.60
2005	0.50	35.45	17.72	0.50	44.09	22.04	39.76
2006	0.50	5.82	2.91	0.50	1.20	0.60	3.51
2007	0.50	28.30	14.15	0.50	21.16	10.58	24.73
		81.00	40.49		81.00		80.98

Average Rate of Return = Rs. 80.98/5 = 16.20%

Illustration 15:

Type of Security		Nos.	Annual Coupon (%)	Maturity Years	Yield (%)
Bond A	(Rs.1000)	10	9	3	12
Bond B	(Rs. 1000)	10	10	5	12
Preference shares C	(Rs.100)	100	11	*	13*
Preference shares D	(Rs.100)	100	12	*	13*

Dr. TKV inherited the following securities upon his uncle's death:

Likelihood of being called at a premium over par. Compute the current value of his uncle's portfolio

Solution:

Calculation of Current value of Dr. RKV's Portfolio inherited from his uncle

			Current Value (Rs.)
Bond A			
(i) Interest p.a. (Rs.10,000 × 9/100) =Rs.900 Compounded @ 12% p.a. for 3 years	(Rs.900 × 2,402)		2,162
(ii) Current value of bonds amount received on maturity P.V. @ 12% on 3rd year	(Rs.10,000 × 0.712)		7,120
		(a)	9,282
Bond B			
(i) Interest p.a. (Rs.10,000 x 10/100) = Rs. 1000 Compounded @ 12% p.a for 5 years	(Rs.1,000 × 3,605)		3,605
(ii) Current value of bonds value received on maturity P.V @ 12% on 5th year	(Rs.10,000 × 0.567)		5,670
		(b)	9,275
Preference shares C			
$\frac{Rs.100 \times 100Nos. \times 11\%}{13\%}$	$= \frac{Rs.1,100}{0.13}$	(c)	8,462
Preference shares D		(d)	9,231
$\frac{Rs.100 \times 100Nos. \times 11\%}{13\%}$	$= \frac{Rs.1,200}{0.13}$		
Current Value of John's Portfolio	(a) + (b) + (c) + (d)		36,250

Illustration 16:

Following is the data regarding six securities:

	A	**B**	**C**	**D**	**E**	**F**
Return (%)	8	8	121	4	9	8
Risk (%) (standard deviation)	4	5	12	4	5	6

(i) Which of the securities will be selected?

(ii) Assuming perfect correlation, analyse whether it is preferable to invest 75% in Security A and 25% in Security C.

Solution:

(i) When we make risk return analysis of different securities from A to F, we can observe that Security A gives a return of 8% at a risk level of 4%. Simultaneously, securities B and F gives the same return of 8% as of security A, but their risk levels are 5% and 6% respectively. Security D is giving only 4% return for the risk rate of 4%. Hence, security A dominates securities B, D and F.

Securities C and E offer more return but carry higher level of risk.

Hence, securities A, C and E can be selected based on individual preferences.

(ii) In a position where the perfect positive correlation exists between two securities, their risk and return can be averaged with the proportion.

Assuming the perfect correlation exists between the securities A and C, the average risk and return of A and C together for proportion 3:1 is calculated as follows:

$$\text{Risk} = (3 \times 4) + (1 \times 12) \div 4 = 6\%$$

$$\text{Return} = (3 \times 8) + (1 \times 12) \div 4 = 9\%$$

When we compare risk of 6% and return of 9% with security E with 5% risk level and 9% return. Security E stands in a better position than combined portfolio of securities A and C in proportion of 3 : 1.

Illustration 17:

Given below is the information of market rates of returns and data from companies.

	Year 2005	**Year 2006**	**Year 2007**
Market	12.0	11.0	9.0
Company	13.0	11.5	9.8

Determine the beta coefficients of the shares of Company.

Solution:

Determination of Beta Coefficients of the shares of Company.

Company

Year	R_x	R_m	$R_x - \bar{R}_x$	$R_m - \bar{R}_m$	$(R_x - \bar{R}_x)(R_m - \bar{R}_m)$	$(R_m - \bar{R}_m)^2$
2005	13.0	12.0	1.57	1.33	2.09	1.77
2006	11.5	11.0	0.07	0.33	0.02	0.11
2007	9.8	9.0	-1.63	-1.67	2.72	2.79
	$\Sigma R_x = 34.3$	$\Sigma R_m = 32.0$	$\Sigma (R_x - \bar{R}_x)(R_m - \bar{R}_m) = 4.83$			$\Sigma (R_m - \bar{R}_m)^2 = 4.67$

$$\bar{R}_x = \Sigma R_x / n = 34.3/3 = 11.43\%$$

$$\bar{R}_m = \Sigma R_m = 32/3 = 10.67\%$$

$$\sigma_m^2 = \frac{(\Sigma R_m - \bar{R}_m^2)}{n - 1} = \frac{4.67}{2} = 2.335$$

$$\text{Cov}_{x,m} = \frac{(\Sigma R_x - \bar{R}_x)(\Sigma R_m - \bar{R}_m)}{n - 1} = \frac{4.83}{2} = 2.415$$

$$\beta_x = \frac{\text{Cov}_{x,m}}{\sigma_m^2} = \frac{4.83}{2} = 1.034$$

3.10 WHEN DIVERSIFICATION DOES NOT HELP

3.10.1 Perfectly Positively Correlated Returns

The return from two securities is perfectly positively correlated when a cross-plot gives points lying precisely on an upward-sloping straight line. Each point indicates the return on security A (horizontal axis) and the return on security B (vertical axis) corresponding to one event.

What is the effect on risk when two securities of this type are combined? The general formula is:

$$V_p = W_x^2 V_x + 2 W_x W_y C_{xy} + W_y^2 V_y$$

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, $V_x = S_x^2$, $V_y = S_y^2$ and $V_p = S_p^2$

Substituting all these values in general formula gives:

$$S_p^2 = W_x^2 S_x^2 + 2W_x W_y S_x S_y + W_y^2 S_y^2$$

$$S_p^2 = (W_x S_x + W_y S_y)^2$$

$$S_p = W_x S_x + W_y S_y \quad \text{When } r_{xy} = +1$$

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.

Illustration 18:

You are evaluating an investment in two companies whose past ten years of returns are shown below:

Companies				Percent returns during years						
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
FST	37	24	-7	6	18	32	-5	21	18	6
SND	32	29	-12	1	15	30	0	18	27	10

(a) Calculate the standard deviation of each company's returns.

(b) Calculate the correlation coefficient of the company's returns.

(c) If you had placed 50% of your money in each, what would have been the standard deviation of your portfolio and the average yearly return?

(d) What percentage investment in each would have resulted in the lowest risk?

(e) Assume that a yearly risk-free return of 8% was available and that you had held only one of the two companies. Which would have been the better to own?

(f) Graph the risk and return of each fund. Given your answer to part (d), what was the single efficient portfolio of the two?

(g) Use part (f) to determine:

- How an average return of 10.8% would have been obtained.
- How an average return of 17.8% would have been obtained.

Solution:

(a) Find the average returns:

$$R_{FST} = (37 + 24 + \ldots\ldots + 6)/10 = 15\%$$

$$R_{SND} = (32 + 29 + \ldots\ldots + 10)/10 = 15\%$$

Next, find the SD:

$$\sigma_{FST} \quad \frac{\sqrt{(37-15)^2 + (24-15)^2 + \ldots\ldots + (6-1)}}{\sqrt{10}} = 14.0\%$$

$$\sigma_{SND} \quad \frac{\sqrt{(37-15)^2 + (24-15)^2 + \ldots\ldots + (10-1)}}{\sqrt{10}} = 14.3\%$$

(b) To find the covariance term:

$$\text{Cov.} = \frac{\sqrt{(37-15)(32-15) + (24-15)(29-15) + \ldots\ldots + (6-15)(10-15)}}{\sqrt{10}} = 187.4\%$$

The correlation coefficient

$$r = \frac{187.4}{(14.0)(14.3)} = 0.94$$

(c) $\sigma_p = (0.5)^2(14.0)^2 + (0.5)^2(14.3)^2 + 2(0.5)(0.5)(14.0)(14.3)(0.94) = 13.9\%$

$E(R_p) = 0.5(15.0) + 0.5(15.0) = 15\%$

(d) Using the minimum variance equation and let W stand for FST :

$$W_{FST} = \frac{\sigma_2^2 - \sigma_1\sigma_2\sigma_{1,2}}{\sigma_1^2 + \sigma_2^2 - \sigma_1\sigma_2\sigma_{1,2}}$$

$$W_{FST} = \frac{(14.3)^2 - (14.0)(14.3)(0.94)}{(14.0)^2 + (14.3)^2 - 2(14.0)(14.3)(0.94)} = 6706\%$$

$$W_{SND} = 32.4\%$$

(e) This part asks which of the funds provided the greater return per unit of risk.

The risk-slope of the line:

$$\text{For } F_{ST} = \frac{15.0 - 8}{14.0} = 0.5\% \text{ per unit of } \sigma$$

$$\text{For } S_{ND} = \frac{15 - 8.0}{14.3} = 0.49\% \text{ per unit of } \sigma$$

They were very close, but FST was better.

(f) Both funds have identical average returns. The minimum variance portfolio of W = 67.6 % and W = 32.4% would also have had a 15 % average return, but its risk would be lower than holding either company in isolation. The minimum standard deviation was 13.9%.

(g) Using 8% as the risk-free rate and the single efficient portfolio in part (f) as the optimal risky portfolio, the following risk/return relationship was available:

$$E(R_c) = R + \sigma_c\left(\frac{E(R_p) - T}{\sigma_p}\right)$$

where $\sigma_c = (1 - W_T)\,\sigma_p$

$$= 8.0\% + \sigma_C\left(\frac{15.0\% - 8.0\%}{8.0\% + \sigma_C}\right)$$

$$= 8.0\% + \sigma_C\,[0.5036]$$

To earn 10.8%, invest 60% risk-free and 40% it the optimal risky portfolio:

$$10.8\ \% = 8\% + (0.4)(13.9\%)(0.5036)$$

To earn 17.8%, borrow 40% on your equity and invest it with your equity in the optimal risky portfolio:

$$17.8\% = 8.0\% + W\,(13.9\%)(0.5036)$$

$$= 8.0\% + (1.4)(13.9)(0.5036)$$

Illustration 19:

K.S. Bhatt holds a well-diversified portfolio of stocks in the XYZ Group. During the last five years, returns on these stocks have average 20.0% per year and had a standard deviation of 15.0%. He is satisfied with the yearly availability of his portfolio and would like to reduce its risk without affecting overall returns. He approaches you for help in finding an appropriate diversification medium. After a lengthy review of alternatives, you conclude: (i) future average returns and volatility of returns on his current portfolio will be the same as he has historically expected, (ii) to provide a quarter degree of diversification in his portfolio, investment could be made in stocks of the following groups:

Groups	Expected Return	Correlation of Returns with Group XYZ	Standard Deviation
ABC	20%	+1.0	15.0%
KLM	20%	-1.0	15.0%
RST	20%	+0.0	15.0%

(a) If Bhatt invests 50% of his funds in ABC Group and leaves the remainder in XYZ Group, how would this affect both his expected return and his risk? Why?

(b) If Bhatt invests 50% of his funds in KLM Group and leaves the remainder in XYZ Group, how would this affect both his expected return and his risk? Why?

(c) What should he do? Indicate precise portfolio weighting.

Solution:

(a) Risk and return of ABC Portfolio are the same as those of XYZ portfolio and the correlation coefficient is 1.0, so there is no diversification gain.

(b) Return would remain at 20% but risk would fall to zero since r + – 1.0

(c) Invest 50/50 in Group XYZ portfolio and group KLM portfolio.

Illustration 20:

Consider the two stocks Wipro and TCS with a standard deviation 0.05 and 0.10 respectively.

The correlation coefficient for these two stocks is 0.8.

(a) What is the diversification gain from forming a portfolio that has equal proportions of each stock?

(b) What should be the weights of the two assets in a portfolio that achieves a diversification gain of 3%?

Solution:

(a) The gain from diversification is:

$$\frac{0.075 - 0.0716}{0.75} = 4.53\%$$

(b) To obtain a diversification gain of 3%, the weighting of the portfolio should be 30% to 70%.

Illustration 21:

Vinay Gautam is considering an investment in one of two securities. Given the information that follows, which investment is better, based on risk (as measured by the standard deviation) and return?

Security ABC		**Security XYZ**	
Probability	**Return**	**Probability**	**Return**
0.30	19%	0.20	22%
0.40	15%	0.30	6%
0.30	11%	0.30	14%
		0.20	-5%

Solution:

Investment in Security ABC				**Investment in Security XYZ**			
Probability	**Return** (%)	**Expected Return** (%)	**Weighted Deviation** (%)	**Probability**	**Return** (%)	**Expected Return**	**Weighted Deviation** (%)
				0.20	22	4.4	31.752
0.30	19	5.7	4.8	0.30	6	1.8	3.468
0.40	15	6.0	1.0	0.30	14	4.2	6.348
0.30	11	3.3	4.8	0.20	-5	-1.0	41.472
		E(R) = 15.0%	σ^2 = 9.6% σ = 3.09			E(R) = 15.0%	σ^2 = 83.04 σ = 9.113

Illustration 22:

You have been asked by a client for advice in selecting a portfolio of assets based on the following data:

Year	Return		
	A	B	C
2005	0.14	0.18	0.14
2006	0.16	0.16	0.16
2007	0.18	0.14	0.18

You have been asked to create portfolios by investing equal proportions (i.e., 50%) in each of two different securities. No probabilities have been supplied.

(a) What is the expected return on each of these securities over the three-year period?

(b) What is the standard deviation on each security's return?

(c) What is the expected return on each portfolio?

(d) For each portfolio, how would you characterize the correlation between the returns on its two assets?

(e) What is the standard deviation of each portfolio?

(f) Which portfolio do you recommend? Why?

Solution:

(a) $E(R_A) = E(R_B) = (R_C) = .16$

(b) $\sigma_A = (.00027)^{.5} = 0.0164$

$\sigma_B = (.00027)^{.5} = 0.0164$

$\sigma_C = (.00027)^{.5} = 0.0164$

(c) $E(R_{AB}) = E(R_{AC}) = (R_{CBC}) = .16$

(d) A and B are perfectly negatively correlated. A and C are perfectly positively correlated. B and C are perfectly negatively correlated.

(e) $\sigma_{AB} = 0$; $\sigma_{AB} = 0.0164$

Since A and C are identical, $\sigma^2_{AB} = 0$;

$\sigma_{AB} = 0$

(f) Choose either AB or BC. All three portfolios have $E(R_p) = .16$, but AB and BC have no risk, while AC has $\sigma_{AC} = .0164$. Therefore, AB and BC provide the most reward for the least amount of risk.

Illustration 23:

You are considering purchasing the equity stock of B Company. The current price per share is Rs. 10. You expect the dividend a year hence to be Re 1.00. You expect the price per share of stock B a year hence to have the following probability distribution:

Price a year hence (Rs.)	10	11	12
Probability	0.4	0.4	0.2

(a) What is the expected price per share a year?

(b) What is the probability distribution of the rate of return on B's equity stock?

Solution:

(a) Expected price per share a year hence will be:

$= 0.4 \times$ Rs. 10 + $0.4 \times$ Rs. 11 + $0.2 \times$ Rs. 12 = Rs. 10.80

(b) Probability distribution of the rate of return is

Rate of return (R_i)	10%	20%	30%
Probability (p_i)	0.4	0.4	0.2

Note that the rate of return is defined as:

$$\frac{\text{Dividend} + \text{Terminal price}}{\text{Initial price}} - 1$$

(c) The standard deviation of rate of return is: $\sigma = p_i (R_i - \bar{R})^2$

The σ of the rate of return on B's stock is calculated below:

R_i	p_i	$p_i R_i$	$(R_i - \bar{R})$	$(R_i - \bar{R})^2$	$p_i(R_i - \bar{R})^2$
10	0.4	4	-8	64	25.6
20	0.4	8	2	4	1.6
30	0.2	6	12	144	28.8

$\bar{R} = 18\%$ $\quad \sigma_p^2 = \Sigma_{p_i}^{1}(R_1 - \bar{R})^2 = 56$

$\sigma_p = \sqrt{56} = 7.48\%$

Illustration 24:

The stock of X Company performs well relative to other stocks during recessionary periods. The stocks of Y Company, on the other hand, do well during growth periods. Both the stocks are currently selling for Rs. 50 per share. The rupee returns (dividend plus price change) of these for the next year would be as follows:

	Economic Condition			
	High Growth	**Low Growth**	**Stagnation**	**Recession**
Probability	0.3	0.3	0.2	0.2
Return on Wipro stock	55	50	60	70
Return on Infosys stock	75	65	50	40

Calculate the expected return and standards deviation of:

(a) Rs. 1,000 in the equity stock of Wipro.

(b) Rs. 1,000 in the equity stocks of Infosys.

(c) Rs. 500 in the equity stock of Wipro and Rs. 500 in the equity stock of Infosys.

(d) Rs. 700 in the equity stock of Wipro and Rs. 300 in the equity of Infosys.

Which of the above four options would you choose? Why?

Solution:

(a) For Rs. 1,000, 20 shares of Wipro's stock can be acquired. The probability distribution of the return on 20 shares is

Economic Condition	Return (Rs.)	Probability
High Growth	20 × 55 = 1,100	0.3
Low Growth	20 × 50 = 1,000	0.3
Stagnation	20 × 60 = 1,200	0.2
Recession	20 × 70 = 1,400	0.2

Expected return = $(1{,}100 \times 0.3) + (1{,}000 \times 0.3) + (1{,}200 \times 0.2) + (1{,}400 \times 0.2)$

= 330 + 300 + 240 + 280

= Rs. 1,150

Standard deviation of the return = $[(1{,}100 - 1{,}150)^2 \times 0.3 + (1{,}000 - 1{,}150)^2 \times 0.3 + (1{,}200 - 1{,}150)^2 \times 0.2 + (1{,}400 - 1{,}150)^2 \times 0.2]^{1/2}$

= Rs. 143.18

(b) For Rs. 1,000, 20 shares of Infosys's stock can be acquired. The probability distribution of the return on 20 shares is:

Economic condition	Return (Rs)	Probability
High growth	20 × 75 = 1,500	0.3
Low growth	20 × 65 = 1,300	0.3
Stagnation	20 × 50 = 1,000	0.2
Recession	20 × 40 = 800	0.2

Expected return = $(1{,}500 \times 0.3) + (1{,}300 \times 0.3) + (1{,}000 \times 0.2) + (800 \times 0.2)$

= Rs.1,200

Standard deviation of the return = $[(1{,}500 - 1{,}200)^2 \times .3 + (1{,}300 - 1{,}200)^2 \times .3 + (1{,}000 - 1{,}200)^2 \times .2 + (800 - 1{,}200)^2 \times .2]^{1/2}$ = Rs. 264.58

(c) For Rs. 500, 10 shares of Wipro's stock can be acquired; likewise for Rs. 500, 10 shares of Infosys's stock can be acquired. The probability distribution of this option is:

Return (Rs)	Probability
$(10 \times 55) + (10 \times 75) = 1{,}300$	0.3
$(10 \times 50) + (10 \times 65) = 1{,}150$	0.3
$(10 \times 60) + (10 \times 50) = 1{,}100$	0.2
$(10 \times 70) + (10 \times 40) = 1{,}100$	0.2

Expected return = $(1,300 \times 0.3) + (1,150 \times 0.3) + (1,100 \times 0.2) + (1,100 \times 0.2)$

= Rs. 1,175

Standard deviation = $[(1,300 - 1,175)^2 \times 0.3 + (1,150 - 1,175)^2 \times 0.3 + (1,100 - 1,175)^2 \times 0.2 + (1,100 - 1,175)^2 \times 0.2\ ]^{1/2}$

= Rs. 84.41

(d) For Rs. 700, 14 shares of Wipro's stock can be acquired; likewise for Rs. 300, 6 shares of Infosys's stock can be acquired. The probability distribution of this option is:

Return (Rs)	Probability
$(14 \times 55) + (6 \times 75) = 1,220$	0.3
$(14 \times 50) + (6 \times 65) = 1,090$	0.3
$(14 \times 60) + (6 \times 50) = 1,140$	0.2
$(14 \times 70) + (6 \times 40) = 1,220$	0.2

Expected return = $(1,220 \times 0.3) + (1,090 \times 0.3) + (1,140 \times 0.2) + (1,220 \times 0.2)$

= Rs. 1,165

Standard deviation = $[(1,220 - 1,165)^2 \times 0.3 + (1,090 - 1,165)^2 \times 0.3 + (1,140 - 1,165)^2 \times 0.2 + (1,220 - 1,165)^2 \times 0.2]^{1/2}$

= Rs. 57.66

The expected return to standard deviation of various options is as follows:

Option	Expected return (Rs.)	Standard deviation (Rs.)	Expected return/ Standard deviation
a	1,150	143	8.04
b	1,200	265	4.53
c	1,175	84	13.99
d	1,165	58	20.09

Option 'd' is the most preferred option because it has the highest return to risk ratio.

Illustration 25:

The return on four stocks X, Y, Z and A over a period of six years has been as follows:

	1	2	3	4	5	6
X	10%	12%	-8%	15%	-2%	20%
Y	8%	4%	15%	12%	10%	6%
Z	7%	8%	12%	9%	6%	12%
A	9%	9%	11%	4%	8%	16%

Calculate the returns on:

(a) A portfolio of one stocks at a time

(b) Portfolios of two stocks at a time

(c) Portfolios of three stocks at a time

(d) A portfolio of all four stocks

Assume equivalent proportional investment.

Solution:

Expected rates of returns on equity stock X, Y, Z and A can be computed as follows:

$$X: \frac{0.10 + 0.12 + (-0.08) + 0.15 + (-0.02) + 0.20}{6} = 0.0783 = 7.83\%$$

$$Y: \frac{0.08 + 0.04 + 0.15 + .12 + 0.10 + 0.06}{6} = 0.0917 = 9.17\%$$

$$Z: \frac{0.07 + 0.08 + 0.12 + 0.09 + 0.06 + 0.12}{6} = 0.0900 = 9.00\%$$

$$A: \frac{0.09 + 0.09 + 0.11 + 0.04 + 0.08 + 0.16}{6} = 0.095 = 9.50\%$$

(a) Return on portfolio consisting of stock X = 7.83%

(b) Return on portfolio consisting of stock A and B in equal proportions

= 0.5 (0.0783) + 0.5 (0.0917)

= 0.085 = 8.5%

(c) Return on portfolio consisting of stocks X, Y and Z in equal proportions

= 1/3(0.0783) + 1/3(0.0917) + 1/3 (0.090)

= 0.0867 = 8.67%

(d) Return on portfolio consisting of stocks X, Y, Z and A in equal proportions

= 0.25(0.0783) + 0.25(0.0917) + 0.25(0.0900) + 0.25(0.095)

= 0.08875 = 8.88%

Illustration 26:

The returns on the equity stocks of TCS limited and the market portfolios over a 12-year period are given below:

Year	Return on auto TCS Ltd. (%)	Return on market portfolio (%)
1	15	12
2	-6	1
3	18	14
4	30	24
5	12	16
6	25	30
7	2	-3
8	20	24
9	18	15
10	24	22
11	8	12

(a) Calculate the beta for the stock of TCS Limited.

(b) Established the characteristics line for the stock of TCS Limited.

Solution:

Define RA and RM as the returns on the equity stock of ACE Limited and market portfolio respectively. The calculations relevant for calculating the beta of the stock are shown below:

Year	R_A	R_M	R_A-R_A	R_M-R_M	(R_A-R_A)	(R_M-R_M)	R_A-R_A/R_M-R_M
1	15	12	-0.09	-3.18	0.01	10.11	0.29
2	-6	1	-21.09	-14.18	444.79	201.07	299.06
3	18	14	2.91	-1.18	8.47	1.39	-3.43
4	30	24	14.91	8.82	222.31	77.79	131.51
5	12	16	0-3.09	0.82	9.55	0.67	-2.53
6	25	30	9.91	14.82	98.21	219.63	146.87
7	2	-3	-13.09	-18.18	171.35	330.51	237.98
8	20	24	4.91	8.82	24.11	77.79	43.31
9	18	15	2.91	-0.18	8.47	0.03	-0.52
10	24	22	8.91	6.82	79.39	46.51	60.77
11	8	12	-7.09	-3.18	50.27	10.11	22.55

$\bar{R}_A = 15.09$ $\bar{R}_M = 15.18$

$\Sigma (R_A - R_A)^2 = 1116.93$ $\Sigma (R_M - R_M)^2 = 975.61$ $\Sigma (R_A - R_A)(R_M - R_M) = 935.86$

Beta of the equity stock of TCS Limited

$$\frac{(R_A - \bar{R}_A)(R_M - \bar{R}_M)}{(R_M - \bar{R}_M)^2} = \frac{935.86}{975.61} = 0.96$$

$$\text{Alpha} = \bar{R}_A - \beta_A \bar{R}_M$$
$$= 15.09 - (0.96 \times 15.18) = 0.52$$

Equation of the characteristic line is

$$R_A = 0.52 + 0.96\ R_M$$

Illustration 27:

National Corporation is planning to invest in a security that has several possible rates of return. Given the following probability distribution returns, what is the expected rate return on investment? Also compute the standard deviation of the returns. What do the resulting numbers represent?

Solution:

Probability (P) (1)	Return (R) % (2)	Expected Return [E(R)] % (3) = (1) × (2)	Weighted Return % $[E(R)-R]^2$ P
0.10	–10	-1	52.9
0.20	5	1	12.8
0.30	10	3	2.7
0.40	25	10	57.6
		E = 13	$\sigma^2 = 126.0$
			$\sigma = 11.22$

From our studies in statistics, we know that if the distribution of returns was normal, then National could expect a return of 13% with a 67% possibility that this return would vary up or down by 11.22% between 1.78% (13% -11.22%) and 24.22% (13% + 11.22%). However, it is apparent from the probabilities that the distribution is not normal.

Illustration 28:

Assume that the current rate on a one-year security is 7%. You believe that the yield on a one-year security will be 9% one year from now and 10% two years from now. According to the expectations hypothesis, what should the yield be on a three-year security?

Solution:

Find the geometric mean by averaging the continuously compounded rates.

$$[\text{In } (1.07) + \text{In } (1.09) + \text{In } (1.10)]/3$$

$$(0.06766 + 0.08618 + 0.09531)/3$$

$$= 0.24915/3$$

$$= 0.08305$$

Then, converting to nominal rate:

$$\text{Exp. } (0.08305) - 1 = 0.0866$$

Your expectation implies that the current rate on a three-year security shall be 8.66%.

Illustration 29:

RKV is evaluating a security. One-year Treasury bills are currently paying 9.1%. Calculate the below investment's expected return and its standard deviation. Should RKV invest in this security?

Probability	.15%	.30%	.40%	.15%
Return	15	7	10	5

Solution:

Probability (P)	**Return (R) (%)**	**Expected Return (%)**	**Weighted Return (%)**
(1)	**(2)**	**(3) = (1) × (2)**	
0.15	15	2.25	5.22
0.30	7	2.10	1.32
0.40	10	4.00	0.32
0.15	5	0.75	2.52
		E(R) = 9.1%	$\sigma^2 = 9.39\%$
			σ=3.06%

RKV should not invest in this security. The level of risk is excessive for a return, which is equal to the rate offered on treasury bills.

Illustration 30:

T.S. Shekhar has a portfolio of five securities. The expected rate and amount of investment in each security is as follows:

Security	**A**	**B**	**C**	**D**	**E**
Expected Return	.14	.08	.15	.09	.12
Amount invested	Rs.20,000	Rs.10,000	Rs.30,000	Rs.25,000	Rs.15,000

Compute the expected return on Shekhar's portfolio.

Solution:

The expected return on Shekhar's portfolio is:

$$E(R_p) = (20,000/1,00,000).14 + (10,000/1,00,000).08 + (30,000/1,00,000).15 + (25,000/1,00,000).9 + (15,000/1,00,000).12$$

$$= .028 + .008 + .045 + .0225 + .018 = .1215$$

$$= 12.15\%$$

Illustration 31:

T.S. Kumar holds a two-stock portfolio. Stock ABC has a standard deviation of returns of .6 and stock XYZ has a standard deviation of .4. The correlation coefficient of the two stocks returns is 0.25. Kumar holds equal amounts of each stock. Compute the portfolio standard deviation for the two-stock portfolio.

Solution:

$$\sigma_p = \sqrt{.5^2 \times .6^2 + 2 \times .5 \times .5 \times .6 \times .4 \times 25 + 5^2 \times .4^2}$$

$$= \sqrt{.09 + .03 + .04}$$

$$= \sqrt{.16} = .4$$

Illustration 32:

Ravi Shankar has prepared the following information regarding two investments under consideration. Which investment should be accepted?

Security ABC		**Security XYZ**	
Probability	**Return %**	**Probability**	**Return %**
0.30	27	0.21	15
0.50	18	0.30	6
0.30	-2	0.40	10
-	-	0.10	4

Solution:

Investment in Security ABC				Investment in Security XYZ			
Probability	**Return (%)**	**Expected Return (%)**	**Weighted Deviation (%)**	**Probability (%)**	**Return (%)**	**Expected Return (%)**	**Weighted Deviation (%)**
				0.20	15	3.0	6.728
0.30	27	8.1	31.8	0.30	6	1.8	3.072
0.40	18	9.0	0.8	0.30	10	4.0	0.256
0.30	-2	-0.4	69.9	0.20	4	0.4	
		E(R) = 16.7%	σ = 102.5%			E(R) = 9.2%	σ^2 =12.76%
			σ = 10.12%				σ =3.57%

Illustration 33:

Ammy, a Korean-based auto manufacturer, is evaluating two overseas locations for proposed expansion of production facilities, one site in Neeroland and another on Forexland. The likely future return from investment in cash site depends to a great extent on future economic conditions. These scenarios are postulated, and the internal rate of return from cash investment is computed under each scenario. The results with their estimated probabilities are shown below:

Probability	**Internal Rate of Return (%)**	
	Neeroland	**Forexland**
0.3	20	10
0.3	10	30
0.4	15	20

Calculate the expected value of the IRR and the standard deviation of the return of investments in each location. What would be the expected return and the standard deviation of the following split investment strategies?

(i) Committing 50% of the available funds to the site in Neeroland and 50% to Forexland?

(ii) Committing 75% of the available funds to the site in Neeroland and 25% to Forexland site? (Assume zero correlation between the returns form the two sites.)

Solution:

Neeroland:

Expected Value of IRR

$= (0.3 \times 20\%) + (0.3 \times 10\%) + (0.4 \times 15\%)$

= 6% + 3% + 6%

= 15%

Outcome	Deviation	Sq'd Dev.	P	Sq'd Dev. Xp
(1)	**(2)**	**(3)**	**(4)**	**(5) = (3) × (4)**
20	+5	25	.3	7.5
10	-5	25	.3	7.5
15	0	0	.4	0
			Variance = 15	
			• = 3.87	

Forexland:

Expected Value of IRR

$= (0.3 \times 10) + (0.3 \times 30\%) + (0.4 \times 20\%)$

= 3% + 9% + 8%

= 20%

Outcome	Deviation	Sq'd Dev	P	Sq'd Dev. Xp
(1)	**(2)**	**(3)**	**(4)**	**(5) = (3) × (4)**
10	-10	100	.3	30
30	+10	100	.3	30
20	0	0	.4	0
			Variance = 60	
			• = 7.75	

(i) For a 50/50 split investment

EV for IRR

$= (0.5 \times 15) + (0.5 \times 20\%)$

= 17.5%

σ = 4.33

(ii) For a 75/25 spilt investment

$= (10.75 \times 15\%) + (0.25 \times 20\%)$

= 16.25%

σ = 3.49, i.e., Lower Risk, Lower Return

Illustration 34:

You have invested Rs. 50,000, 30% of which is invested in Company A, which has an expected rate of return of 15%, and 70% of which is invested in Company B, with an expected return of 12%. What is the return on your portfolio? What is the expected percentage rate of return?

Solution:

(a) The rate of return is the percentage of the amount invested in as stock multiplied by its expected rate of return. Thus, of the Rs. 50,000 invested

Company A – 30% of the total with 15% rate of return:

$30 \times \text{Rs. } 50{,}000 \times .15 = \text{Rs. } 2{,}250$

Company B – 70% with a 12% rate of return:

$70 \times \text{Rs. } 50{,}000 \times .12 = \text{Rs. } 4{,}200$

The total return is Rs.6,450 (i.e., Rs.2,250 + Rs.4,200)

(b) The expected percentage rate of return is the total return divided by the amount invested:

$$r = \frac{\text{Total return}}{\text{Total amount invested}}$$

$$r = \frac{\text{Rs. } 6450}{\text{Rs. } 50{,}000} = 12.90\%$$

Illustration 35:

Suppose you invest in four securities. Company ABC has on expected return of 20%, Company BCD has an expected return of 10%, Company CDE has an expected return of 12%, and Company DEF has an expected return of 9%. You have invested Rs. 40,000. What is the expected rate of return on your portfolio?

Solution:

The expected rate of return is the weighted average of expected rates in the portfolio:

$$E(R_p) = \sum_{i=1}^{n} W_i E(R_i)$$

The portfolio weights are first determined by the formula

$$W_A = \frac{\text{Rs. Invested in ABC}}{\text{Total equity investment}}$$

Since you have invested equally in four securities and total investment is Rs.40,000, the portfolio weights are equal ($W_{ABC} = W_{BCD} = W_{CDE} = W_{DEF}$) and are determined:

$$W_A = \frac{\text{Rs. } 10{,}000}{\text{Rs. } 40{,}000} = .25$$

Hence, the expected return on the individual securities and the expected rate of return on the portfolio is:

$$R_P = (W_{ABC} \times r_{ABC}) + (W_{BCD} \times r_{BCD}) + (W_{CDE} \times r_{CDE}) + (W_{DEF} \times r_{DEF})$$
$$= (.25 \times .20) + (.25 \times .10) + (.25 \times .12) + (.25 \times .09)$$
$$= .1275 = 12.75\%$$

Illustration 36:

Assume the investor in Problem 35 wants to determine how risky his portfolio is and wants you to compute the portfolio variance. If the expected correlations and variance of the stocks are as follows, what is the variance of the portfolio?

Correlations		**ABC**	**BCD**	**CDE**	**DEF**
	BCD	.50	-	-	-
	CDE	.60	.30	-	-
	DEF	-.30	-.20	-.10	-
Variances:		.04	.16	.02	.10

Solution:

To compute the variance, you need to make a covariance matrix. Using the square roots of the variances and correlations given, the covariance are calculated:

$$Cov(r_{ABC}, R_{BCD}) = .500 \times .200 \times .400 = .040$$
$$Cov(r_{ABC}, R_{CDE}) = .600 \times .200 \times .141 = .070$$
$$Cov(r_{ABC}, R_{DEF}) = -.300 \times .200 \times .316 = -.019$$
$$Cov(r_{BCD}, R_{CDE}) = .300 \times .400 \times .141 = .017$$
$$Cov(r_{BCD}, R_{DEF}) = .200 \times .400 \times .316 = -.025$$
$$Cov(r_{CDE}, R_{DEF}) = .100 \times .141 \times .316 = .004$$

With the given variance and the portfolio weights, the covariance matrix is as follows:

Securities	**Weights**	**ABC** **.25**	**BCD** **.25**	**CDE** **.25**	**DEF** **.25**
ABC	.25	.04	.040	.017	-.019
BCD	.25	.040	.16	.017	-.025
CDE	.25	.017	.017	.02	-.004
DEF	.25	-.019	-.025	-.004	1.0

Multiplying each covariance by the weight at the top of the column and at the left of the row and summing, we get

$$.25 \times .25 \times .04 = .0025$$
$$.25 \times .25 \times .040 = .0025$$
$$.25 \times .25 \times .017 = .0011$$
$$.25 \times .25 \times -.019 = .0012$$

$.25 \times .25 \times .040 = .0025$

$.25 \times .25 \times .16 = .0100$

$.25 \times .25 \times .017 = .0011$

$.25 \times .25 \times -.025 = .0016$

$.25 \times .25 \times .017 = .0011$

$.25 \times .25 \times .017 = .0011$

$.25 \times .25 \times .02 = .0013$

$.25 \times .25 \times -.004 = .0003$

$.25 \times .25 \times -.019 = .0012$

$.25 \times .25 \times -.025 = -.0016$

$.25 \times .25 \times -.004 = -.0003$

$.25 \times .25 \times 1.0 = .0063$

Total portfolio variance = .0223

Illustration 37:

Suppose you have Rs. 10,000 to invest and would like to sell Rs. 5,000 in stock XYZ short to invest in ABC. Assuming no correlation between the two securities, compute the expected return and the standard deviation of the portfolio from the following characteristics:

Security	ABC	XYZ
E(R)	.12	.02
σ (R)	.08	.10

Solution:

Expected return:

$$E(R)_p = W_{ABC}\ E\ (R_{ABC}) + W_{XYZ}\ E(R_{XYZ})$$

$$= \frac{15,000}{10,000} \times 2 - \frac{5,000}{10,000} \times 2$$

$$= .18 - .01 = .17$$

Standard deviation:

$$[W^2_{ABC}\ \sigma^2 (R_{ABC}) + W^2_{XYZ}\ \sigma^2\ (R_{XYZ})]^{1/2} = \sigma_p$$

$$= [(1.5)^2 \times (.08)^2 + (-.5)^2 \times (.10)^2]^{1/2}$$

$$= .130$$

Illustration 38:

Suppose we have two portfolios known to be on the minimum variance set for a population of three securities A, B, and C. There are no restrictions on short sales. The weights for each of the two portfolios are as follows:

	W_A	W_B	W_C
Portfolio X	.24	.52	.24
Portfolio Y	-.36	.72	.64

(a) What would the stock weights be for a portfolio constructed by investing Rs. 2,000 in portfolio X and Rs. 1,000 in portfolio Y?

(b) Suppose you invest Rs. 1,500 of the Rs. 3,000 in Security X. How will you allocate the remaining Rs. 1500 between Securities X and Y to ensure that your portfolio is on the minimum variance set?

Solution:

(a) Given a Rs. 2,000 investment in portfolio X and Rs. 1,000 investment in portfolio Y, the investment committed to each security would be:

	A	B	C	Total
Portfolio X	Rs.480	Rs.1040	Rs.480	Rs.2000
Portfolio Y	-360	720	640	1000
Confirmed Portfolio	Rs.120	Rs.1760	Rs.1120	Rs.3000

Since we are investing a total of Rs. 3,000 in the combined portfolio, the investment position in three securities are consistent with the following portfolio weights .

	W_A	W_B	W_C
Combined portfolio	.04	.59	.37

(b) Since the equation for the critical line takes the following form:

$$W_B = a + bw_A$$

Substituting in the values for W_A and W_B from portfolio X and Y, we get

$$.52 = a + .24\ b$$

$$.72 = a + –.36b$$

By solving these equations simultaneously, we can obtain the slope and the intercept of the critical line

$$W_B = .6 – 1/3\ W_A$$

Using this equation, we can find W for any given W_A if we invest half of the funds in security A(W_A = .5), then

$$W_B = .6 – 1/3\ (.5) = .43$$

Since $W_A + W_B + W_C = 1$, we know $W_C = 1 – W_A – W_B$

Substituting in our value for W and W, we find

$$W_C = .6 – .5 – .43 = .07$$

Illustration 39:

A stock that pays no dividends is currently selling at Rs. 100. The possible prices for which the stock might sell at the end of one year, with associated probabilities, are:

End-of-year Price (in Rs.)	Probability
90	0.1
100	0.2
110	0.4
120	0.2
130	0.1

(a) Calculate the expected rate of return by year-end.

(b) Calculate the standard deviations of the expected rate of return.

Solution:

(a)

Probability	0.1	0.2	0.4	0.2	0.1
Return	–10	0	10	20	30

$E(R) = 0.1(–10) + 0.2(0) + 0.4(10) + 0.2(20) + 0.1(30)$

$= –1.0 + 0 + 4.0 + 4 + 3.0$

$= 10.0\%$

(b) $\sigma = [0.1(–10 – 10)^2 + 0.2(0 – 10)^2 + 0.4(10 – 10)^2 + 0.2(20 – 10)^2 + 0.1(30 – 10)^2]^5$

$= 10.95\%$

Check Your Progress 3

State whether the following statements are true or false:

1. Financial analysis is the informative and predictive function in Investing.
2. Risk can be defined as the probability that the expected return from the security will not materialize.
3. Risk avoidance and risk minimisation are not the important objectives of portfolio management.
4. Risk and return are the two main determinants of an investment decision.
5. Purchasing power risk is also known as inflation risk.

Illustration 40:

An investor saw an opportunity to invest in a new security with excellent growth potential. He wants to invest more than he had, which was only Rs. 10,000. He sold another security short with an expected rate of return of 15%. The total amount he sold of was Rs. 40,000, and his total amount invested in the growth security, which had an expected rate of return of 30%, was that Rs. 50,000. Assume no margin requirements, what is his expected rate of return on this portfolio.

Solution:

Computing the portfolio weights for each security with the formula:

$$\frac{\text{Investment in A (sold short)}}{\text{Total equity investment}}$$

We find

$$W_A = \frac{-\text{Rs.}\,40,000}{\text{Rs.}\,10,000} = -4.0$$

$$W_B = \frac{-\text{Rs.}\,50,000}{\text{Rs.}\,10,000} = 5.0$$

$$R_p = (-4.0 \times 15) + (5.0 \times .24)$$
$$= -.60 + 1.2$$
$$= .60 = 60\%$$

3.11 LET US SUM UP

Corporations are managed by people and therefore open to problems associated with their faulty judgments. Moreover, corporations operate in a highly dynamic and competitive environment, and many operate both nationally and internationally. As a result, the judgment factor still dominates investment decisions. Risk can be defined as the probability that the expected return from the security will not materialize. Every investment involves uncertainties that make future investment returns risk-prone. Uncertainties could be due to the political, economic and industry factors. Risk could be systematic in future, depending upon its source. Systematic risk is for the market as a whole, while unsystematic risk is specific to an industry or the company individually. The first three risk factors discussed below are systematic in nature and the rest are unsystematic. Political risk could be categorised depending upon whether it affects the market as whole or just a particular industry.

Beta is a measure of the systematic risk of a security that cannot be avoided through diversification. Beta is a relative measure of risk - the risk of an individual stock relative to the market portfolio of all stocks. If the security's returns move more (less) than the market's returns as the latter changes, the security's returns have more (less) volatility (fluctuations in price) than those of the market. It is important to note that beta measures a security's volatility, or fluctuations in price, relative to a benchmark, the market portfolio of all stocks.

The risk/return trade-off could easily be called the "ability-to-sleep-at-night test." While some people can handle the equivalent of financial skydiving without batting an eye, others are terrified to climb the financial ladder without a secure harness. Deciding what amount of risk you can take while remaining comfortable with your investments is very important.

The investor can minimise his risk on the portfolio. Risk avoidance and risk minimisation are the important objectives of portfolio management. A portfolio contains different securities; by combining their weighted returns we can obtain the expected return of the portfolio.

3.12 LESSON END ACTIVITY

Suppose you are a financial advisor and are to give you views to the management on risk and return, how would you express yourself. Describe.

3.13 KEYWORDS

Financial Analysis: Financial analysis is the informative and predictive function in investing.

Economic Analysis: Economic analysis provides both near term and longer-term projections for the total economy in terms of the nation's output of goods and services, inflation, profits, monetary and fiscal policy and productivity.

Capital Market Analysis: Capital market analysis examines the industries and securities of individual companies primarily to develop value and return expectations for securities and thus to distinguish over priced securities from under-priced ones.

Market Risk: Market risk is the variability in a security's returns resulting from flactuations in the aggregate market.

Regulation Risk: In business some investments can be relatively attractive to other investments because of certain regulations or tax laws that give them an advantage of some kind.

Interest Rate Risk: The variability in a security's return resulting from changes in the level of interest rates is referred to as interest rate risk.

Management Risk: It is a risk which may be result of fault or mistake committed or may be committed by people involved in the management and are fallible and capable of making a mistake.

3.14 QUESTIONS FOR DISCUSSION

1. What do you understand by risk and return?
2. What are the different types of risk influencing an investment?
3. Explain systematic and unsystematic risk.
4. What are the different steps involved in the calculation of return and risk?
5. What do you mean by portfolio diversification?

Check Your Progress: Model Answers

CYP 1

1. exchange rate 2. Default 3. currency 4. systematic

CYP 2

1. securities 2. normal 3. Beta 4. Betas

CYP 3

1. T 2. T 3. F 4. T 5. T

3.15 SUGGESTED READINGS

Sudhindra Bhat, *Security Analysis and Portfolio Management*, Excel Books, Delhi.

Kevin, S., *Security Analysis and Portfolio Management*, Printice Hall of India.

Prasanna Chandra, *Investment Analysis and Portfolio Management*, Second Edition, Tata McGraw Hill.

Punithavathy Pandian, *Securities Analysis and Portfolio management*, Vikas.

Investment Management, V. K. Bhalla.

A. Davis, *Investors in a Changing Economy*, Printice -Hall, 1968.

Williamson, J. Peter, *Investments: New Analytic Techniques*, London, Longman, 1970.

Cottle, CC., and Whitman, W.T., *Investment Timing: The Formula Plan Approach*, McGraw Hill.

LESSON

4

MEASUREMENT AND SIGNIFICANCE OF BETA

CONTENTS

4.0 AIMS AND OBJECTIVES

After studying this lesson, you should be able to:

- Know about definition and measurement of Beta
- Understand the significance of Beta in relation to return

4.1 INTRODUCTION

Beta is a measure of a security's or portfolio's volatility, or systematic risk, in comparison to the market as a whole. It is also known as "beta coefficient."

The beta coefficient, in terms of finance and investing, describes how the expected return of a stock or portfolio is correlated to the return of the financial market as a whole.

An asset with a beta of 0 means that its price is not at all correlated with the market; that asset is independent. A positive beta means that the asset generally follows the market. A negative beta shows that the asset inversely follows the market; the asset generally decreases in value if the market goes up.

Correlations are evident between companies within the same industry, or even within the same asset class (such as equities), as was demonstrated in the Wall Street crash of 1929. This correlated risk, measured by Beta, creates almost all of the risk in a diversified portfolio.

The beta coefficient is a key parameter in the capital asset pricing model (CAPM). It measures the part of the asset's statistical variance that cannot be mitigated by the diversification provided by the portfolio of many risky assets, because it is correlated with the return of the other assets that are in the portfolio. Beta can be estimated for individual companies using regression analysis against a stock market index.

Beta is calculated using regression analysis, and you can think of beta as the tendency of a security's returns to respond to swings in the market. A beta of 1 indicates that the security's price will move with the market. A beta less than 1 means that the security will be less volatile than the market. A beta greater than 1 indicates that the security's price will be more volatile than the market. For example, if a stock's beta is 1.2 it's theoretically 20% more volatile than the market.

Many utilities stocks have a beta of less than 1. Conversely most high-tech Nasdaq-based stocks have a beta greater than 1, offering the possibility of a higher rate of return but also posing more risk.

4.2 DEFINITION

The formula for the Beta of an asset within a portfolio is , where r_a measures the rate of return of the asset, r_p measures the rate of return of the portfolio of which the asset is a part and Cov (r_a, r_p) is the covariance between the rates of return. In the CAPM formulation, the portfolio is the market portfolio that contains all risky assets, and so the r_p terms in the formula are replaced by rm, the rate of return of the market.

Beta is also referred to as financial elasticity or correlated relative volatility, and can be referred to as a measure of the sensitivity of the asset's returns to market returns, its non-diversifiable risk, its systematic risk or market risk. On an individual asset level, measuring beta can give clues to volatility and liquidity in the marketplace. On a portfolio level, measuring beta is thought to separate a manager's skill from his or her willingness to take risk.

The beta movement should be distinguished from the actual returns of the stocks. For example, a sector may be performing well and may have good prospects, but the fact that its movement does not correlate well with the broader market index may decrease its beta. However, it should not be taken as a reflection on the overall attractiveness or the loss of it for the sector, or stock as the case may be. Beta is a measure of risk and not to be confused with the attractiveness of the investment.

4.3 BETA COEFFICIENT

The beta coefficient was born out of linear regression analysis. It is linked to a regression analysis of the returns of a portfolio (such as a stock index) (x-axis) in a specific period versus the returns of an individual asset (y-axis) in a specific year. The regression line is then called the Security Characteristic Line (SCL).

α_a is called the asset's alpha coefficient and β_a is called the asset's beta coefficient. Both coefficients have an important role in Modern portfolio theory.

For example, in a year where the broad market or benchmark index returns 25% above the risk free rate, suppose two managers gain 50% above the risk free rate. Since this higher return is theoretically possible merely by taking a leveraged position in the broad market to double the beta so it is exactly 2.0, we would expect a skilled portfolio manager to have built the outperforming portfolio with a beta somewhat less than 2, such that the excess return not explained by the beta is positive. If one of the managers' portfolios has an average beta of 3.0, and the other's has a beta of only 1.5, then the CAPM simply states that the extra return of the first manager is not sufficient to compensate us for that manager's risk, whereas the second manager has done more than expected given the risk. Whether investors can expect the second manager to duplicate that performance in future periods is of course a different question.

4.3.1 Investing

By definition, the market itself has an underlying beta of 1.0, and individual stocks are ranked according to how much they deviate from the macro market (for simplicity purposes, the S&P 500 is usually used as a proxy for the market as a whole). A stock that swings more than the market (i.e. more volatile) over time has a beta whose absolute value is above 1.0. If a stock moves less than the market, the absolute value of the stock's beta is less than 1.0.

More specifically, a stock that has a beta of 2 follows the market in an overall decline or growth, but does so by a factor of 2; meaning when the market has an overall decline of 3% a stock with a beta of 2 will fall 6%. (Betas can also be negative, meaning the stock moves in the opposite direction of the market: a stock with a beta of -3 would decline 9% when the market goes up 3% and conversely would climb 9% if the market fell by 3%.)

Higher-beta stocks mean greater volatility and are therefore considered to be riskier, but are in turn supposed to provide a potential for higher returns; low-beta stocks pose less risk but also lower returns. In the same way a stock's beta shows its relation to market shifts, it also is used as an indicator for required Returns on Investment (ROI). If the market with a beta of 1 has an expected return increase of 8%, a stock with a beta of 1.5 should increase return by 12%.

This expected return on equity, or equivalently, a firm's cost of equity, can be estimated using the Capital Asset Pricing Model (CAPM). According to the model, the expected return on equity is a function of a firm's equity beta (β_E) which, in turn, is a function of both leverage and asset risk (β_A):

where:

- K_E = firm's cost of equity
- R_F = risk-free rate (the rate of return on a "risk free investment", e.g. U.S. Treasury Bonds)
- R_M = return on the market portfolio

because:

and

Firm Value (V) = Debt Value (D) + Equity Value (E)

4.3.2 Multiple Beta Model

The Arbitrage Pricing Theory (APT) has multiple betas in its model. In contrast to the CAPM that has only one risk factor, namely the overall market, APT has multiple risk factors. Each risk factor has a corresponding beta indicating the responsiveness of the asset being priced to that risk factor.

Check Your Progress 1

Fill in the blanks:

1. Beta is a measure of a security's or portfolio's volatility, or systematic risk, in _____ to the market as a whole.
2. Beta is also known as _____ .
3. The Arbitrage Pricing Theory (APT) has multiple _____ in its model.
4. Many gold related stocks are _____ negative.

4.4 MEASUREMENT OF BETA

To estimate or measure Beta, one needs a list of returns for the asset and returns for the index; these returns can be daily, weekly or any period. Next, a plot should be made, with the index returns on the x-axis and the asset returns on the y-axis, in order to check that there are no serious violations of the linear regression model assumptions. The slope of the fitted line from the linear least-squares calculation is the estimated Beta. The y-intercept is the alpha.

- There is an inconsistency between how beta is interpreted and how it is calculated. The usual explanation is that it gives the asset volatility relative to the market volatility. If that were the case it should simply be the ratio of these volatilities. In fact, the standard estimation uses the slope of the least squares regression line - this gives a slope which is less than the volatility ratio. Specifically it gives the volatility ratio multiplied by the correlation of the plotted data.

4.4.1 Extreme and Interesting Cases

- Beta has no upper or lower bound, and betas as large as 3 or 4 will occur with highly volatile stocks.
- Beta can be zero. Some zero-beta securities are risk-free, such as *treasury bonds* and cash. However, simply because a beta is zero does NOT mean that it is risk free. A beta can be zero simply because the correlation between that item and the market is zero. An example would be betting on horse racing. The correlation with the market will be zero, but it is certainly not a risk free endeavor.
- A negative beta simply means that the stock is inversely correlated with the market. Many gold-related stocks are beta-negative.
- A negative beta might occur even when both the benchmark index and the stock under consideration have positive returns. It is possible that lower positive returns of the index coincide with higher positive returns of the stock, or vice versa. The slope of the regression line, i.e. the beta, in such a case will be negative.

- Using beta as a measure of relative risk has its own limitations. Most analysis consider only the magnitude of beta. Beta is a statistical variable and should be considered with its statistical significance (*R square* value of the regression line). Higher *R square* value implies higher correlation and a stronger relationship between returns of the asset and benchmark index.

4.5 ALPHA

Alpha is a risk-adjusted measure of the so-called active return on an investment. It is a common measure of assessing an active manager's performance as it is the return in excess of a benchmark index. Note that the term "active return" refers to the return over a specified benchmark (e.g. the S&P500), whereas "excess return" refers specifically to the return over the risk-free rate. It is a common error to confound these two terms, and the reader is cautioned to make a careful distinction between them when studying or discussing investments.

The difference between the fair and actually expected rates of return on a stock is called the stock's alpha.

The alpha coefficient (α_i) is a parameter in the capital asset pricing model. In fact it is the intercept of the Security Characteristic Line (SCL). One can prove that in an efficient market, the expected value of the alpha coefficient equals the return of the risk free asset: $E(\alpha_i) = r_f$.

Therefore the alpha coefficient can be used to determine whether an investment manager or firm has created economic value:

- $\alpha_i < r_f$: the manager or firm has destroyed value
- $\alpha_i = r_f$: the manager or firm has neither created nor destroyed value
- $\alpha_i > r_f$: the manager or firm has created value

The difference $\alpha_i - r_f$ is called Jensen's alpha.

4.5.1 Origin of the Concept

The concept and focus on Alpha comes from an observation increasingly made during the middle of the twentieth century, that around 75 percent of stock investment managers did not make as much money picking investments as someone who simply invested in every stock in proportion to the weight it occupied in the overall market in terms of market capitalization, or indexing. Many academics felt that this was due to the stock market being "efficient" which means that since so many people were paying attention to the stock market all the time, the prices of stocks rapidly moved to the correct price at any one moment, and that only luck made it possible for one manager to achieve better results than another, before fees or taxes were considered. A belief in efficient markets spawned the creation of market capitalization weighted index funds that seek to replicate the performance of investing in an entire market in the weights that each of the equity securities comprises in the overall market. The best examples are the S&P 500 and the Wilshire 5000 which approximately represent the 500 largest equities and the largest 5000 securities respectively, accounting for approximately 80%+ and 99%+ of the total market capitalization of the US market as a whole.

In fact, to many investors, this phenomenon created a new standard of performance that must be matched: an investment manager should not only avoid losing money for the client and should make a certain amount of money, but in fact should make more money

than the passive strategy of investing in everything equally (since this strategy appeared to be statistically more likely to be successful than the strategy of any one investment manager). The name for the additional return above the expected return of the beta adjusted return of the market is called "Alpha".

4.5.2 Relation to Beta

Besides an investment manager simply making more money than a passive strategy, there is another issue:

> Although the strategy of investing in every stock appeared to perform better than 75 percent of investment managers, the price of the stock market as a whole fluctuates up and down, and could be on a downward decline for many years before returning to its previous price.

The passive strategy appeared to generate the market-beating return over periods of 10 years or more. This strategy may be risky for those who feel they might need to withdraw their money before a 10-year holding period, for example. Thus investment managers who employ a strategy which is less likely to lose money in a particular year are often chosen by those investors who feel that they might need to withdraw their money sooner. The measure of the correlated volatility of an investment (or an investment manager's track record) relative to the entire market is called ***beta***. Note the "correlated" modifier: an investment can be twice as volatile as the total market, but if its correlation with the market is only 0.5, its beta to the market will be 1.

Investors can use both alpha and beta to judge a manager's performance. If the manager has had a high alpha, but also a high beta, investors might not find that acceptable, because of the chance they might have to withdraw their money when the investment is doing poorly.

Check Your Progress 2

State whether the following statements are true or false:

1. Beta is also referred to as financial elasticity or correlated relative volatility.
2. The beta coefficient was born out of linear regression analysis.
3. Beta cannot be zero.
4. A negative beta might occur even when both the benchmark index and the stock under consideration have positive returns.
5. Beta coefficient was born out of linear regression analysis.

4.6 SIGNIFICANCE OF BETA

Bull-market betas are significantly positively related to returns and, except for some models in January, bear-market betas are significantly negatively related to returns. These relationships are not lost even after other independent variables, including size, book-to-market equity, and an earnings-price ratio, are added to the cross-sectional regressions. Book-to-market equity is an important factor in bear, but not bull, markets. Size is important in January and in bear markets during February through December.

Fama and French's (1992) assertion that investors receive premium payments for risk associated with the book value to market price (BE/ME) and size and not for holding

beta risk has sparked a lively debate concerning risk factors that are priced in the market. Howton and Peterson (1998) use a dual-beta model to test the Fama and French conclusions. They conclude that the significant relationship between beta and returns depends on the use of the dual-beta model. This work, however, ignores the results reported by Pettengill, Sundaram, and Mathur (PSM, 1995). PSM find a significant relation between a constant risk beta and returns when data are segmented between up and down markets, but do not consider the impact of size and BE/ME. The PSM market segmentation procedure alone provides a sufficient condition to identify a significant relation between beta and returns in the presence of size and BE/ME. Dual market betas may be relevant in explaining risk and return. However, the market segmentation procedure of PSM (1995) is the critical condition for finding a significant relationship between returns and betas.

4.7 LET US SUM UP

Beta is a measure of a security's or portfolio's volatility, or systematic risk, in comparison to the market as a whole. It is also known as "beta coefficient."

The beta coefficient, in terms of finance and investing, describes how the expected return of a stock or portfolio is correlated to the return of the financial market as a whole.

The beta coefficient is a key parameter in the capital asset pricing model (CAPM). It measures the part of the asset's statistical variance that cannot be mitigated by the diversification provided by the portfolio of many risky assets, because it is correlated with the return of the other assets that are in the portfolio. Beta can be estimated for individual companies using regression analysis against a stock market index.

Beta is calculated using regression analysis, and you can think of beta as the tendency of a security's returns to respond to swings in the market.

Beta is also referred to as financial elasticity or correlated relative volatility, and can be referred to as a measure of the sensitivity of the asset's returns to market returns, its non-diversifiable risk, its systematic risk or market risk.

Higher-beta stocks mean greater volatility and are therefore considered to be riskier, but are in turn supposed to provide a potential for higher returns; low-beta stocks pose less risk but also lower returns. In the same way a stock's beta shows its relation to market shifts, it also is used as an indicator for required returns on investment (ROI).

4.8 LESSON END ACTIVITY

Write a note on the beta coefficient and beta factor of a market portfolio.

4.9 KEYWORDS

Beta Coefficient: It describes how the expected return of a stock or portfolio is correlated to the return of the financial market as a whole.

A Positive Beta: It A positive beta means that the asset generally follows the market.

A Negative Beta: It A negative beta shows that the asset inversely follows the market; the asset generally decreases in value if the market goes up.

CAPM: The expected return on equity, or equivalently, a firm's cost of equity, can be estimated by using the Capital Asset Pricing Model (CAPM).

Cost of Equity: The cost of equity is broadly defined as the risk-weighted projected return required by investors, where the return is largely unknown.

Cost of Capital: The cost of capital is often used as the discount rate, the rate at which projected cash flow will be discounted to give a present value or net present value.

4.10 QUESTIONS FOR DISCUSSION

1. Define Beta coefficient.
2. Define Alpha coefficient.
3. Explain the significance of Beta in relation to returns.
4. How is Beta calculated?

Check Your Progress: Model Answers

CYP 1

1. comparison 2. Beta coefficient 3. betas 4. beta

CYP 2

1. T 2. T 3. F 4. T 5. T

4.11 SUGGESTED READINGS

Sudhindra Bhat, *Security Analysis and Portfolio Management*, Excel Books, Delhi.

Kevin, S., *Security Analysis and Portfolio Management*, Printice Hall of India.

Prasanna Chandra, *Investment Analysis and Portfolio Management*, Second Edition, Tata McGraw Hill.

Punithavathy Pandian, *Securities Analysis and Portfolio management*, Vikas.

Investment Management, V. K. Bhalla.

A. Davis, *Investors in a Changing Economy*, Printice -Hall, 1968.

Williamson, J. Peter, *Investments: New Analytic Techniques*, London, Longman, 1970.

Cottle, CC., and Whitman, W.T., *Investment Timing: The Formula Plan Approach*, McGraw Hill.

UNIT III

LESSON

5

SECURITY VALUATION

CONTENTS

5.0 AIMS AND OBJECTIVES

After studying this lesson, you should be able to understand:

- Types of Bond and Preference Shares
- Yield and Interest Rates
- Yield to Maturity
- Bond Duration and Price Volatility
- Pre-emptive Rights Preference Share Yields

- Holding Period Return
- Valuation of Fixed-income Securities
- Valuation of Preference Shares

5.1 INTRODUCTION

Implicit in all rational buy-sell transactions relating to claims, goods, and services is the question. Is it good or real? The investor surrenders a cost (time or money) in exchange for promised benefits. Both cost and benefits have to face uncertainty since nothing appears certain in this world, except death and taxes. The basic valuation process, therefore, is a constant exercise in rationality with cost, benefits and uncertainty as important variables.

The question of the valuation process following a sequence has been widely examined in the literature and the industry performance, in turn, is linked to performance of the economy and the market in general. The three sequential steps in the valuation process would, therefore, be as follows.

1. Economy analysis
2. Industry analysis
3. Company analysis

5.1.1 Economy Influences

All firms are parts of the overall systems known as the 'general economy', which records ups and downs. It is important to begin the valuation process with projections of the 'macro economy'. What you should grasp is the vast number of influences that affect the 'general economy'. A few examples may suffice for an initial view of these. Fiscal policy affects spending both directly and through its multiplier effects. Monetary policy affects the supply and cost of funds available to business units. Interest rates and hence required rates of return are influenced by expected inflation. The exchange rates of the balance payments position, and hence required rates of return are influenced by expected inflation. Balance of payments affects the performance of the economy. A well-informed investor will first attempt to project the future course of the economy. Should he anticipate a recession he should get his cash back and say 'good-bye' to new investments. If this projection indicates conditions of boom, he should select industries most likely to benefit from the expected phase of prosperity.

5.1.2 Industry Influences

All industries are not influenced equally by changes in the economy nor they are affected by busy cycles at just one single point of time. For example, in an international environment of peace treaties and reasonably cold war, profits of defence-related industries would wane, as the economy is not likely to benefit from such industries, which are primarily centered around defence and armaments. Similarly, a boom or expansion of the economy is not likely to benefit industries subject to foreign competition or marked by product obsolescence. A weak firm in a boom industry might prove more rewarding to a leader in a weak or declining industry. Of course, the investor would continuously be through a search process that identifies the best firms in strong industries, and narrow down his area of search for investment.

5.2 THE GENERAL VALUATION FRAMEWORK

Most investors look at price movements in securities markets. They perceive opportunities of capital gains in movements. All wish that they could successfully predict them and ensure their gains. Few, however, recognize that value determines both price and change randomly. It would be useful for an intelligent investor to be aware of this process. The present section examines this process in detail. We first present a brief outline of the evaluation model and then proceed do discuss the relationship of value with price via investor-market. We action shall also recall active and passive investment strategies and finally figure out the dynamic valuation model.

5.2.1 The Basic Valuation Model

Value of security is a fundamental variable and depends on its promised return, risk, and the discount rate. It may recall your basic understanding of present value concept with the mention of fundamental factor like sum and discount rate. In fact, the basic valuation model is none else than the present value procedure. Given an adjusted discount rate and the future expected earnings flow of a security in the form of interest, dividend, earnings or cash flow, you can always determine the present value as follows:

$$PV = \frac{CF_1}{1 + r} + \frac{CF_2}{(1 + r)^2} + \frac{CF_3}{(1 + r)^3} + \text{- - - - - -} + \frac{CF_n}{(1 + r)^n}$$

PV = Present value

CV = Cash, flow, interest, dividend, or earnings per time period up to 'n' number of periods.

R = Risk-adjusted discount rate (generally the interest rate)

Expressed in the above manner, the model looks simple. But practical difficulties do make the use or model complicated. For instance, it may be quite in the fitness of this that a single value is generated. Whosoever does the valuation job (a professional analyst or an intelligent investor), the safest course would be to work on margin of error. Thus, the value estimated may be Rs. 100 + Rs. 20 and not just Rs. 100 or Rs. 800 or Rs. 120. The analyst will realize that market operations would become tedious with a range of values. Secondly, return risk and value would tend to change over time. Thus, security prices may rise or fall with buying and selling pressures respective (assuming supply of securities does not change) and this may affect capital gains and hence returns expect. Consequently, estimates of future income will have to be revised and values reworked. Similarly, the entire risk of the security may change over time. The firm may over borrow (and face operating risk) or engage in a venture (and face operating risk). An increase in risks would raise the discount rate and lower value. It would seem to be a continuous exercise. Every new information will affect values and the buying and selling pressures, which keep prices in continuous motion, and would drive them continuously closer to new values. The last part of section portrays this dynamic valuation model with ever-changing information inputs.

5.2.2 Value-Price Relationship

You would recall that investments strategies can be 'passive' or 'active'. Following this, investors and investment managers can also be broadly grouped into 'passive' and 'active'

categories. You should note that buying and selling pressures predominantly originate with active investors. They follow certain rules of the game, which are as follows:

Rule 1: Buy when value is more than price. This underlines the fact that shares are under-priced and it is deemed to be a bargain to buy now and sell when prices move up towards value.

Rule 2: Sell when value is less than price. In a situation like this, shares would be overpriced and it would advantageous to sell them now and avoid a loss when price later moves down to the level of the value.

Rule 3: Don't trade when value is equal to price. This is a state when the market price is in equilibrium and is not expected to change.

An example would be to make the operation of these rules and the consequential investor actions clear. Assume that the share of a hundred-percent-export-unit (EOU) is currently trading at Rs. 80 against a face value of Rs… Now, most active investors in the market receive news of the company having lost a valuable export contract amounting to around 40 % of its expect total export sales of the coming year. They revise their estimate of future income downward by 40 %with risk, discount rate and other things remaining unchanged. Review the present value at Rs. 48 (60% of Rs. 80). Now, this takes you to Rule 2 when what you value is less than price. More appropriately, when price is more than value. One would expect a decline in price due to an adverse net affecting the present value. Active investors would begin selling to avoid probable losses so the selling pressure would be generated. Its supply of shares does not change. Such a pressure would reduce price till such time that it nears the new present value viz., Rs. 45. Contrarily, take the case of a company whose share was trading at Rs. 20 (with a par of Rs. 10). Now, the alert and active investors receive news of the lifting of a year-long lockout and signing of three-wage agreements quite beneficial to management much before even the media could know it. Other things including risk and discount rate remaining unchanged, analysts revise the estimates of the present value to Rs. 40 (Rs. 10 below the peak of the last year when the company was working normally). You will see the case now falling under Rule 1. Investors would expect price to move up towards the next value of Rs. 40 and would immediately start buying at or around the current price of Rs. 20. This will generate buying pressures and the price would increase if supplies of the scrip do not increase at the same time.

5.3 VALUATION OF FIXED INCOME SECURITIES

A debenture is a legal document containing an acknowledgement of indebtedness by a company. It contains a promise to pay a stated rate of interest for a defined period and then to repay the principal at a given date of maturity.

In short, a debenture is a formal legal evidence of debt and is termed as the senior securities of a company.

Unlike equity holders, the bond investor does not share in the growth of a company to any appreciable extent. Thus, although serious losses can accrue to bond holders if a company suffers financial reverses, they cannot profit to any significant degree by a spectacular improvement in the company's position. It is a case of heads they lose and tails they cannot win. Therefore, their primary role in an investment portfolio is to provide continuity of income under all reasonably conceivable economic conditions.

5.3.1 Bond Features

Indenture: The indenture is a long, complicated legal instrument containing the restrictions, pledges and promises of the contract. Bond indenture involves three parties. The first party is the debtor corporation that borrows the money, promises to pay interest, and promises to repay the principal borrowed.

Maturities: Maturities vary widely. Bonds are usually grouped by their maturity classes.

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

Call Feature: Most modern corporate bonds are callable at the discretion of the issuer. This gives the issuing company the right to recall a bond before it reaches maturity.

5.3.2 Reasons for Issuing Bonds

To Reduce the Cost of Capital: Bonds are the cheapest source of financing.

To Widen the Sources of Funds: By issuing bonds, the corporation can attract funds from individual investors and especially from those investing institutions that are reluctant or not permitted to purchase equity shares.

To Preserve Control: An increase in debt does not diminish the voting power of present owners, since bonds ordinarily carry no voting right.

To Gain the Benefit of Leverage: The presence of debt and/or preference shares in the company's financial structure means that it is using financial leverage. When financial leverage is used, changes in Earnings Before Interest and Tax (EBIT) translate into the larger changes in earnings per share.

To Effect Tax Saving: Unlike dividends on equity, the interest on bonds is deductible in figuring up corporate income for tax purposes. Hence, the EPS increases if the financing is through bonds rather than with preference or equity shares.

5.3.3 Types of Bonds

Convertible and Non-Convertible Bonds: Convertible bonds can be one of the finest holdings for the investor looking for both appreciation of investment and income of bond. A convertible bond is a cross between a bond and a stock. The holder can at his option, convert the bond into a predetermined number of shares of common stock at a predetermined price.

Collateral Trust Bonds: Instead of being secured by a pledge of tangible property, as are mortgage bonds, collateral trust issues are secured by a pledge of intangibles, usually in the form of stocks and bonds of corporation. Collateral trust issues are, thus, secured by (1) shares, representing ownership in corporation, (2) bonds, representing the indirect pledge of assets, or a combination of both. Usually, the pledged securities are those of other corporations.

Income Bonds: Income bonds are bonds on which the payment of interest is mandatory only to the extent of current earnings. If earnings are sufficient to pay only a portion of the interest, that portion usually is required to be paid, but if the corporation is able to pay the unearned balance out of its cash resources, it is of course free to do so.

Redeemable and Irredeemable Bonds: A redeemable debenture is a bond, which has been issued for a certain period on the expiry of which its holder will be repaid the amount thereof, with or without premium. A bond without the aforesaid redemption period is termed as an irredeemable debenture. These may be repaid either in the event of the winding-up of company or the happening of certain specified uncertain or contingent events.

Participating Bonds: Companies with poor credit positions issue participating bonds. They have a guaranteed rate of interest, but may also participate in earnings up to an additional specified percentage.

Sinking Fund Bonds: Sinking fund bonds arise when the company decides to retire its bond issue systematically by setting aside a certain amount each year for the purpose. The payment, usually fixed annual rupees amount or percentage installment, is made to the sinking fund agent who is usually the trustee.

Serial Bonds: Like sinking fund bonds, serial bonds are not special types of bonds but just names given to describe the method of repayment. Thus, any bond can be a serial bond by merely specifying it in the indenture.

Mortgage or Secured Bonds: The term mortgage generally refers to a lien on real property or buildings. Mortgage bonds may be open-end, close-end, and limited open-end. An open-end mortgage means that a corporation under the mortgage may issue additional bonds. But the open-end mortgage indenture usually provides that the corporation can issue more bonds only if the earnings or additional security obtained by selling the new securities meet certain tests of earnings and asset coverage.

Check Your Progress 1

1. The term mortgage generally refers to a lien on _____ property or _____ .
2. All firms are parts of the overall systems known as the _____, which records ups and downs.
3. A week firm in a boom industry might prove more rewarding to a leader in a weak or _____ industry.
4. _____ of security is a fundamental variable and depends on its promised return, risk and the discount rate.

5.4 BOND VALUATION

Debt securities issued by governments, government and quasi-government organizations, and private business firms are fixed income securities. Bonds and debentures are the most common examples.

The intrinsic value of bond or debenture is equal to the present value of its expected cash flows. The coupon interest payments, and the principal repayment are known and the present value is determined by discounting these future payments from the issuer at an appropriate discount rate or market yield. The usual present value calculations are made with the help of the following equation.

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

Where PV = the present value of the security today (i.e., time period zero)

C = coupons or interest payments per time period 't'

TV = the terminal value repayable at maturity; this could be at par, premium, or even at discount (in extraordinary cases)

r = the appropriate discount rate or market yield

n = the number of years to maturity

Illustration 1:

Consider a Rs. 1,000 bond issued with a maturity of five years at par to yield 10%. Interest is paid annually and the bond is newly issued.

Solution:

The value of the bond would be as follows:

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

$$= 100 \times .9091 + 100 \times .8264 + 100 \times .7513 + 100 \times .6830 + 1100 \times .6209$$

$$= 90.91 + 82.64 + 75.13 + 68.30 + 682.99$$

$$= 999.97 \text{ or Rs. } 1000 \text{ approx.}$$

You should recognize that the present value of the bond viz., Rs. 1,000 estimated above is equal to the issue price because the bond was just been sold at par of Rs. 100.

Now, consider another of Rs. 1,000 Bond B is issued ten years ago at a coupon at 6%. The bond had a maturity period of ten years and as of today, therefore, five more years are left for final repayment at par. The current discount rate is 10 % as before. All other characteristics of Bond B are identical with Bond A.

It is obvious that the present value of Bond B will not be Rs. 1,000 because investors will not pay this price and agree to receive Rs. 60 per year as interest for the next five years when Bond A with similar characteristics provides annual interest payments of Rs. 100 for the five years. The present value of Bond B will be determined as:

$$PVA = \frac{Rs.60}{1+.10} + \frac{Rs.60}{(1+.10)^2} + \frac{Rs.60}{(1+.10)^3} + \frac{Rs.60}{(1+.10)^4} + \frac{Rs.60}{(1+.10)^5}$$

$$= 60 \times .9091 + 60 \times .8264 + 60 \times .7513 + 60 \times .6830 + 1100 \times .6209$$

$$= 54.55 + 48.59 + 45.08 + 40.98 + 657.15$$

$$= \text{Rs. } 847.35$$

You will observe that the numerator of the PV equation will be given at the time of issuance of the bond or the nature. The maturity period, timing of interest is payments, and maturity value will also be specified. What should be determined is the denominator of the equation viz., the discount rate. You may notice that this comes with the same features. In other words, it is an opportunity cost. Thus, the discount rate incorporates the change of interest rates and reflects the current market yield for the issue.

Should interest payments be semi-annual, the PV equation will have to be modified as follows: divide 'Ct' both end and by multiply 'n' by 2. The resultant equation will be:

$$PV = \sum_{t=1}^{2n} \frac{ct/2}{(1+r/2)^t} + \frac{C}{(1+r/2)^{2n}}$$

Coming under semi-annual payments, the present values of Bonds A and B the above examples can be solved as under

$$PV_A = \sum_{t=1}^{10} \frac{Rs.50}{(1.05)^t} + \frac{1000}{(1.05)^{10}}$$

= Rs. 999.985 or Rs. 1000 approx.

= 845.551

5.4.1 Estimating Returns on Fixed Income Securities

Several measures of returns on bonds are available. They are the coupon rate, the current yield and the yield maturity. The coupon rate is specified at the time of issue and is all too obvious. The other two measures can be discussed.

Current yield: This is calculated as follows:

$$\text{Current yield} = \frac{\text{Stated (coupon) interest per year}}{\text{Current market price}}$$

Illustration 2:

15% Rs. 200 debenture is currently selling for Rs. 220, the annual current yield would be

$$\frac{\text{Rs } 30}{\text{Rs. } 220} = 13.64\%$$

You must notice that the 15% debenture is currently selling for Rs. 220 because interest rates have subsequently declined and debenture/bond prices move inversely with interest rates. The current yield has declined to 13.64%. The coupon rate of 15% reflects this.

Current yield is a superior measure than coupon rate because it is based on the current market price. However, it does not account for the difference between the purchase price of the bond/debenture and its maturity value.

5.5 YIELD-TO-MATURITY (YTM)

This is most widely used measure of return on fixed income securities. It may be defined as the income (promised) that the compounded rate of return will receive from a bond purchased at the current market and held to maturity. Computing YTM involves equating the current market price of bond with the discount value of future interest payments and the terminal principal repayment. Thus, YTM equates the two values, i.e. value market price and the present value of future payments including the principal repayment.

Illustration 3:

Assume that an investor purchased a 15% Rs. 500 fully secured non-convertible debenture at par five years ago. The current market price of the debenture is Rs. 400, which implies increase in market interest rates subsidy to the issue of the security. Five years remain to maturity and the debenture is repaid at par. What is required in this case is a value of YTM, which equates Rs. 400 with the sum of present values 75 per year for 5 years and of Rs. 500 receivable at the end of the fifth year:

The yield-to maturity can be estimated as follows.

Solution:

Several values of YTM can be tried till the equating value emerges. Trials can be started with the current with the next trial rate increased if the present value of the preceding trial exceeds the current market and *vice versa*. Thus, trying at 15%, the following present value of the right hand side cash flows is estimate.

PV15% = Rs. 75 per annum × PVIF a.yrs.15% + Rs. 500 × PVIF15%.5yrs.

= Rs. 75 × 3.3522 + Rs. 500 × .4972 = Rs. 251.42 + 248.60

= Rs. 500.08

Since the PV of Rs. 500.08 exceeds Rs. 400, a higher discount rate must be tried.

PV20% = Rs. 75 × 2.9906 + Rs. 500 × .8333

= Rs. 224.295 + Rs. 200.95

= Rs. 425.245

Even the second trial has failed to equate the two values. Hence, you can go over to the third trial at, say

PV24% = Rs. 75 × 2.7454 + Rs. 500 × .3411

= Rs. 205.91 + Rs. 170.55

= Rs. 376.46

The third trial has lowered the present value to Rs. 376.46, which is less than Rs. 400. Hence, the required must lie between 20% and 24%. The estimate can be obtained by interpolating, thus:

$$\text{YTM} = \frac{20\% + 425.245 - 400.00 \times (24\% - 20\%)}{425.245 - 346.46} = \frac{20\% + 25.245 \times 4\%}{48.785}$$

20% + 2.07% = 22.07%

It may be noted that YTM calculation is similar to calculating the internal rate of return. Calculators and computers made these calculations extremely easy. You may further note that the YTM is just a promised yield and the investor cannot earn it unless the bond/debenture is held to maturity. And if you have to hold the security till you cannot, at the same time, sell it. Thus, there would be no trading. One significant implication of such a situation is that the investor simply buys and holds and assumes all intermediate cash flows in the form of interest principal repayments to be reinvested at YTM. In other words, the YTM concept is a compound interest concept, i.e. the investor is earning interest-on-interest at YTM throughout the hold period till maturity. One should understand that intermediate cash flows are not reinvested at YTM. The realized yield actually earned will differ from the rate. The receipts are reinvested at different rates (interest being receivable semi-annually).

Coupon Interest Income (Rs.)	Assumed Reinvestment (%)	Interest on Interest income (Rs.)	Total return (Rs.)	Realized Return (%)
(1)	(2)	(3)	(4)	(5)
2000	0	0	2000	5.57
2000	5	1370	3370	7.51
2000	8	2751	4751	8.94
2000	9	3352	5352	9.46
2000	10	4040	6040*	10.00
2000	11	4830	6830	10.56
2000	12	5738	7738	11.14

Notes:

Vol. 1: Coupon interest @ 10% on Rs. 1000 received for 20 years semi-annually = Rs. 50 × 40 periods = Rs. 2000 Interest on interest at the assumed reinvestment rate for 40 per cent.

Vol. 3: Co. 1 + Col. 3 + Co.4

Vol. 4: Sum of an annuity of Rs. 50 for 40 periods at 5% semi-annual reinvestment rate is, thus, period annuity factor = 120.80 × 50 = Rs.6040*

Vol. 5: Realized return = (Future value per rupee invested)$^{1/N-1}$

$$\text{Future value per rupee invested} = \frac{\text{Total return} + \text{Cost of bond}}{\text{Cost of bond}}$$

The realized return is the compound return on semi-annual basis. For an annual basis, this figure must be doubled. The table above clearly demonstrates the critical nature of the reinvestment rate assumption of YTM. You may note that the realized return is equal to the YTM of 10% only when the reinvestment rate is 10%. At a payment rate of zero (i.e., the investor consumes away all intermediate cash flows from the bond), interest-on-interest is zero and the realized return is a low 5.57%. In contrast, at a reinvestment rate of 12%, the interest-on-interest is Rs. 5738 (i.e. 5738/7738 = around 75% of total return) and the realized return is 11.14%.

Investors must make specific assumptions about re-investment rates in order to gain ideas about realized returns. Zero coupon bonds eliminate the reinvestment rate risk because investors know that at the time of purchase of YTM that will be realized when the bond is held to maturity.

$$\text{Approximate YTM} = \frac{\text{Coupon Interest} + MP_n - MP_t}{[MP_n + MP]/2}$$

where MP_n is market price at if maturity and MPt is market price (or cost) at the beginning.

Illustration 4:

An investor is considering the purchase of the following debenture:

Maturity/3 years Coupon/11% Par/Rs. 100

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

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

(c) If the investor expects the debenture to provide a final payment of Rs. 105 in year 3 instead of the promised Rs. 11 (par plus coupon). Using the debenture's market price of Rs.97.59, what is his expected annual return? If the return on three-year risk-free securities is equal to 10.0 %, why might this debenture sell at a higher expected return?

(d) Why is the expected return different from the yield-to-maturity calculated in part (b)?

(e) What is the duration of this debenture?

(f) If an investor 'X' has a horizon date of 4.0 years, why is this debenture risky to investor 'X'?

(g) If an investor 'Y' has a horizon date of 2.0 years, why is this debenture risky to investor 'Y'?

Solution:

(a) Rs. 11/(1 + 0.13) + Rs. 11/(1 + /13)^2 + Rs. 111/(1 + 1.13)^3 = Rs. 95.28

(b) By trial and error, YTM is found to be 12 %:

Rs. 11/(1 + 0.12) + Rs. 11/(1+ /12)^2 + Rs. 11/(1 + 1.12)^3 = Rs. 97.59

(c) Again, by trial and error, the expected return is 10.16%:

Rs. 11/1.1016 + Rs. 11/(1.1016)^2 + Rs. 105/(1.1016)^3 = Rs. 97.59

If the default risk on this debenture is systematic (undiversifiable), a risk premium above the risk-free rate of 10 per cent will be required.

(d) The yield-to-maturity is the return which is expected only if all promised payments are indeed expected. If this is not the case, YTM will be an upwardly biased measure of the true expected return.

(e) Consider the debenture to be a portfolio of three zero-coupon debentures:

Debenture	Duration	Value	X_i	Weighted Duration
1	1 Year	Rs. 9.82*	10.06 per cent	0.1006 = (1 × 0.1006) = 10.06%
2	2 Year	Rs. 8.77**	8.99 per cent	0.1798 = (2 × 0.0899) = 17.98%
3	3 Year	Rs. 79.01***	80.95 per cent	2.4285 = (3 × 0.8095) = 24.29%
		Rs. 97.60	100.00	2.7087

* Rs. 11/1.12 = Rs.9.82

** Rs.11/1.122 = Rs.8.77

*** Rs.111/1.123 = Rs.97.01

(f) Investor 'X' faces net reinvestment risk since the average date at which cash is to be received (2.7 years) is sooner than the date when cash is needed (4.0 years). The portfolio will have to be reinvested at unknown future interest rates.

(g) Investor 'Y' faces a price risk since cash is needed in 2.0 years but the portfolio measures (on average) is 2.7 years. To obtain this cash, the portfolio will have to be sold at unknown future prices.

Illustration 5:

RKV recently purchased a bond with a Rs. 1000 face value, a 10% coupon rate, and four years to maturity. The bond makes annual interest payments, the first to be received one year from today. RKV paid Rs. 1,032.40 for the bond.

(i) What is the bond's yield-to-maturity?

(ii) If the bond can be called two years from now at a price of Rs. 1,100, what is its yield-to-call?

Solution:

(i) A bond YTM is that interest rate that equates the bond's price to the discounted value of its promised cash flows. In this case:

Rs. 1032.40 = Rs. 100/(1 + YTM) + Rs.100/(1 + YTM)^2 + Rs.100/(1 + YTM)^3 + Rs.1.100 /(1 + YTM)^4

YTM = 9%

(ii) If the bond can be called in two years for Rs.1,100 its yield-to-call is found by solving for the YTM assuming the receipt of only two coupon payments and a call price of Rs.1,100. That is:

$$\text{Rs. } 1032.40 = \text{Rs.}100/(1 + \text{YTC})^1 + \text{Rs. } 1,200/(1 + \text{YTC})^2$$

where YTC = Yield-to-call

By solving YTC = 125%

Illustration 6:

Ravi is considering investing in a bond currently selling for Rs. 8,785.07. The bond has four years to maturity, a Rs. 10,000 face value, and a 8 per cent coupon rate. The next annual interest payment is due one year from today, The approximate discount factor for investments of similar risk is 10%.

(i) Calculate the intrinsic value of the bond. Based on this calculation, should Ravi purchase the bond?

(ii) Calculate the YTM of the bond. Based on this calculation, should Ravi purchase the bond?

Solution:

(i) The intrinsic value of a bond is equal to the discounted value of the cash flows . In this particular problem:

$$V = \text{Rs. } 800/(1 + 10)^1 + \text{Rs.}800/(1 + 10)^2 + \text{Rs.}800/(1 + 10)^3 + \text{Rs.}10,\ 800/(1 + 10)^4$$

$$= \text{Rs. } 727.27 + \text{Rs.}661.16 + \text{Rs.}601.05 + \text{Rs.}7,376.55$$

$$= \text{Rs. } 9,366.03$$

Because the bond is actually selling for Rs.8,785.07, the bond is underpriced and Ravi should purchase it.

(ii) The YTM is the interest rate that equates the price of the bond to the discounted value of the bond's cash flows. In this particular problem:

$$\text{Rs. } 8785.07 = \text{Rs. } 800/(1 + \text{YTM})^1 + \text{Rs.}800/(1 + \text{YTM})^2 + \text{Rs.}800/(1 + \text{YTM})^3 + \text{Rs.}10,800/(1 + \text{YTM})^4$$

YRM = 12%

Because the YTM (12%) is greater than the appropriate discount rate (10%) for this bond, Ravi should purchase it.

Illustration 7:

Sen acquired at par a bond for Rs. 1,000 that offered a 15% coupon rate. At the time of purchase, the bond had four years to maturity. Assuming annual interest payments, calculate Sen's actual yield-to-maturity if all the interest payments were reinvested in an investment earning 18% per year. What would Sen's actual yield-to-maturity be if all interest payments were spent immediately upon receipt?

Solution:

Sen receives four Rs. 150 coupon payments from the bond. Assuming that they are reinvested at 18%, those coupon payments plus the principal repayment will, after four years, have grown to an accumulated value of:

Ace value = Rs. $150 \times (1.18)^3$ + Rs. $150 \times (1.18)^2$ + Rs. $150 \times (1.18)^1$
+ Rs. 1,150 $(1.18)^0$

= Rs. 246.45 + Rs. 208.86 + Rs. 177 + Rs. 1,150

= Rs. 1,782.31

As the bond had a purchase price of Rs.1,000, Sen's actual YTM over the four years is:

Actual yield = $(Rs.1,782.31/Rs.1,000)^{1/4}$ = 15.54 per cent

If the coupon payments were spent immediately upon receipt, then the effective reinvestment rate is 0%. Thus the accumulated value of the cash flow is:

Ace value = Rs. $150 \times (1.0)^3$ + Rs. $150 \times (1.0)^2$ + Rs. $150 \times (1.0)^1$ + Rs. $1,150(1.0)^0$

= Rs. 1600

Therefore, Sen's actual YTM over the four years is:

Actual yield = (Rs.1600/Rs.1000)1/4

= 1.1246828 = 12.47%.

Illustration 8:

From the price data that follow, compute the holding period returns:

Time	Stock Price (in Rs.)
1	25
2	30
3	24
4	32

Solution:

Time	Stock Price (in Rs.)	Holding-Period Return
1	25	
2	30	(Rs. 30/Rs. 25) - 1 = 20%
3	24	(Rs. 24/Rs. 30) - 1 = - 20%
4	32	(Rs. 32/Rs. 24) - 1 =333%

Illustration 9:

Calculate the value and duration for the following bonds:

Bond	Years of Maturity	Annual Interest	Maturity value
Wipro	10	Rs. 80	Rs.1,000
SBI	15	Rs. 65	Rs. 1,000

Solution:

Bond	Wipro Bond		SBI Bond	
Bond value	**Rs. 1000**		**Rs. 872**	
Year	**Interest (in Rs.)**	**PV of Interest (in Rs.)**	**Interest (in Rs.)**	**PV of Interest (in Rs.)**
1	80	74	65	60
2	80	137	65	111
3	80	191	65	155
4	80	235	65	191
5	80	272	65	221
6	80	302	65	246
7	80	327	65	265
8	80	346	65	281
9	80	360	65	293
10	1080	5002	65	301
11			65	307
12			65	310
13			65	311
14			65	310
15			1065	5036
Sum of PV of Interest		Rs. 7,247		Rs. 8,398
Duration		7.25		9.63

Illustration 10:

ABC Company has just sold a Rs. 10 crore, 10-year, 12% bond issue. A sinking fund will retire the issue over its life. Sinking fund payments are of equal amount and will be made semi-annually, and the proceeds will be used to retire bonds as the payments are made. Bonds can be called at par for sinking fund purposes, or the funds paid into the sinking fund can be used to buy bonds in the open market.

(a) How large must each semi-annual sinking fund payment be?

(b) What will happen, under the conditions of the problem thus far, to the company's debt service requirements per year for this issue over time?

(c) Now suppose ABC Ltd. set up its sinking fund so that equal annual amount, payable at the end of each year, are paid into a sinking fund trust held by a bank, with the proceeds being used to buy government bonds that pay 9% interest. The payments, plus accumulated interest, must total Rs. 10 crore at the end of 10 years, and the proceeds will be used to retire the bonds at the time. How large must the annual sinking fund payment be now?

(d) What are the annual cash requirements for covering bond service costs under the trusteeship arrangement described in part c?

(e) What would have to happen to interest rates to cause the company to buy bonds on the open market rather than call them under the original sinking fund plan?

Solution:

(a) Rs. 10,00,00,000/10 = Rs. 1,00,00,000 per year or Rs. 50,00,000 each 6 months. Since the Rs. 50,00,000 will be used to retire bonds immediately, no interest will be earned on it.

(b) The debt service requirements will decline. As the amount of bonds outstanding declines, so will the interest requirements:

Semi-annual Payment Period	**Outstanding Bonds on Which Interest is Paid**	**Interest Payment**	**Sinking Fund Payment**	**Total Bond Service**
(1)	**(2)**	**(3)**	**(4)**	**(3) + (4) = (5)**
1	Rs. 10 crore	Rs. 0.6 crore	Rs. 0.5 crore	Rs. 1.10 crore
2	9.5	0.57	0.5	1.07
3	9.0	0.54	0.5	1.04
.	.	.	.	.
.	.	.	.	.
.	.	.	.	.
20	0.5	0.03	0.5 crore	0.53

(a) Interest is calculated as (0.5) (0.12) (Column 2); for example: interest in Period 2 = (0.5) (0.12) (Rs. 9.5 crore) = Rs. 0.57 crore

The company's total cash bond service requirement will be Rs. 2.17 crore per year for the first year. The requirement will decline by 0.12 (Rs. 1,00,00,000) = Rs. 12,00,000 crore per year for the remaining years.

(c) Here we have a 10-year, 9% annuity whose compound value is Rs. 10 crore, and we are seeking the annual payment, PMT. The solution can be obtained by using this equation:

$$\begin{aligned} \text{Rs. } 1,00,000,000 &= \text{PMT } (1 + k)t \\ &= \text{PMT } (\text{FVIFA}9\%, 10) \\ &= \text{PMT } [\,(1 + 0.09)10 - 1)\,] / 0.09 \\ &= \text{PMT } (15.193) \\ \text{PMT} &= \text{Rs. } 65,81,979 = \text{Sinking fund payment.} \end{aligned}$$

(d) Annual debt service costs will be Rs. 10,00,00,000 (0.12) + Rs. 65,82,009 = Rs. 18,582.009.

(e) If interest rates rise, causing the bonds' price to fall, the company would use open market purchase. This would reduce its debt service requirements.

Illustration 11:

What is the elasticity of a ten-year zero-coupon bond priced to yield 10%?

Solution:

Because it is a zero-coupon bond, its duration is equal to its maturity.

$$e_1 = 10(0.10) / (1 + 0.10) = -0.9091$$

This means that for a 1% rise in interest rates (not a rise of one percentage point), the price of the bond should fall by 0.90915%.

Check Your Progress 2

State whether the following statements are true or false:

1. A debenture is not a legal document.
2. Income bonds are bonds on which payment of interest is not mandatory only to the extent of current earnings.
3. Companies with poor credit do not issue participating bonds.
4. Unlike equity holders, the bonds investor does not share in the growth of a company to any appreciable extent.
5. An increase in debt does not diminish the voting power of present owners, since bonds ordinarily carry no voting rights.

5.6 VALUATION OF PREFERENCE SHARES

Preference shares are hybrid security. They have some features of bonds and some of equity shares. Theoretically, preference shares are considered a perpetual security but there are convertible, callable, redeemable and other similar features, which enable issuers to terminate them within a finite time horizon. In the case of redeemable preference shares, legal mandates require creation of redemption sinking funds and earmarked investments to ensure funds for repayments.

Preference dividends are specified like bonds. This has to be done because they rank prior to equity share for dividends. However, specification does not imply obligation, failure to comply with which may amount to default. Several preference issues are cumulative where dividends accumulate over time and equity dividends need clearance of preference arrears first.

Preference shares are less risky than equity because their dividends are specified and all arrears must paid before equity holders get dividends. They are, however, more risky than bonds because the latter earn priority in payment and in liquidation. Bonds are also secured and enjoy protection of the principal which is ordinary not available to preference shares. Investors' required returns on preference shares are more than those on bond, but less than on equity shares. In exceptional circumstances when preference shares enjoy special tax-shares (like in the US, inter-corporate holdings of preference shares get exemption on 80% of preference dividends) required return on such shares may even be marginally below those on bonds.

Since dividends from preference shares are assumed to be perpetual payments, the intrinsic value of shares will be estimated from the following equation valid for perpetuities in general

$$V_P = \frac{C}{(1 + K_p)} + \frac{C}{(1 + K_p)^2} + \ldots\ldots\ldots\ldots\ldots$$

Where V_p = the value of a perpetuity today

C = the constant annual payment to be received

K_p = the required rate of return appropriate for the perpetuity

You have only to substitute preference dividend (D) for 'C' and the appropriate required return (K_{PS}) for 'K_P' to obtain the following equation for valuing preference shares.

$$V_P = \frac{D}{K_{PS}}$$

You may note that 'D' is a perpetuity and is known and fixed forever. A perpetuity does not involve present value calculations and the equitation provides for computing any of the three variables viz., value of perpetuity (V), preference dividend (D) and required rate of return (K_{PS}) only if the remaining two variables are known. Thus, the value of a preference share can be calculated if the dividend per share and the required rate of return are known. Similarly, the required rate of return (or yield) can be known if the value of the perpetuity and dividend per share are known.

Illustration 12:

We look at the valuation process of a preference share. Consider the issue of preference shares of Rs. 100 each with a specified dividend of Rs. 11.5 per share. Now, if the investor's required rate of return corresponding to the risk-level of firm A is 10% what would the value today of the share be?

Solution:

$$V_P = \frac{Rs.11.50}{.10} = Rs.115.00$$

Should the required return increase (say in the wake of rising interest rates and, consequently the high opportunity costs) to 12%, value will be:

$$\frac{Rs.11.50}{.12} = Rs.95.83$$

You may note that the value changes inversely to the required rate of return.

If you are an observer of market prices, you may notice the price of any preference share on any day and calculate its yield on that day using the above formula. Thus, if the current market price of the preference share in question is Rs. 125.00, the required rate of return or yield can be calculated as under:

$$V_P = \frac{D}{K_{PS}} \text{ or, } Rs.125.00 = \frac{Rs.11.50}{K_{PS}}$$

Or

$$= \frac{11.50}{125.00} = 9.2\%$$

Thus, the yield declines after issue of the shares by 'A'. May be, interest rates decline or other changed to induce the downward shift in the yield.

You can observe price shifts over various ranges of time, say weeks, months and years and examine the causes of shifts in yields of preference shares. These relate to 'fundamental approach to 'floatation equity shares.'

Illustration 13:

What is the value of a preference share where the dividend rate is 18% on a Rs. 100 par value? The appropriate discount rate for a stock of this risk level is 15%.

Solution:

$$V_p = (0.18 \times \text{Rs. } 100) / 0.15$$
$$= \text{Rs. } 18 / 0.15$$
$$= \text{Rs. } 120$$

Illustration 14:

The preference shares of RKV Group are selling for Rs. 47.50 per share and pay a dividend of Rs. 2.35 in dividends. What is your expected rate of return if you purchase the security at market price?

Solution:

$$\text{Expected rate of return} = \text{Dividend / Market Price}$$
$$= \text{Rs. } 2.35/\text{Rs. } 47.50$$
$$= 4.95\%$$

Illustration 15:

You own 250 preference shares of ABC company which currently sells for Rs. 38.50 per share and pays annual dividends of Rs. 6.50 per share.

(a) What is your expected return?

(b) If you require a 13% return, given the current price, should you sell or buy more preference shares?

Solution:

(a) $\text{Expected return} = \text{Dividend}/\text{Market Price}$
$$= \text{Rs. } 6.50/\text{Rs. } 38.50$$
$$= 16.88\%$$

(b) Given a 13% required rate of return, the stock is worth:

$$V_p = \text{Dividend/Required Rate}$$
$$= \text{Rs. } 6.50/0.13$$
$$= \text{Rs. } 50.00$$

Because the expected rate of return (16.88%) is greater than the required rate of return (13%) or because the current market price (Rs. 38.50) is less than Rs. 50.00, the stock is undervalued and it is worth buying.

Illustration 16:

Pioneer's preference shares are selling for Rs. 44 per share in the market and pay a Rs. 4.40 annual dividend.

(a) What is the expected rate of return on the preference shares?

(b) If an investor's required rate of return is 12%, what is the value of a preference share for that investor?

(c) Should the investor acquire the preference shares?

Solution:

(a) Expected rate of return on preference

= Rs. 4.40/Rs. 44.00

= 10%

(b) V_p = Dividend/Required rate of return

= Rs. 4.40/0.12

= Rs. 36.67

(c) The investor's required rate of return (12%) is more than the expected rate of return for the investment (10%). Also, the value of the preference share to the investor (Rs. 36.67) is less than the existing market price (Rs. 44). Therefore, the investor should not acquire the preference shares from the market.

Illustration 17:

Consider a share of preferred stock with a par value of Rs. 100 that pays a 12% annual dividend, or Rs. 12. If the discount rate for this share is 15%, what would the preference share be worth?

Solution:

V_p = Rs. 12/0.15

= Rs. 80

Illustration 18:

KSDB pays a Rs. 2.76 dividend on each preference share. What is the value of each preference share if the required rate of return of investors is 12%?

Solution:

V_p = Rs. 2.76/0.12

= Rs. 23

5.7 LET US SUM UP

The question of the valuation process following a sequence has been examined in the literature and the industry performance overall, in turn, is linked to performance of the economy and the market in general. The three sequential steps in the valuation process would, therefore, be as follows. Economy analysis, industry analysis, company analysis

Most investors look at price movements in the securities markets. They perceive opportunities of capital gains in these movements. All would wish that they could successfully predict these and ensure their gains. Few, however, recognize that value determines price and both change randomly. It would be useful for an intelligent investor to be aware of this process. The present section examines this process in detail. We first presented a brief outline of the evaluation model and then proceeded do discuss the relationship of value with price via investor-market-action. We also recall active and passive investment strategies and finally figure out the dynamic valuation model.

Debt securities issued by governments, government and quasi-government organizations, and private business firms are fixed income securities. Bonds and debentures are the most common examples. The intrinsic value of bond or debenture is equal to the present

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

5.8 LESSON END ACTIVITY

Evaluate briefly earning of variable income securities.

5.9 KEYWORDS

Indenture: The indenture is a long, complicated legal instrument containing the restrictions, pledges and promises of the contract. Bond indenture involves three parties. The first party is the debtor corporation that borrows the money, promises to pay interest, and promises to repay the principal borrowed.

Maturities: Maturities vary widely. Bonds are usually grouped by their maturity classes.

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

Call Feature: Most modern corporate bonds are callable at the discretion of the issuer. This gives the issuing company the right to recall a bond before it reaches maturity.

Income Bonds: Income bonds are bonds on which the payment of interest is mandatory only to the extent of current earnings.

Participating Bonds: Companies with poor credit positions issue participating bonds. They have a guaranteed rate of interest, but may also participate in earnings up to an additional specified percentage.

Serial Bonds: Like sinking fund bonds, serial bonds are not special types of bonds but just names given to describe the method of repayment. Thus, any bond can be a serial bond by merely specifying it in the indenture.

5.10 QUESTIONS FOR DISCUSSION

1. Write on the three-step valuation process.
2. Explain the general valuation framework.
3. Write on Value-Price Relationship.
4. Write on features of bonds and explain them in detail.
5. What are the reasons for issuing Bonds?
6. Define a bond and also explain the different types, in detail.
7. What is meant by yield-to-maturity (YTM)?
8. What comprises the appropriate discount rate for a given debenture?
9. Market interest rates and debenture prices are inversely related. Explain why.
10. What are some of the general characteristics found in preference shares?
11. Explain preference shares in detail.

Check Your Progress: Model Answers

CYP 1

1. Real, buildings 2. general economy 3. declining 4. Value

CYP 2

1. F 2. F 3. T 4. T 5. T

5.11 SUGGESTED READINGS

Sudhindra Bhat, *Security Analysis and Portfolio Management*, Excel Books, Delhi.

Kevin, S., *Security Analysis and Portfolio Management*, Printice Hall of India.

Prasanna Chandra, *Investment Analysis and Portfolio Management*, Second Edition, Tata McGraw Hill.

Punithavathy Pandian, *Securities Analysis and Portfolio management*, Vikas.

Investment Management, V. K. Bhalla.

A. Davis, *Investors in a Changing Economy*, Printice -Hall, 1968.

Williamson, J. Peter, *Investments: New Analytic Techniques*, London, Longman, 1970.

Cottle, CC., and Whitman, W.T., *Investment Timing: The Formula Plan Approach*, McGraw Hill.

LESSON

6

EQUITY SHARES VALUATION

CONTENTS

6.0 AIMS AND OBJECTIVES

After studying this lesson, you should be able to understand:

- Equity Valuation Model
- Basic Models: Zero Growth Model, Constant Growth Model, Variable Growth Model,
- Valuation Models of Cyclical Stocks
- Models based on Price Ratio Analysis
- Random Valuation Model
- Group Rotation Model
- Considerations in Developing and Selecting Quantitative Strategy

6.1 INTRODUCTION

Fundamental analysis is centred on present value, which is computed as the discounted value of future of earnings. This poses two problems. One, it is neither specified (as in the case of preference shares) not stated and their timing have both to be estimated in a probabilistic viz., dividends, cash flows and earnings. The solution to the first problem is offered by past data, which is appropriately modified for future projections. Also, doing period of investors on the margin (i.e., the major players in the market who influence the pricing) in the case of active strategists and 'infinity' in the case of those who follow the 'buy-and-hold' strategy is the base for determining the timing of these benefits. A major modification to past data will be premised on received growth rates of return on equities.

The second problem can also be viewed as a case of three alternatives not really conflicting with each other. And question is: which cash flows are appropriate in the valuation of equity shares? Now, if you buy equities and place them all in a trust fund for your and your heir's perpetual benefit, what cash flows will be received to fund? The answer is 'dividends' because this is the only cash distribution, which a company makes to that. Even though earnings per share in any year do belong to the shareholders, companies do not distribute them all. There is no doubt that investors who follow the 'buy-and-sell' strategy i.e., active strategists, would sell their whenever price changes are favourable. But since a price is the present value of future dividends, investors' cash flows from equity shares as a combination of dividends and a future price at which the shares can be equivalent to the stream of all dividends to be received on the shares.

Finally, should you regard earnings as important and use them as a measure of future benefits? Obviously, the answer is 'yes'. All dividends are paid out of earnings. Moreover, a popular approach to valuation of equity down as P/E ratio uses earnings as its basis. Hence, earnings are important. Now if all earnings are paid dividends, they will be accounted for as dividends. In the even of a part of earnings being retained, the effect will be to increase future earnings and finally future dividends too. Present value analysis accounts for earnings reinvested currently and paid later as dividends. Such a risk of double counting is present as open 'earnings' are used as a measure of future benefits. In fact, the two can be properly defined in which case the two variables viz. earnings and dividends would produce the same results. You would recognize that more than one present value model is possible in the case of equity shares viz., earnings now (i.e., earnings after tax plus depreciation). However, it is always correct to use dividends as the sum of the present value equation used to estimate the intrinsic value of equity shares. The present value, which uses dividends as its variable representing the cash flow stream, is known as the dividend valuation. This model is discussed below and is followed by a discussion of the P/E approach to equity shares situation.

6.2 ACTIVE EQUITY INVESTMENT STYLES

The primary styles of active equity management are top-down and bottom-up. A manager who uses a top-down equity management style begins with an assessment of the overall economic environment and a forecast of its near-term outlook and makes a general asset allocation decision regarding the relative attractiveness of the various sectors of the financial markets (e.g., equity, bond, real estate, bullion, and cash equivalents).

The top-down manager then analyses the stock market in an attempt to identify economic sectors and industries that stand to gain or lose from the manager's economic forecast. After identifying attractive and unattractive sectors and industries, the top-down manager finally selects a portfolio of individual stocks.

EQUITY MANAGEMENT	
Active	Passive
Subjective	Objective
Complex rules	Simple rules
Few names	Many names
Appropriate weightings	Precise weightings
Trading	
Active	Passive
Worked transactions	Programme transactions
Few names	Many names
Cash reserves	Fully vested
Monitoring	
Active	Passive
Infrequent	Constant
Approximate	Detailed

6.3 SHARE VALUATION

Share valuation is the process of assigning a rupee value to a specific share. An ideal share valuation technique would assign an accurate value to all shares. Share valuation is a complex topic and no single valuation model can truly predict the intrinsic value of a share. Valuation models can provide a basis to compare the relative merits of two different shares.

Equity valuations could be classified into the following categories:

1. Earnings valuation
2. Revenues valuation
3. Cash flow valuation
4. Asset valuation
5. Yield valuation
6. Member valuation

6.4 EQUITY VALUATION MODELS

We now turn to some of the actual models of equity valuation. The purpose of these models is to identify whether a stock is mispriced. Underpriced stocks need to be purchased; overpriced stocks should be shorted. As most modern equity valuation models are based upon the present value theory, set forth in detail by John B. Williams in Theory of Investment Value, the investment analyst must first turn to the present value estimation to know the intrinsic value of the equities.

Check Your Progress 1

1. _____ valuation is the process of assigning a rupee value to a specific share.
2. An ideal share valuation will assign an accurate value to all _____ .
3. Fundamental analysis is centered on present value, which is computed as the discounted value of the future of _____ .
4. The primary styles of active equity management are top-down and _____ .

6.5 DIVIDEND VALUATION MODEL

A difficult problem in using the dividend valuation model is the timing of cash flows from dividends. Since equity shares have no finite measure, the investor must forecast all future dividends. This might imply a forecast of intently long stream of dividends. Clearly, this would be almost impossible. And therefore, in order to manage the problem, assumptions are made with regard to the future growth of the dividend of the immediately previous period available at the time the investor wants to determine the intrinsic value of his/her equity shares. The assumptions can be:

(a) Dividends do not grow in future i.e., the constant or zero growth assumption.

(b) Dividends grow at a constant rate in future, i.e., the constant assumption.

(c) Dividends grow at varying rates in the future time period i.e., multiple growth assumption.

The dividend valuation model is now discussed with these assumptions.

6.5.1 Zero-Growth Case

The growth rate of dividend D at time 't' will be known by solving for 'g' in the following

$$D_t = D_t - 1\ (1 + g_t) \qquad ...(1)$$

Or,

$$D_t = \frac{D_t - 1(1+g_t)}{D_1 - 1} \qquad ...(2)$$

You can easily see that when $g_t = 0$, 3 equation 1 will yield $D_t = D_t - 1$, which means all future dividends would equal to be current dividend (i.e., the dividend of the immediately preceding period available as on date)

Now, the present value of dividends for an infinite future period would be

$$V = \frac{D_0}{1+k} + \frac{D_1}{(1+k)^2} + \frac{D_2}{(1+k)^3} + \infty \qquad ...(3)$$

Since, $D_0 = D_1 = D_2 = D_3$, under the zero-grown assumption, the numerator D_1 in equation 3 is replaced D_0.

You will appreciate that discounting cash flows over a very distant long future period would be meaningless. Mathematics tells us that if K > 0 then the value of

an infinite series like the one in equation (4) is reduced so that the equation (4) results in following :

$$V_0 = \frac{D_0}{K} 1 = \frac{D_0}{K_0} \quad ...(4)$$

And since $D_0 = D_1$, equation (5) can also be written as

$$V = \frac{D_1}{K} \quad ...(5)$$

Illustration 1:

Consider a preference share on which the company expects to pay a cash dividend of RKV Rs. 9 per share for an indefinite future period. The required rate return is 10% and the current market price is Rs. 80.00. Would you buy the share at its current price?

Solution:

This is a zero-growth case because the dividend per share remains Rs. 9 for all future time periods. You find the intrinsic value of the share using equation

$$V = \text{Rs. } 9.00/.10 = \text{Rs. } 90$$

The intrinsic value of Rs. 90 is more than the market price of Rs. 80. You would consider buying the share.

Illustration 2:

The company paid its first cash dividend of Rs. 2.50 today and dividends are expected to grow at a rate of 30% per year for the next three years. Thereafter, cash dividends will grow at a 10% rate per year. Shareholders expect to earn a 15% return on their investments. Calculate the present value of dividend.

Solution:

STEP 1: Calculate the present value of dividends for the first three years.

$$\sum_{t=1}^{n} D_o(1 + g_x)^t/(1 + K)^t$$

$$= \text{Rs. } 8.3473$$

Year	**Dividend $D_o (1+g_x)^t$ Rs. $2.50(1+0.30)^t$**	**x Capitalisation Rate × k = 0.15**	**= Present Value**
(1)	**(2)**	**(3)**	**(4) = (2) × (3)**
0	Rs.2.500		
1	Rs.3.250	0.870	3.7356
2	4.225	0.756	5.5886
3	5.493	0.658	8.3473

STEP 2: Value at the end of three years for the remaining life of the company

Dividend in 4th year $D_4 = D_3 (1 + gy)$

$$= \text{Rs.}5.493 (1 + 0.10) = \text{Rs. } 6.0423$$

Value at the end of the third year

$$V_3 = D_4/(k - gy)$$

$$V_3 = 6.0423/(0.15 - 0.10)$$

$$= \text{Rs. } 120.846$$

STEP 3: The present value at the end of three years (V_3) discounted by the required rate of return k = 0.15

$$(V_3) \times 1/(1 + k)^3$$

$$= \text{Rs. } 120.846\ (0.658)$$

$$= \text{Rs. } 79.516668$$

STEP 4: The value per share today equals the present value of dividends for the first three years (Step-1) plus the present value of the share price at the end of year 3 (Step-3)

Step 1	**Step 2**
Vo =Rs.8.343 +	Rs.79.516668
= Rs.87.8639668	

STEP 5: Multiply the number of shares by the price per share to determine the total value of the equity. If there are 10,00,000 ordinary shares the total value of the firm is Rs. 8,78,63,967.

6.5.2 Multiple-Growth Case

The multiple-growth assumption has to be made in a vast number of practical situations. The infinite future period is viewed as divisible into two or more different growth segments. The investor must forecast the time to which growth would be variable and after which only the growth rate would show a pattern and would be constant. This would mean that present value calculations will have to be spread over two phases viz., one phase would last until time 'T' and other would begin after 'T' in infinity.

The present value of all dividends forecasts up to and including time 'T' $V_{T(i)}$ would be

$$V_{T(i)} \sum_{t=1}^{T} \frac{D_t}{(1+K)^t} \qquad \ldots(6)$$

The second phase present value is denoted by $V_{T(2)}$ and would based on constant-growth dividend forecast after time 'T'. The position of the investor at time 'T' after which the second phase commences is viewed as a point in time when he is forecasting a stream of dividends for time periods T + 1, T+2, T+3 and so on, which grow at a constant rate. The second phase dividends would be

$$D_{T+1} = D_T(1 + g)$$

$$D_{T+2} = D_{T+1}(1 + g) = D_T(1 + g)^2 \qquad \ldots(7)$$

$$D_{T+3} = D_{T+2}(1 + g) = D_T(1 + g)^3$$

And so on. The present value of the second phase stream of dividends can, therefore, be estimated using equation (6) and at time 'T'

$$V_T = D_{T+1} \frac{1}{K-g} \quad \ldots(8)$$

You may note 'V_T' given by equation (9) is the present value at time 'T' of all future expected dividends. Hence, when this value has to be viewed at time 'zero', it must be discounted to provide the present value at time for the second phase present value. The latter can also be viewed at time 'zero' as a series of each dividend that grow at a constant rate as already stated. The resulting second phase value $V_{T(2)}$ will give the following.

$$V_{T(2)} = V_{T+1} \frac{1}{(K-g)^T} \quad \ldots(9)$$

$$V_{T(2)} = V_{T+1} \frac{D_{T+1}}{(K-g)(1+K)^T}$$

Now, the two present values of phases 1 and 2 can be added to estimate the intrinsic value of an equal that will pass through a multiple growth situation. The following describes the summation of the two phases.

$$V_{T(2)} = V_{T(1)} + V_{T(2)}$$

$$\sum_{t=1}^{T} \frac{D_t}{(1+K)^t} + \frac{D_{T+1}}{(K-g)(1+K)^T}$$

Illustration 3:

RKV Ltd., paid dividends amounting to Rs. 0.75 per share during the last year. The company is to pay Rs. 2.00 per share curing the next year. Investors forecast a dividend of Rs. 3.00 per share in that year. At this time, the forecast is that dividends will grow at 10% per year into an indefinite future. Would you sell the share if the current price is Rs. 54.00? The required rate of return is 15%.

Solution:

This is a case of multiple growth. Growth rates for the first phase must be worked out and the time between the two phases established. It is clear that 'T' = 2 years. Hence, this becomes the time-partition. Rates before 'T' are:

$$g_1 = \frac{D_1 - D_g}{D_0} = \frac{Rs.2.00 - Rs.0.75}{Rs.0.75} = 167\%$$

$$g_2 = \frac{D_2 - D_1}{D_1} = \frac{Rs.3.00 - Rs.2.00}{Rs.0.75} = 50\%$$

The values $V_{T(1)} + V_{T(2)}$ can be calculated as follows:

$$V_{T(1)} = \frac{Rs.\,2.0}{(1+15)^t} + \frac{Rs.\,3.0}{(1+15)^2} = Rs.\,4.01$$

$$V_{T(1)} = \frac{Rs.\,3.30}{(.15+.10)^t} + \frac{Rs.\,49.91}{(1+.15)^2}$$

Since $V_0 = V_{T(1)} + V_{T(2)}$ the two values can be summed to find the intrinsic value of a Cromecon equity share time 'zero'.

This is given below:

$$V_0 = \text{Rs. } 4.01 + \text{Rs. } 49.91 = \text{Rs. } 53.92$$

At the current price of Rs. 54.00, the share is fairly priced and hence you won't trade.

6.5.3 Models based on Price Ratio Analysis

Price ratios are widely used by financial analysts, more so even than dividend discount models. Of course, all valuation methods try to accomplish the same thing, which is to appraise the economic value of a company's stock

The P/E approach to Equity Valuation

The first step here consists of estimating future earning per share. Next, the normal price-earnings ratio will be estimated. Product of these two estimates will give the expected price. For a single year holding period, with D_1 as the referred dividends in the coming year, the expected return of an investor can be found as under.

$$\text{Expected Return} = \frac{D_1(p_1 - P)}{P}$$

Stagnating normal price-earning ratio is central to the P/E approach for valuing equity shares. The procedure has been described in the following paragraphs.

You may go back to equation 3 and introduce the earnings variable in it by expressing

$$D_t = p_1 - E_1 \qquad ...(10)$$

Where P_1 = pay-out ratio, and E_t = earnings per share in time 't' so, if you forecast earnings per share and layout ratio you have in fact forecast dividends per share. Now, use equation (10) to restore equation (3) where it will be replaced by p_tE_t as follows:

$$V = \frac{D_1}{1+K} + \frac{D_1}{(1+K)^2} + \frac{D_1}{(1+K)^3} + ...$$

$$= \frac{p_1E_1}{1+K} + \frac{p_2E_2}{(1+K)^2} + \frac{p_3E_3}{(1+K)^3}$$

$$= \sum_{t=1}^{\infty} \frac{P_1E_1}{(1+K)^1} \qquad \ldots(11)$$

Now, if earnings like dividends also grow at a rate 'g_e' in future time periods as

$$E_1 = E_{t-1}(1 + g_{et})$$

And which would also imply that

$$E_1 = E_{t-1}(1 + g_{et})$$

$$E_2 = E_1(1 + g_{et}) = E_0(1 + g_{e1})\ (1 + g_{e2})$$

$$E_3 = E_2(1 + g_{e3}) = E_0(1 + g_{e3})\ (1 + g_{e3})$$

and so, on where E_0 is the actual level of earnings per share over the past year, E_1 is the expected level of earnings per share for the year after E_1 and E_2 is expected level of earnings per share for the year after E_2.

Substituting these equations in equation (12), we get

$$V = \frac{P_1[E_0(1+g_{e1})]}{1+K} + \frac{P_2[E_0(1+g_{e1})+(1+g_{e2})]}{(1+K)^2} +$$

$$\frac{P_2[E_0(1+g_{e1})+(1+g_{e2})+(1+g_{e3})]}{(1+K)^3} + \quad ...(12)$$

now you may recall that 'V' is the intrinsic value or the price at which the share would sell if it were priced. Then, V/E_0 would be the price-earnings ratio that must prevail if the share were fairly priced. In other words, V/E_0 would be the normal price-earnings ratio. To obtain a normal price-earnings ratio from equation 13, divide both sides of the equation by E_0 and simplify. The resultant equation would be

$$\frac{V}{E_0} = \frac{P_1(1+g_{e1})}{1+K} + \frac{P_2(1+g_{e1})+(1+g_{e2})}{(1+K)^2} + \frac{P_2(1+g_{e1})+(1+g_{e2})+(1+g_{e3})}{(1+K)^3} + ... \quad ...(13)$$

You can now interpret equation (12) to show that a share's normal price-earnings ratio will be higher:

(g_{e1}, g_{e1}, g_{e1}……); the smaller the required rate of return (K).

The above relationships are qualified by the phrase "other things being equal", which means no change in variables. For example, the normal price earnings ratio would increase with increase with increase in payout ratio but no company can ever achieve this result concentrating on an increase in the payout ratio. What happens with an increased payout ratio is a corresponding decrease in reinvestment of earnings and consequently a diminution in the growth rate; increased payout would neutralized by decreased growth so on. Consequently, intrinsic value and therefore the normal price-earnings will not increase.

Second, equation (13) is based on the infinite series of dividends in the growth situations. The equations can be derived as follows:

$$\text{The Constant Growth Situation : } V = \frac{p}{E_0}\frac{1+g_e}{K-g} \quad ...(14)$$

$$\text{Zero Growth Situation : } \frac{V}{E_0} = \frac{1}{K}$$

Reasons for company to have negative earning

There are a number of reasons for a company to have negative earnings. Some of the reasons for negative earnings can be listed as follows:

- Cyclical nature of industry
- Unforeseeable circumstances
- Poor management
- Persistent negative earnings
- Early growth stage
- High leverage cost

1. ***Cyclical Nature of Industry:*** Companies might belong to the cyclical industry. When there is a recession in the economy, the company will post negative earnings.

However, once the economic variables change, the companies in these cyclical industries also recover and show a positive growth rate. Normalised Net Income = Average ROE * Current Book Value of Equity

Normalised after-tax Operating Income = Average ROC * Current Book Value of Assets

2. ***Unforeseeable Circumstances:*** The earnings of a company may show a negative result due to a one-time unforeseen event. The extent of downtrend could depend on both external and internal factors relating to the company.

3. ***Poor Management:*** The company might have a team at the top that is responsible for the wrong business decisions or the company could have been affected by fraud or mismanagement issues. However, if it is felt that the negative earnings due to this mismanagement has been identified and corrective action by the company is on the agenda of the board, the valuation of such companies has to be done considering the industry earnings record.

Illustration 4:

Zee Ltd. is paying dividends on its equity shares at Rs. 8 per share and expects to pay it for an undefined long period in future. The equity share currently sells for Rs. 65 and investor's required rate of return is 10. Determine if the Zee share is fairly priced using P/E approach valuation.

Solution:

This is a zero-growth case and the normal price-earnings ratio can be found as under

$$V/E_0 = 1/K = 1/10 = 10$$

The actual price earnings ratio = P/E = Rs. 65/Rs. 8 = 81. Since the normal price-earnings ratio of 10 is more than the actual price-earnings ratio of 8.1, the share at Rs. 65.0 is under priced.

Illustration 5:

Now, assume that Zee paid a dividend of Rs. 1.80 per share over the past year and the forecast then is that would grow at 5% per annum forever. The required rate of return is 11% and the current market price is Rs. 40 per share. Using P/E approach, determine if the Zee share is fairly priced. E_0 may be taken as Rs. 2.70.

Solution:

This is a constant growth case. The normal price earnings ratio (V/E_0) can be

$$\frac{V}{E_0} = P = \frac{(1+g_e)}{K-g} = 1.80/2.70\,\frac{1+0.5}{.11-0.5}$$

$$= .6667\frac{1.05}{.05} = 11.67$$

$$\frac{P}{E_0} = \frac{\text{Rs. } 40.0}{\text{Rs. } 2.70} = 14.81$$

Since $\frac{V}{E_0} = 11.67 < \frac{P}{E_0} = 14.81,$ the share is overpriced

Price-Book [P/B] Ratio

A very basic price ratio for a company is its price-book [P/B] ratio, sometimes called the market-book ratio. A price-book ratio is measured as the market value of a company's equity issued divided by its book value of equity. Price-book ratios are appealing because book values represent, in principle, historical costs. The stock price is an indicator of current value, so a price-book ratio simply measures what the equity is worth today, relative to what it cost. A ratio bigger than 1.0 indicates that the firm has been successful in creating value for its stockholders. A ratio smaller than 1.0 indicates that the company is actually worthless than its cost.

Price-Sales (P/S) Ratio

A price-sales ratio is calculated as the current price of a company's stock divided by its current annual sales revenue per share. A high P/S ratio would suggest high sales growth, while a low P/S ratio might indicate sluggish sales growth.

6.5.4 Considerations in Developing and Selecting Quantitative Strategies

Many models can be used in combination with each other and especially in combination with sound judgement. The quantitative strategy in valuation models may be defined as engineered investment strategies. In developing these strategies, consideration must be given at least to three characteristics. First, the strategy should be based on a sound theory. That is, there should be not only a reason why the strategy worked in the past, but, more importantly, a reason why it should be expected to work in the future. Second, the strategy should be put in quantified terms. Finally, a determination should be made of how the strategy would have performed in the past. This last characteristic is critical and is the reason why investment strategies are back-tested. An equity manager encounters many potential problems in the design, testing and implementation of engineered investment strategies. These include:

Random Valuation Model

The Random Valuation model begins with the premise that the next three years' growth of earnings, dividends, and price will be similar to those of the past ten years. This is similar to the Trend Valuation equation for estimating the rate of return, r. In the Random Valuation model, the ten-year growth rate of earnings and dividends is used, along with the ten-year P/E ratio.

Check Your Progress 2

State whether the following statements are true or false:

1. Fundamental analysis is centred on present value, which is computed as the discounted value of future earnings.
2. Share valuation is not the process of assigning a rupee value to a specific share.
3. The earnings of a company may show a negative result due to a one-time unforseen event.
4. The present value, which uses dividends as its variable representing the cash flow stream, is known as the dividend valuation.
5. Present valuation analysis accounts for earnings reinvested currently and paid later as dividends.

Illustration 6:

Ravi paid Rs. 2.75 in dividends on its equity shares last year. Dividends are expected to grow at 12% annual rate for an indefinite number of years.

(a) If Ravi's current market price is Rs. 37.50, what is the stock's expected rate of return?

(b) If your required rate of return is 14%, what is the value of the stock for you?

(c) Should you make the investment?

Solution:

(a) Expected Rate of Return = Rs.2.75 (1.12)/(Rs. 37.50 + 0.12) = 20.21%

(b) Investor's value = Rs. 2.75(1.12)/(0.14 – 0.12) = Rs. 154

(c) The expected rate of return is greater than the required rate of return (20.21% versus 14%). Also, the value of the stock (Rs. 154) is larger than the current market price (Rs. 37.50). The share is undervalued and should be purchased.

Illustration 7:

The market price for Super Iron's equity is Rs. 65 per share. The price at the end of one year is expected to be Rs. 90, and dividends for next year should be Rs. 2.90. What is the expected rate of return?

Solution:

If the expected rate of return is represented by ERR:

Current Price = (Dividend in year 1)/(1 + ERR) + (Price in year 1)/(1 + ERR)

ERR = [(Dividend in year 1 + Price in year 1)/Current Price] – 1

ERR = [(Rs.2.90 + Rs.90)/65] – 1 = 0.30

ERR = 30.0%

Illustration 8:

Ravi Petro is expected to pay Rs.3.00 in dividends next year, and the market price is projected to be Rs. 75 by year-end. If the investor's required rate of return is 20%, what is the current value of the stock?

Solution:

V_e = (Dividend in year 1)/(1 + Required rate) + (Price in year 1)/(1 +Required rate)

= Rs. 3.00/(1 + 0.20) + Rs. 75/(1 + 0.20)

= Rs. 2.50 + Rs. 62.50

= Rs. 65.00

Illustration 9:

On Sudha Enterprises' equity shares, the dividend was paid at Rs. 1.32 per equity share last year and this is expected to grow indefinitely at an annual 7% rate. What is the value of each equity share of Sudha Enterprises if the investor requires an 11% return?

Solution:

V_e = (Last year dividend{1 + Growth Rate})/(Required rate of return – Growth rate)

= Rs. 1.32 (1.07) / (0.11 – 0.07) = Rs. 35.31

Illustration 10:

An investor holds an equity share giving him an annual dividend of Rs. 30. He expects to sell the share for Rs. 300 at the end of a year. Calculate the value of the share if the required rate of return is 10%.

Solution:

The market price of a share in the beginning of the period is equal to the present value of the dividends paid at the end of the period plus the market price of the share at the end of the period. Symbolically:

$$P_0 = D_1/(1 + i) + P_1(1 + i)$$

OR

$$P_0 = (D_1 + P_1)/(1 + i)$$

where

P_0 = Current price of the share

i = Required rate of return or the cost of equity

D_1 = Dividend to be received at the end of the period

P_1 = Market price of share at the end of the period

Substituting the values, we get:

P_1 = Market price of share at the end of the period

P_0 = (Rs. 30 + Rs. 300)/(1 + 0.10) = Rs. 330/1.10 = Rs. 300

Illustration 11:

Ravi equity share currently sells for Rs. 23 per share. The company's finance manager anticipates a constant growth rate of 10.5% and an end-of-year dividend of Rs. 2.50.

(a) What is the expected rate of return?

(b) If the investor requires a 17% return, should he purchase the stock?

Solution:

(a) Expected rate of return = (Dividend in year 1) / (Market Price) + Growth rate

= (Rs. 2.50 / Rs. 23.00) + 0.105

= 21.37%

(b) V_e = Rs. 2.50 / (0.17 – 0.105)

= Rs. 38.46

The value of the stock would be Rs.38.46. Thus, the expected rate of return exceeds the required rate of return, which means that the value of the security is greater than the current market price. Therefore, the investor should buy the stock.

Illustration 12:

RAJ's equity shares currently sells for Rs. 22.50 per share. The finance manager of RAJ anticipates a constant growth rate of 12% and an end-of-year dividend of Rs. 2.50.

(a) What is your expected rate of return if you buy the stock for Rs. 25?

(b) If you require an 18% return, should you purchase the stock?

Solution:

(a) Expected rate of return: (Dividend in year 1)/(Market Price) + Growth rate

= Rs. 2.50 / Rs.25 + 0.12

= 0.22 = 22%

(b) V_e = Rs. 2.50 / (0.18 – 0.12)

= Rs. 41.67

Yes, do purchase the equity shares of RAJ.

Illustration 13:

Firms A, B and C are similar. Firm A is the most progressive and trades at a 18/1 P/E multiple. Firm B is less progressive, is not publicly traded, and has an EPS of Rs. 1.20. Firm C is least progressive and trades at a 15/1 P/E ratio. What is the intrinsic value of firm B?

Solution:

Average P/E = 16.5

Intrinsic value = 16.5×1.20

= Rs. 19.80

Illustration 14:

Companies R, S and T are similar. Company R is privately held, and has a book value of Rs. 40 per share. Company S has a market price of Rs. 15 and a book value of Rs. 12. Company T has a market value (MV) of Rs. 82 and a book value of Rs. 62. What is a possible value for Company R?

Solution:

Ratio of book value to market value:

Company R = Rs. 40/MV – 0.78

MV = Rs. 51

Company S = Rs. 12/Rs. 15 = 0.8

Company T = Rs. 62/Rs. 82 = 0.76

Illustration 15:

Verma is a conservative investor who demands 10% interest on his fixed investment but 20% from his equity investments. He has been considering the purchase of an equity that pays Rs. 2.50 in dividends this year and whose dividends are expected to grow at 10% per year for the next three years. Earnings this year are Rs. 5 per share and are expected to grow at 20% for the next seven years. Stocks growing at this rate generally sell at 40 times earnings. What price does Verma pay for this equity?

Solution:

Using the three year valuation formula:

$$P_0 = D(1 + g)/(1 + k) + D(1 + g)^2/(1 + k)^2 + D(1 + g)^3/(1 + k)^3$$

where

$P_3 = (E)(P/E)(1 + g)^3$

$P_3 = (Rs.\ 4)\ (40)\ (1 + 20\%)_3 = Rs.\ 276.48$

$P_0 = Rs.\ 2.50\ (1 + 0.10)/(1 + 0.20) + Rs.\ 2.50\ (1 + 0.10)^2/(1 + 0.20)^2$
$+ [Rs.\ 2.50\ (1 + 0.10)^3 + Rs.\ 276.48]/(1 + 0.20)^3$

$Rs.\ 2.50/(1.20) + Rs.\ 3.035/(1.44) + (Rs.\ 3.3275 + Rs.\ 276.48)/(1.728)$

$= Rs.\ 2.292 + Rs.\ 2.107 + Rs.\ 161.926$

$= Rs.\ 166.32$

6.6 LET US SUM UP

Fundamental analysis is centred on present value, which is computed as the discounted value of future earnings. This poses two problems. One, it is neither specified (as in the case of preference shares) nor is it stated and their timings have to be both estimated in a probabilistic viz., dividends cash flows, and earnings. The solution to the first problem is offered by past data, which is appropriately modified for future projections. Also, doing period of investors on the margin (i.e., the major players in the market who influence the pricing) in the case of active strategists and 'infinity' in the case of those who follow the 'buy-and-hold' strategy' is the base for determining the timing of these benefits. A major modification to past data will be premised on received growth rates of return on equities.

The valuation task is relatively straightforward in case of bond and preference share, because benefits are generally constant and reasonably certain. Equity valuation is different, because the return on equity is uncertain and can change from time to time. It is the size of the return and the degree of fluctuation (i.e. risk), which together determine the value of a share to the investor. We have also discussed equity valuation models. The purpose of these models is to identify whether a stock is mispriced. Underpriced stocks need to be purchased; overpriced stocks should be shorted. As most modern equity valuation models are based upon the present value theory, set forth in detail by John B. Williams in Theory of Investment Value, investment analyst must turn first to the present value estimation to know the intrinsic value of the equities.

6.7 LESSON END ACTIVITY

Do the risk analysis of different securities mainly with fixed income and variable income.

6.8 KEYWORDS

Fundamental Analysis: It is centred on present value, which is computed as the discounted value of future of earnings.

Present Value Analysis: It accounts for earnings reinvested currently and paid later as dividends.

Share Valuation: It is the process of assigning a rupee value to a specific share.

Price-Book Ratio: A very basic price ratio for a company is its price-book [P/B] ratio, sometimes called the market-book ratio.

Price-Sale Ratio: A price-sales ratio is calculated as the current price of a company's stock divided by its current annual sales revenue per share.

Random Valuation Model: It begins with the premise that the next three years' growth of earnings, dividends, and price will be similar to those of the past ten years.

6.9 QUESTIONS FOR DISCUSSION

1. Write a note on the present value of expected stream of benefits from equity shares.
2. Explain passive and active investment styles.
3. What are the differences between active equity management and passive equity management?
4. What do you mean by valuation? Explain briefly different equity evaluation modules.
5. Write a short note with illustrations for the following:
   (i) Dividend Valuation Model
   (ii) Zero Growth Case
   (iii) Constant Growth Case
   (iv) Multiple Growth Case
   (v) P/E Approach to Equity Valuation
   (vi) Price-Book [P/B] Ratio
   (vii) Random Valuation Model

Check Your Progress: Model Answers

CYP 1

1. Share 2. shares 3. earnings 4. bottom up

CYP 2

1. T 2. F 3. T 4. T 5. T

6.10 SUGGESTED READINGS

Sudhindra Bhat, *Security Analysis and Portfolio Management*, Excel Books, Delhi.

Kevin, S., *Security Analysis and Portfolio Management*, Printice Hall of India.

Prasanna Chandra, *Investment Analysis and Portfolio Management*, Second Edition, Tata McGraw Hill.

Punithavathy Pandian, *Securities Analysis and Portfolio management*, Vikas.

Investment Management, V. K. Bhalla.

A. Davis, *Investors in a Changing Economy*, Printice -Hall, 1968.

Williamson, J. Peter, *Investments: New Analytic Techniques*, London, Longman, 1970.

Cottle, CC., and Whitman, W.T., *Investment Timing: The Formula Plan Approach*, McGraw Hill.

UNIT IV

LESSON

7

FUNDAMENTAL ANALYSIS 1: ECONOMIC ANALYSIS

CONTENTS

7.0 AIMS AND OBJECTIVES

After studying this lesson, you should be able to:

- Analysis of Economy
- Current State of Economy and Indicators
- Tools for Economic Analysis
- Economic Forecasting

7.1 INTRODUCTION

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

Unfortunately, for long, investment decision-making was regarded only as an act. As an art it is personal subjective, it was difficult to provide a general framework with in one could operate. Only, recently it was considered as science with the result that a body of literature has been developed that help us to understand the way investment decisions can be attempted. Recognizing its art content, this body of literature works on the thinking that a general system framework can be suggested for those involved in investment decisions, who can then modify it according to their requirements. It has, therefore, been recognized that investment decision-making is both an art as well as a science. This is indeed an on-going process in which a decision-maker attempts to update himself regarding the characteristics of returns of securities. These characteristics keep on changing and investors go on attempting to understand their impact on their decisions. The conceivable investment opportunities were discussed and explained in Block I. The investment decision-maker takes them into account in order to decide which securities should be bought or held or sold by him. A very simple decision rule is applicable here: buy a security that has highest bought, held or sold security volume and the above required per unit of risk or lowest risk per unit or return. And, sell the security, which does not satisfy the above required.

The above decision rule to buy/sell securities is highly simple, but it is very difficult to apply both risk and return fashion in actual practice. This is because there are a large number of factors, which affect both risk and return in the real world. Thus, a security that had the highest return per unit of risk at one point of time and was considered to be a good buy might turn into a less attractive proposition and could be considered later on as a possible candidate for disinvestments. Such a situation might arise due to change in the management concerned company or changes in government policy concerning the economy, making it less attractive.

Investment decision-making being continuous in nature should be attempted systematically. Broadly approaches are suggested in the literature. These are: fundamental analysis and technical analysis. In this approach, the investor attempts to look at fundamental factors that affect risk return characteristic of the security. While in the second approach, the investor tries to identify the price trends that reflect these characteristics. Technical analysis concentrates on demand and supply of securities and prevalent trend in share prices mean by various market indices in the stock market.

7.2 FUNDAMENTAL ANALYSIS

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

If the price of a security at the market place is higher than the one, which is justified by the security fundamentals, sell that security. This is because, it is expected that the market will sooner or later realize its mistake and price the security properly. A deal to sell this security should be based on its fundamentals; it should be both before the market correct its mistake by increasing the price of security in question. The price prevailing in market is called "market price' (MP) and the one justified by its fundamentals is called 'intrinsic value' (IV) session rules/recommendations.

(1) If IV > MP, buy the security

(2) If IV < MP, sell the security

(3) If IV > MP, no action

The fundamental factors mentioned above may relate to the economy or industry or company or all some of this. Thus, economy fundamentals, industry fundamentals and company fundamentals are considered while prizing the securities for taking investment decision. In fact, the economy-industry-company framework forms integral part of this approach. This framework can be properly utilized by making suitable adjustments in a regular context. A world of caution, though. Please remember, the use of an analytical framework does not guarantee an actual decision. However, it does guarantee an informed and considered investment decision, which would hopefully be better as it based on relevant and crucial information.

7.2.1 Fundamental Analysis and Efficient Market

Before elaborating in detail on the economy-industry-company framework, it is pertinent to mention that doubts are expressed about the utility of this approach in the contest of efficient stock market set-up. Briefly, the market efficiency relates to the speed with which the stock market incorporates the information about the economy, industry and company, in the share prices, rather instantaneously. The above given view about share market efficiency implies that no one would be able to make abnormal profits given such a set-up. Some research studies in the literature also support the above view. Practitioners, however, do not agree to such conclusions of an empirical nature.

7.2.2 Fundamental Analysis and Chemistry of Earnings

The logic for fundamental analysis becomes crystal clear once we understand the chemistry of earnings and macro and macro factors which influence the future of earnings.

Table 7.1: Factors affecting Distributable Earnings

Board Source/Form of Earnings	Company Specific Factors	Industry Factors	Macro-Economic
Sales	Competitive strength	Industry demand/ supply	National income, sp.. savings, Monetary policy credit, Export-import policies, Population, price level.
Less Costs of sales	Operating efficiency	Industry wage Levels: Industrial infrastructure Import-export policy	National wage policy price levels, Economic Raw materials infrastructure, production
Earnings Before Interest Depreciation & Taxes (EBIDT) Less Interest	Capital Structure/financial leverage policy	Industry cost of capital	Interest rates in the Economy, Capital conditions
Less Depreciation	Operational leverage policy	Industry practices	Capital goods import
Less Tax	Tax Planning and Management	Industrial lobby	Fiscal Policy
Net Earnings after Tax (NEAT)			
Less			
(Preference Dividend)	Capital Structure Policy	Industry Practices	Interest Rate Structure, Capital… Conditions
Distributable Earnings Less			
Equity Dividend	Dividend Policy	Industry Practices	Fiscal Policy, Credit Capital Market conditions
Retained Earnings			

Check Your Progress 1

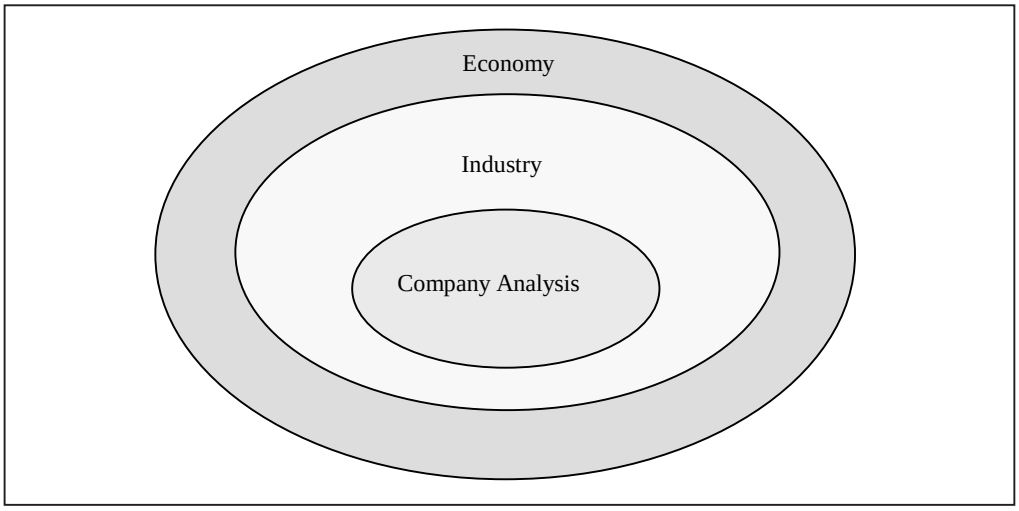
1. Investment decisions include two kinds of analysis, fundamental analysis and _____ analysis.
2. A security that had the highest return per unit of risk at one point of time and was considered to be a good buy might turn into a less attractive proposition and could be considered later on as a possible candidate for _____.
3. In the fundamental analysis the investor attempts to look at fundamental factors that affect risk return characteristic of _____.
4. _____ analysis concentrates on demand and supply securities and prevalent trends in share prices meant by various market indices in the stock market.

7.3 ECONOMY - INDUSTRY - COMPANY ANALYSIS: A FRAMEWORK

The analysis of economy, industry and company fundamentals as mentioned above is the main ingredient of the fundamental approach. The analyst should take into account all the three constituents that form different but special steps in making an investment decision. These can be looked at as different stages in the investment decision-making. Operationally, to base the investment decision on various fundamentals, all the three stages must be taken into account.

7.3.1 Economy Analysis

In actual practice, you must have noticed that investment decisions of individuals and the institutions made in the economic set-up of a particular country. It becomes essential, therefore, to understand the star economy of that country at the macro level. The analysis of the state of the economy at the macro level incorporates the performance of the economy in the past, how it is performing in the present and how it is expected to perform in future. Also relevant in this context is to know how various sectors of the economy are going to grow in the future.



7.3.2 Macro Economic Analysis

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

- Money supply
- Industrial production
- Capacity utilisation
- Unemployment
- Inflation
- Growth in GDP
- Institutional lending
- Stock prices
- Monsoons
- Productivity of factors of production

- Fiscal deficit
- Credit/Deposit ratio
- Stock of food grains and essential commodities
- Industrial wages
- Foreign trade and balance of payments position
- Status of political and economic stability
- Industrial wages
- Technological innovations
- Infrastructural facilities
- Economic and industrial policies of the government
- Debt recovery and loans outstanding
- Interest rates
- Cost of living index
- Foreign investments
- Trends in capital market
- Stage of the business cycle
- Foreign exchange reserves

In a globalised business environment, the top-down analysis of the prospects of a firm must begin with the global economy. The global economy has a bearing on the export prospects of the firm, the competition it faces from international competitors, and the profitability of its overseas investors.

The government employs two broad classes of macroeconomic policies, viz. demand-side policies and supply-side policies.

Traditionally, the focus was mostly on fiscal and monetary policies, the two major tools of demand-side economics. From the 1980s onward, however, supply-side economics has received a lot of attention.

7.3.3 Fiscal Policy

Fiscal policy is concerned with the spending and tax initiatives of the government. It is the most direct tool to stimulate or dampen the economy.

An increase in government spending stimulates the demand for goods and services, whereas a decrease deflates the demand for goods and services. By the same token, a decrease in tax rates increases the consumption of goods and services and an increase in tax rates decreases the consumption of goods and services.

7.3.4 Monetary Policy

Monetary policy is concerned with the manipulation of money supply in the economy. Monetary policy affects the economy mainly through its impact on interest rates.

The main tools of monetary policy are:

- Open market operation
- Bank rate

- Reserve requirements
- Direct credit controls

7.4 SIGNIFICANCE OF ECONOMIC ANALYSIS

Each of the sectors show sings of stagnation and degradation in the economy. This, we can examine and understand by studying historical performance of various sectors of the economy in the past, their performances at present and then forming the expectation about their performances in the future. It is through this systematic process that one would be able to realise various relevant investment opportunities whenever these arise. Sectoral analysis, therefore, is carried out along with overall economy analysis as the rate of growth in overall economy often differs from the rate within various segments/sectors.

Rationale of the above type of analysis depends on economic considerations too. The way people in general, their income and the way they spend these earnings would in ultimate analysis decide which industry or bunch of industries would grow in the future. Such spending affects corporate profits, dividends and prices of the shares at the many would grow in the future. A research study conducted by King (1966) reinforces the need of economic and industry analysis in this context. According to him on an average, over half the variation in stock returns is attributed to market prices that affect all the market indices. Over and above this, industry specific factors account for approximately 10 to 15 per cent of the variation of stock returns. Thus, taken together, two-third of the variation of stock prices/returns reported to market and industry related factors. King's study, despite the limitations of its period of its publication and use of US-specific data, highlights the importance of economic and industry analyses in making investment decisions. To neglect this analysis while deciding where to invest would be at one's peril.

It must be clear by this now that analysis of historical performance of the economy is a starting point; albeit a portent step. But, for the analyst to decide whether to invest or not, expected future performance of the overall economy along with its various segments is most relevant. Thus, all efforts should be made to forecast the performance of the economy so that the decision to invest or to disinvest the securities can be a beneficial one. Decisions can be made in the most haphazard manner. Interestingly, this calls for using the same indicators that describe how the economy has shaped up in the past and how it is likely to take shape in the future as compared to the current state of affairs. A healthy outlook about the economy goes a long way in boosting the investment climate in general and investment in securities in particular.

Check Your Progress 2

1. _____ policy is concerned with the manipulation of money supply in the economy.
2. Monetary policy affects the economy mainly through its impact on _____.
3. The government applies two broad classes of microeconomic policies, viz. demand-side policies and _____ side policies.
4. _____ policy is concerned with the spending and tax initiatives of the government.

7.5 ECONOMIC FORECASTING

Still, it must be properly understood at this stage that economic forecasting is a must for making investment decision. It has been mentioned earlier too, that the fortunes of specific industries and the firm depends upon how the economy looks like in the future, both short-term and long-term. Accordingly, forecasting techniques can also be divided and categories: Short-term forecasting techniques are dealt with in detail; these terms should be clearly understood. Short-term refers to a period up to three years. Sometimes, it can also refer to a much shorter period, as a quarter or a few quarters. Intermediate period refers to a period of three to five years. Long-term refers to the forecast made for more than five years. This may mean a period of ten years or more.

7.5.1 Techniques

- Economic indicators
- Diffusion index
- Surveys
- Economic Model Building

At the very outset, let it be mentioned that the central theme of economic forecasting is to forecast national some with its various components. This is because it summarizes the receipts and expenditures of all segments of the economy, be they government, business or households. These macro-economic accounts describe economic activities over a period of time. Not surprisingly, therefore, all the techniques focus on forecast national income and its various components, particularly, those components that have bearing on an industry and the particular industry and the company to be analysed.

GNP is a measure to quantify national income and is the total value of the final output of goods and produced in the economy. It is an important indicator of the level and the rate of growth in the economy, and is of central concern to analysts for forecasting overall as well as various components during a certain period. Following are some of the techniques of short-term economic forecasting.

7.5.2 Anticipatory Surveys

This is very simple method through which investors can form their opinion/expectations with respect to the future state of the economy. As is generally understood, this is a survey of expert opinions of those prominent in the government, business, trade and industry. Generally, it incorporates expert opinion with construction activities, plant and machinery expenditure, level of inventory etc. that are important economic activities. Anticipatory surveys can also incorporate the opinion or future plans of consumers regarding their spending. So long as people plan and budget their expenditure and implement their plans accordingly, such surveys should provide valuable input, as a starting point.

Despite the valuable inputs provided by this method, care must be exercised in using the information obtained through this method. Precautions are needed because:

1. Survey results cannot be regarded as forecasts per se. A consensus of opinion may be used investor in forming his own forecasts.
2. There is no guarantee that the intentions surveyed would certainly materialize. To this extent, they cannot rely solely on these.

Despite the above limitations, surveys are very popular in practice and used for short-term forecast of course, requires continuous monitoring.

7.6 BAROMETRIC OR INDIAN APPROACH

In this approach, various types of indicators are studied to find out how the economy is likely to behave in future. For meaningful interpretations, these indicators are roughly classified into leading, lagging and coincidental indicators.

Leading indicators: As the name suggests, these are indicators that lead the economic activity in their outcome. That is, these are those time series data of the variables that reach their high points as well low points in advance of the economic activity.

Lagging indicators: These are time series data of variables that lag behind in their consequences vis-à-vis the economy. That is, these reach their turning points after economy has already reached its own.

In developed countries, data relating to various indicators are published at short intervals. For example, the Department of Commerce publishes data regarding various indicators in each of the following categories.

7.6.1 Leading Indicators

- Average weekly hours of manufacturing production workers
- Average weekly in initial unemployment claims
- Contacts and orders for plant and machinery
- Index of S&P 500 stock prices
- Money supply (M2)
- Change in sensitive material prices
- Change in manufacture's unfilled orders (durable goods industries)
- Index of consumer expectations.

7.6.2 Coincidental Indicators

- Index of industrial production
- Manufacturing and trade sales
- Employee on non-agricultural payrolls
- Personal income less transfer payment

7.6.3 Lagging Indicators

- Average duration of unemployment
- Ratio of manufacturing and trade inventories to sales
- Average prime rate
- Outstanding commercial and industrial loans

The above list is not exhaustive. It is only illustrative of various indicators used by investors. A word of caution will not be out of place here as forecasting based solely on leading indicators is a hazardous business. One has to be quite careful in using them. There is always a time lag it with result that interpretation can be erroneous, if it is not done well in advance. Interpretation even if performed meticulously, cannot be fruitfully utilized. Further, problems with regard to their interpretation exist as well. Indicators are classified under the broad category of leading indicators. Their various measures may emit

conflicting signals about the future direction of the economy; the use of diffusion index or composite index has, thus, been suggested. This deals with the problem by combining several indicators into one index in order to measure the strength or weaknesses of the problem by combining several indicators into one index in order to measure the strength or weaknesses of a particular kind of indicator. Care has to be exercised even in this case as diffusion indices are also without problems. Apart from the fact that its computations are difficult, it does not eliminate the varying factors in the series. Despite these limitations, indicator approach/diffusion index can be useful tool in the armoury of a skilful forecaster.

7.7 MONEY AND STOCK PRICES

Analysts have recognized that money supply in the economy plays a crucial part in the investment decision per se. The rate of change in the money supply in the economy affects the GNP, corporate profits, interest rates and prices. Accordingly, monetarists argue that total money supply in the economy and its rate of change has an important influence the stock prices as a hedge against inflation, and in creases in stock prices sometimes.

7.8 DIFFUSION INDEX

- A diffusion index is an indicator of the extensiveness or spread of an expansion or contraction.
- It has been developed by the National Bureau of Economic Research, USA.
- There are two main categories of diffusion index:

    1. *Composite or Consensus Index:* It combines several indicators into one single measure, in order to measure the strength or weakness in the movements of these particular time series of data.

        For instance, there are ten leading indicators; out of them four are moving up and others are not. How do we interpret it?

        $$\text{Diffusion Index} = \frac{\text{No of members in the set in the same direction}}{\text{Total no. of members in the set}}$$

        In the example, diffusion index = 4/10 = 0.4

        Next month, if the index moved to 0.6, it certainly is a strong confirmation of economic advance.

    2. *Component Evaluation Index:* This is a narrow type of index, one that examines a particular series taking into consideration its components. It measures the breadth of the movement within a particular series.

7.9 GEOMETRIC MODEL BUILDING APPROACH

This is an approach to determine the precise relationship between the dependent and the independent variables. In fact, econometrics is a discipline wherein application of mathematics and statistical techniques is a part of economic theory. It presupposes the precise and clear relationship between the dependent and independent variables and the onus of such well-defined relationship with its attendant assumptions rests with the analyst.

Thus, by geometrics, the analyst is able to forecast a variable more precisely than by any other approach. But this derived approach would be as good as the data inputs used and assumptions made.

Static Model Building or GNP Model Building or Sectoral Analysis is frequently used in particular in the methods discussed earlier. These use national accounting framework in making short-term forecasts. The various steps while using this approach are:

1. Hypothesize the total demand in the economy as measured by its total income (GNP) based on likely conditions in the country like war, peace, political instability, economic changes, level and rate of inflation etc.
2. Forecast the GNP by estimating the levels of its various components like:
   - ❖ Consumption expenditure
   - ❖ Private cosmetic investment
   - ❖ Government purchases of goods and services
   - ❖ Net exports
3. Forecasting the individual components of GNP, the analysis then adds them up to obtain a figure of the GNP.
4. The analyst compares the total of GNP and arrives at an independent estimate appropriately. The forecast of GNP is an overall forecast for internal consistency. This is done to ensure that both his total forecast and permanent forecast make sense and fit together in a reasonable manner.
5. Thus the GNP model building involves all the details described above with a considerable amount of judgment.
6. What has accounted for this suddenly revived economy? One likely answer is definitely a cut in customs and a corresponding reduction in excise, which has helped reduce the cost structure of a number of products. This has made a number of products cheaper in the domestic market and expanded the demand for them in the process.

7.9.1 Future Scenario

What of the future? The scenario could emerge strongly bullish if the cut in costs in implementing the finished product is accompanied by a cut in the import tariff for the raw materials as well. Besides, the excise component would have to be lowered as well, resulting in an expansion of demand within the economy. Once this transpires, more goods will be sold, recession will history and if installed capacities fail to meeting the demand, we could even have a temporary shortage in certain areas on our hands.

Given this scenario, only the obstinate would continue to be bearish. It is time perhaps, to overcome the current shorts on the Sensex and place and place all our big chips on the shares of polyesters companies. Stock polyester, Sanghi Polyster, Sanghi Polyster and Haryana Petro look cheap when viewed against projected 1993-94 earnings. With the festive season under way, the buoyancy in yarn prices is expected to continue giving investors a turnaround for the first half of the current financial year.

Check Your Progress 3

State whether the following statements are true or false:

1. Monetary policy is not concerned with the money supply and interest rates.
2. Fiscal policy is concerned with the spending and tax initiatives of the government.
3. GNP is a measure to quantify national income and is the total value of the final output of goods and services produced in the economy.
4. Anticipatory survey is a method in which investors can form their opinion with respect to the future state of the economy.
5. Lagging indicators are time series data of variables that lag behind in their consequences vis-a-vis the economy.

7.10 ECONOMY AND INDUSTRY ANALYSIS

Investment decisions are a part of our economic life, made by almost everybody in different contexts at different times. The highly subjective nature of such decisions and the varying results that they offer therefore, necessitate a further study and analysis into the same.

Long regarded as an art, investment decision-making has only recently been considered as science with an attendant body of literature being developed helping us understand its dynamics. Investment decision-making is now accepted both as an art as well as a science. Decision-makers attempt to update themselves on the characteristics of returns securities, which keep changing. Their understanding needs sustained efforts. Conceivable investment opportunities were discussed and explained in Block I.

Changes in the management of any particular company or changes in government policy at macro level can bring about changes in the attractiveness of certain securities. For example, before 1992-93, the shares of sugar industry in India did not catching the attention of the investing public. But due to changes in the government policy towards this industry around 1999, sugar industry shares became quite attractive. Policy changes made by the government related to hike in the sugar per sold both in open market as well as through public distribution system, increase in the quantity of sugar for sale in the free market etc. played a very important role in making the shares of sugar companies attractive. There may be other factors too, that are more specific to a particular company or industry.

7.11 LET US SUM UP

A commonly advocated procedure for fundamental analysis involves a 3-step analysis: macro-economic analysis, industry analysis, and company analysis. In a globalised business environment, the top-down analysis of the prospects of a firm must begin with the global economy. There are two broad classes of macroeconomic policies, viz. demand side policies and supply side policies. Fiscal and monetary policies are the two major tools of demand side economics. Fiscal policy is concerned with the spending and tax initiatives of the government. Monetary policy is concerned with money supply and interest rates. The macro-economy is the overall economic environment in which all firms operate.

7.12 LESSON END ACTIVITY

Study the fundamental analysis of BSE 30 companies.

7.13 KEYWORDS

Fundamental Analysis: It is an analysis of various fundamental or basic factors that affect the risk-return of securities.

Short-term: It refers to a period upto three years.

Long-term: It refers to a period more than five years.

GNP: It is a measure to quantify national income and is the total value of the final output of goods and services produced in the economy.

Fiscal Policy: It is concerned with the spending and tax initiatives of the government.

Monetary Policy: It is concerned with the manipulation of money supply in the economy.

7.14 QUESTIONS FOR DISCUSSION

1. Define fundamental analysis
2. What is economic forecasting?
3. Define EIC Analysis.
4. Define Diffusion Index.
5. What are the factors influencing economic analysis?
6. What are the techniques used in economic analysis?
7. Explain the barometric Indian approach.
8. Explain the geometric module building approach.

Check Your Progress: Model Answers

CYP 1

1. technical 2. disinvestments 3. security 4. Technical

CYP 2

1. Monetary 2. interest rates 3. supply 4. Fiscal

CYP 3

1. F 2. T 3. T 4. T 5. T

7.15 SUGGESTED READINGS

Sudhindra Bhat, *Security Analysis and Portfolio Management*, Excel Books, Delhi.

Kevin, S., *Security Analysis and Portfolio Management*, Printice Hall of India.

Prasanna Chandra, *Investment Analysis and Portfolio Management*, Second Edition, Tata McGraw Hill.

Punithavathy Pandian, *Securities Analysis and Portfolio management*, Vikas.

Investment Management, V. K. Bhalla.

A. Davis, *Investors in a Changing Economy*, Printice -Hall, 1968.

Williamson, J. Peter, *Investments: New Analytic Techniques*, London, Longman, 1970.

Cottle, CC., and Whitman, W.T., *Investment Timing: The Formula Plan Approach*, McGraw Hill.

LESSON

8

FUNDAMENTAL ANALYSIS 2: ZINDUSTRY ANALYSIS

CONTENTS

8.0 AIMS AND OBJECTIVES

After studying this lesson, you should be able to understand:

- The Concepts of Industry Analysis
- Standard Industry Classification
- The Industry Growth Cycle

- Tools for Industry Analysis
- Quantitative Industry Analysis

8.1 INTRODUCTION

After conducting an analysis of the economy and identifying the direction it is likely to take in the short, interim and long term, the analyst must look into various sectors of the economy in terms of various industries. An industry is a homogenous group of companies. That is, companies with similar characteristic can be divided into one industrial group. There are many bases on which grouping of companies can be done. For example, traditional classification is generally done product-wise like pharmaceuticals, cotton textile, synthetic fibre etc. Such a classification, through useful, does not help much in investment decision-making. Some of the useful bases for classifying industries from the investment decision-point of view are as follows:

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

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

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

   Another useful criterion to classify industries is the various stages of their development. Different stages of their life cycle development exhibit different characteristic. In fact, each development is quite unique. Grouping firms with similar characteristics of development help investors to properly identify different investment opportunities in the companies. Based on the stage in the life cycle, industries are classified as follows:

   (i) *Pioneering stage:* This is the first stage in industrial life cycle of a new industry. In this, technology and its products are relatively new and have not reached a stage of perfection. There is an experimental order both in product and technology. However, there is a demand for its products in the market; the profits opportunities are in plenty. This is a stage where the venture capitalists take a lot of interest, enter the industry and sometimes organize the business. At this stage, the risk commences in this industry and hence, mortality rate is very high. If an industry withstands them, the investors would reap the rewards substantially or else substantial risk of investment exists. A very pertinent example of this stage of industry in India was the leasing industry, which tried to come up during the mid-eighties. There was a mushroom growth of companies in this period. Hundreds of companies came into existence. Initially, lease rental charged by them were very high. But as competition grew among firms, lease rentals reduced and came down to a level where it became difficult for a number companies to survive. This period saw many companies that could not survive the onslaught of competition of those firms that could tolerate this onslaught of price war, could remain in the industry. The leasing industry today is much pruned down compared to the mid-eighties.

   (ii) *Fast growing stage:* This is the second stage when the chaotic competition and growth that is the hallmark of the first stage is more or less over. Firms

that could not survive this onslaught have already died. The surviving large firms now dominate the industry. The demand of their product still grows faster, leading to increasing amount of profits the companies can reap. This is a stage where companies grow rapidly. These companies provide a good investment opportunity to the investors. In fact, as the firms during stage of development grow faster, they sometimes break records in various areas, like payment of dividend and become more and more attractive for investment.

(iii) *Security and stabilization stage:* The third stage where industries grow roughly at the rate of the economy, develop and reach a stage of stabilization. Looked at differently, this is a stage where the ability of the industry appears to have more or less saturated. As compared to the competitive industries, at this stage, the industry faces the problem of what Grodinsky called "latent obsolescence" a term used to a stage where earliest signs of decline have emerged. Investors have to be very cautions to examine those sings before it is too late.

(iv) *Relative decline stage:* The fourth stage of industrial life cycle development is the relative decline The industry has grown old. New products, new technologies have entered the market. Customers have new habits, styles, likes etc. The company's/industry's products are not much in demand as was in the earliest stage. Still, it continues to exist for some more time. Consequently, the industry would grow less than the economy during the best of the times of the economy. But as is expected, the industry's decline is much faster than the decline of the economy in the worst of times.

The characteristics of different stages of life cycle development of industries have a number of implications for decisions. Investment at this stage is quite rewarding. However, for an investor looking for steady forms with risk aversion, it is suggested that he should in general avoid investing at this stage. But if he is still keen to invest, he should try to diversify or disperse his investment price the risk. It would be quite prudent on this part to look for companies that are in the second date i.e., fast growth. This probably explains the prevalent higher stock prices of the companies of this industry.

From the investment point of view, selection of the industries at the third stage of development is quite crucial. It is the growth of the industry that is relevant and not its past performance. There are a number of cases where the share prices of a company in a declining industry have been artificially hiked up in the market, on the basis of its good performance. But the fact of the matter is that a company in such an industry would sooner or later feel the pinch of its decline and an investor investing in such companies experiences a reduction in the value of his investment in due course.

Having discussed various investment implications, it may be pointed out that one should be careful while classifying them. This is because the above discussion assumes that the investor would be able to identify the industrial life cycle. In practice, it is very difficult to detect which stage of the industry is at. Needless to say, it is only a general framework that is presented above. One can spangle this analysis with suitable modifications. In order to strengthen the analysis further, it is essential to outline the features of the industry in detail. Due to its unique characteristic, unless the specific industry is analysed properly and in depth with regard to these, it will be very difficult to form an opinion for profitable investment opportunities.

1. There is competition among domestic and foreign firms, both in the domestic and the foreign markets. How do firms perform here?
2. Many types of products are manufactured in this industry. Are these homogenous in nature or highly heterogeneous?
3. What is the nature and prospect of demand for the industry? Are these homogenous in nature or highly heterogeneous?
4. This may also incorporate the analysis of the markets of its products, customer-wise and geographical area-wise, identifying various determinants of this type of industry its growth, cyclical, defensive or relative decline industry.

8.2 IMPORTANCE OF INDUSTRY ANALYSIS

Why should a security analyst carry out industry analysis?

To answer this question, logically, two arguments are presented:

(i) Firms in each different industry typically experience similar levels of risk and similar rates of return. As such, industry analysis can also be useful in knowing the investment-Worthiness of a firm.

(ii) Mediocre stocks in a growth industry usually outperform the best stocks in a stagnant industry. This points out the need for knowing not only company prospects but also industry prospects.

Risk-return patterns: Economic theory points out that competitive firms in an industry try to maximize their profits by adopting fairly similar policies with respect to the following:

1. The labour-capital ratio utilized by each firm.
2. Mark ups, profit margins and selling prices.
3. Advertising and promotional programmes.
4. Research and development expenditures.
5. Protective measures of the government.

At such, they have the same risk level as well as rates of return, on an average. Empirical evidence shown by research done by Fabozzi and Francis supports this argument.

Growth Factor: All industries do not have equally good or equally bad experiences and expectations; their fortunes keep on changing. It implies that the past is not a good indicator of the future - if one looks very far into the future.

This view is well supported by research. Researchers have ranked the performance of different industries over a period of one year and then ranked the performance of the same industries over subsequent periods of years. They compared the ranking and obtained near zero correlations. It implies that an industry that was good during one period of time cannot continue to be good in all periods.

Another observation is every industry passes through four distinct phases of the life cycle. The stages may be termed as pioneering, expansion, stagnation and decline. Different industries may be in different stages. Consequently their prospects vary. As such, separate industry analysis is essential.

Check Your Progress 1

1. _____ industry is an industry that is expected to grow consistently and its growth may exceed the average growth of the economy.
2. In the cyclical industry the firms included are those that move closely with the rate of _____ growth of the economy and fluctuate cyclically as the economy fluctuates.
3. _____ industry is a grouping that includes firms, which move steadily with the economy and less than the average decline of the economy in a cyclical downturn.
4. _____ stage is the first stage in the industrial life cycle of a new industry.

8.3 ALTERNATIVE CLASSIFICATION OF INDUSTRIES

There are different ways of classifying industrial enterprises:

(i) ***Classification by Reporting Agencies:*** In India, The Reserve Bank of India has classified industries into 32 groups. Stock exchanges have made a broad classification of industry into 10 groups.

Business media have their own classification. The Economic Times classifies industry into 10 groups and the Financial Express into 19 groups. The groups are further sub-divided.

(ii) ***Classification by Business Cycle:*** The general classification in this framework is growth, cyclical, defensive and cyclical growth. Growth industries are characterized by high rates of earnings expansion, often independent of business cycles. These industries are pioneers of a major change in the state of the art i.e., innovation diffusing concerns. The ongoing revolution in the electronics industry and communications equipments is an example of this kind.

Cyclical industries are closely related to business cycles. Prosperity provides consumers purchasing power and boom to industry whereas depression adversely affects them. Consumer durables are subject to these kinds of changes.

Defensive industries are those the products of which have relatively inelastic demand. Food processing industry is an example.

Cyclical growth industries are those that are greatly influenced by technological and economic changes. The airline industry can be cited as an example.

8.4 INDUSTRY LIFE CYCLE ANALYSIS

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

Every industry passes through different stages in its lifetime. The stages can be identified as follows:

- Pioneering Stage (Introduction)
- Expansion Stage (Growth)

- Stagnation Stage (Maturity)
- Decay Stage (Decline)

8.4.1 Pioneering Stage

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

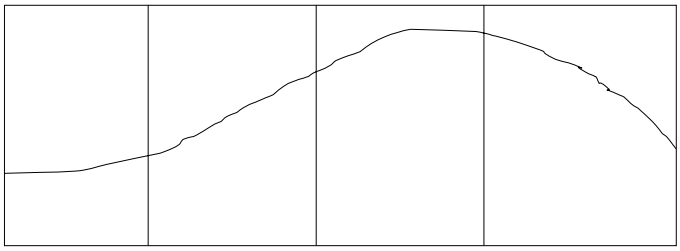


Figure 8.1: Industry Life Cycle Stages

Characteristics

Sales	Low Sales	Rapidly rising	Peak sales	Declining sales
Costs	High cost per Customer	Average cost	Low cost per customer	Low cost per customer
Profits	Negative	Rising Profits	High Profits	Declining profits
Customers	Innovators	Early adopters	Middle majority	Laggards
Customers	Innovators	Early adopters	Middle majority	Laggards
Competitors	Few	Growing Number	Stable number Beginning to Decline	Declining number

8.4.2 Expansion Stage

This is characterized by the hectic activity of firms surviving the pioneering stage. After overcoming the teething problems, the firms continue to improve financially and competitively. The market continues to grow but slowly, offering steady and slow growth in sales of the industry. It is a phase of consolidation wherein companies establish durable policies relating to dividends and investments.

8.4.3 Stabilization Stage

This stage shows signs of slow progress and also prospects of decay. The stagnation in the economy and the pedestrian nature of the product call for innovative strategies to begin a new life-cycle. Grodinsky explains this transition from the rising to the crawling age with reference to latent obsolescence.

"Latent obsolescence - while an industry is still expanding economic and financial infection may develop. Though its future is promising, seeds of decay may already have been planted. These seeds may not germinate; the latent decay becomes real. These seeds may be described as "latent obsolescence", because they may not become active, and they are the earliest signs of decline. Such factors must be examined and interpreted by the investor."

Symptoms of latent obsolescence include changing social habits, high labour costs, changes in technology, stationary demand.

8.4.4 Decay Stage

An industry reaches this stage when it fails to detect the death signal and implement - proactively or reactively - appropriate strategies. Obsolescence manifests itself, effecting a decline in sales, profit, dividends and share prices.

Implications to the Investor: This approach is useful to the analyst as it gives insights, not apparent merits and demerits of investments in a given industry at a given time. What the investor has to do is.

(i) Collect relevant data to identify the industry life cycle stage

(ii) Forecast the probable life period of the stage

(iii) Decide whether to buy, hold or sell.

Figure 8.1 shows the diagrammatic presentation along with the indicators of each stage. Although the industry life cycle theory appears to be very simple, it is no so in practice. Proper identification of the life cycle stage is difficult. Temporary setbacks or upheavals may confuse the analyst. Further, how long the stage continues is difficult to predict.

The internal analysis can be done periodically to evaluate strengths and weaknesses either by inside company executives or outside consultants. This can be done by using a form such as the one shown in Table 8.1. Each factor, minor or major weakness is displayed. Of course, not all factors are equally important for succeeding in business. Therefore, it is necessary to rate the importance of each factor - high, medium or low. When combining performance and importance levels, four possibilities emerge. These are illustrated in Figure 8.2.

		Performance	
		Low	High
Importance	High	A. Concentrate here	B. Keeping the good work
	Low	C. Take enough care	D. If overkill, divert

Figure 8.2: Importance – Performance Matrix

This analysis provides norms for management attention. For example, an industry is performing poorly in a high priority area. It should hence concentrate here. If the industry strategy is not addressed to this, it becomes unattractive to the investor.

Table 8.1: Strengths Weaknesses Analysis

S. No.	Factor		Performance			Importance	
	Major	Minor	Neutral	Minor	Major	High	Medium
Marketing							
1. Popularity and regard							
2. Relative market share							
3. Quality image							
4. Service reputation							

5. Distribution costs
6. Sales force
7. Market locations

Finance

1. Cost of Capital
2. Funds availability
3. Financial stability
4. Profitability

Manufacturing

1. Facilities
2. Economics of scale
3. Capacity utilization
4. Labour productivity
5. Manufacturing costs
6. Raw material availability
7. Technology of process

Human Resources

1. Leadership
2. Management capabilities
3. Worker attitudes
4. Entrepreneurial competence
5. Skill development
6. Structural flexibility
7. Adaptation
8. Industrial Relations

Check Your Progress 2

1. The Reserve Bank of India has classified industry into _____ groups.
2. Stock exchanges have made a broad classification of industry into _____ groups.
3. The financial express has classified industry into _____ groups.
4. Every industry passes through different stages in its lifetime. The first stage is the pioneering stage or the introduction stage, second the expansion or growth stage, third the stagnation or maturity stage and the fourth is _____ or _____ .

8.5 FORECASTING METHODS

The techniques for analyzing information about industry within a time framework are briefly explained in this lesson.

8.5.1 Market Profile

A market profile consists of those endogenous characteristics that have a significant bearing on demand or the way in which it can be developed.

Its basic elements are:

- Number of establishments
- Geographical location of establishment
- Number of employees
- Value of sales
- Value added by manufacturing
- Capital expenditures
- Degree to which establishments are specialized
- Importance of their output in the national total

The trend of these elements when analysed, reveal vital information about the position and progress of the industry. Illustratively some lead points are given here:

- A decrease in number of establishments and employment accompanied by an increase in the other elements of the profile means increased automation.
- An increase in value of sales, unaccompanied by an increase in value added and capital expenditure signifies rising prices.
- An increase in value added without an increase in capital expenditure signifies increase in labour productivity.
- A fall in the share of industry in national total implies decline of industry.

8.5.2 Cumulative Methods

These are based either on market surveys or statistical measurements:

1. ***Surveys:*** Surveys are carried out by research agencies, consultants, industry association and the research bureau of media. These surveys generally study the current facilities and demand, future demand and proposed investment, and thereby the expansion prospects vis-à-vis demand gap. Other factors like, strengths and weaknesses of the organization, environmental forces are also brought into focus to evaluate the future of the industry.

   Surveys adopt the methodology of inquiry, through questionnaires and interviews. The subjects will be either manufacturer or dealers/end users.

2. ***Correlation and Regression analysis:*** Statistical methods like correlation and regression analysis can be of much help in demand measurement. The following steps have general application.

   (i) Determine the total requirement for the type of product in question by present customers in each industry classification.

   This can be done by asking the customer or obtaining the estimate from the salesmen, or by comparing with other customers of same size and class.

(ii) Correlation product requirement of customer establishments with a variable to output for which accurate published data are available. Generally, employment is the most useful variable.

The correlation can be observed by preparing a scatter or calculating mathematically, using the formula given below:

$$\text{Degree of relationship (r)} = \frac{N\Sigma(xy) - (\Sigma x)(\Sigma y)}{[n\Sigma x^2 - (\Sigma x)^2][N\Sigma x^2 - (\Sigma y)^2]}$$

Where X = Number of employees

Y = Number product items

… observation

The nearer the correlate n coefficient is to +1 or – 1, the closer the relationship of the two variables under study.

The significance of the relationship can be determined using hypothesis testing procedure.

(iii) Apply the relationship to estimate demand. If the degree of correlation between purchases of a given product by present customers and their employment size is considered significant, the demand estimation can be done as follows:

- ❖ Computing the average number of items purchased per employee and applying this ratio to total employment.
- ❖ Formulating an estimating equation through regression method.

$$\Sigma y = Na + b\Sigma x$$

$$x\Sigma y = a\Sigma x + b\Sigma x$$

Where, a equals the number of products purchased when employment is zero and b equals the amount of change in the number of products purchased with every change in total employment.

The latter method is more accurate because it is more sensitive to the influence of independent variable on dependent variable.

Multiple regression analysis facilitates the study of impact of more than one independent variable on the dependent variable.

$$Y = a + b\,x_1 + c\,x_2 + d\,x_3 + e\,x_4 + f\,x_5$$

Where Y = Yearly sales in lakhs of rupees;

x_1 = yearly sales (lagged one year) in lakhs of rupees

x_2 = yearly advertising expenditure in lakhs of rupees

x_3 = a dummy variable

x_4 = year

x_5 = disposable personal income in lakhs of current rupees

3. ***Time series analysis:*** Time series analysis consists of decomposing the original sales series over a period of time. The elements derived are:

(a) *Trend (T):* It is the result of basic developments in population, capital formation, and technology. It is found by fitting a straight or curved line through past sales.

(b) *Cycle (C):* It captures the wave-like movement of sales. Many sales are affected by swings in general economic activity, which tends to be somewhat periodic. The cyclical component can be useful in intermediate range forecasting.

(c) *Season (S):* It refers to a consistent pattern of sales movements within the year. The term season describes any recurrent sales pattern. The seasonal component may be related to weather factors, holidays, and trade customs. The seasonal pattern provides a norm for forecasting short-range sales.

(d) *Erratic Events (E):* It refers to the unpredictable sales caused by unforeseen events like strikes, riots, war scares, floods, and other disturbances.

Another time series technique is exponential smoothing. For industries with several items in product line, this technique is useful to produce efficient and economical short-run forecasts. It requires only three pieces of information.

- This period's actual sales (Q_t)
- This period's smoothed sales (Q_t)
- A smoothing parameter (a), where

  Sales forecast for next period ($Q_t + 1$) = $Q_t + (1 - a)Q_t$

The initial level of smoothed sales can simply be the average sales for the last few periods. The smoothing constant is derived by trial and error testing of different smoothing constants between zero and one, to find the constant that produces the best fit of past sales.

8.6 CONDITIONS AND PROFITABILITY

The worth of a share depends on its return, which in turn depends on the profitability of the company. It is interesting that growth is an essential variable but its mere presence does not guarantee profitability. Profitability depends upon the state of competition prevalent in the industry. Cost control measures adopted by its units and the growth in demand for its products. While conducting an analysis from the point of view of profitability, some relevant aspects to be investigated are:

- How is the cost allocation done among various heads like raw materials, wages and overheads? Knowledge about the distribution of costs under various heads is very essential as this gives an idea to investors about the controllability of costs. Some industries have much higher overhead costs than others. Labour cost is another area that requires close scrutiny. This is because finally whether labour is cheap or expensive depends on the wage level and labour productivity. Labour that apparently look cheaper may turn out to be when its productivity is taken into account.
- Price of the product of the industry
- Capacity of production-installed, used, unused etc.
- Level of capital expenditure required to maintain or increase the productive efficiency of the industry.

Profitability is another area that calls for a thorough analysis on the part of investors. No industry can survive in the long run if it is not making profits. This requires thorough investigation into various aspects of profitability. However, such an analysis can begin by

having a bird's eye view of the situation. In this context, ratio analysis has been found quite useful. Some of the important often used are:

- Gross Profit Margin ratio
- Operating Profit Margin ratio
- Rate of Return on Equity
- Rate of Return on Total Capital

Ratios are not an end in themselves. But they do indicate possible areas for further investigation.

8.6.1 Technology and Research

Due to increasing competition in general, technology and research play a crucial part in the growth and survival of a particular industry. However, technology itself is subject to change; sometimes, very fast, and can lead obsolescence. Thus only those industries, which update themselves in the field of technology, can attain competitive advantage over others in terms of the quality, pricing of products etc.

The relevant questions to be probed further by the analyst in this respect could include the following.

- What is the nature and type of technology used in the industry?
- Are there any expected changes in the technology in terms of offering new products in the market to increase in sales?
- What has been the relationship of capital expenditure and the sales over time?
- Whether more capital expenditure has led to increase in sales or not?
- What has been the amount of money spent in the research and development activities of the firm? Did amount on the research and development in the industry relate to its redundancy or otherwise?
- What is the assessment of this industry in terms of its sales and profitability in the short, intermediate and long run?

The impact of all these factors have to be finally translated in terms of two most crucial numbers i.e. profitability - their level and expected rate of change during short, intermediate and long run.

Check Your Progress 3

Indicate true or false for the following statements:

1. Input output analysis helps us understand demand analysis in greater detail.
2. End use and regression analysis is the process whereby the analyst or investor attempts to dial the factor that determines the demand for the output of the industry.
3. Season refers to a consistent pattern of sales movements within the year.
4. Trend is not the result of basic developments in population, capital formation and technology.
5. The worth of a share depends on its return, which in turn depends on the profitability of the company.

8.7 INDUSTRY ANALYSIS FACTORS

The securities analyst will take into consideration the following factors into account in assessing the industry potential in making investments.

- Post-sales and earnings performance
- The government's attitude towards industry
- Labour conditions
- Competitive conditions
- Performance of the industry
- Industry share prices relative to industry earnings
- Stage of the industry life cycle
- Industry trade cycle
- Inventories build-up in the industry
- Investors' preference over the industry
- Technological innovations

8.7.1 Techniques of Industry Analysis

So far, we have discussed about various factors that are to be taken into account while conducting industry analysis. Now, we turn our attention towards various techniques that help us evaluate the factors mentioned above:

- ***End Use and Regression Analysis:*** It is the process whereby the analyst or investor attempts to dial the factor that determines the demand for the output of the industry. This is also known as end-use demand analysis. In this process, the investor hopes to uncover the factors that explain the demand. Some of the factors are found to be powerful in explaining the demand for the product, like disposable income per capital consumption, price elasticity of demand and per capital income. In order to identify the factors that affect demand, statistical techniques like regression analysis and correlation have often been used. These help identify the important factors/variables. However, one should be aware of their limitations.
- ***Input Output Analysis:*** This analysis helps us understand demand analysis in greater detail. Input of analysis is a very useful technique that reflects the flow of goods and services through the economy, including intermediate steps in the production process as the goods proceed from the raw material stage through to consumption. This information is reflected in the input-output table that reflects the pattern of consumption at all stages, not at the final stage of consumption of final goods. This is done to detect any changing patterns. It might also indicate the growth or decline of industries.

8.8 LET US SUM UP

After conducting analysis of the economy and identifying the direction, it is likely to take in the short intermediate and long term, the analyst must look into various sectors of the economy in terms of various industries. An industry is a homogenous group of companies. That is, companies with the similar characteristics can be divided in to one industrial group. There are many bases on which grouping of companies can be done.

The securities analyst will take into consideration the following factors into account in assessing the industry potential in making investments. Post-sales and earnings performance, the government's attitude towards industry, labour conditions and competitive conditions are the various factors that are to be taken into account while conducting industry analysis. Now we turn our attention to various techniques that help us evaluate the factors mention above.

End Use and Regression Analysis: It is the process whereby the analyst or investor attempts to dial the factor that determines the demand for the output of the industry. This is also known as end-use demand analysis.

8.9 LESSON END ACTIVITY

Suppose you are appointed portfolio manager of ABC industries Ltd. How would you prepare on industry analysis for your company?

8.10 KEYWORDS

Time Series Analysis: Time series analysis consists of decomposing the original sales series over a period of time.

Trend (T): It is the result of basic developments in population, capital formation, and technology. It is found by fitting a straight or curved line through past sales.

Cycle (C): It captures the wave-like movement of sales. Many sales are affected by swings in general economic activity, which tends to be somewhat periodic. The cyclical component can be useful in intermediate range forecasting.

Season (S): It refers to a consistent pattern of sales movements within the year. The term season describes any recurrent sales pattern. The seasonal component may be related to weather factors, holidays, and trade customs. The seasonal pattern provides a norm for forecasting short-range sales.

Erratic Events (E): It refers to the unpredictable sales caused by unforeseen events like strikes, riots, war scares, floods, and other disturbances.

End Use and Regression Analysis: It is the process whereby the analyst or investor attempts to dial the factor that determines the demand for the output of the industry.

Input Output Analysis: This analysis helps us understand demand analysis in greater detail.

8.11 QUESTIONS FOR DISCUSSION

1. Why does portfolio manager do the industry analysis?
2. What are the factors influencing industry analysis?
3. Write notes on different types of industry.
4. Explain in detail the key indicators of industry analysis.

Check Your Progress: Model Answers

CYP 1

1. Growth	2. industrial	3. Defensive	4. Pioneering

CYP 2

1. thirty-two	2. ten	3. nineteen	4. decay stage, decline

CYP 3

1. T	2. T	3. T	4. F	5. T

8.12 SUGGESTED READINGS

Sudhindra Bhat, *Security Analysis and Portfolio Management*, Excel Books, Delhi.

Kevin, S., *Security Analysis and Portfolio Management*, Printice Hall of India.

Prasanna Chandra, *Investment Analysis and Portfolio Management*, Second Edition, Tata McGraw Hill.

Punithavathy Pandian, *Securities Analysis and Portfolio management*, Vikas.

Investment Management, V. K. Bhalla.

A. Davis, *Investors in a Changing Economy*, Printice -Hall, 1968.

Williamson, J. Peter, *Investments: New Analytic Techniques*, London, Longman, 1970.

Cottle, CC., and Whitman, W.T., *Investment Timing: The Formula Plan Approach*, McGraw Hill.

LESSON

9

FUNDAMENTAL ANALYSIS 3: COMPANY ANALYSIS

CONTENTS

9.0 AIMS AND OBJECTIVES

After studying this lesson, you should be able to understand:

- Need for Company Analysis
- Estimation of Future Price
- Quantitative Analysis
- Forecasting Earning Per Share
- Traditional and Modern Methods of Forecasting EPS
- Qualitative Analysis
- Tools for Company Analysis

9.1 INTRODUCTION

We have discussed the relevance of economy and industry analysis and the manner in which it is conducted. In this unit, we will discuss the company level analyses. In order to provide a proper perspective to this analysis, let us begin by discussing the way investor makes investment decisions given his goal maximization. For earning profits, investors apply a simple and common sense decision rule of maximization. That is:

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

The above decision rule is very simple to understand, but difficult to apply in actual practice. Huge efforts are made to operationalise it by using a proper formal and analytical framework. To begin with, problems faced by the investor are: how to find out whether the price of a company's share is high or low? What is the benchmark used to compare the price of the share? The first question becomes easier if some benefits are agreed upon with which the prevailing market price can be compared. In this respect, fundamental analysis provides the investor a real benchmark in terms of intrinsic value. This value is dependent upon industry and company fundamentals. Out of these three, company level analysis provides a direct link to investor's action and his investment goal in operational terms. This is because an investor buys the equivalent of a company and not that of industry and economy. This framework indeed provides him with a proper background, with which he buys the shares of a particular company. A careful examination of the company's quantitative and qualitative fundamentals is, therefore, very essential. As Fischer and Jordan have aptly put it: "If the economic outlook suggests purchase at the time, the industry analysis will aid the investor in selecting the proper industry in which to invest. Nonetheless, when to invest and in which industry is not enough. It is also necessary to know which companies industries should be selected."

The real test of an analyst's competence lies in his ability to see not only the forest but also the trees. Superior judgment is an outcome of intelligence, synthesis and inference drawing. That is why, besides economic analysis and industry analysis, individual company analysis is important.

9.2 FRAMEWORK OF COMPANY ANALYSIS

The two major components of company analysis are:

(i) Financial (ii) Non-financial

A good analyst gives proper weightage to both these aspects and tries to make an appropriate judgment. In the process of evaluating the investment-worthiness of a company's securities, the analyst will be concerned with two broad categories information: (i) internal and (ii) external. Internal information consists the data and events relating to the enterprise as publicized by it. External information comprises the reports and analyses made by sources outside the company viz. media and research agencies.

9.2.1 Non-financial Aspects

A general impressionistic view is also important in evaluating the worth of a company for investing in securities. This could be obtained by gathering and analyzing information about companies, publicized in the media, the stock exchange directory, annual reports and prospectus.

1. History and business of the company
2. Top management team
3. Collaboration agreements
4. Product range
5. Future plans of expansion/diversification
6. R & D
7. Market standing – competition and market share
8. Corporate social responsibility
9. Industrial relations scenario
10. Corporate image etc.

Besides these internal factors, the external environment related to the company survival and image:

1. Statutory controls
2. Government policy
3. Industry life cycle stage
4. Business cycle stage
5. Environmentalism
6. Consumerism, etc.

9.2.2 Financial Analysis

Financial analysts interested in making investments in equality shares of a company will be concerned with the prospects of rise in value of the firm.

Asset value vs. Earnings value

The asset value of a security is determined by estimating the liquidating value of the firm, deducting the claims of firm's creditors and allocating the remaining net asset value of the firm over the outstanding shares of stock. The asset value is usually estimated by consultation with:

(i) A specialist who appraises asset values and/or

(ii) An accountant who gives book value of the firm.

This method is suitable only for companies heading towards bankruptcy. For them, the firm's income and dividends will be declining and discontinuous. Hence, they will have negligible value. On the other hand, for going concerns, the intrinsic value far exceeds the value of the firm's physical assets. There is a definite lack of relationship between book value and real value, in the case of prosperous firms.

Therefore, investment analysis focus their attention on the trends of earnings and the related factors like dividends, bonus issues, rights shares, and appreciation of the market value of the share. It is believed that the appropriate indices for a company's performance are Market Price Per Share (MPS) and Earnings Per Share (EPS).

Check Your Progress 1

Fill in the blanks

1. The real test of an analyst's competence lies in his ability to see not only the forest but also the _____ .
2. _____ information consists of data and events relating to the enterprise as publicized by it.
3. _____ information comprises the reports and analyses made by sources outside the economy viz. media and research agencies.
4. _____ analysts interested in making investments in equity shares of a company will be concerned with the prospects of rise in the value of the firm.

9.3 FUNDAMENTAL ANALYST'S MODEL

The true economic value or intrinsic value of a share of common stock. Like the value of bond or other assets it is equal to the present value of all cash flows from the asset.

$$P_{io} = \sum_{t=1}^{\infty} \frac{d_{it}}{(1+k_i)^t}$$

$$= \sum_{t=1}^{\infty} \frac{d_o(1-g_i)^t}{(1+k_i)^t}$$

$$= \frac{d_{i1}}{k-g}$$

Where P_{io} = Value of share i

D_{it} = Dividends of share I in the t th period

K_1 = Equity capitalization rate

G_{it} = Growth rate of dividends of share I (a constant)

This value is obtained by stock analysts y multiplying the 'i' the stock's normalized earnings per share (e) with price-earnings ratio or earnings multiplier (m)

$$P_{io} = e_{io}. M_{io}$$

Where P_{io} = Value of share 'I'

e_{io} = Earning of share 'c'

m_{io} = Earnings multiplier of share 'i'

The ratio of d_{io}/e_{io} is known as dividend payout ratio. From the above model it is obvious that, to determine the appropriate earnings multiplier an analysis must consider the following:

- The earnings of the security
- The risk of the security
- The growth rate of the dividend stream
- The duration of the expected growth and
- The dividend payout ratio

9.3.1 Earnings Analysis

As seen earlier, to value common stocks or other risky assets, the present value model is employed.

Present value = AQ

Where t = time period

This model gives rise to two questions:

1. How does the investor measure the income from the common stocks?
2. What discount or capitalization rate should be used?

The income question is discussed here:

Income concepts: Accountants and economists have provided two different concepts of income.

Accountant's income is the revenue over the above all the costs incurred. Economists define the income of a firm as the maximum amount, which can be consumed by the owners of the firm in any period without decreasing their future consumption opportunities.

Adjusting for economic income: Since income, which is very important is determining the value of a security, is vaguely reported by accountants, it is necessary to adjust or normalize it in a consistent manner.

Fundamental analysts find it necessary to significantly alter the income statements, to obtain estimates for two reasons:

(i) The accountant has used an accounting procedure, which is inappropriate for the relevant economic transaction and/or

(ii) The accountant, perhaps under the pressure of top management, has adopted a procedure to minimise the firm's income taxes or window dress the firm's financial statements.

We will now discuss four differences in accounting procedures. These are only illustrative of the controversy in reporting incomes.

1. ***Sales – Revenue Recognition Principle:*** Sales can be either cash sales or credit sales. Sales can be recognized as early as the date the sale order is signed. However, in the case of long-term construction contracts the sale may not be recognized until as late as the day the cash is fully paid. Between these two extremes, the accountant may choose a suitable time point to recognize the sales revenue in the financial statements. He may do it either in an attempt to improve current income or because he has grown confident about its collectability. In the case of credit sales, companies may factor their accounts receivable and realize cash proceeds. One firm may

recognize this immediately, whereas another firm may wait until the customer's final cash payment is actually received.

2. ***Inventory:*** Inventory valuation is done based on two methods:

   FIFO – First in, first out method

   LIFO – Last in, first our method

3. ***Depreciation:*** Several depreciation methods may be used in financial statements that a firm to the public:

   1. Straight line method
   2. Sum-of-digit method
   3. Double declining balance method
   4. Units of production method

The second and third methods are accelerated methods of deprecation. The second method may be used to accelerate depreciation during a period of rapid production.

9.3.2 Accounting Income Effect on Balance Sheet

A balance sheet is a summary of account balance carried after the appropriate closing of the books. Income statements deal with flows, whereas balance sheet deals with stocks. Since stocks are accumulations of flows, vagaries that undermine the estimates of accounting income are cumulated in certain sheet items.

For instance, the impact of inflation should be considered to make the balance sheet items realistic. Measures suggested are:

Assets side

1. Report marketable securities at current value.
2. Inventory should be valued at replacement cost.
3. Land and natural resources to be shown at net realizable value (current market price-future development, selling or interest costs.
4. Plant & machinery at replacement cost.
5. Goodwill.
6. R & D expenses.

Liabilities side

1. Debt. In future, at the time of maturity it is repaid in cheaper money units (rupees). It is a gain to shareholders.
2. Deferred taxes.
3. Retained earnings.

9.3.3 Forecasting Earnings

It is necessary to estimate a stock's future income because the value of the share is the present value of its future income. This can be done by focussing on:

(a) Identification of variables which will have impact on income, and

(b) Determining the extent of change in income due to change in the identified variables, by employing appropriate method of forecasting.

(a) ***Identification of variables:*** Basically changes in income result from changes in:

(i) Operations of the business and (ii) In the financing of the business.

(i) *Operations and Earnings:* The operating cycle of a firm starts with cash converted into inventory. Inventory turns into sale and accounts receivables, which finally become cash.

Return on Investment (ROI) is the measure of the firm's operating result.

$$\text{ROI} = \frac{\text{EBIT}}{\text{Investment}} = \frac{\text{EBIT}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Investment}}$$

There are two products:

(a) profit margins on sale and (b) turnover of assets

(ii) *Financing and Earnings:* The two main sources of financing an enterprise are:

(i) Borrowings (ii) Issue of new shares.

Debt financing provides leverage to common shareholders. It raised the earnings per share but also risk. Equity financing is advisable where new shares can be sold at a price in excess of asset value per share, as it improves EPS. This is possible only when the company management can maintain a reasonably higher ROI.

From the above, it is clear that EPS and changes in earnings are function of:

(i) Turnover of investment

(ii) Margin on sales

(iii) Effective interest rate (cost of borrowed funds)

(iv) Debt equity ratio

(v) Equity base

(vi) Effective tax rate.

(b) ***Determining the extent of change method:*** Different methods of forecasting earnings are available. The two categories into which the methods fall are given below with a brief list of some of the methods:

1. *Earlier methods*
   - ❖ Earnings methods
   - ❖ Market share/profit margin approach (break-even analysis)
2. *Modern techniques*
   - ❖ Regression and correlation analysis
   - ❖ Trend analysis (time series analysis)
   - ❖ Decision trees
   - ❖ Simulation

The methods are briefly explained in the following:

(i) ***Earnings model:*** The ROI method which has been earlier introduced as a device for analyzing the effects of and interaction between the earnings and assets can be used as a forecasting tool. If predicted data relating to assets, operating income, interest, depreciation and forces are available the new values can be substituted in the model and EAT can be forecasted.

(ii) ***Market share/profit margin approach:*** This is derivative of industry forecast of market. Once the total market is known, the market share of the individual company can be determined either using historical tract second or subjective probabilities. The next step is estimating net income after taxes and dividends. This can be done by cost analysis and estimates in relation to quantity of sales or operating capacity. Break-even analysis is the appropriate tool to carry out such an analysis.

(iii) ***Projected financial statement:*** This method makes an item-wise analysis of revenues and expenses and predicts them over a number of years, based on the variations in the key determining variables. It is possible only when the forecaster has through information about the inner working of the company.

A simplified approach involves consideration of branch/divisional total in place of item-wise amounts.

The above three approaches are not mutually exclusive. They are not without shortcomings. They are based on subjective evaluations made at various stages of the analysis.

(iv) ***Regression and correlation analysis:*** These methods as applicable to industry analysis can be used at company level. The methods permit analyzing the relationships between several variables of company, industry and economy to develop more accurate forecasts.

Because of the facility of considering many variables and analysing them, this method is more advantageous.

(a) Analysts are forced to think through various problems of company and the various interrelationships, internal and external variables and company revenues and expenses.

(b) Analysts can clearly explain the causal variables of changes and improve the confidence in forecasts.

(v) ***Trend analysis:*** Trend analysis is a time series analysis that permits identification of seasonal, cyclical and erratic fluctuations of the variables under consideration over a time period. Analysts employ trends analysed by plotting the data on a special kind of graph paper, semi-logarithmic or semi-log paper, in order to reveal starkly different growth rates.

(vi) ***Decision trees:*** This can be used to forecast earnings and security values. Decision tree is an advanced technique because it considers possible outcomes with their probabilities and analyses them.

A decision tree contains branches, each one representing a possible outcome. Probabilities of the end points of the branches add up to 1.

The decision tree of security analysis starts with sale. If sales are expected at two levels, high and low, there will be two branches; on the other hand if medium level sales are included, there will be three branches. Each one indicates expected sales and their probabilities. For each sale branch, different levels of earnings expected

can be given with their probabilities. Finally, for each of the earnings branch, different expected P/E ratios can be presented. Based on the data MPS can be calculated for each alternative course of events and outcomes.

The advantages of this method are:

(i) Stage-wise analysis of probable events and outcomes help in improving accuracy in forecasting, and

(ii) Final recommendations can be made with more understanding and confidence.

(vii) ***Simulation:*** This method can be applied to forecast earnings and also security values. Simulation is a technique that systematically repeats the application of a rule or formula to know outcomes in different situations. It answers the question – what happens to the outcome, if one or more variables influencing it change?

All that is to be done is to set up the formulae

$$\text{For example, EPS} = \frac{\text{Sales} \times \text{Margin (\%)}}{\text{No. of shares outstanding}}$$

$$\text{MPS} = \text{EPS} \times \text{P/E}$$

Now, data relating to variables viz., Sales, profit margin, number of shares outstanding and P/E ratio are generated along with their probability distributions as in the case of decision tree.

The formula is applied to compute MPS under varying conditions. Computer programming will help analyse security values rapidly and accurately.

9.4 DETERMINING EARNINGS – MULTIPLIER (P/E) RATIO

So far, the focus has been on determining Earnings Per Shares (EPS). This is to be translated into Market Price per Share (MPS). As such, most of the fundamental security analysis work centres on determining the appropriate multiplier.

Research Findings: Bing carried out a survey of practitioners' stocks evaluation methods and found that several approaches were in vogue. He found that analysts (1) used time horizon from 1 to 3 years and (2) preferred to use several techniques in combinations. Seventy-five per cent of the analysts followed rules of thumb to normalize P/E ratios:

1. They compared current actual P/E with what they considered normal for the stock in question.
2. They compared price times estimated future earnings (1 to 3 years out) with what they considered normal for the stock in questions.
3. They compared the multiplier and growth or earnings of individual stocks with industry group multiple and earnings growth.

With and Kisor based on their study of a number of stocks, opined that differences in P/Es between stocks were due to projected earnings growth, expected dividend payout, and variation in rate of earnings growth or growth risk. Bower and Bower came up with similar conclusion.

They divided risk into marketability of stock, price variability, and conformity with market behaviour. Malkiel and Cragg found positive effect of earnings growth on P/E. They further found that dividend payout effect was not clear.

9.5 DIVIDEND DISCOUNT MODEL OF VALUATION

In determination of the P/E ratio, the factors to be considered are

- Capitalization rate (K)
- Growth rate of dividend stream (g) and
- Dividend pay-out ratio (d/e)

(a) ***Capitalization rate (k):*** Capitalization rates vary with the firm's risk-class and the prevailing market conditions. Three risk classes may be considered for analysis – high, medium and negligible. Based on market level and directions of change, markets can be classified as:

(i) *Normal market:* In which most securities prices are experiencing slow steady growth and the average price-earnings ratio is the low mid teens (13-18 times).

(ii) *Bear market:* When average earnings multipliers drop below 13 times, many market prices are deflated.

(iii) *Bull market:* When average earnings multipliers rise above approximately 18, many stocks are over-priced.

Since future expectations are influenced by past experience, a good way to estimate a firm's risk-class is to examine historical data. Capital Asset Pricing Model (CAPM) or Security Market Line (SML) depicts the risk return relationships based on historical data. It illustrates the positive relationship between assets, undiversifiable (as measured ROR) for the asset. The fundamental analyst can measure the risk of the company in recent periods, adjust it for anticipated changes and then us, these forecasted risk statistics to obtain capitalization rates. Also adjustment upward or downward is to be made in earnings multipliers in line with prevailing conditions, i.e., depressed or inflated.

(b) ***Growth rate (g):*** Next step is determination of growth rates of earnings. If payout ratio in constant, the multiplier is influenced by growth rate (g) conditions viz., zero growth, perpetual growth and temporary growth.

(c) ***Payout ratio (d/e):*** The effects of changes in dividend payout ratio (d/e) are direct and proportional, direct as can be observed from the P/E model. The EPS and DPS are not equal, for the reason some companies prefer a stable dividend policy and some others retain earnings and maintain low dividend pay out ratios. It implies that analysts have to study the history of dividends announcements by the firm to make proper prediction of future pay out ratios.

Empirical studies have produced the following relevant findings:

1. Companies seem to have a predetermined payout ratio that they appear to adhere to over the long run.
2. Dividends are raised only if corporate management feels that a new higher level of earnings can be supported in the future; and
3. Managements are extremely reluctant to cut the absolute monetary amount of cash dividends.

It gives price earrings ratios or various risk classes and various rates of dividends or earnings growth in normal market along with formulae for computing value of stocks.

Illustration 1:

A firm's earnings per share are Rs. 8. Dividend payout ratio is 0.5; systematic risk coefficient is 0.1. What will be the firm's share value when the growth rate is zero?

Solution:

The firm's normalized EPS (e) = Rs. 8

Average payout ratio d/e = 50%

Beta Coefficient (B) = 0.1

Capitalisation rate (k) = 10%

(i) When growth rate (g) is zero

$$\text{Earnings multiplier} = \frac{d_i/e}{k-g}$$

$$\text{When } g = 0 \text{ earnings multiplier} = \frac{d_i/e}{k} = \frac{0.5}{0.10} = 5$$

$$\text{Firm's share value} = 7 \times 5 = \text{Rs. } 40$$

9.6 COMPARATIVE P/E APPROACH

Comparative or relative valuation makes use of the average P/E of market or industry to determine the P/E for an individual stock. The procedure is as follows:

(i) Determine the market P/E using dividend discount model.

(ii) Determine the market pay back period based on earnings growth rate of market. (How many years it takes to obtain market P/E at the given growth factor?)

(iii) Assign P/E to the stock based on its growth rate and market payback period.

(iv) Make adjustments for dividend pay out ratio and earnings volatility.

(v) Find volume of stock by multiplying normal earnings with the determined P/E.

Illustration 2:

The market P/E is 10 and earnings (dividend) growth rate is 9%. If individual stocks were to grow at 12%, normal earnings at the end of financial year were Rs. 4, projected earnings volatility was 10% and projected dividend pay out ratio was 15%, determine the value of the stock.

Solution:

(i) Market P/E = 10

(ii) Market payback period

Given a growth rate of 9% expected earnings stream would be 1.09, 1.88, 2.95 and 29 on. It will add up to Rs. 10 in 6.99 years.

(iii) Individual stock growth rate = 12%

In 6.99 years, it is worth 11.3 /(expected earnings stream would be (1.12, 1.25, 1.40 and so on).

(iv) Projected earnings volatility = 10%

Premium for earnings volatility = + 15%

$$\text{Discount for dividend payout ratio} = \frac{-13.6\%}{+1.4\%}$$

Net premium

(v) Adjusted stock P/E = 11.3 × 101.4/100 = 11.45

(vi) Normal value of stock = Normal Earnings × P/E

= 4 × 11.45 = Rs. 45.8

Check Your Progress 2

1. _____ is a technique that systematically repeats the application of a rule or formula to know the outcomes in different situations.
2. Accountant's income is the _____ over the all the costs incurred.
3. A balance sheet is a summary of the _____ balance carried after the appropriate closing of the books.
4. Income statements deal with flows, whereas balance sheet deals with _____ .

9.7 GROWTH STOCKS

Investors are interested in not only current dividends but also in future earnings through dividends and capital gains.

Characteristics of growth stocks: The following features help identify growth stocks:

(i) Substantial and steady growth in EPS

(ii) Low current DPS, because retained earnings are high and reinvested.

(iii) High returns on book value

(iv) Emphasis on R & D

(v) Diversification plans for strategic competitive advantage

(vi) Marketing competence and edge.

Benefits: Investment in growth stocks would benefit investors in many ways:

1. The market value goes up at a rate much faster than the rate of inflation.
2. Higher capital gains.
3. Long range tension free holding without any need for sell & buy operations and associated problems.

Valuation: The investor interested in growth shares can either employ (1) Comparative P/E ratios approach or (2) Dividend Discount model for valuation of the stocks.

9.7.1 Guidelines for Investment

The following guidelines will be helpful to investors interested in growth stocks:

1. Tuning is not very important, but with appropriate timing one may be able to pick up shares at the threshold of high growth rate.
2. Choice of stock should not be based on simple factor. Multiple criteria using different appraisal techniques may be employed.
3. It is better to diversify investment in growth stocks industry-wise. Because different industries grow at different by evening out differences.
4. One should hold the stock for more than 5 years to gain advantage.

9.7.2 Estimation of Future Price

Before attempting to discuss the approach that can be adopted for company level analysis, let us about the objective of investor and how it can be quantified. It is to reiterate the proposition that an investor looks for increasing his returns from the investment. Returns are composed of capital gains and a stream of income in the form of dividends. Assuming he has equity shares for a period of one year (known as holding period), i.e., he sells it at the end of the year, the total returns obtained by him would be equal to capital gains plus dividends received at the end of the year.

Where $R_1 = (P_1 - P_{1-1}) + D_t$

P_1 = Price of the share at the end of the year

P_{1-1} = Price of the share at the beginning of the year

D_1 = Dividend received at the end of the year

R_1 = Return for the holding period, t

In order to calculate the return received by him on his original investment (i.e. purchase price), total should be divided by Pt – 1. These are expressed in percentage terms and known as holding period yield. Thus,

$$\text{HRY (\%)} = \frac{(P_1 - P_1 - 1) + D_1}{P_1 - 1}$$

The above computation is quite simple as long as the value of the variables is available. In reality, however, the investor would know the beginning price of the share (called purchase price) as this is the price paid to buy the shares, but the price at the end of the year (i.e. selling price) as well as dividend income received would have to be estimated. This is where the problem lies. How to estimate the future price of the share as well as dividends? This becomes the main challenge. The series data relating to dividends paid by companies provide us useful clues in estimating the dividends likely to be declared by companies. There is, it seems, a dividends policy followed by most firms in general. Thus, an investor would be able to estimate dividend for the year with reasonable degree of accuracy under normal circumstances.

It has been found the management is very conservative in increasing the amount of dividend paid to shareholders. Managements generally do not increase the dividend unless this increase is sustainable in the long run. This is to avoid further cuts if need count of dividend, in actual practice, does not form large part of the total returns of the investor. It is an important constraint, as indicated above.

Estimation of future price of the share that contributes a major portion in the total returns of the investor is the problematic and is discussed in detail in the following section. In order to estimate future price of share, you may adopt two approaches, namely Quantitative analysis and attractive analysis. Let us elaborate each of the two approaches.

9.7.3 Quantitative Analysis

This approach helps us to provide a measure of future value of equity share based on quantitative factors. The methods commonly used under this approach are:

- Dividend discounted method, and
- Price-earnings ratio method

1. ***Dividend Discounted Method:*** Dividend discounted method is based on the premise that the value of an investment is the present value, its future returns. The Present Value (PV) calculated by discounting the future returns, which are divided in the formula, thus, is

$$PV = \frac{D_1}{(1+K)} + \frac{D_1}{(1+K)^2} + \frac{D_1}{(1+K)^3}$$

Under the constant growth assumption, this boils down to

$$PV = \frac{D_1}{K - g}$$

K = Discount rate (g) = Growth rate

DPS = EPS × (1 – b)

DPS = Dividend Per Share

b = Proportion of earnings retained such that (1 – b) is the dividend payout

Substituting the above in the formula, it becomes

$$\frac{EPS(1-b)}{K-g}$$

On the basis of the above model, the following inferences can be drawn:

(a) Higher the EPS, other things like b, k, g remaining the same, higher would be value of the share

(b) Higher the b, retention rate, or lower the 1-b i.e., g remaining the same, higher would be value of the share

(c) Higher the k, i.e. discount rate, other things like b, g remaining the same, higher would be value of a equity

(d) Higher the growth rate, other things like EPS, b, k remaining constant, higher would be value of the share.

These inferences clearly highlight the effect of different variables on the future price of equity shares.

When applying this approach, one has to be careful about using discount rate k. A higher value of discount could unnecessary reduce the value of share and equity, while a lower value unreasonably increase it; this will induce a complication to invest/disinvest the shares. A discount rate is based on the risk rate and risk premium. That is

Discount risk free rate + Risk premium

$$K = r_1 + r_2$$

Where r_t = risk free rate of return

r_2 = risk premium

Thus, higher the risk free interest rate with r_p remaining the same would increase the discount rate, which in turn would decrease the value of the equity. In the same way, higher risk premium with of remaining the same increase the overall discount rate and decrease the value of the equity. Like discount rate, growth equally critical variable in this method of share valuation. It may be pointed out that growth from

internal of it depends on the amount of earnings retained and return on equity. Thus, higher is the retention rate, highly be the value of the firm, other things remaining constant.

2. ***Price Earnings Approach:*** According to this method, the future price of an equity share is calculated by multiplying the P/E ratio by the price. Thus,

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

The P/E ratio or multiple is an important ratio frequently used by analyst in determining the value of an equity share. It is frequently reported in the financial press and widely quoted in the investment community. In India, we can gauge its popularity by looking at various financial magazines and newspapers.

This approach seems quite straight and simple. There are, however, important problems with respect calculation of both P/E ratio and EPS. Pertinent questions often asked are:

- How to calculate the P/E ratio?
- What is the normal P/E ratio?
- What determines P/E ratio?
- How to relate company P/E ratio to market P/E ratio?

The problems often confronted in calculating this ratio are: which of the earnings – past, present or future to be taken into account in the denominator of this ratio? Likewise, which price should be put in the numerator ratio? These questions need to be answered while using this method.

Indeed, both these methods are inter-related. In fact, if we divide the equation of dividend discounted made under constant growth assumption by E_0 (Earnings per shares), we get $\frac{P_0/E_0 = D_0/E_0(1+g)}{K-g}$

Here D0 (1 + g) – D_1

Based on the above model, decision rules become:

DECISION RULES

- Higher the P/E ratio, other things remaining the same, higher would be the value of an equity share.
- Lower the P/E ratio, other things remaining the same, lower would be the value of an equity share.

Looking at the above decision rules, it is not uncommon to find that investor prefer shares of companies higher P/E multiple.

You will appreciate that the usefulness of the above model lies in understanding the various factors determine P/E ratio is broadly determined by:

- Dividend payout
- Growth
- Risk free rate
- Business risk
- Financial risk

Thus, other things remaining the same:

1. Higher would be the P/E ratio, if higher is the growth rate or dividend or both
2. Lower would be P/E ratio, if higher is:
   (a) Risk-free rate,
   (b) Business risk
   (c) Financial risk

The foregoing presentation helps us provide a quantity measure of the value of equity share. However, there remains the problem of estimating earning per share, which has been used in both the methods discussed. This is a key number, which is being quoted, reported and used most often by company management analysts, financial press etc. It is this number everybody is attempting to forecast. The starting point to earnings per share, however, is to understand the chemistry of earnings as described in the previous unit. We describe various approaches to forecast earnings per share in the following sections.

Check Your Progress 3

1. External information comprises the reports and analysis made by sources outside the company, which include media and research agencies.
2. Internal information consists the data and events relating to the enterprise as published by it.
3. Accountant's income is the revenue over and the above all the costs incurred.
4. Forecasting is necessary to estimate a stock's future income because value of the share is the present value of its future income.
5. Debt financing provides leverage to common shareholders.

9.8 FORECASTING EARNINGS PER SHARE

Things are the most important number in the arsenal of the investor. The most important and the principal is getting information about the earnings of the company is its financial statements. The analyst must remember the fact that there is more to the financial statements than what meets his eyes. Out of the two statements, balance sheet and income statement, it is the income statement that is more often used in order to gauge the future state of the firm. Research studies have indicated the significance of this number in influencing prices and dividends. The research study conducted by Niederhoffer and Regan for example, found that the prices are strongly dependent on the changes in the earnings, both absolute and relative to the analysis.

The above study and some others indicate the importance of the forecast of earnings as the most important variable to work on in the investment decision-making process. The critical aspects of the earnings are its level, trend and stability.

There are various methods employed to assess the future outlook of the revenue, expenses and the earnings from given the economic and industry outlook. These methods can be broadly classified into two categories, traditional and modern. Under the traditional approach, the forecaster obtains the estimate of the single value variable. While in the case of modern approach, he obtains the range of values with the probability of each. Let us discuss these two approaches in detail.

9.8.1 Traditional Methods of Forecasting EPS

Under the traditional approach the following methods of forecasting are adopted:

1. ROI approach
2. Market share approach
3. Independent estimates approach

Beginning the discussion on the forecasting techniques, it will not be out of place to briefly mention that the earnings per share are measured from the financial statement. This will provide us an understanding of its changes. Broadly, changes in earnings are affected by operating and financing decisions. Both these decisions are, however, interdependent. Various companies do this by presenting the information in the income statement reflecting both types of decisions. Given below is the format, which analyses:

Income Statement for the year ended……..

1. Sales revenue
2. Less interest expenses
3. Earnings Before Interest and Tax (EBIT)
4. Less interest expenses
5. Earnings Before Tax (EBT)
6. Number of shares outstanding
7. Earning After Tax (EAT)
8. Number of shares outstanding
9. EPS = EAT/number of shares outstanding

Let us now explain the ROI approach to forecast earnings per share

9.8.2 ROI Approach

Under this approach, attempts are made to relate the productivity of assets with the earnings. That is, returns on the total investment (assets) are calculated and estimates regarding per share are made stated.

$$\text{Return on Assets} = \text{EBIT/Assets}$$

Return on assets is a function of the two important variables viz., turnover of assets, and margin of profit

$$\text{Return on Assets} = \text{Assets Turnover} \times \text{Profit Margin}$$

9.8.3 Ratio Analysis

Based on the financial data available in income statement and balance sheets relevant ratios may be calculated and analyzed to appraise the financial soundness of a company

S. No.	Indicator	Ratios
A	Technical Solvency	Current ratio Liquidity ratio Net Income to Debt service ratio
B	Actual Solvency	Debt-equity ratio Return on investment Profit margin Fixed Assets to total assets
C	Profitability	Gross profit margin Net profit margin Return on investment Earnings per share Dividend yield ratio P/E ratio
D	Efficiency	Operating ratio Expense ratio Current assets turnover Inventory turnover Credit collection period

9.9 LET US SUM UP

Here, we have discussed in the company level analyses. For earning profits, investors apply a simple and common sense decision rule, that is, maximization. A careful examination of the company quantitative and qualitative fundamentals is, therefore, very essential. As Fischer and Jordan have aptly put it: "If the economic outlook suggests purchase at the time, the economic analysis of the industry analysis will aid the investor selecting their proper industry in which to invest. Nonetheless, when to invest and in which industry is not enough. It is also necessary to know which companies industries should be selected".

9.10 LESSON END ACTIVITY

"An analyst will not be able to develop a trading strategy based on adjustment to new public information". Discuss.

9.11 KEYWORDS

Earnings model: The ROI method which has been earlier introduced as a device for analyzing the effects of and interaction between the earnings and assets can be used as a forecasting tool.

Market share/profit margin approach: This is derivative of industry forecast of market. Once the total market is known, the market share of the individual company can be determined either using historical tract second or subjective probabilities.

Projected financial statement: This method makes an item-wise analysis of revenues and expenses and predicts them over a number of years, based on the variations in the key determining variables.

Regression and correlation analysis: These methods as applicable to industry analysis can be used at company level.

Trend analysis: Trend analysis is a time series analysis that permits identification of seasonal, cyclical and erratic fluctuations of the variables under consideration over a time period.

Decision trees: This can be used to forecast earnings and security values. Decision tree is an advanced technique because it considers possible outcomes with their probabilities and analyses them.

Simulation: This method can be applied to forecast earnings and also security values. Simulation is a technique that systematically repeats the application of a rule or formula to know outcomes indifferent situations.

9.12 QUESTIONS FOR DISCUSSION

1. What is the need of company analysis? Do we need the company analysis? Illustrate your answer.
2. What is the framework of company analysis?
3. What are the two major components of company analysis?
4. Explain financial analysis.
5. What do you mean by earnings analysis?

Check Your Progress: Model Answers

CYP 1

1. trees 2. Internal 3. External 4. Financial

CYP 2

1. Simulation 2. revenue 3. account 4. stocks.

CYP 3

1. T 2. T 3. T 4. T 5. T

9.13 SUGGESTED READINGS

Sudhindra Bhat, *Security Analysis and Portfolio Management*, Excel Books, Delhi.

Kevin, S., *Security Analysis and Portfolio Management*, Prentice Hall of India.

Prasanna Chandra, *Investment Analysis and Portfolio Management*, Second Edition, Tata McGraw Hill.

Punithavathy Pandian, *Securities Analysis and Portfolio management*, Vikas.

Investment Management, V. K. Bhalla.

A. Davis, *Investors in a Changing Economy*, Printice -Hall, 1968.

Williamson, J. Peter, *Investments: New Analytic Techniques*, London, Longman, 1970.

Cottle, CC., and Whitman, W.T., *Investment Timing: The Formula Plan Approach,* McGraw Hill.

LESSON

10

TECHNICAL ANALYSIS

CONTENTS

Contd....

10.0 AIMS AND OBJECTIVES

After studying this lesson, you should be able to understand:

- Introduction to Technical Analysis and Assumptions
- Technical Versus Fundamental Analysis
- Origins and Development of Technical Analysis
- Techniques of Technical Analysis
- Market Indicators
- Old Puzzles and New Developments: Fibonacci Numbers,
- The Dow Theory, Elliott Wave Principles; Kondratev Wave Theory
- Chaos Theory, Neutral Networks
- Tools of Technical Analysis

- Charting as a Technical Tool: Types of Charts, Important Chart Patterns
- Limitation of Charts
- Limitation of Technical Analysis
- The Future of Technical Analysis

10.1 INTRODUCTION

The methods used to analyze securities and make investment decisions fall into two very broad categories: fundamental analysis and technical analysis. Fundamental analysis involves analyzing the characteristics of a company in order to estimate its value. Technical analysis takes a completely different approach; it doesn't care one bit about the 'value' of a company or a commodity. Technicians (sometimes called chartists) are only interested in the price movements in the market.

The term technical analysis is used to mean fairly wide range of techniques, all based on the concept that past information on prices and trading volume of stocks give the enlightened investor a picture of what lies ahead. It attempts to explain and forecast changes in security prices by studying only the market data rather than information about a company or its prospects as is done by fundamental analyst. John Magee, whose book Technical Analysis of Stock Trends is considered a classic for technical analysts, says:

"The technician has elected to study, not the mass of fundamentals, but certain abstractions, namely the market data alone. But this technical view provides a simplified and more comprehensible picture of what is happening to the price of a stock. It is like a shadow or reflection in which can be seen the broad outline of the whole situation. Furthermore, it works."

The technical analysts believe that the price of a stock depends on supply and demand in the marketplace and has little relationship to value, if any such concept even exits. Price is governed by basic economic and psychological inputs so numerous and complex that no individual can hope to understand and measure them correctly. The technician thinks that the only important information to work from is the picture given by price and volume statistics.

The technician sees the market, disregarding minor changes, moving in discernible trends, which continue for significant periods. A trend is believed to continue until there is definite information of a change. The past performance of a stock can then be harnessed to predict the future. The direction of price change is as important as the relative size of the change. With his various tools, the technician attempts to correctly catch changes in trend and take advantage of them.

10.2 WHAT IS TECHNICAL ANALYSIS?

Technical analysis is a method of evaluating securities by analyzing the statistics generated by market activity, such as past prices and volume. Technical analysts do not attempt to measure a security's intrinsic value, but instead use charts and other tools to identify patterns that can suggest future activity.

Just as there are many investment styles on the fundamental side, there are also many different types of technical traders. Some rely on chart patterns, others use technical indicators and oscillators, and most use some combination of the two. In any case, technical analysts' exclusive use of historical price and volume data is what separates

them from their fundamental counterparts. Unlike fundamental analysts, technical analysts don't care whether a stock is undervalued - the only thing that matters is a security's past trading data and what information this data can provide about where the security might move in the future.

10.2.1 Basic Technical Assumptions

Before we embark on the actual methods themselves, let us review the basic and necessary assumptions regarding the technical analysis:

1. ***The Market Discounts Everything:*** A major criticism of technical analysis is that it only considers price movement, ignoring the fundamental factors of the company. However, technical analysis assumes that, at any given time, a stock's price reflects everything that has or could affect the company - including fundamental factors. Technical analysts believe that the company's fundamentals, along with broader economic factors and market psychology, are all priced into the stock, removing the need to actually consider these factors separately. This only leaves the analysis of price movement, which technical theory views as a product of the supply and demand for a particular stock in the market.

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

3. ***History Tends to Repeat Itself:*** Another important postulate in technical analysis is that history tends to repeat itself, mainly in terms of price movement. The repetitive nature of price movements is attributed to market psychology; in other words, market participants tend to provide a consistent reaction to similar market stimuli over time. Technical analysis uses chart patterns to analyze market movements and understand trends. Although many of these charts have been used for more than 100 years, they are still believed to be relevant because they illustrate patterns in price movements that often repeat themselves.

   Technical analysis and fundamental analysis are the two main schools of thought in the financial markets. As we've mentioned, technical analysis looks at the price movement of a security and uses this data to predict its future price movements. Fundamental analysis, on the other hand, looks at economic factors, known as fundamentals. Let's get into the details of how these two approaches differ, the criticisms against technical analysis and how technical and fundamental analysis can be used together to analyze securities.

Check Your Progress 1

Fill in the blanks:

1. Fundamental analysis involves analyzing the characteristics of a company in order to estimate its _____.
2. _____ analysis is a method of evaluating securities by analyzing the statistics generated by the market activity, such as past prices and volume.
3. In technical analysis price movements are believed to follow _____ .
4. A major criticism of technical analysis is that it only considers price movement, ignoring the _____ factors of the company.

10.3 TECHNICAL VS FUNDAMENTAL ANALYSIS

With a view to making a broad comparison between technical analysis and fundamental analysis, let us assume that the fundamentalist is a conservative who invests for the long-term and the technician is a trader who buys and sells for short-term profits. Actually, of course, the value of technical analysis lies between these extremes.

Fundamentalists study the cause, not the "should." They make their decisions on quality, value and depending on their specific investment goals, the yield or growth potential of the security. They are concerned with the basis, the corporation's financial strength, record of growth in sales and earnings, profitability, the investment acceptance and so on. They also take into account the general business and market conditions. Finally they interpret these data inductively to determine the current value of the stock and then to project its future price. Fundamentalists are patient and seldom expect meaningful profits in less than one year.

In the long run, the fundamentalist who selects quality stocks when they are undervalued and sells them when they become fully priced will make substantial profits. But as John Maynard Keynes often noted, "In the long run, we'll all be dead".

Compared with long-term investors, technicians seek to keep their money working as profitably as possible at all times. When trading, they want to score profits quickly, and if the stock to market does not perform as anticipated, they are willing to take a small, fast loss.

Technically-oriented investors start by checking the market action of the stock. If it is favourable, they examine the fundamentals to be sure the company is sound and profitable. At all times, their focus is on the market, generally, on the performance of all listed stocks; specifically, on the price/volume movements of the stock they are considering buying. They make their decisions based on technical, not fundamental, data.

Technicians believe that (1) the stock market is rooted 15% in economics and 85% in psychology; (2) the record of past and present performance of a stock, not necessarily of the corporation, is the key factor; and (3) stock market dominated by institutional investors, operates on the wolf pack theory of following leaders. When major money managers start to buy, regardless of the reason, the price of the stock will go up. When they start to sell, it will go down. All such moves are shown by technical indicators.

In more detailed terms, here are several ways the technician acts:

1. ***Technicians believe that behind the fundamentals are important factors:*** At any given time, some investors have gains in the stock, and some usually have losses. Those with gains want to safeguard them and if possible, build them higher, they will hold the stocks.

   Those with losses will adopt different tactics; some will cut their losses short by selling out early when the stock price begins to decline others will sell when a minor rally has moved the stock up to their cost price; and still others will hold on doggedly until there is a turnaround.

   Each of these decision points can be spotted on charts: current configuration to show the action of the past week or so; intermediate and long-term patterns to find the previous important price levels at which selling is likely; and interim and long-term high points from which the stock started to move down in the past.

   In this method of analysis, a vital factor is volume. Volume is favourable on the upside when the number of shares traded is greater than before and on the downside

when the number of shares traded dwindles. Volume is unfavourable when volume dips as prices rise or increases when there is a decline. None of these indicators is concerned with the fundamentals of the corporation.

2. ***Technicians act on the what not the why:*** They recognize that formations and patterns signify changes in real value as the result of investor expectations, hopes, fears, industry developments and so on. They are not as impressed with fundamental value of any security as they are with current and prospective values reflected by market action.

3. ***Technicians are not committed to a buy-and-hold policy:*** As long as the trend is up, they will hold a stock. This may be for months or even years. But if there is a reversal, they will sell within hours of purchase. They recognize that, to achieve the greatest gains, they must never let sentiment of emotion override facts (as shown by technical indicators) and should always get out of a situation which, on available evidence, is no longer profitable.

4. ***Technicians do not separate income from capital gains:*** They look for total returns, that is, the realized price less the price paid plus dividends received. This is in sharp contrast to most long-term investors who buy a high-dividend paying stock and hold it for years, through up-and-down fluctuations. To the technicians, such strategy is foolish. A stock may continue to pay liberally but lose 50% of its value. If a stock is to be judged solely on its income, a non-dividend payer would have no value at all.

5. ***Technicians act more quickly to make commitments and to take profits and losses:*** They are not concerned with maintaining a position in any market, any industry or any stock. As a result, they are willing to take smaller gains in an up-market and accept quick losses in a down market. Traders/technicians want to keep their money working at maximum efficiency.

   Technicians know that there is no real value to any stock and that price reflects supply and demand, which are governed by hundreds of factors, rational and irrational. No one can grasp and weigh them all, but to a surprising degree, the market does so automatically.

6. ***Technicians recognize that the more experience one has with the technical indicators, the more alert one becomes to pitfalls and failure of investing:*** To be rewarding, technical analysis requires attention and discipline, with quality stocks held for the long terms. The duration can make up for timing mistakes. With technical approaches, the errors become clear quickly.

7. ***Technicians insist that the market always repeats:*** What has happened before will probably be repeated again; therefore, current movements can be used for future projection.

   With all markets and almost all securities, there are cycles and trends which will occur again and again. Technical analyses, especially charts, provide the best and most convenient method of comparison.

8. ***Technicians believe that breakouts from previous trends are important signals:*** They indicate a shift in that all-important supply and demand. When confirmed, breakouts are almost always accurate signals to buy or sell.

9. ***Technicians recognize that the securities of a strong company are often weak and those of a weak company may be strong:*** Technical analysis can quickly show when such situations occur. These indicators always delineate between the company and the stock.

10. ***Technicians use charts to confirm fundamentals:*** When both agree, the odds are favourable for profitable movement if the trend of the overall stock market is also favourable.

In view of the above comparison between technical and fundamental analysis, let us consider some of the tools used by technical analysts to measure supply and demand and forecast security prices.

Table 10.1: Distinctions between Fundamental and Technical Analysis

S.No.	Fundamental	Technical
1.	His perspective is long-term in nature. He is conservative in his approach. He acts on 'What should be'.	His outlook is short-term oriented. He is aggressive. He acts on 'what is'.
2.	He adopts a buy-and hold policy. He does not usually expect any significant increase in the value of his investments in less than a year.	He believes in making a quick buck. He snuffles his investments quite often recognizing and foresees changes in stock prices.
3.	He considers total gain from equity investment consists of current yield by way of dividends and long-term gains by way of capital appreciation.	He does not distinguish between current income and capital gains. He is interested in short-term profits.
4.	He forecasts stock prices on the basis of economic, industry and company statistics. The principal decision variables take the form of earnings and dividends. He makes a judgment of the stock's value with a risk-return.	He forecasts security prices by studying patterns of supply of and demand for securities. Technical analysis is study of stock exchange information.
5.	He uses tools of financial analysis and statistical forecasting techniques	He uses mainly charges of financial variables besides some quantitative tools.

10.3.1 Critics

Some critics see technical analysis as a form of black magic. Don't be surprised to see them question the validity of the discipline to the point where they mock its supporters. In fact, technical analysis has only recently begun to enjoy some mainstream credibility. While most analysts on Wall Street focus on the fundamental side, just about any major brokerage now employs technical analysts as well.

Much of the criticism of technical analysis has its roots in academic theory - specifically the Efficient Market Hypothesis (EMH). This theory says that the market's price is always the correct one - any past trading information is already reflected in the price of the stock and, therefore, any analysis to find undervalued securities is useless.

There are three versions of EMH. In the first, called weak form efficiency, all past price information is already included in the current price. According to weak form efficiency, technical analysis can't predict future movements because all past informations have already been accounted for and, therefore, analyzing the stock's past price movements will provide no insight into its future movements. In the second, semi-strong form efficiency, fundamental analysis is also claimed to be of little use in finding investment opportunities. The third is strong form efficiency, which states that all informations in the

market are accounted for in a stock's price and neither technical nor fundamental analysis can provide investors with an edge. The vast majority of academics believe in at least the weak version of EMH. Therefore, from their point of view, if technical analysis works, market efficiency will be called into question. (For more insight, read What Is Market Efficiency? and Working Through The Efficient Market Hypothesis.)

There is no right answer as to who is correct. There are arguments to be made on both sides and, therefore, it's up to you to do the homework and determine your own philosophy.

10.3.2 Superiority of Technical Analysis

Technical analysts differ in their views about fundamental analysis. Those who depend exclusively on technical analysis, criticize fundamental analysis as follows.

- Fundamental analysis is hard and time consuming work. Technical analysis, on the other hand, requires less schooling and is easier to use.
- Fundamental analysis is based on inadequate income statements and highly subjective nature of earnings multipliers.
- Fundamental analysis is right in its assertion that security prices fluctuate around their intrinsic values. But even if a fundamental analyst does find an under-priced security, he must wait and hope that the rest of the market recognizes the security's true value and bids its price up.

10.4 OLD PUZZLES AND NEW DEVELOPMENTS

10.4.1 Fibonacci Numbers

Fibonacci numbers have intrigued mathematicians and scientists for hundred of years. Leonardo Fionacci (1170-1240) was a medieval mathematician who discovered the series of numbers while studying the reproductive behaviour of rabbits. The beginning of the Fibonacci series is shown below: 1,1,2,3,5,8,13,21,34,55,89,144,233,…….

After the initial pair of ones, each succeeding number is simply the sum of the previous two.

The remarkable thing about these numbers is the frequency with which they appear in the environment. Sunflowers have seeds spiralling around the centre of the plant. Some spirals contain seeds leaning counter-clockwise, with other spirals going the other way. On most sunflowers, the number of clockwise and counter-clockwise spirals are adjacent Fibonacci numbers. A blossom might have 34 counter-clockwise spirals and 55 clockwise spirals. The structure of pine cones, the number of chambers in a nautilus seashell, the topology of spiralling galaxies, and the ancestry of bees all reveal Fibonacci numbers. There is even a professional journal, the Fibonacci Quarterly, which devoted to the study of this series.

- Technical analysts who follow Fibonacci numbers usually make use of the number 1.613. This number is called the golden mean and appears in ancient writings and architecture. (The golden mean features prominently in the dimensions of the Parthenon). After the first ten or so numbers in the series, each Fibonacci number divided by its immediate predecessor equals 1.618. For example, 89/55 = 1.618, 134/89 = 1.6189, and so on. This magic number is used to calculate Fibonacci ratios as shown in Table 10.2.

Table 10.2: Fibonacci Ratios

0/618	1	0.618	1.000	1.618	2.618
–	–	×	×	×	×
1.618	1.618	1.618	1.618	1.618	1.618
0.382	0.618	1.000	1.618	2.618	4.236

- Many Fibonacci advocate in the investment business use the first two ratios, 0.382 and 0.618, to "compute retracement levels of a previous move." For instance, a stock that falls from Rs. 50 to Rs. 35 (a 30% drop) will encounter resistance to further advances after it recoups 38.2% of its loss (that is, after it rises to Rs. 40.73).
- Some technical analysts keep close-tabs on resistance and support levels as predicted by the Fibonacci ratios. Even people who do not subscribe to this business know that many other people do, and that when stock prices approach important Fibonacci levels, unusual things can occur.
- A male bee (a drone) has only a mother; it comes from an unfertilized egg. A female bee (a queen) comes from a fertilized egg and has both a mother and a father. This means one drone has one parent, two grandparents, three great-grandparents, five great-great grandparents, and so on. The number of ancestors at each generation is the Fibonacci series.

10.4.2 Elliott Wave Principle

One theory that attempts to develop a rationale for a long-term pattern in the stock price movements is the Elliott Wave Principle (EWP), established in the 1930s by R.N. Eliott and later popularized by Hamilton Bolton. The EWP states that major moves take place in five successive steps resembling tidal waves. In a major bull market, the first move is upward, the second downward, the third upward, the fourth downward and the fifth and final phase upward. The waves have a reverse flow in a bear market.

10.4.3 Kondratev Wave Theory

Nikolay Kondratev was a Russian economist and statistician born in 1892. He helped develop the first Soviet Five-Year Plan. From 1920 to 1928 he was Director of the Study of Business Activity at the Timiriazev Agricultural Academy. While there, he devoted his attention to the study of Western capitalist economies. In the economies of Great Britain and the United States, he identified long-term business cycles with a period of 50-60 years. He became well-known after the US market crash of 1929, which Kondratev predicted would follow the US crash of 1870. His hypothesis of a long-term business cycle is called the Kondratev Wave Theory.

Note that the market crash for 1987 occurred 58 years after the crash of 1929, a period consistent with Kondratev's theory. Some modern economists believe that Kondratev's theory has merits. Many others believe that significant macro-economic changes, such as floating exchange rates, the elimination of the gold standard, and the reduction of barriers to free trade, make the decision cycle less predictable. Still, many market analysts consider Kondratev's work in their assessment of the stock market and its risks.

10.4.4 Chaos Theory

At recent finance conferences, a few researchers have presented papers on the chaos theory and its application to the stock market. In physics, chaos theory is growing field of study examining instances in which apparently random behaviour is, in fact, quite systematic or even deterministic. Scientists apply this theory to weather prediction, population growth estimates, and fisheries biology.

- As an example of the latter application, a given volume of ocean water, left free from human interference, will not necessarily reach an equilibrium population of the various species that inhibit it. As fishes grow, they consume the smaller fry (of their own or a different species) in increasing numbers. Fewer younger fishes are left to mature; this, coupled with the natural death of the older fish, eventually results in a sudden drastic reduction in fish population, causing dismay to fishermen and excitement in the local media. At the same time, it results in reduced predation and competition for food among the surviving fry, so the population begins to grow dramatically, and the cycle continues. Interactions between species add complexity to the process.
- Investment analysts have sought a pattern in stock market behaviour since the origin of the exchanges. Much remains unknown about how security prices are determined, and chaos theory may eventually provide some potential answers. If the apparent randomness of security price changes, can be shown to be non-random, much of the theory of finance would need revision.

10.5 NEUTRAL NETWORKS

A neutral network is a trading system in which a forecasting model is trained to find desired output from past trading data. By repeatedly cycling through the data, the neutral network eventually learns the pattern that produces the desired output. If the desired output remains elusive, more data is included until a pattern is found. Neutral networks may also include a feedback mechanism whereby experience gained from past errors.

- This topic is a hot one in the investment community. National conferences have been organized dealing exclusively with this topic, and the trade literature publishes many articles upon this. A problem with concept of a neutral network is that the stock market is seldom deterministic. Situations constantly change, and what may have been true a few years ago will not necessarily prevail tomorrow. Financial academics are especially leery of back-tests, or research that tests a hypotheses using past data. Mining the data will almost always result in some apparent cause and effect between past events and stock market performance. Research that tests a hypothesis using subsequent data is much more useful. An article in the popular press describes Wall Street's response to this criticism.
- One way to get around this hazard is to build something called a genetic algorithm into your neutral network. A sexy term that currently causes Wall Street rocket scientists to swoon, genetic algorithms enable neutral nets to adapt to the future buy spawning schools of baby nets, each of which is sent to swim against the changing flow of data, where only the fittest survive to take over the role of the mother.
- No matter what someone's field of study, they are interested in the search for a better mousetrap. Essentially, what all security analysts seek to do is to find improvements in their methodology for security selection.

10.6 TOOLS OF TECHNICAL ANALYSIS

The technician must (1) identify the trend, (2) recognize when one trend comes to an end and prices set off in the opposite direction. His central problem is to distinguish between reversals within a trend and real changes in the trend itself. This problem of sorting out price changes is critical, since prices do not change in a smooth, uninterrupted fashion.

The two variables concerning groups of stocks or individual stocks are:

1. Behaviour of prices, and
2. Volume of trading contributing to and influenced by changing prices.

The use of technical 'indicators' to measure the direction of overall market should precede any technical analysis of individual stocks, because of systematic influence of the general market on stock prices. In addition, some technicians feel that forecasting aggregates an more reliable, since individual errors can be filtered out.

First, we will examine the seminal theory from which much of the substances of technical analysis has been developed - the Dow Theory - after which the key indicators viz., price and volume relating to entire market and individual stock performance as shown in Table 10.3 will be examined.

Table 10.3: Tools of Technical Analysis

Category	Market Indicators	Market and individual stock indicators
Price indicators	Dow Theory – Breadth of market indicators o Plurality o Market breadth index o Advance –Declines o New highs and new lows o The most active list o Confidence indicator (Disparity index)	Line, bar and point and figure charges Moving averages. Relative strength
Volume indicators	New York and American Exchange volume Contrary Opinion Theories o Short selling o Odd Lot trading	Resistance and support charts Price volume bar charts
Other indicators	Mutual fund activity Credit balance theory	

10.7 DOW THEORY

The Dow Theory is one of the oldest and most famous technical tools. It was originated by Charles Dow, who founded the Dow Jones company and was the editor of The Wall Street Journal. Charles Dow passed away in 1902.

The Dow Theory was developed by W.P. Hamilton and Robert Rhea from the editorial written by Dow during 1900-02. Numerous writers have altered, extended and in some cases abridged the original Dow Theory. It is the basis for many other techniques used by technical analysts.

The Dow Theory is credited with having forecast the Great Crash of 1929. On October 23, 1929, The Wall Street Journal published a still famous editorial "A Twin in the Tide"

which correctly stated that the bull market was then over and a bear market had started. The horrendous market crash which followed the forecast drew much favourable attention to the Dow Theory. Greiner and Whitecombe assert that "The Dow Theory provides a time-tested method of reading the stock market barometer."

There are many versions of this theory, but essentially it consists of three types of market movements: the major market trend, which can often last a year or more; a secondary intermediate trend, which can move against the primary trend for one to several months; and minor movements lasting only for hours to a few days. The determination of the major market trend is the most important decision for the Dow believer.

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

These movements are called:

- Daily fluctuations (minor trends)
- Secondary movements (trends), and
- Primary trends

The primary trends are the long range cycle that carries the entire market up or down (bull or bear markets). The secondary trend acts as a restraining force on the primary trend. It ends to correct deviations from its general boundaries. The minor trends have little analytical value, because of their short duration and variations in amplitude. Figure 10.1 represents the Dow Theory.

The Dow Theory is built upon the assertion that measures of stock prices tend to move together. It employs two of the Dow Jones' averages:

(i) Dow-Jones Transportation Average (DJTA)

(ii) Dow-Jones Transportation Average (DJTA)

Bear market - If both the averages are rising

Bear market - If both the averages are falling

Uncertain - If one is rising and other is falling

Although Charles Dow believed in fundamental analysis, the Dow Theory has evolved into a primarily technical approach to the stock market. It asserts that stock prices demonstrate patterns over four to five years and these patterns are mirrored by indices of stock prices. The Dow Theory employs two of the Dow Jones' averages, the industrial average and the transportation average. The utility average is generally ignored.

The Dow Theory is built upon the assertion that measures of stock prices tend to move together. If the Dow Jones industrial average is rising, then the transportation average should also be rising. Such simultaneously price movements suggest a strong bull market. Conversely, a decline in both the industrial and transportation averages, both move in opposite directions; the market is uncertain as to the direction of future stock prices.

If one of the averages starts to decline after a period of rising stock prices, then the two are at odds. For example, the industrial average may be rising while the transportation average is falling. This suggests that the industries may not continue to rise but may soon begin to fall. Hence, the market investor will use this signal to sell securities and convert to cash.

The converse occurs when after a period of falling security prices, one of the averages starts to rise while the other continues to fall. According to the Dow Theory, this divergence suggests that this phase is over and that security prices in general will soon start to rise. The astute investor will then purchase securities in anticipation of the price increase.

These signals are illustrated in Figure 10.1. Part A that illustrates a buy signal. Both the industrial and transportation average have been declining when the industrial starts to rise. Although the transportation index is still declining, the increase in industrial average suggests that the declining market is over. This change is then confirmed when the transportation average also starts to rise.

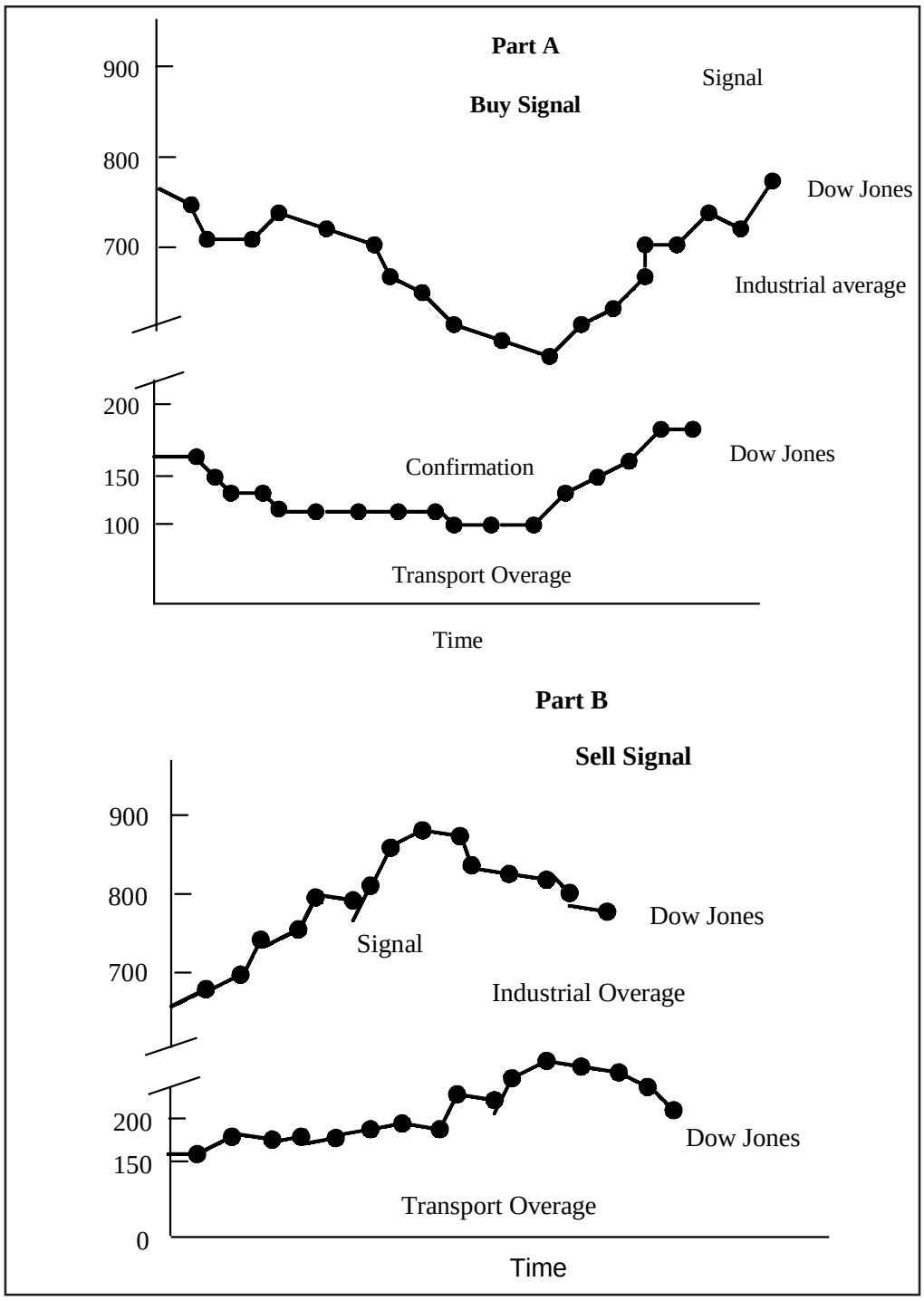


Figure 10.1: The Dow Jones Averages

Check Your Progress 2

1. A _____ network is a trading system in which a forecasting model is trained to find desired output from past trading data.
2. _____ analysis is based on inadequate income statements and highly subjective nature of earnings multipliers.
3. Technically oriented investors start by checking the market action of the _____ .
4. Technical analysts know that there is no real value to any stock and that price reflects supply and _____ .

10.8 CRITICISM OF DOW THEORY

Several criticisms are levelled against the Dow Theory.

1. It is not a theory but an interpretation of known data. A theory should be able to explain why a phenomenon occurs. No attempt was made by Dow or his followers to explain why the two averages should be able to forecast future stock prices.
2. It is not acceptable in its forecast. There was considerable lag between the actual turning points and those indicated by the forecast.
3. It has poor predictive power. According to Rosenberg, the Dow Theory could not forecast the bull market which had preceded the 1929 crash. It gave bearish indication in early 1926. The 31/2 years which followed the forecast of Hamilton's editorials for the 26-year period, from 1904 to 1929. Of the 90 recommendations Hamilton made for a change in attitude towards the market 55% were bullish, 18% bearish and 29% doubtful) only 45 were correct. Such a result an investor may get by flipping a coin.

10.8.1 Price Indicators of Market

The different price indicators which measure market movement are briefly explained below:

(A) ***Breadth of Market:*** Breadth-of-market indicators are used to determine what the main body of stocks is doing. It is computed by comparing market advances or declines. The technician is interested in change in breadth than in absolute level. Several methods are in vogue for measuring the breadth of the market. The most common ones are explained here.

The breadth-of-market statistics are obtained by using the data of stock advances and declines. The data of advances and declines are published daily in most financial and national newspapers. Three simple methods are presented here:

(i) *Plurality or Net Advances and Declines:* To get net advances or declines, subtract the number of issues whose prices declined from the number of issues whose prices advanced each day. Obtain cumulative index by adding daily net advances and declines.

When the index +ve, market is bullish

When the index –ve, market is bearish

(ii) *Advance: Decline ratio:* a simple variant to the above method is computing a ratio.

Advance - Decline ratio = no. of advances/no. of declines.

When the ratio is > 1, market is bullish

When the ratio is < 1, market is bearish

(iii) *Market breadth index:* This is another way of computing the advance and declines

$$\text{Market breadth index} = \frac{2(\text{advance} - \text{declines})}{\text{Unchanged}}$$

The figure of each week is added to the next week. The data are then plotted to establish the patterns of movement of advances and declines.

If both the stock index and market breadth index increase, the market is bullish.

When the stock index increases but breadth index does not, the market is bearish.

Iteratively, it can be emphasized that the technician is more interested in change in breadth. Further indexes are used along with stock market index. Normally, breadth and stock market index will move in unison. The key signals occur where there is divergence between the two. When they diverge, the advance decline line shows the direction of the market.

(B) ***Price Indicators of Individual Stock:*** After the technical analysis has forecast the probable future performance of the market, he has focussed his attention on individual stock performance. The popular method of analyzing price changes of individual stocks are charts and moving averages.

10.9 TYPES OF TREND

There are three types of trend:

- Uptrends
- Downtrends
- Sideways/Horizontal Trends

As the names imply, when each successive peak and trough is higher, it's referred to as an upward trend. If the peaks and troughs are getting lower, it's a downtrend. When there is little movement up or down in the peaks and troughs, it's a sideways or horizontal trend. If you want to get really technical, you might even say that a sideways trend is actually not a trend on its own, but a lack of a well-defined trend in either direction. In any case, the market can really only trend in these three ways: up, down or nowhere.

10.9.1 Trend Lengths

Along with these three trend directions, there are three trend classifications. A trend of any direction can be classified as a long-term trend, intermediate trend or a short-term trend. In terms of the stock market, a major trend is generally categorized as one lasting longer than a year. An intermediate trend is considered to last between one and three

months and a near-term trend is anything less than a month. A long-term trend is composed of several intermediate trends, which often move against the direction of the major trend. If the major trend is upward and there is a downward correction in price movement followed by a continuation of the uptrend, the correction is considered to be an intermediate trend. The short-term trends are components of both major and intermediate trends. Take a look a Figure 10.2 to get a sense of how these three trend lengths might look.

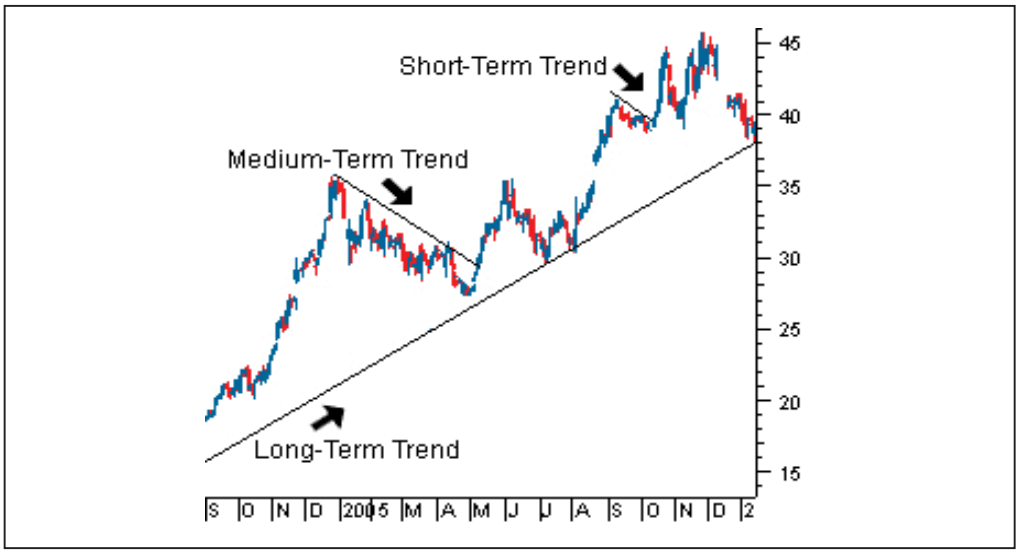


Figure 10.2: Trend Lengths

When analyzing trends, it is important that the chart is constructed to best reflect the type of trend being analyzed. To help identify long-term trends, weekly charts or daily charts spanning a five-year period are used by chartists to get a better idea of the long-term trend. Daily data charts are best used when analyzing both intermediate and short-term trends. It is also important to remember that the longer the trend, the more important it is; for example, a one-month trend is not as significant as a five-year trend.

10.9.2 Trendlines

A trendline is a simple charting technique that adds a line to a chart to represent the trend in the market or a stock. Drawing a trendline is as simple as drawing a straight line that follows a general trend. These lines are used to clearly show the trend and are also used in the identification of trend reversals.

10.9.3 Volume and Chart Patterns

The other use of volume is to confirm chart patterns. Patterns such as head and shoulders, triangles, flags and other price patterns can be confirmed with volume, a process which we'll describe in more detail later in this tutorial. In most chart patterns, there are several pivotal points that are vital to what the chart is able to convey to chartists. Basically, if the volume is not there to confirm the pivotal moments of a chart pattern, the quality of the signal formed by the pattern is weakened.

10.9.4 Volume Precedes Price

Another important idea in technical analysis is that price is preceded by volume. Volume is closely monitored by technicians and chartists to form ideas on upcoming trend reversals. If volume is starting to decrease in an uptrend, it is usually a sign that the upward run is about to end.

Now that we have a better understanding of some of the important factors of technical analysis, we can move on to charts, which help to identify trading opportunities in prices movements.

10.10 TECHNICAL ANALYSIS: CHART TYPES

One school of though led by William L. Jiler developed a comprehensive technique called "Chart Reading". Charts provide visual assistance detecting the emerging and changing patterns and changing patterns of price behaviour. Technical analysts use three basic types of charts.

- Line Charts
- Bar Charts
- Candlestick Charts
- Point and Figure Charts

10.10.1 Line Chart

The most basic of the four charts is the line chart because it represents only the closing prices over a set period of time. The line is formed by connecting the closing prices over the time frame. Line charts do not provide visual information of the trading range for the individual points such as the high, low and opening prices. However, the closing price is often considered to be the most important price in stock data compared to the high and low for the day and this is why it is the only value used in line charts.

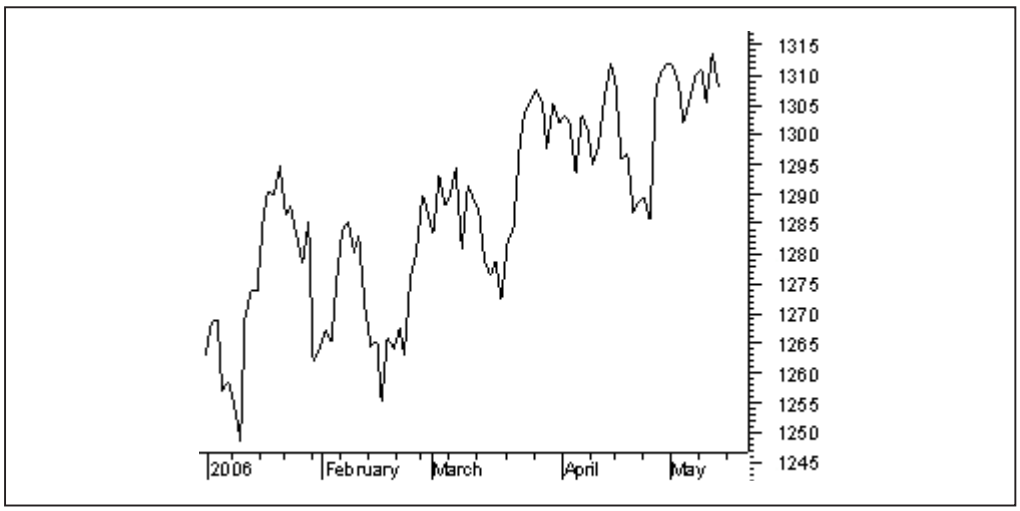


Figure 10.3: A Line Chart

10.10.2 Bar Charts

Most investors interested in charting use bar charts - primarily because they have meanings familiar to a technical analyst, but also because these charts are easy to draw. The procedure for preparing a vertical line or bar chart is simple. Suppose an investor is to draw on graph on logarithmic paper a series of vertical lines, each line representing the price movements for a time period - a day, a week, or even a year. The vertical dimensions of the line represent price; the horizontal dimension indicates the time involved by the chart as a whole. In a daily chart, for example, each vertical line represents the range of each day's price activity, and the chart as a whole may extend for a month.

For this, extend the line on the graph paper from the highest transaction of each day drawn to the lowest and make a cross mark to indicate the closing price.

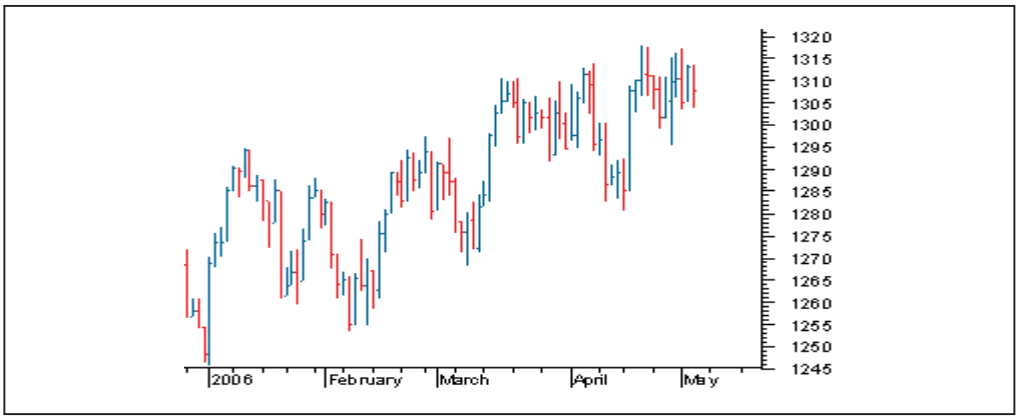


Figure 10.4: A Bar Chart

10.10.3 Candlestick Charts

The Candlestick chart is similar to a bar chart, but it differs in the way that it is visually constructed. Similar to the bar chart, the candlestick also has a thin vertical line showing the period's trading range. The difference comes in the formation of a wide bar on the vertical line, which illustrates the difference between the open and close. And, like bar charts, candlesticks also rely heavily on the use of colours to explain what has happened during the trading period. A major problem with the candlestick colour configuration, however, is that different sites use different standards; therefore, it is important to understand the candlestick configuration used at the chart site you are working with. There are two colour constructs for days up and one for days that the price falls. When the price of the stock is up and closes above the opening trade, the candlestick will usually be white or clear. If the stock has traded down for the period, then the candlestick will usually be red or black, depending on the site. If the stock's price has closed above the previous day's close but below the day's open, the candlestick will be black or filled with the colour that is used to indicate an up day.

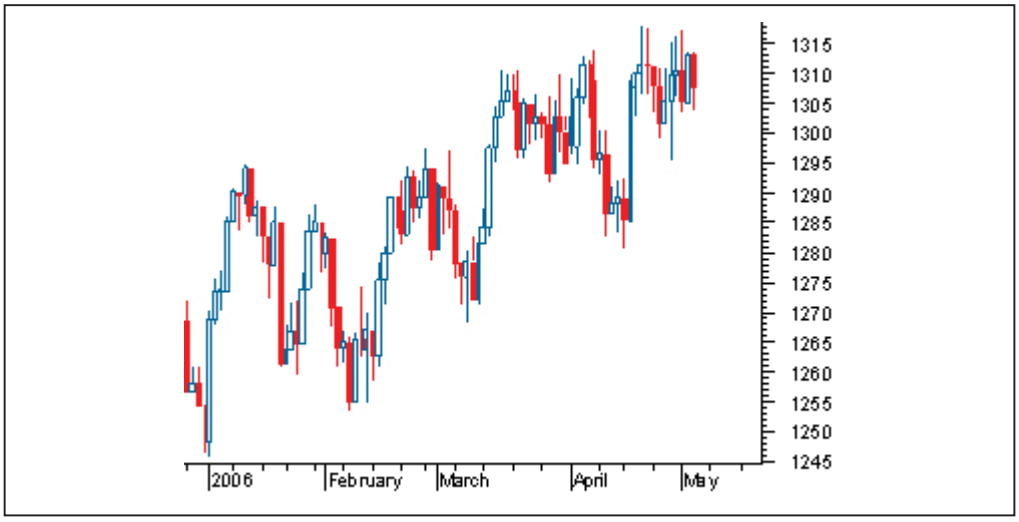


Figure 10.5: A Candlestick Chart

10.10.4 Point-and-Figure Chart

Bar chartists count on discovering certain buying and selling forces in the market, on the basis of which they predict future price trends. These forces consist of three factors - time, volume and price. Members of another school, known as the point-and-figure chartists, question the usefulness of the first two factors. They argue that the way to predict future price fluctuations is to analyze price changes only. Consequently, they assert, no volume action need be recorded, and the time dimension (day, week, or month) should also be ignored. If only significant price changes are important, then one need only capture the significant (say, one point or more, ignoring all fractions) price changes in a stock, no matter how long it takes for the stock to register this change.

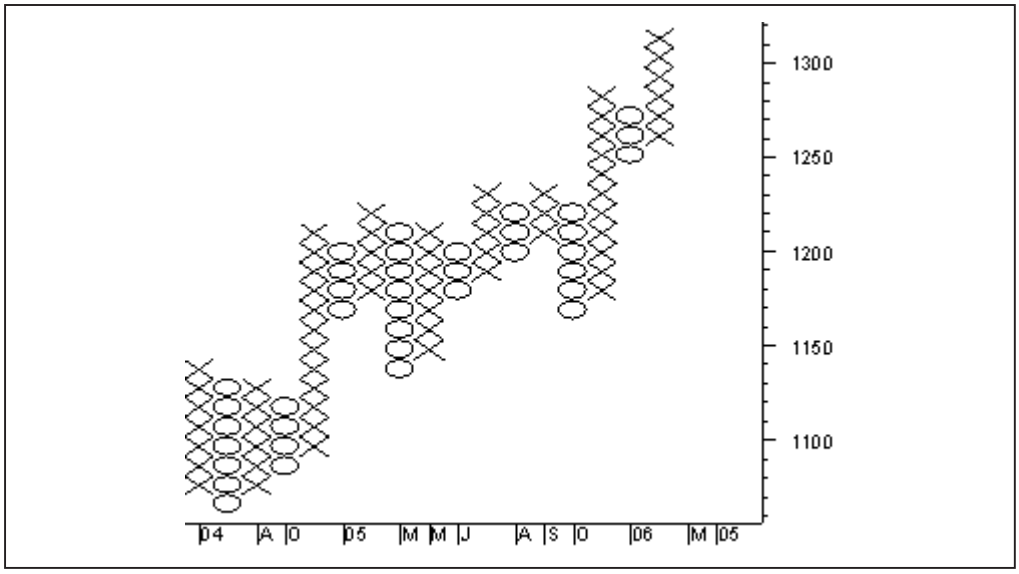


Figure 10.6: A Point and Figure Chart

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

10.10.5 Technical Analysis: Chart Patterns

A chart pattern is a distinct formation on a stock chart that creates a trading signal, or a sign of future price movements. Chartists use these patterns to identify current trends and trend reversals and to trigger buy and sell signals.

Head and Shoulders

This is one of the most popular and reliable chart patterns in technical analysis. Head and shoulders are a reversal chart pattern that when formed, signals that the security is likely to move against the previous trend. As you can see in Figure 10.7, there are two versions of the head and shoulders chart pattern. Head and shoulders top (shown on the left) is a chart pattern that is formed at the high of an upward movement and signals that the upward trend is about to end. Head and shoulders bottom, also known as inverse head and shoulders.

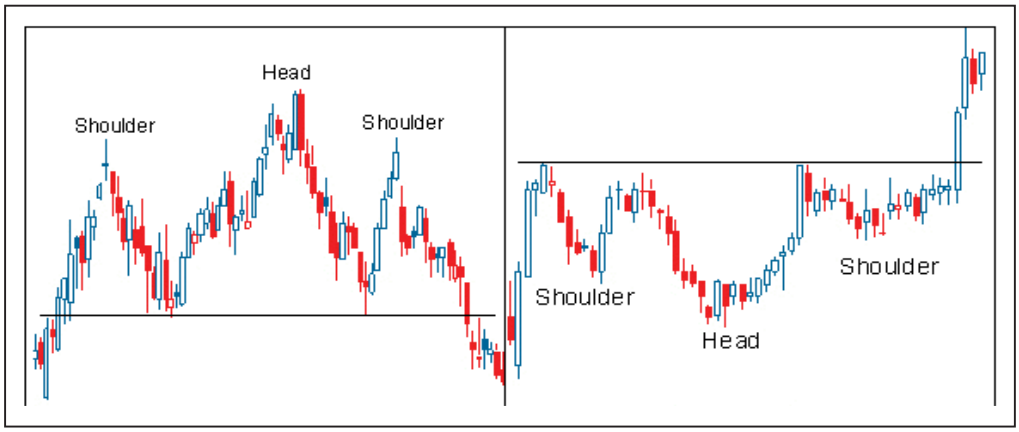


Figure 10.7: Head and Shoulders

Head and shoulders top is shown on the left. Head and shoulders bottom, or inverse head and shoulders, are on the right.

Cup and Handle

A cup and handle chart is a bullish continuation pattern in which the upward trend has paused but will continue in an upward direction once the pattern is confirmed.

As you can see from the below, this price pattern forms what looks like a cup, which is preceded by an upward trend. The handle follows the cup formation and is formed by a generally downward/sideways movement in the security's price. Once the price movement pushes above the resistance lines formed in the handle, the upward trend can continue. There is a wide-ranging time frame for this type of pattern, with the span ranging from several months to more than a year.

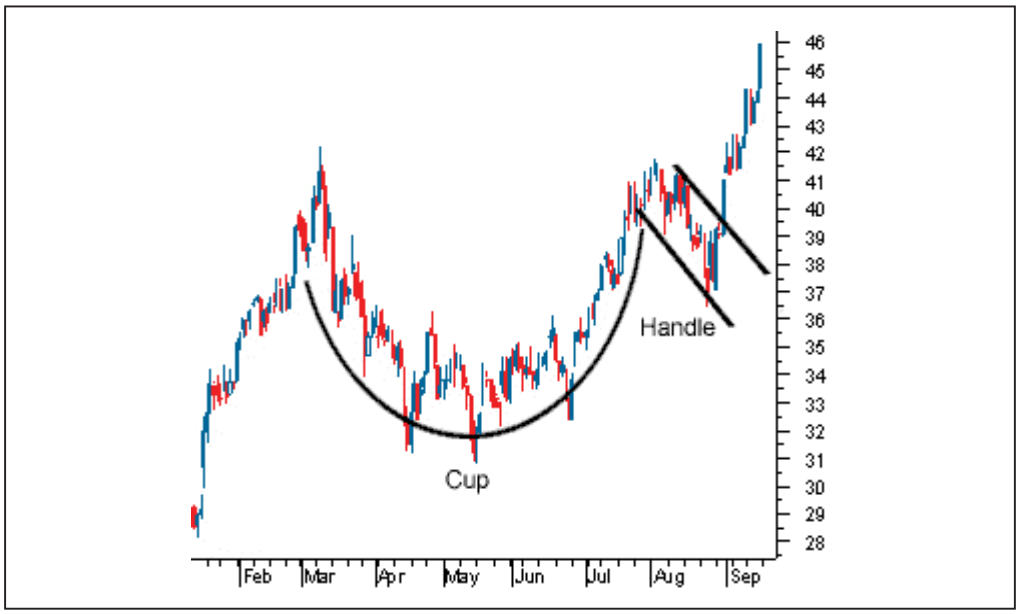


Figure 10.8: Cup and Handle Chart

Double Tops and Bottoms

This chart pattern is another well-known pattern that signals a trend reversal - it is considered to be one of the most reliable and is commonly used. These patterns are formed after a sustained trend and signal to chartists that the trend is about to reverse.

The pattern is created when a price movement tests or supports resistance levels twice and is unable to break through. This pattern is often used to signal intermediate and long-term trend reversals.

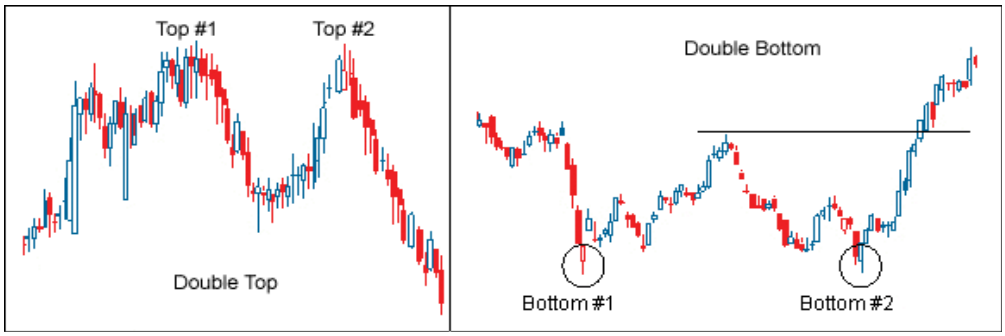


Figure 10.9: Double Tops and Bottoms

A double top pattern is shown on the left, while a double bottom pattern is shown on the right.

Flag and Pennant

These two short-term chart patterns are continuation patterns that are formed when there is a sharp price movement followed by a generally sideways price movement. This pattern is then completed upon another sharp price movement in the same direction as the move that started the trend. The patterns are generally thought to last from one to three weeks.

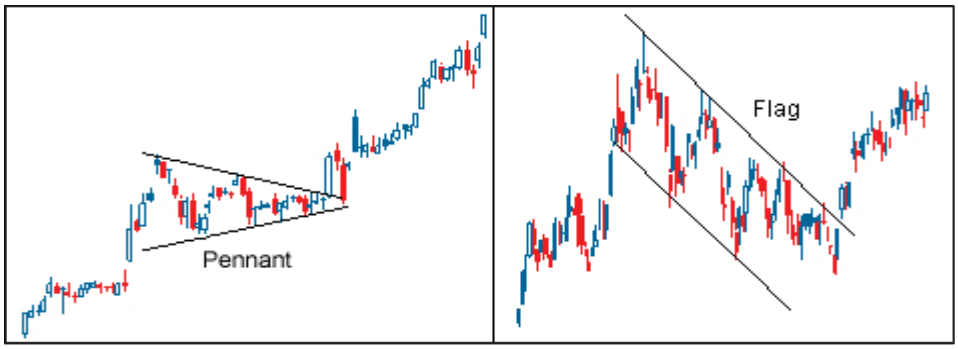


Figure 10.10: Flag and Pennant

As you can see in the above figure, there is little difference between a pennant and a flag. The main difference between these price movements can be seen in the middle section of the chart pattern. In a pennant, the middle section is characterized by converging trendlines, much like what is seen in a symmetrical triangle. The middle section on the flag pattern, on the other hand, shows a channel pattern, with no convergence between the trendlines. In both cases, the trend is expected to continue when the price moves above the upper trendline.

Triangles

Triangles are some of the most well-known chart patterns used in technical analysis. The three types of triangles, which vary in construct and implication, are the symmetrical triangle, ascending and descending triangle. These chart patterns are considered to last anywhere from a couple of weeks to several months.

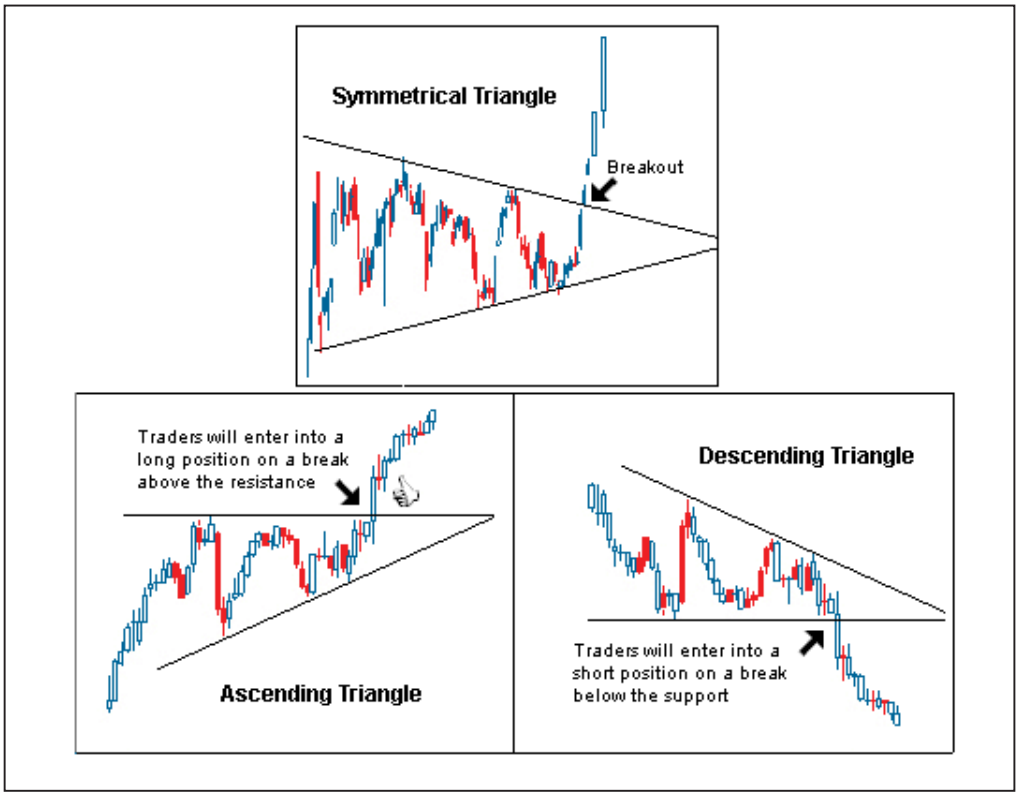


Figure 10.11: Triangles

The symmetrical triangle is a pattern in which two trendlines converge toward each other. This pattern is neutral in that a breakout to the upside or downside is a confirmation of a trend in that direction. In an ascending triangle, the upper trendline is flat, while the bottom trendline is upward sloping. This is generally thought of as a bullish pattern in which chartists look for an upside breakout. In a descending triangle, the lower trendline is flat and the upper trendline is descending. This is generally seen as a bearish pattern where chartists look for a downside breakout.

Wedge

The wedge chart pattern can be either a continuation or reversal pattern. It is similar to a symmetrical triangle except that the wedge pattern slants in an upward or downward direction, while the symmetrical triangle generally shows a sideways movement. The other difference is that wedges tend to form over longer periods, usually between three and six months.

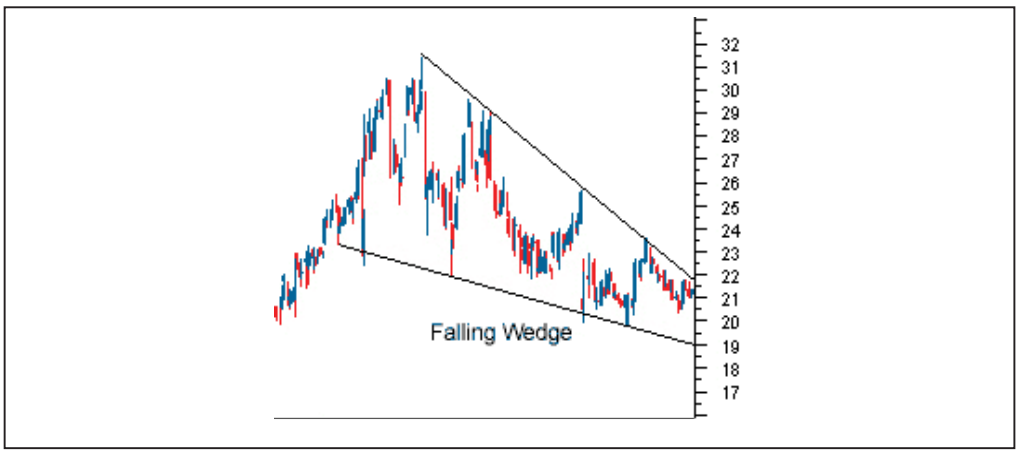


Figure 10.12: Wedge

Rounding Bottom

A rounding bottom, also referred to as a saucer bottom, is a long-term reversal pattern that signals a shift from a downward trend to an upward trend. This pattern is traditionally thought to last anywhere from several months to several years.

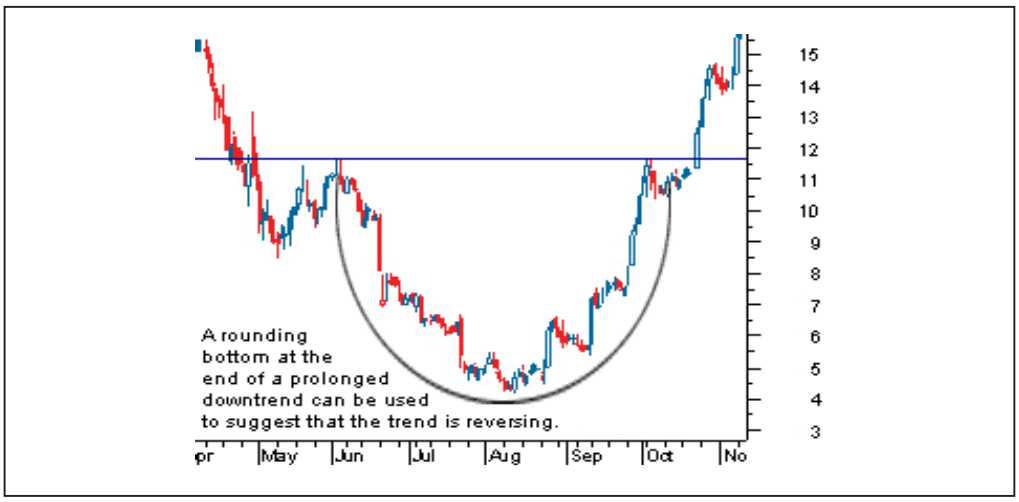


Figure 10.13: Rounding Bottom

A rounding bottom chart pattern looks similar to a cup and handle pattern but without the handle. The long-term nature of this pattern and the lack of a confirmation trigger, such as the handle in the cup and handle, make it a difficult pattern to trade.

Gaps

A gap in a chart is an empty space between a trading period and the following trading period. This occurs when there is a large difference in prices between two sequential trading periods.

Triple Tops and Bottoms

Triple tops and triple bottoms are another type of reversal chart pattern in chart analysis. These are not as prevalent in charts as head and shoulders and double tops and bottoms, but they act in a similar fashion. These two chart patterns are formed when the price movement tests a level of support or resistance three times and is unable to break through; this signals a reversal of the prior trend.

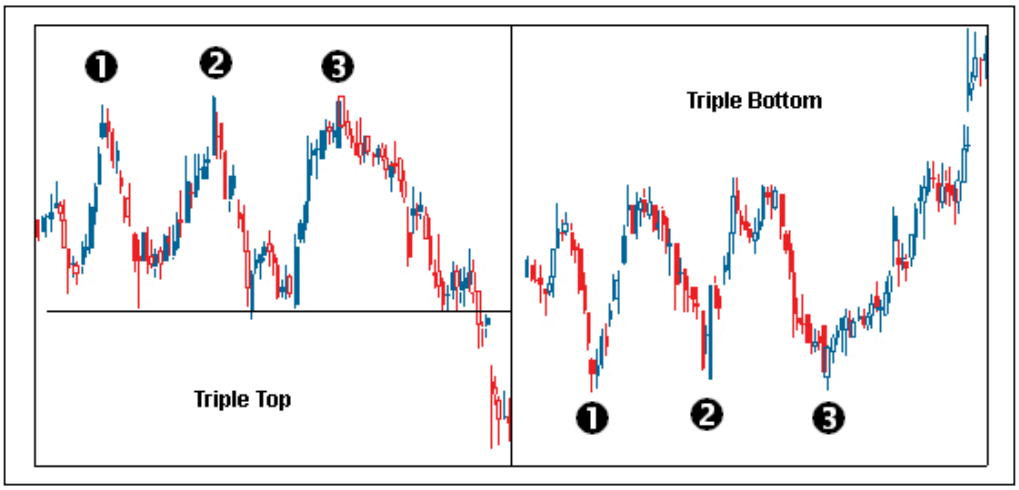


Figure 10.14: Triple Tops and Bottoms

Confusion can form with triple tops and bottoms during the formation of the pattern because they can look similar to other chart patterns. After the first two support/resistance tests are formed in the price movement, the pattern will look like a double top or bottom, which could lead a chartist to enter a reversal position too soon.

10.11 TECHNICAL ANALYSIS: MOVING AVERAGES

Most chart patterns show a lot of variation in price movement. This can make it difficult for traders to get an idea of a security's overall trend. One simple method traders use to combat this is to apply moving averages.

A moving average is the average price of a security over a set amount of time. By plotting a security's average price, the price movement is smoothed out. Once the day-to-day fluctuations are removed, traders are better able to identify the true trend and increase the probability that it will work in their favour.

10.11.1 Types of Moving Averages

Simple Moving Average (SMA)

This is the most common method used to calculate the moving average of prices. It simply takes the sum of all of the past closing prices over the time period and divides the result by the number of prices used in the calculation.

For an instance, in a 10-day moving average, the last 10 closing prices are added together and then divided by 10. As you can see in Figure 10.15, a trader is able to make the average less responsive to changing prices by increasing the number of periods used in the calculation. Increasing the number of time periods in the calculation is one of the best ways to gauge the strength of the long-term trend and the likelihood that it will reverse.

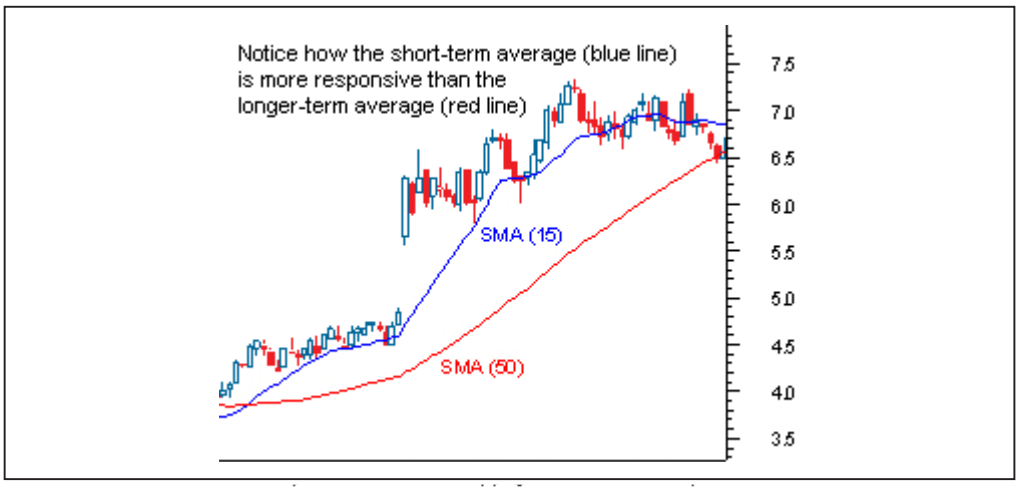


Figure 10.15: Simple Moving Average

10.12 EXPONENTIAL MOVING AVERAGE (EMA)

This moving average calculation uses a smoothing factor to place a higher weight on recent data points and is regarded as much more efficient than the linear weighted average. Having an understanding of the calculation is not generally required for most traders because most charting packages do the calculation for you. The most important thing to remember about the exponential moving average is that it is more responsive to

new information relative to the simple moving average. This responsiveness is one of the key factors of why this is the moving average of choice among many technical traders.

10.12.1 Linear Weighted Average

This moving average indicator is the least common out of the three and is used to address the problem of the equal weighting. The linear weighted moving average is calculated by taking the sum of all the closing prices over a certain time period and multiplying them by the position of the data point and then dividing by the sum of the number of periods.

For instance, in a five-day linear weighted average, today's closing price is multiplied by five, yesterday's by four and so on, until the first day in the period range is reached. These numbers are then added together and divided by the sum of the multipliers.

10.12.2 Moving Average Convergence Divergence (MACD)

The Moving Average Convergence Divergence (MACD) is one of the most well-known and used indicators in technical analysis. This indicator is comprised of two exponential moving averages, which help to measure momentum in the security. The MACD is simply the difference between these two moving averages plotted against a centreline. The centreline is the point at which the two moving averages are equal. Along with the MACD and the centreline, an exponential moving average of the MACD itself is plotted on the chart. The idea behind this momentum indicator is to measure short-term momentum compared to the longer term momentum to help signal the current direction of momentum.

MACD = Shorter-term moving average – Longer-term moving average

When the MACD is positive, it signals that the shorter-term moving average is above the longer-term moving average and suggests upward momentum. The opposite holds true when the MACD is negative - this signals that the shorter-term is below the longer and suggest downward momentum. When the MACD line crosses over the centreline, it signals a crossing in the moving averages. The most common moving average values used in the calculation are the 26-day and 12-day exponential moving averages. The signal line is commonly created by using a nine-day exponential moving average of the MACD values. These values can be adjusted to meet the needs of the technician and the security. For more volatile securities, shorter-term averages are used, while less volatile securities should have longer averages.

Another aspect to the MACD indicator that is often found on charts is the MACD histogram. The histogram is plotted on the centreline and represented by bars. Each bar is the difference between the MACD and the signal line or, in most cases, the nine-day exponential moving average. The higher the bars are in either direction, the more momentum behind the direction in which the bars point.

As you can see in Figure 10.16, one of the most common buy signals is generated when the MACD crosses above the signal line (blue dotted line), while sell signals often occur when the MACD crosses below the signal.

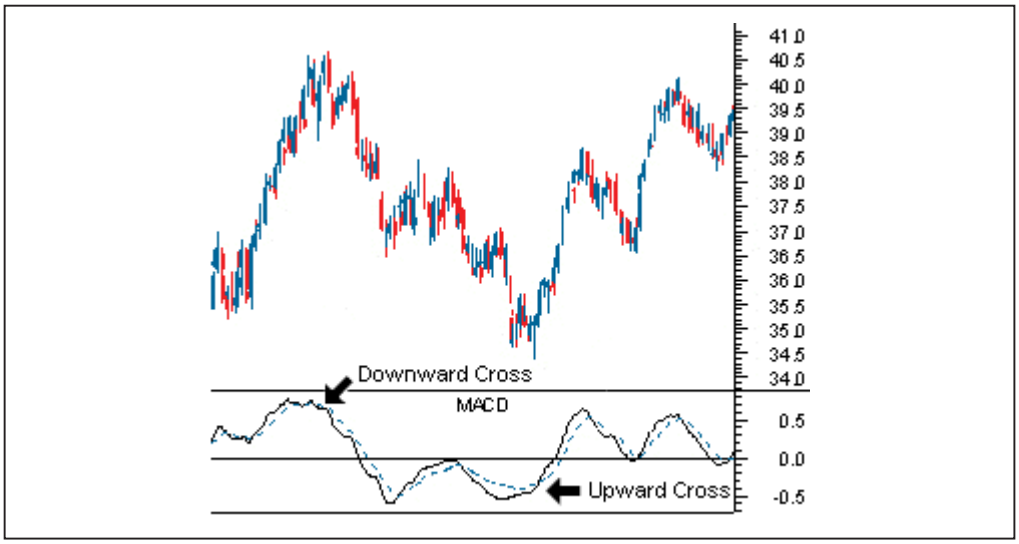


Figure 10.16: Moving Average Convergence Divergence

10.13 MAJOR USES OF MOVING AVERAGES

- Moving averages are used to identify current trends and trend reversals as well as to set up support and resistance levels.
- Moving averages can be used to quickly identify whether a security is moving in an uptrend or a downtrend depending on the direction of the moving average.

10.14 TECHNICAL ANALYSIS: INDICATORS AND OSCILLATORS

Indicators are calculations based on the price and the volume of a security that measure such things as money flow, trends, volatility and momentum. Indicators are used as a secondary measure to the actual price movements and add additional information to the analysis of securities. Indicators are used in two main ways: to confirm price movement and the quality of chart patterns, and to form buy and sell signals.

There are two main types of indicators: leading and lagging. A leading indicator precedes price movements, giving them a predictive quality, while a lagging indicator is a confirmation tool because it follows price movement. A leading indicator is thought to be the strongest during periods of sideways or non-trending trading ranges, while the lagging indicators are still useful during trending periods.

10.14.1 Aroon Oscillator

An expansion of the Aroon is the Aroon oscillator, which simply plots the difference between the Aroon up and down lines by subtracting the two lines. This line is then plotted between a range of -100 and 100. The centreline at zero in the oscillator is considered to be a major signal line determining the trend. The higher the value of the oscillator from the centreline point, the more upward strength there is in the security; the lower the oscillator's value is from the centreline, the more downward the pressure.

10.14.2 Relative Strength Index

The Relative Strength Index (RSI) is another one of the most used and well-known momentum indicators in technical analysis. RSI helps to signal overbought and oversold

conditions in a security. The indicator is plotted in a range between zero and 100. A reading above 70 is used to suggest that a security is overbought, while a reading below 30 is used to suggest that it is oversold. This indicator helps traders to identify whether a security's price has been unreasonably pushed to current levels and whether a reversal may be on the way.

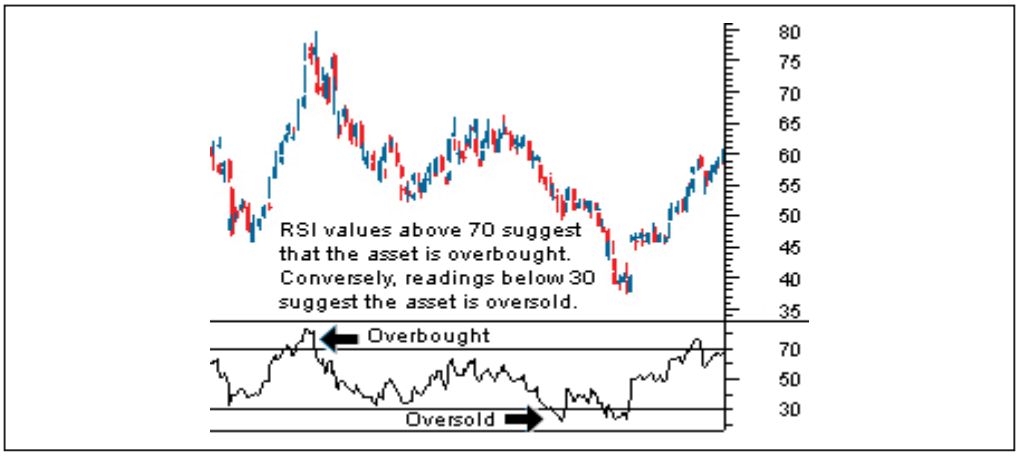


Figure 10.17: Relative Strength Index

10.15 LIMITATIONS OF CHARTS

The technical analyst may have charts of all the principal shares in the market. But all that is necessary is a proper interpretation of charts. Interpretation of charts is very much like a personal offer. In a way, it is like an abstract art. Take an abstract painting and shown it to ten people and you will get at least eight different interpretations of what is seen. Take one set for chart figures and show it to ten chartists and you are liable to get almost as many interpretations of which way the stock is going.

The trouble with most chart patterns is that they cause their followers to change their opinion so frequently. Most chart service change like the wind. One day they put out a strong buy signal, two weeks later, they see a change in the pattern and tell their clients to sell, then two weeks later, they tell them to buy again. The result is that these patterns force their followers in and out of the market time and time again. Though this is great for brokers' commission, but not so great for the investor.

Another disadvantage - and a great one - which exists in charting is that decisions are almost always made on the basis of the chart alone. Most buyers under this method have no idea why they are buying a company's stock. They rely alone on a stock's action, assuming that the people who have caused or are currently causing the action really know something about the company. This is generally negative thinking - simply because, as more and more chartists are attracted to a stock, there are simply more and more owners who know little or nothing about the company.

10.15.1 Technical Indicators

Most of the technical indicators make sense when examined individually but when one examines many technical indicators simultaneously, the interpretation of their collective meaning is often contradictory and confusing. Once technical analyst issued the following report:

The breadth of the market remains pretty bearish, but the odd-lot index is still in balance and is more bullish than bearish. While the short interest is not bearish, brokers loans are at a dangerously high level. Business indices are beginning to turn sharply upward and

most psychological indicators are generally uptrend. The index of 20 low-priced stocks remains in a general upward trend, but the confidence index still is in a long-term downtrend. The Canadian gold price index is still in a downtrend, which normally implies a higher stock market ahead. Professional and public opinion remains cautiously optimistic, which is also an indication of a higher stock market, but on a decline below 800, the Dow Jones Industrial averages would emit a definite sell signal.

The author of this technical report presented numerous technical indicators that collectively add up to organized confusion. Some of the major technical indicators are described in the following sections. Each indicator makes sense by itself, but interpreting all of them at the same time may yield the same type of confusion found in the passage quoted above.

Check Your Progress 3

Fill in the blanks:

1. The _____ analyst may have charts of all the principal shares in the market.
2. The Moving Average Convergence Divergence (MACD) is one of the most well-known and used indicators in _____ analysis.
3. A gap is an empty space between a trading period and the _____ trading period.
4. A cup and _____ chart is a bullish continuation pattern in which the upward trend has paused but will continue in an upward direction once the pattern is confirmed.

10.16 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 150% is considered bullish, and a ratio below 100% is considered bearish.

The logic behind this ratio is that speculators and other investor sell stocks at high price 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 cover (buying) is yet to come; whereas an established slight short interest is considered a sign of weakness (more short sales are to come).

10.16.1 Confidence Index

It is the ratio of a group of lower-grade bonds to a group of higher-grade bonds. 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.

10.16.2 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.

10.16.3 Advance-Decline Ratio

The index-relating advance to decline is called the advance decline ratio. When advances persistently outnumber declines, the ratio increases. A bullish condition is said to exist, and vice versa. Thus, an advance decline ratio tries to capture the market's underlying strength by taking into account the number of advancing and declining issues.

10.16.4 Market Breadth Index

The 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[(9600-200)/200]. These data are then plotted to establish the pattern of movement of advance 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 the market breadth index increase, the market is bullish; when the stock index increase but the breadth index does not, the market is bearish.

10.16.5 Odd-Lot Ratio

Odd-lot transactions are measured by odd-lot changes in 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 need to be the 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.

10.16.6 Insider Transactions

The hypothesis that insider activity may be indicative of future stock prices has received some support in 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. Stockholders 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.

Check Your Progress 4

1. Technical analysis is a method of evaluating securities by analyzing the statistics generated by market activity, such as past prices and volume.
2. Technical analysis and fundamental analysis are the two main schools of thought in the financial markets.
3. Technical analyst does not care whether a stock is undervalued- the only thing that matters is a security's past trading data.
4. In technical analysis, price movements are not believed to follow trends.
5. The Dow Theory was developed by W.P. Hamilton and Robert Rhea.

10.17 CRITICISMS OF TECHNICAL ANALYSIS

Despite the assertions of technical analysis, technical analysis is not a sure-fire method. The various limitations of technical were pointed but by its critics are as given under:

(i) ***Difficult in interpretation:*** Technical analysis is not as simple as it appears to be. While the charts are fascinating to look at, interpreting them correctly is very difficult. It is always easy to interpret the charts long after the actual point of time. As such, fundamentals argue that charting techniques are no different from palmistry.

(ii) ***Frequent changes:*** Technical analysis is not as simple as it appears to be. While the charts are fascinating to look at, interpreting them correctly is very difficult. It is always easy to interpret the charts long after the actual point of time. As such, fundamentalists argue that charting techniques are no different from palmistry.

(iii) ***Frequent changes:*** With changes in market, chart patterns keep on changing. Accordingly, technical analysts change their opinions about a particular investment very frequently. One day they put up a buy signal. A couple of weeks later, they see a change pattern and put up a sell signal.

(iv) ***Unreliable changes:*** Changes in market behaviour observed and studied by technical analyst may not always be reliable owing to ignorance or intelligence or manipulative tendencies of some participants.

A false piece of information or wrong judgment may result in trade at a lower than market price. If the technicians fail to wait for confirmation, they incur losses.

With actively traded stocks, the prices may be the result of battle of wits and not the intrinsic worth. In the game of making money, two knowledgeable persons may engage in buying and selling every one hoping to make money at the expense of the others. In this game, many may lose, if they are not cleverer and luckier.

The market prices of shares are sometimes the results of certain unhealthy practices like cornering and rigging of certain shares by some stock market operators.

(v) ***Unpredictable changes:*** Technicians expect changes to take place in a known and gradual fashion.

(a) *History does not repeat itself:* One of the major limitations of technical analysis is that the entire data is based on the past. It is presumed that future resembles the past. There is no guarantee that history repeats itself. Systems become more sophisticated and people become more mature, effecting a

different pattern of behaviour. Further, unexpected events like a change of the government, or a violent agitation or a natural calamity may produce a different pattern of behaviour. This contingency is not taken into account in making projections.

(b) *No gradual shifts:* It is presumed that shifts in supply and demand occur gradually rather than instantaneously. Since these shifts are expected to continue as the price gradually reacts to new or other factors the price change pattern is extrapolated to predict further price changes. However, economists asserted that this is a wrong proposition. Their random walk theory has shaken the conceptual foundation of technical analysis. They believe that securities price changes are a series of random numbers, which occur in reaction to the random arrival of news.

(vi) ***Less precise tools:*** The greatest limitation of technical analysis is perhaps the mechanical precision it gives to the entire exercise of investment in equity shares. However, the tools are subject to errors, breakdown and misinterpretation.

(vii) ***False signals can occur:*** Technical analysis is a signalling device. Like a thermometer, it may give a false indication when there is no alarm, but when there is cause for alarm, the signal will almost invariably be flashed.

(viii) ***No one indicator is infallible:*** Technical analysis includes many approaches, most requiring a good deal of subjective judgment in applications. A number of tests have been conducted to obtain statistically reliable estimates of the worth of various technical trading strategies. The results have been inconclusive because of different findings of different researchers using different procedures and different samples.

The hub of the problem as it applies to indicators is that while they may be crystal clear in definition and theory, they often break down in practice. Each one of them has at some particular time been ineffective, out-weighed by a number of other indicators.

Because of this, technicians seldom rely upon a single indicator; they place reliance upon reinforcement provided by groups of indicators.

In conclusion, it can be said that technical analysis is essentially an imperfect science and an art. It helps those who have good skills, of course, not always.

10.17.1 Future of Technical Analysis

Although there is much in finance that we do not completely understand, technical analysis has been around for more than 100 years, and it is not likely to disappear from the investment scene anytime soon. Improved quantitative methods coupled with improved behavioural research will continue to generate ideas for analysts to test. The well-known financial behaviourist Warner De Bont, for instance, recently reported substantial evidence that the public expects the continuation of past price trends. That is, they are bullish in bull markets and pessimistic in bear markets.

Perhaps within a decade or more, the fragmentation of technical analysis into such a wide-ranging array of increasingly complex, widely differing formulae will cause a gradual movement away from the entire quasi-science back to some form of more fundamental evaluation.

10.18 LET US SUM UP

The term technical analysis is used to mean a fairly wide range of techniques; all based on the concept that past information on prices and trading volume of stocks gives the enlightened investor a picture of what lies ahead. It attempts to explain and forecast

changes in security prices by studying only the market data rather than information about a company or its prospects, as is done by fundamental analyst. John Magee, whose book “Technical Analysis of Stock Trends” is considered a classic for technical analysts, says: "The technician has elected to study, not the mass of fundamentals, but certain abstraction, namely the market data alone.

Fundamentalists study the cause, not the 'should.' They make their decisions on quality, value and depending on their specific investment goals, the yield or growth potential of the security. They are concerned with the basis, the corporation's financial strength, record of growth in sales and earnings, profitability, the investment acceptance and so on. They also take into account the general business and market conditions. Finally, they interpret these data inductively to determine the current value of the stock and then to project its future price. Fundamentalists are patient and seldom expect meaningful profits in less than one year.

Some critics see technical analysis as a form of black magic. Don't be surprised to see them question the validity of the discipline to the point where they mock its supporters. In fact, technical analysis has only recently begun to enjoy some mainstream credibility. While most analysts on Wall Street focus on the fundamental side, just about any major brokerage now employs technical analysts as well.

The technician must (1) identify the trend, (2) recognize when one trend comes to an end and prices set off in the opposite direction. His central problem is to distinguish between reversals within a trend and real changes in the trend itself. This problem of sorting out price changes is critical since prices do not change in a smooth, uninterrupted fashion. The two variables concerning groups of stocks or individual stocks are:

1. Behaviour of prices, and
2. Volume of trading contributing to and influenced by changing prices.

One school of thought led by William L. Jiler developed a comprehensive technique called "Chart Reading". Charts provide visual assistance detecting the emerging and changing patterns and changing patterns of price behaviour. Technical analysts use three basic types of charts. These are Line Charts, Bar Charts, Point and Figure Charts.

The trouble with most chart patterns is that they cause their followers to change their opinion very frequently. Most chart services change like the wind. One day they put out a strong buy signal, two weeks later, they see a change in the pattern and tell their clients to sell, then two weeks later, they tell them to buy again. The result is that these patterns force their followers in and out of the market time and time again. This might be great for brokers' commission, but not so great for the investor. Most of the technical indicators make sense when examined individually but when one examines many technical indicators simultaneously, the interpretation of their collective meaning is often contradictory and confusing. One technical analyst issued the following report: The breadth of the market remains pretty bearish, but the odd-lot index is still in balance and is more bullish than bearish. While the short interest is not bearish, brokers loans are at a dangerously high level.

Although there is much in finance that we do not completely understand, technical analysis has been around for more than 100 years, and it is not likely to disappear from the investment scene anytime soon. Improved quantitative methods coupled with improved behavioural research will continue to generate ideas for analysts to test. The well-known financial behaviourist Warner De Bont, for instance, recently reported substantial evidence that the public expects the continuation of past price trends. That is, they are bullish in bull markets and pessimistic in bear markets.

10.19 LESSON END ACTIVITY

"We can understand the characterization of technical analysis as 'crystal ball gazing'." Discuss the statement.

10.20 KEYWORDS

Technical Analysis: It attempts to explain and forecast changes in security prices by studying only the market data rather than information about a company or its prospects as is done by fundamental analyst.

Elliot Wave Principle: It is a theory that attempts to develop a rational for a long-term pattern in the stock price movements.

Chaos Theory: It provides potential answers to how security prices are determined.

Dow Theory: According to 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 duration."

Chart Pattern: A chart pattern is a distinct formation on a stock chart that creates a trading signal, or a sign of future price movements.

Head and Shoulders: Head and shoulders are a reversal chart pattern that when formed, signal that the security is likely to move against the previous trend.

Cup and Handle: A cup and handle chart is a bullish continuation pattern in which the upward trend has paused but will continue in an upward direction once the pattern is confirmed.

Double Tops and Bottoms: This chart pattern signals a trend reversal. The pattern is created when a price movement test or supports resistance levels twice and is unable to break through.

Gap: A gap in a chart is an empty space between a trading period and the following trading period.

MACD: Moving Average Convergence Divergence (MACD) is comprised of two exponential moving averages, which helps to measure momentum in the security.

RSI: Relative Strength Index (RSI) helps to signal overbought and oversold conditions in a security.

Confidence Index: It is the ratio of a group of lower grade bonds to a group of higher-grade bonds.

10.21 QUESTIONS FOR DISCUSSION

1. Write a brief note on technical analysis and assumptions.
2. What are the differences between technical and fundamental analysis?
3. Write on the origin and development of technical analysis.
4. What are the techniques of technical analysis?
5. What do you mean by market indicators?

Check Your Progress: Model Answers

CYP 1

1. value	2. Techanical	3. trends	4. fundamental

CYP 2

1. Neutral	2. Fundamental	3. stock	4. demand

CYP 3

1. technical	2. technical	3. following	4. handle

CYP 4

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

10.22 SUGGESTED READINGS

Sudhindra Bhat, *Security Analysis and Portfolio Management*, Excel Books, Delhi.

Kevin, S., *Security Analysis and Portfolio Management*, Prentice Hall of India.

Prasanna Chandra, *Investment Analysis and Portfolio Management*, Second Edition, Tata McGraw Hill.

Punithavathy Pandian, *Securities Analysis and Portfolio management*, Vikas.

Investment Management, V. K. Bhalla.

A. Davis, *Investors in a Changing Economy*, Prentice -Hall, 1968.

Williamson, J. Peter, *Investments: New Analytic Techniques*, London, Longman, 1970.

Cottle, CC., and Whitman, W.T., *Investment Timing: The Formula Plan Approach*, McGraw Hill.

UNIT V

LESSON

11

PORTFOLIO SELECTION

CONTENTS

11.0 AIMS AND OBJECTIVES

After studying this lesson, you should be able to understand:

- Optimal Portfolio
- Risk and Investor Preferences
- Selecting the best Portfolio
- Simple Sharp Portfolio Optimization
- Markowitz Model: The Mean-variance Criterion
- Significance of Beta in the Portfolio
- Single Index Model
- Solved Problems
- Other Portfolio Selection Models

11.1 INTRODUCTION

The art and science of making decisions about investment mix and policy, matching investments to objectives, asset allocation for individuals and institutions, and balancing risk vs. performance. Portfolio management is all about strengths, weaknesses, opportunities and threats in the choice of debt vs. equity, domestic vs. international, growth vs. safety, and numerous other trade-offs encountered in the attempt to maximize return at a given appetite for risk.

11.2 DIVERSIFICATION

Diversification is a risk-management technique that mixes a wide variety of investments within a portfolio in order to minimize the impact that any one security will have on the overall performance of the portfolio. Diversification lowers the risk of your portfolio. Academics have complex formulas to demonstrate how this works, but we can explain it clearly with an example:

Suppose that you live on an island where the entire economy consists of only two companies: one sells umbrellas, while the other sells sunscreen. If you invest your entire portfolio in the company that sells umbrellas, you'll have strong performance during the rainy season, but poor performance when it's sunny outside. The reverse occurs with the sunscreen company, the alternative investment; your portfolio will be high performance when the sun is out, but it will tank when the clouds roll in. Chances are you'd rather have constant, steady returns. The solution is to invest 50% in one company and 50% in the other. Because you have diversified your portfolio, you will get decent performance year round, instead of having either excellent or terrible performance depending on the season.

There are three main practices that can help you ensure the best diversification:

1. Spread your portfolio among multiple investment vehicles such as cash, stocks, bonds, mutual funds and perhaps even some real estate.
2. Vary the risk in your securities. You're not restricted to choosing only blue chip stocks. In fact, it would be wise to pick investments with varied risk levels; this will ensure that large losses are offset by other areas.

3. Vary your securities by industry. This will minimize the impact of industry-specific risks.

Diversification is the most important component in helping you reach your long-range financial goals while minimizing your risk. At the same time, diversification is not an ironclad guarantee against loss. No matter how much diversification you employ, investing does involve taking on some risk.

Another question that frequently baffles investors is how many stocks should be bought in order to reach optimal diversification. According to portfolio theorists, adding about 20 securities to your portfolio reduces almost all of the individual security risk involved. This assumes that you buy stocks of different sizes from various industries. Now let us understand optimal portfolio.

11.3 OPTIMAL PORTFOLIO: SELECTION AND PROBLEMS

The optimal portfolio concept falls under the modern portfolio theory. The theory assumes (among other things) that investors fanatically try to minimize risk while striving for the highest return possible. The theory states that investors will act rationally, always making decisions aimed at maximizing their return for their acceptable level of risk.

Harry Markowitz used the optimal portfolio in 1952, and it shows us that it is possible for different portfolios to have varying levels of risk and return. Each investor must decide how much risk they can handle and then allocate (or diversify) their portfolio according to this decision.

The chart below illustrates how the optimal portfolio works. The optimal-risk portfolio is usually determined to be somewhere in the middle of the curve because as you go higher up the curve, you take on proportionately more risk for a lower incremental return. On the other end, low risk/low return portfolios are pointless because you can achieve a similar return by investing in risk-free assets, like government securities.

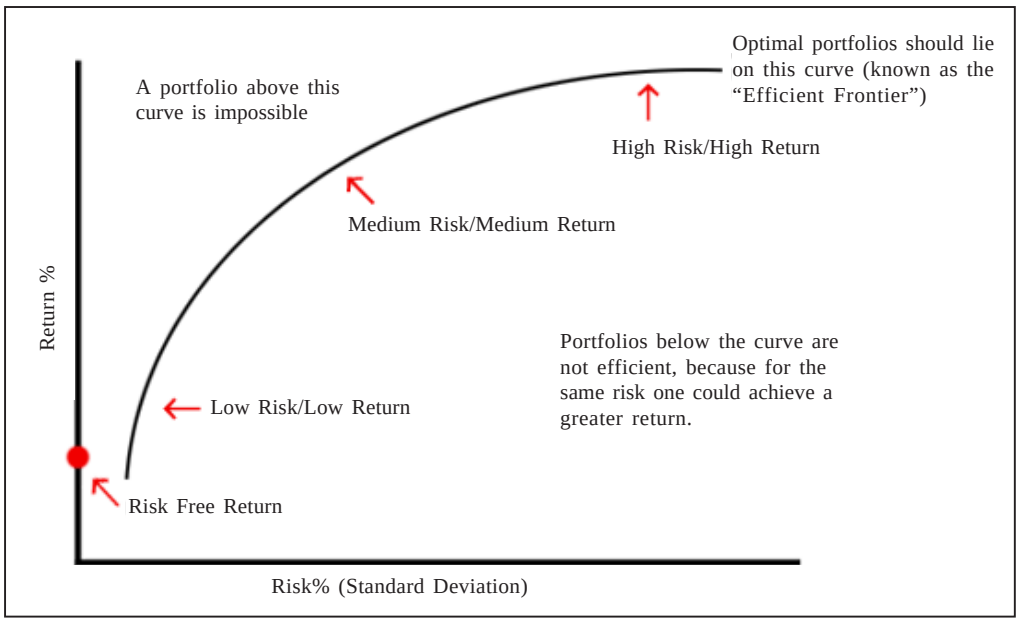


Figure 11.1: Optimal Portfolio

You can choose how much volatility you are willing to bear in your portfolio by picking any other point that falls on the efficient frontier. This will give you the maximum return for the amount of risk you wish to accept. Optimizing your portfolio is not something you can calculate in your head. There are computer programs that are dedicated to determining optimal portfolios by estimating hundreds (and sometimes thousands) of different expected returns for each given amount of risk

11.3.1 Selection and Problems

Suppose you find a great investment opportunity, but you lack the cash to take advantage of it. This is the classic problem of financing. The short answer is that you borrow either privately from a bank, or publicly by issuing securities. Securities are nothing more than promises of future payment. They are initially issued through financial intermediaries such as investment banks, which underwrite the offering and work to sell the securities to the public. Once they are sold, securities can often be re-sold. There is a secondary market for many corporate securities. If they meet certain regulatory requirements, they may be traded through brokers on the stock exchanges, such as the NYSE, the AMEX and NASDAQ, or on options exchanges and bond trading desks.

11.3.2 Finance from the Investor's Perspective

Most financial decisions you have addressed up to this point in the term have been from the perspective of the firm. Should the company undertake the construction of a new processing plant? Is it more profitable to replace an old boiler now, or wait? In this module, we will examine financial decisions from the perspective of the purchaser of corporate securities: shareholders and bondholders who are free to buy or sell financial assets. Investors, whether they are individuals or institutions such as pension funds, mutual funds, or college endowments, hold portfolios, that is, they hold a collection of different securities.

11.4 RATES OF RETURN

The investor return is a measure of the growth in wealth resulting from that investment. This growth measure is expressed in percentage terms to make it comparable across large and small investors. We often express the percent return over a specific time interval, say, one year. For instance, the purchase of a share of stock at time t, represented as P_t will yield P_{t+1} in one year's time, assuming no dividends are paid. This return is calculated as: $R_t = [P_{t+1} - P_t]/P_t$. Notice that this is algebraically the same as: $R_t = [P_{t+1}/P_t] - 1$. When dividends are paid, we adjust the calculation to include the intermediate dividend payment: $R_t = [P_{t+1} - P_t + D_t]/P_t$. While this takes care of all the explicit payments, there are other benefits that may derive from holding a stock, including the right to vote on corporate governance, tax treatment, rights offerings, and many other things. These are typically reflected in the price fluctuation of the shares.

11.4.1 Arithmetic vs. Geometric Rates of Return

There are two commonly quoted measures of average return: the geometric and the arithmetic mean. These rarely agree with each other. Consider a two period example: $P_0 = \$100$, $R_1 = -50\%$ and $R_2 = +100\%$. In this case, the arithmetic average is calculated as $(100 - 50)/2 = 25\%$, while the geometric average is calculated as: $[(1 + R_1)(1 + R_2)]^{1/2} - 1 = 0\%$. Well, did you make money over the two periods, or not? No, you didn't, so the geometric average is closer to investment experience. On the other hand, suppose R_1 and R_2 were statistically representative of future returns. Then next year,

you have a 50% shot at getting $200 or a 50% shot at $50. Your expected one year return is (1/2)[(200/100) – 1] + (1/2)[(50/100) – 1] = 25%. Since most investors have a multiple year horizon, the geometric return is useful for evaluating how much their investment will grow over the long-term. However, in many statistical models, the arithmetic rate of return is employed. For mathematical tractability, we assume a single period investor horizon.

11.5 EXPECTED RETURN ON A PORTFOLIO

The Expected Return on a Portfolio is simply the weighted average – the expected returns of the individual securities in the given portfolio.

$$R_P = W_A R_A + W_B R_B + ... W_n R_n$$

or

$$= \sum_{i=1}^{n} W.R$$

Where R_P = Expected Rate of Return in a Portfolio

W_1 = Proportion of total investment invested in VI asset

R_i = Expected Rate of return as ith Security

n = number of securities in a given portfolio

Suppose your Expected Rate of Return from Lakshmi Mills (LML) stocks is 20% during a given holding period and the same rate of return – in case of Khandri Mills (KM) scrip is, say 16% and you are interested in putting you total investment equally in both these securities, then Expected Rate of Return from the Two-Asset Portfolio is

$$W_{LMC} = 0.50\ R_{LML} = 0.20$$

$$W_{xm} = 0.50\ R_{KM} = 0.16$$

$$R_P = (W_{LM})\ (R_{LML} + (W_{KM})\ R_{KM})$$

$$= (0.50 \times 0.20) + (0.50 \times 0.16)$$

$$= 0.10 + 0.08$$

$$= 0.18$$

or

$$= 18\%$$

Suppose you are interested in including the Arvind Mills scrip too into your Portfolio, by partly selling of your earlier investment in Khandri Mills, say about 20% of total investment and if your Expected Rate of return from Arvind Mills is 22% during the same said holding period, then the return from the 3-asset portfolio would be

$$R_P = [0.50 \times 0.201 + [0.30 \times 0,16 + [0.20 \times 0.221$$

$$= 0.\ 10 + 0,048 + 0.044$$

$$= 0.192 \text{ or } 19.2\%$$

Using the same logic the rate of return on a portfolio with assets wherein short and long positions could also be calculated.

11.5.1 Short and Long Positions

Short-selling and long-buying are certain trading activities that active stock holders (speculators) use to perform on the list of forward securities. These practices are allowed by most stock exchanges. In India, these activities are often called badla transactions.

Basically, short selling refers to that trading activity wherein the speculator sells a 'security without currently possessing it. Similarly, the long buy refers to the contract of buying a security without any real intention to take the delivery of it.

11.5.2 Portfolio Rate of Return in Case of Short Selling and Long Buying

Illustration 1:

X Y is a portfolio with two assets – one with short and another with long positions. Then the portfolio rate of return is as follows: Proportion is – 0.50 & + 1.50 respectively and return stock on x is 20% and on stock y is 25%. Find out the expected return (R_p).

Solution:

Let weightages $X = -0.50$

$Y = +1.50$

Expected Rates of Return $X = 20\%$

$Y = 25\%$

$R_r = W.R + W.R$

$R_p = (-0.50 \times 0.20) + (1.50 \times 0.25)$

$= 0.275$ or 27.5%

11.5.3 Portfolio Risk

Calculation of portfolio risk is not similar to weighted average of individual assets' total risk. Portfolio's risk is sometimes substantially different from individual assets risk. It is quite possible that the individual assets may be substantially risky with sizeable standard deviations and when combined may result in a portfolio which is absolutely riskless.

Illustration 2:

The following data relates to the annual rates of returns earned from two stocks, viz., M and W whose rates of return are perfectly negatively correlated. To make it more meaningful, we can say that the stock M relates an agro-based industry while stock W relates to the construction industry.

Year	Stock M	Stock W
2001	40%	–10%
2002	–10%	40%
2003	35%	–5%
2004	–5%	35%
2005	15%	15%
Average Return	15%	15%
Standard Deviation	22.6%	22.6%

Solution:

Portfolio Rates of return and Risk on M and W

Year	Return on M	Return on W	Portfolio MW Return
2001	40%	-10%	$R_p = (0.5 \times 0.40) + (0.5 \times -0.10) = 0.15$ or 15%
2002	-10%	40%	$R_p = (0.5 \times -0.10) + (0.5 \times 0.40) = 0.15$ or 15%
2003	35%	-5%	$R_p = (0.5 \times 0.35) + (0.5 \times -0.5) = 0.15$ or 15%
2004	-5%	35%	$R_p = (0.5 \times -0.05) + (0.5 \times 0.35) = 0.15$ or 15%
2005	15%	15%	
Average	15%	15%	
S.D	22.6%	22.6%	

Both the two stocks are quite risky if they are held in isolation. But when they are combined to form a portfolio MW they are not risky at all. In the reason for arriving at such a riskless portfolio is that the rate of returns on each of these individual stocks move counter cynically to one another – when M's return falls, W's return rises. Statistically such a relationship is called negatively correlated. One conclusion that we can draw at this stage is that a portfolio with negatively correlated stocks likely to reduce the risk significantly.

11.5.4 Distribution of Rates of Return on two Perfectly Positively Correlated Stocks

But in reality, we may not be able to find stocks with such a negative correlation. Many a time, stock prices move in the same direction instead of the opposite direction, as seen in the earlier illustration. Although such movement in stock prices may not result in perfect positive correlation between any two scrips, there is every possibility that any two stocks may move with + 0.5 or + 0.6 or + 0.7 correlation. What would happen to the Portfolio Risk when stocks move in opposite directions?

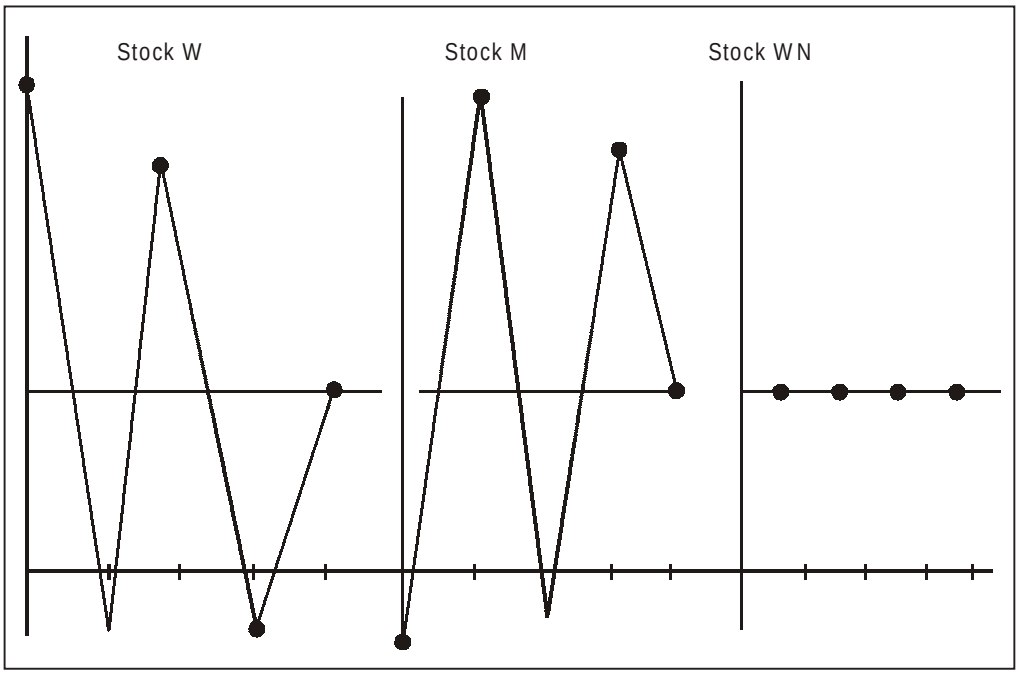


Figure 11.2: Distribution of Rates of Return

Illustration 3:

Following information provided to you. Compute the portfolio return

Year	Stock W	Stock Z
2002	40%	28%
2003	-10%	20%
2004	35%	41%
2005	-5%	-7%
2006	15%	3%
Average	15%	15%
Standard Deviation	22.6%	22.6%

Solution:

The returns of above two scrips exhibit a, correlation of 0.65, indicating positive movement in stock prices of W and Z. The Average and Standard Deviation of a portfolio consisting of both these assets equally would be as follows:

Year	Stock W	Stock 2	Portfolio WZ
2002	40%	28%	$R_p = (0.5 \times 0.40) + (0.50 \times 0.28) = 34\%$
2003	-10%	20%	$R_p = (0.5 \times -0.10) + (0.5 \times 0.20) = 5\%$
2004	35%	41%	$R_p = (0.5 \times 0.35) + (0.5 \times 0.41) = 38\%$
2005	-5%	-7%	$R_p = (0.5 \times -0.05) + (0.5 \times -0.07) = -11\%$
2006	15%	3%	$R_p = (0.5 \times 0.15) + (0.5 \times 0.03) = 9\%$
Average return:	15%	15%	15%
Standard deviation	22.6%	22.6%	20.6%

Check Your Progress 1

Fill in the blanks:

1. The investor _____ is a measure of the growth in wealth resulting from that investment.
2. The growth measure is expressed in _____ terms to make it comparable across large and small investors.
3. There are two mainly quoted measures of average return: the geometric and the _____ mean.
4. Short selling and long - buying are certain trading activities that active stock holders (speculators) use to perform on the list of _____ securities.

11.6 SHARPE'S SINGLE INDEX MARKET MODEL

Sharpe assumed that, for the sake of simplicity, the return on a security could be regarded as being linearly related to a single index like the market index. Theoretically, the market index should consist of all the securities trading on the market. However, a popular

average can be treated as a surrogate for the market index. The acceptance of the idea of a market between individual securities is because any movements in securities could be attributed to movements in the single underlying factor being measured by the market index. The simplification of the Markowitz Model has come to be known as the Market Model or Single Index Model (SIM).

In an attempt to capture the relative contribution of each stock towards portfolio risk, William Sharpe has developed a simple but elegant model called as 'Market Model'. His argument is like this. We appreciate that the portfolio risk declines as the number of stocks increases but to an extent. That part of the risk which cannot be further reduced even when we add few more stocks into a portfolio is called systematic risk. That undiversifiable risk is attributed to the influence of systematic factors principally operated at a given market.

$$R_{it} + \alpha_i + \beta_{mt} - e_{it} \text{ Where}$$

R_{it} = Return on ith security during tth holding period

R_{mt} = Return on a Market Index during tth holding period

α = Constant term

β_{mt} = Market Beta or Market Sensitivity of a given stock

Since the regression coefficient (Beta) indicates the manner in which a security's return changes systematically with the changes in market, this linear line is also called Characteristic Line. The slope of the line is called Beta. It gained lot of popularity in security analysis as a measure of relative market risk. Beta is 'one' for such a stock, which is said to have the risk exactly equal to that of the market. On the other hand, the stock with Beta greater than one indicates the aggressiveness of the stock in the market and less than one indicates the slow response in the price of that stock.

11.6.1 Beta Predicting

Beta, as commonly defined, represents how sensitive the return of an equity portfolio (or security) is to the return of the overall market. It can be measured by regressing the historical returns of a portfolio (or security) against the historical returns of an index; the resulting slope of this regression line would be the historical beta. This can be useful for attributing relative performance to various sources or for explaining active risk over a certain period of time.

Portfolio managers are also very interested in what the beta of a portfolio (or security) will be in the future, or what the realized beta will be. As one might expect, predicting the value of beta can be a complicated process.

11.6.2 Back to Basics

Since daily returns are now widely available, it is worth asking the question: are multi-factor predicted betas better predictors of realized betas than historical betas, which use daily returns? A related question, which probably should have been asked some time ago, is: how good are these predictors? We will try to address these questions below.

Using daily security returns, going back to the end of 1998 and Barra-predicted betas for the same time period, we performed the following calculations for each month:

- For each security, we calculated the beta relative to the S&P 500 using the 20 business days' returns starting in that month (the realized beta).
- For each security, we obtained the Barra-predicted beta as of the beginning of that month.

- Using the data points for all these securities, we performed the regression:

$$\text{Realized Beta} = a + b \times \text{Predicted Beta} + e$$

We repeated this calculation by substituting a historical beta (calculated using trailing daily returns) for the predicted beta; we used trailing periods of 60, 120, 180, 240, 300, and 360 business days to calculate six different values of trailing historical betas. We then repeated all of these calculations using 60 business days' returns for the calculation of the realized beta.

11.6.3 Interpreting the Results

A perfect predictor would have regression results of a = 0, b = 1, correlation = 1, and MAE = 0. While these results are far from perfect, it is important to remember that they are for individual securities; predictions for portfolios can be expected to be far more reliable.

It is more useful to look at the results on a comparative basis. For each line, the shaded values of b, correlation, and MAE are the closest to ideal. We can see that all of the shaded numbers are associated with either the daily historical beta or the average of the predicted and historical beta. While we cannot conclude from this that daily historical betas are significantly better predictors of realized beta than Barra-predicted betas, it certainly raises the question of whether the Barra-betas (or any other multi-factor betas) are the best predictors.

There are a few other interesting results worth noting:

- The "b" in the regression results for the predicted betas are greater than 1. This is not necessarily good or bad, but simply indicates that the predicted betas have less dispersion than the realized betas. This makes intuitive sense, since the predicted betas are based on longer-term factor relationships.
- The "b" in the regression results for the historical betas increases as the length of the trailing period increases. This indicates that the dispersion of historical betas decreases as the trailing period increases, which also makes intuitive sense.
- All of the prediction results are better for the 60-day realized betas than for the 20-day realized betas.
- The historical beta appears to have the largest relative advantage for trailing periods of 240-300 days (for both the 20-day and the 60-day realized betas).

11.6.4 Implications

As mentioned previously, we should not rush to draw any hard conclusions from these results. A brief study such as this has its limitations, not the least of which is the fact that it uses less than four years worth of data. However, the evidence presented above supports the following claim: In recent years, a simple daily historical beta has been at least as good a predictor of short-term security betas as the predicted betas generated by a sophisticated multi-factor equity model.

Illustration 4:

Mr. Soma owns a portfolio of two securities with the following expected returns, standard deviations, and weights:

Security	Expected Return	Standard Deviation	Weight
RNL	12%	15%	.40
SBI	15%	20%	.60

What are the maximum and minimum portfolio standard deviations for varying levels of correlation between two securities?

Solution:

$$\sigma_p = [X^2_A \sigma^A_A + X^2_B \sigma^2_B + 2\ X_A\ X_B\ r_{AB}\ \sigma_A\ r_B]^{½}$$

$$\sigma_p = [(.40)^2\ (15)^2 + (.60)^2\ (20)^2 + 2(.60)\ (.40)\ (15)\ (20)\ r^{AB}]^{½}$$

$$= [36 + 144 + (144)\ r_{AB}]^{½}$$

The portfolio's standard deviation will be at a maximum when the correlation between securities RNL and SBI is + 1.0. That is:

$$\sigma_p = [36 + 144 + (144 \times 1)]^{½}$$

$$= 18\%$$

The portfolio's standard deviation will be at a minimum when the correlation between securities RNL and SBI is –1.0. That is:

$$= [36 + 144 + (144 \times 1)]^{½} = 6\%$$

Illustration 5:

RKV owned five securities at the beginning of the year in the following amounts and with the following current and expected end-of-year prices:

Security	Share Amount	Current Price in (Rs.)	Expected Year-End Price in (Rs.)
KRBL	100	50	65
SBI	150	30	40
INY	75	20	25
RNL	100	25	32
I-Gate	125	40	47

What is the expected return on RKV's portfolio for the year?

Solution:

The initial value of RKV's portfolio is:

= (Rs. 50 × 100) + (Rs. 30 × 150) + (Rs. 20 × 75) + (Rs. 25 × 100) + (Rs. 40 × 125)

= Rs. 5000 + Rs. 45000 + Rs. 1500 + Rs. 2500 + Rs. 5000

= Rs. 18,500

The proportion that each security constitutes of RKV's initial portfolio is:

$$X_A = (\text{Rs. } 50 \times 100)/(\text{Rs. } 18{,}500) = 0.27$$

$$X_B = (\text{Rs. } 30 \times 150)/(\text{Rs. } 18{,}500) = 0.24$$

X_C = (Rs. 20 × 75)/(Rs. 18,500) = 0.08

X_D = (Rs. 25 × 100)/(Rs.18,500) = 0.14

X_E = (Rs. 40 × 125)/(Rs. 18,500) = 0.27

The expected returns on the portfolio securities are:

$\sim R_A$ = (Rs. 65 – Rs. 50)/Rs. 50 + 30.0%

$\sim R_B$ = (Rs. 40 – Rs. 30)/Rs.30 + 33.3%

$\sim R_A$ = (Rs. 25 – Rs. 20)/Rs.20 + 25.0%

$\sim R_A$ = (Rs. 32 – Rs. 25)/Rs.25 + 28.0%

$\sim R_A$ = (Rs. 47 – Rs. 40)/Rs.40 + 17.5%

The expected return on a portfolio is given by:

$$\tilde{R} = \sum_{i=1}^{N} (X_i \times R_x)$$

In the case of RKV's portfolios

$\tilde{R}_p$ = (0.27 × 30.0%) + (0.24 × 33.3%) + (0.08 × 25.0%) + (1.4 × 28.0%) + (0.27 × 17.5%)

= (0.81%) + (7.992%) + (2.0%) + (3.92%) + (4.725%)

= (19.447%)

Illustration 6:

From the information given below, calculate each stock's expected return. Using these individual security's expected returns, compute the portfolio's expected return.

Stock	Initial Investment Value (in Rs.)	Expected End-of-Period Investment Value (in Rs.)	Proportion of Portfolio's Initial Market Value (%)
A	5,000	7000	20.0
B	2,500	4,000	10.0
C	4,000	5,000	16.0
D	10,000	12,000	40.0
E	3,500	5,000	12.0

Solution:

Stock	Expected Return	Proportion of Portfolio's Initial Market Value (%)
A	Rs. 7,000 /Rs.5,000 = 40.00%	20.0
B	Rs. 4,000 /Rs.2,500 = 60.00%	10.0
C	Rs. 5,000 /Rs.4,000 = 25.00%	16.0
D	Rs. 12,000/Rs.10,000 = 20.00%	40.0
E	Rs. 7,000 /Rs.3,500 = 42.86%	12.0

The portfolio's expected return is given by:

$$\tilde{R} = \sum_{i=1}^{N} (X_i \times R_x)$$

$$= (0.200 \times 40.0\%) + (0.10 \times 60.0\%) + (0.16 \times 25.0) + (0.40 \times 20.0\%) + (0.14 \times 42.86\%)$$

$$= 8 + 6 + 4 + 8 + 6.0004$$

$$= 32.000.\%$$

11.7 MARKOWITZ MODEL: THE MEAN-VARIANCE CRITERION

Dr. Harry Markowitz is credited with developing the first modern portfolio analysis model since the basic elements of modern portfolio theory emanate from a series of propositions concerning rational investor behaviour set forth by Markowitz, then of the Rand Corporation, in 1952, and later in a more complete monograph sponsored by the Cowles Foundation. It was this work that has attracted everyone's perspective regarding portfolio management. Markowitz used mathematical programming and statistical analysis in order to arrange for the optimum allocation of assets within portfolio. To reach this objective, Markowitz generated portfolios within a reward-risk context. In other words, he considered the variance in the expected returns from investments and their relationship to each other in constructing portfolios. In so directing the focus, Markowitz, and others following the same reasoning, recognized the function of portfolio management as one of composition, and not individual security selection – as it is more commonly practiced. Decisions as to individual security additions to and deletions from an existing portfolio are then predicated on the effect such a manoeuvre has on the delicate diversification balance. In essence, Markowtiz's model is a theoretical framework for the analysis of risk return choices. Decisions are based on the concept of efficient portfolios.

A portfolio is efficient when it is expected to yield the highest return for the level of risk accepted or, alternatively, the smallest portfolio risk for a specified level of expected return. To build an efficient portfolio an expected return level is chosen, and assets are substituted until the portfolio combination with the smallest variance at return level is found. As this process is repeated for other expected returns, a set of efficient portfolios is generated.

11.7.1 Assumptions

The Markowitz model is based on several assumptions regarding investor behaviour:

(i) Investors consider each investment alternative as being represented by a probability distribution of expected returns over some holding period.

(ii) Investors maximize one period's expected utility and progress along the utility curve, which demonstrates diminishing marginal utility of wealth.

(iii) Individuals estimate risk on the basis of the variability of expected returns.

(iv) Investors base decisions solely on expected returns and variance (or standard deviation) of returns only.

(v) For a given risk level, investors prefer high returns to lower returns. Similarly, for a given level of expected return, investor prefer less risk to more risk.

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

$$\sigma_p = W^2_C \sigma^2_C + (1 - W_C) \sigma^2_E + 2 [W_C (1 - W_C) \sigma_C \sigma_E r_{CE}]^{½}$$

$$E(R)_P = W_C E (R_C) + (1 + W_C) E(R_E)$$

Geographical representation of the Mean-Variance Criterion is presented in Figure 11.3, the vertical axis denoting expected return while the horizontal axis measures the standard deviation (or variance) of the returns. Given its expected return and standard deviation, any investment option can be represented by a point on such a plane and the set of all potential options can be enclosed by an area such as shown in Figure 11.3. The efficient frontier, given by the arc AB, is a boundary of the attainable set. In Figure 11.3 the shaded area represents the attainable set of portfolio considerations, with their own risks and expected returns. (Two different portfolios may have the same expected return and risk). Any point inside the shaded area is not as efficient as a corresponding point on the efficient frontier – the arc AB.

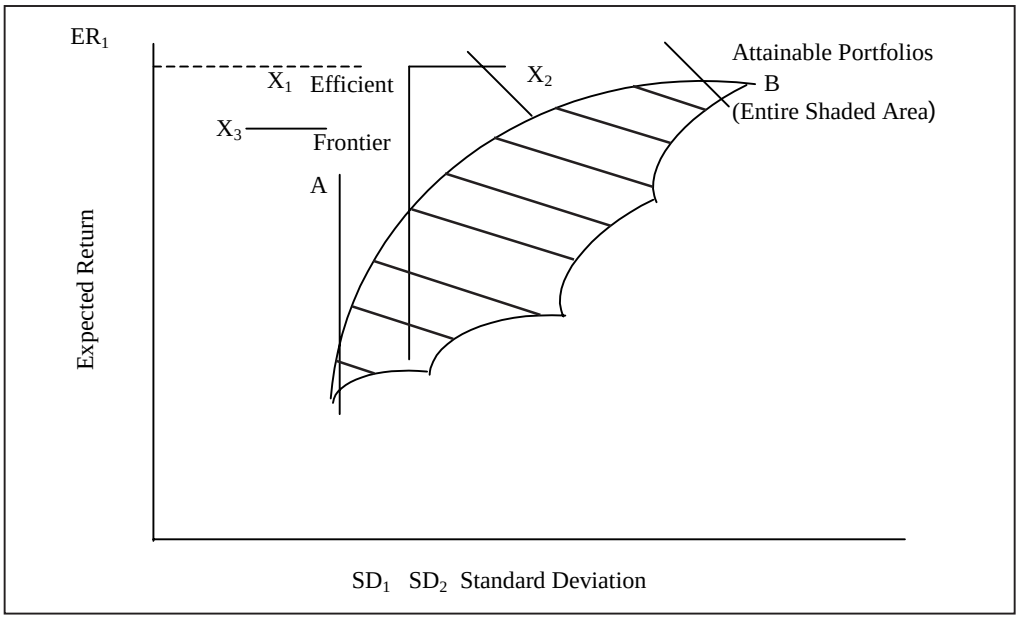


Figure 11.3: Markowitz Efficient Frontier

Illustration 8:

The policy committee of CDME recently used reports from various security analysts to develop inputs for the single-index model. Output derived from the single-index model consisted of the following efficient portfolios:

Portfolio	Expected Return (ER)	Standard Deviation
1	8%	3%
2	10%	6%
3	13%	8%
4	17%	13%
5	20%	18%

(a) If the prevailing risk-free rate is 6% which portfolio is the best?

(b) If a SD of 12% were acceptable, what would the expected portfolio return be and how would CDME Finance achieve it?

(c) Assume that the policy committee would like to earn an expected 10% with a SD of 4%. Is this possible?

Solution:

(a)

Portfolio	[E (R) – T/ σ]
1	8 – 6)/ 3 = 0.67
2	(10 – 6)/6 = 0.67
3	(13 – 6)/8 = 0.875
4	(17 -6)/13 = 0.846
5	(20 – 6)/18 = 0.77

Portfolio 3 is the optimal portfolio

(b) E(R) = 6% + 12% (0.875) = 16.5%

Borrow Re. 0.50 for each Re. 1.00 equity.

σ_p = 1.5 (8%) = 12%

(c) A standard deviation of 4% results in an expected return of only 9.5%:

9.5% = 6% + 4% (0.875)

Check Your Progress 2

1. Diversification is an ironclad guarantee against loss.
2. The optimal risk portfolio is usually determined to be somewhere in the middle of the curve because as you go higher up the curve, you take on proportionately more risk for a lower incremental return.
3. The expected return on a portfolio is simply the weight average—the expected returns of the individual securities in the given portfolio.
4. Short selling and long-buying are certain trading activities that active stock holders (speculators) use to perform on the list of forward securities.
5. The regression coefficient (Beta) indicates the manner in which a security's return changes systematically with the changes in the market.

11.8 OTHER PORTFOLIO SELECTION MODELS

Some other portfolio selection models that seem to hold great promises to practical applications are also looked at here. One such model is the 'multi-index model.' There are different variants of this model and each of them is developed to capture some of the non-market influences that cause shares to move together (recall that single-index model accounts for only market-related influences). The non-market influences, in essence, include a set of economic factors or industry (or group) characteristics that account for common movement in share prices. While it is easy to find a set of indices that are associated with non-market effects over any period of time, it is quite another matter to find a set that is successful in predicting co-variances that are not market related. There

is still a great deal of work to be done before multi-index models consistently outperform the simpler one. Another model that takes into account a wide spectrum of practical considerations in portfolio selection is the goal-programming model. In real life, an investor's goals and desires transcend the notion of a trade-off between only risk and return. For example, an investor may prefer to invest some minimum amount in several different shares, but at the same time he or she may not like individual investment to exceed a specified limit. Additionally, he or she prefers dividend income to capital appreciation.

11.9 LET US SUM UP

The application of Markowitz's model requires estimation of large number of co-variances. And without having estimates of co-variances, one cannot compute the variance of portfolio returns. This makes the task of delineating efficient set extremely difficult. However, William Sharpe's single-index model' simplifies the task to a great extent. Even with a large population of assets from which to select portfolios, the numbers of required estimates are amazingly less than what are required in Markowitz's model. But how accurate is the portfolio variance estimate as provided by the single-index model's simplified formula? While the Markowitz's model makes no assumption regarding the source of the co-variances, the single-index model does so. Obviously, the accuracy of the latter model's formula for portfolio variance is as good as the accuracy of its underlying assumptions.

In passing, we have also mentioned in this unit other portfolio selection models, such as 'multi-index model' and 'goal programming model,' which have high intuitive appeal but would require much more work before they outperform the simple ones.

11.10 LESSON END ACTIVITY

You are provided Rs. 1,50,000. Construct an optimum portfolio by using Debt market, Equity market, Mutual Fund and Gold investment.

11.11 KEYWORDS

Diversification: Diversification is a risk-management technique that mixes a wide variety of investments within a portfolio in order to minimize the impact that any one security will have on the overall performance of the portfolio.

Optimal Portfolio: It states that investors will act rationally, always making decisions aimed at maximizing their return for their acceptable level of risk.

Expected Return on a Portfolio: It is simply the weighted average – the expected returns of the individual securities in the given portfolio.

Markowtiz's Model: It is a theoretical framework for the analysis of risk return choices. Decisions are based on the concept of efficient portfolios.

11.12 QUESTIONS FOR DISCUSSION

1. Define optimal portfolio. How is it important in investment decisions?
2. Write a brief note on risk and investor preferences.
3. What are the steps we take when selecting the best portfolio?

4. Write a note on simple Sharpe portfolio optimization.

5. Explain Markowitz model – the mean-variance criterion.

Check Your Progress: Model Answers

CYP 1

1. return	2. percentage	3. arithmetic	4. forward

CYP 2

1. F	2. T	3. T	4. T	5. T

11.13 SUGGESTED READINGS

Sudhindra Bhat, *Security Analysis and Portfolio Management*, Excel Books, Delhi.

Kevin, S., *Security Analysis and Portfolio Management*, Prentice Hall of India.

Prasanna Chandra, *Investment Analysis and Portfolio Management*, Second Edition, Tata McGraw Hill.

Punithavathy Pandian, *Securities Analysis and Portfolio management*, Vikas.

Investment Management, V. K. Bhalla.

A. Davis, *Investors in a Changing Economy*, Prentice -Hall, 1968.

Williamson, J. Peter, *Investments: New Analytic Techniques*, London, Longman, 1970.

Cottle, CC., and Whitman, W.T., *Investment Timing: The Formula Plan Approach*, McGraw Hill.

LESSON

12

PERFORMANCE EVALUATION OF PORTFOLIO

CONTENTS

12.0 AIMS AND OBJECTIVES

After studying this lesson, you should be able to understand:

- Classification of Managed Portfolio
- Advantages of Managed Portfolio

- Methods of Computing Portfolio Return
- Components of Investment Performance
- Problems with Risk-adjusted Measures
- Benchmark Portfolios for Performance Evaluation
- Risk-adjusted Measure of Performance
- Sharpe's Reward-to-variability Ratio
- Treynor's Reward-to-volatility Ratio
- Treynors Versus Sharpe Measures
- Jensen's differential Return Measures
- Application of Evaluation Techniques

12.1 INTRODUCTION

Of late, mutual funds have gained popularity in India since the early 90s. Most individual investors find it difficult to identify and diversify their investments across different portfolios, either due to lack of adequate knowledge of investment management principles or because of lack of skills needed to play actively with the complex system of making quick decisions for proper handling of their portfolios. As a result, they are simply turning to specialised institutions like mutual funds. Mutual funds in turn, with their skilled portfolio managers are promising to generate a rate of return almost similar to the size of return that market yields on efficient portfolios. These specialised institutions are able to invest across different industries and different securities with the available large amounts of money entrusted to them by investors. This facilitates the obtainment of fuller benefits of diversification. Further, the myriad schemes in mutual funds throw up opportunities to suit to the varied requirements of different investors. This lesson examines the performance of a portfolio manager in investing the funds entrusted to a mutual fund. Such an evaluation is important to an investor in different directions.

1. It enables the investor to appraise how well the portfolio manager has achieved the targeted return.
2. It enables the investor to examine how well the manager has achieved the targets in comparison to other mutual funds.
3. It enables the fund authorities to evaluate the performance of their investment decisions not only earning a specified rate of return, but return in relative terms i.e. per unit of risk.

12.2 METHODS OF CALCULATING PORTFOLIO RETURNS

Calculation of portfolio returns is almost similar to the calculation of rate of return on individual stock. The rate of return is generally estimated for a specific holding period. The performance of a portfolio fund is evaluated on the returns generated over a timeframe, with number of sub-periods, by considering the holding periods. The calculation of portfolio return is relatively easy when there are no additions or withdrawals from the initial corpus during the given phenomena.

Illustration 1:

The portfolio returns can be calculated as illustrated in the following example.

Portfolio Composition: (Beginning)

Scrip	No. of shares	Market price at beginning	Portfolio value at beginning
Alpic Finance	100	93	9,300
Ashok Leyland	50	70	3,500
Ballarpur Industries	100	150	15,000
CIPLA	50	221	11,050
Federal Bank	200	156	31,200
		P_o	70,050

Portfolio Value at the End of Holding Period

Scrip	No. of shares	Market price at end	Portfolio value at the end
Alpic Finance	100	120	12,000
Ashok Leyland	50	122	6,100
Ballarpur Industries	100	164	16,400
CIPLA	50	358	17,900
Federal Bank	200	160	32,000
		P	84,400

In the above illustration, we have calculated the portfolio returns by taking the price changes of all individual stocks during the holding period. If we get the net ending value of a portfolio as less than the beginning value, then the portfolio return would be negative.

As we have seen earlier, all mutual funds are specially designed portfolios. The returns from such portfolios are calculated by considering the Net Asset Values (NAVs) of each of these funds, rather than the changes in market prices of all stocks constituting the given portfolio. Then, the portfolio returns (fund returns) are given by

$$R_F = \frac{NAV_t - NAV_{t-i}}{NAV_{t-I}}$$

Performance measurement is just an accounting function that attempts to reconcile the end of period with the beginning period values. Performance evaluation on the other hand, addresses the issues of whether:

(i) the past performance was superior or inferior

(ii) such performance was due to skill or luck

(iii) future performance will be similar or not

Portfolio performance is generally evaluated over a time interval of at least four years, with returns for a number of sub-periods within the interval, like monthly or quarterly, so that there is a fairly adequate number of observations for statistical evaluation. The calculation of portfolio return is fairly simple when there are no deposits or withdrawals of money from a portfolio during a time period. In that case, the market value of the portfolio in the beginning and at the end of the given period is determined for computing the portfolio return.

Illustration 2:

Step 1: Portfolio Value – Beginning

Shares	No. of Shares	Market Price	Portfolio Value Beginning
A	50	100	5,000
B	100	70	7,000
C	200	40	8,000
D	500	60	30,000
Total (V_o)			50,000

Step 2: Portfolio Value – End

Shares	No. of Shares	Market Price	Portfolio Value End
A	50	100	10,000
B	100	40	4,000
C	200	110	22,000
D	500	80	40,000
Total (V_o)			76,000

Step 3: Portfolio Return

$$= \frac{V_1 - V_0}{V_0}$$

$$= \frac{6,000 - 50,000}{50,000} = 52\%$$

Performance measurement becomes different when a client adds or withdraws money from the portfolio. The percentage change in the market value of the portfolio as computed above may not be an accurate measurement of the portfolio's return in that case. For example, if the beginning value of the portfolio is Rs. 50,000 and the value at the end of October is Rs. 70,000 and the client deposits Rs. 30,000 in cash in early November, the value at the end of the year would be Rs. 1,00,000. The portfolio return in this case will be:

$$(1,00,000 - 50,000)/50,000 = 100\%$$

However, the entire return was not due to the actions of the investment manager. A more accurate measure would be:

$$(1,00,000 - 30,000) - 50,000/50,000 = 40\%$$

In the event of a deposit or a withdrawal occurring just after the start of the period, the return on the portfolio should be calculated by adjusting the beginning market value of the portfolio. In the case of a deposit, the beginning value would be increased by the deposit amount and in the case of withdrawal, the beginning value would be decreased by the amount.

When deposits or withdrawals occur in the middle of the period, either the dollar-weighted return (rupee-weighted return) or the time-weighted return should be used. The choice

of method will depend on the performance evaluation objectives. If the performance of the fund is being evaluated, dollar-weighted return would be appropriate as it provides the return from the perspective of the client, if the investment manager's decisions are being evaluated, the time-weighted return would be appropriate as it would exclude the effect of the client's cash flow decisions. Let us explain these methods now.

The calculation of portfolio return becomes complicated when there exist certain additions or withdrawals into the funds during the specific evaluating period. Further, when there exist intermediate cash flows that may be due to dividend declarations by some companies and when such cash flows are reinvested into the units of the given mutual fund, the calculation of portfolio return becomes complicated. The following methods are used to calculate the portfolio return during such situations.

1. Dollar-Weighted Rate of Return
2. Time-Weighted Rate of Return
3. Unit-Value Rate of Return

12.2.1 Dollar-Weight Rate of Return

The internal rate of return that equates the initial contribution and the cash flows that occur during the period with the ending value of the fund is the dollar-weighted rate of return. Mathematically, this measure of return is the dollar-weighted average of sub-period returns with the dollar weights equal to the sum of the initial contribution and all the cash flows up to the time of the sub-period return.

Illustration 3:

A portfolio has a market value of Rs. 100 lakh. In the middle of the quarter, the client deposits Rs. 5 lakh and at the end of the quarter the value of the portfolio is Rs. 103 lakh. What is the dollar weighted return?

Solution:

The dollar-weighted return would be calculated by solving the following equation for r

$$100 = [-5/(1 + r)] + [103/(1 + r)^2]$$

$r = -0.98\%$ which is a semi-quarterly rate of return.

This can be converted into a quarterly rate of return by adding 1 to it, squaring this value and then subtracting 1 from the square, resulting in a quarterly return of $[1 + (-0.0098)\ 2 - 1] = -1.95\%$.

12.2.2 Time-weighted Rate of Return

This time-weighted rate of return is the weighted average of the internal rates of return for the sub-periods between the cash flows and it is weighted by the length of the sub-periods.

This method considers the market value of the portfolio just before each cash flow occurs.

The percentage change in the value would be 160% as compared with a change in value of 82%, if there had been no interim cash flow. The time-weighted return of 82% is however more appropriate return for the fund manager.

Illustration 4:

Fund A has Rs. 10,00,000 under management at time 0. It earns 25% in period 1. At that time, Rs. 5,00,000 is pulled out by other investors. The remaining capital earns negative 10% during period 2. What are the funds time-weighted and rupee-weighted rates of return?

Solution:

The time-weighted rate of return is calculated as a geometric mean of the individual rates of return. Thus the time-weighted performance is

$$[(1.25)\ (0.90)]\ 0.5 - 1 = 0.0607 = 6.07\%$$

The rupee-weighted rate of return is found as the solution to the internal rate of return problem.

$$\text{Rs. } 10{,}00{,}000 = \text{Rs. } 5{,}00{,}000/(1 + r) + \text{Rs. } 6{,}75{,}000/(1 + r)^2$$

$$R = 10.88\%$$

12.2.3 Unit Value Rate of Return

When intermediate cash flows are generated, new units can be added to the existing portfolio. If you assume that the unit value is unchanged while procuring the interim units, the change in Net Asset Value (NAV) of the portfolio indicates the return on portfolio. In the above illustration, about 8,000 units are there at a Net Asset Value of Rs. 100 at the beginning. Since the value of unit has gone up to Rs. 110 by July, the intermediate cash flow of Rs. 2,20,000 is converted into 2,000 units increasing the total units to 10,000. At the end of the year, the NAV further raised to Rs. 132 per unit. The NAV of Rs. 132 at the end of the year compared with Rs. 100 at the beginning of the year obviously results in a return of 32% for the year. This is called Unit Value Rate of Return.

Check Your Progress 1

Fill in the blanks:

1. Calculation of portfolio returns is almost similar to the calculation of rate of return on _____ stock.
2. The rate of return is generally estimated for a specific _____ period.
3. Portfolio performance is generally evaluated over a time interval of at least - _____ years.
4. The time - weighted rate of return is the weighted average of the internal rates of return for the sub-periods between the cash flows and it is weighed by the _____ of the sub-periods.

12.3 PORTFOLIO PERFORMANCE AND RISK ADJUSTED METHODS

Modern Portfolio Theory provides a variety of measures to measure the return on a portfolio as well as the risk. When a portfolio carries a degree of risk, the return from it should be evaluated in terms of risk. More specifically, it is better to evaluate the performance of fund in terms of return per unit of risk. In case of a well-diversified

portfolio the standard deviation could be used as a measure of risk, but in case of individual assets and not-so-well diversified portfolios, the relevant measure of risk could be the systematic risk. We have already seen in earlier units the measurement aspects of portfolio risk and the systematic risk.

In case of a well-diversified portfolio the standard deviation could be used as a measure of risk, but in case of individual assets and not-so-well diversified portfolios the relevant measure of risk could be the systematic risk. We have already seen in earlier units the measurement aspects of portfolio risk and the systematic risks.

There are three popular measures to estimate the return per unit of risk from a portfolio. They are:

(a) Risk-adjusted Returns

(b) Sharpe's Ratio

(c) Treynor's Measure

(d) Jensen's Differential Returns

12.3.1 Risk-adjusted Returns

The performance of a fund should be assessed in terms of return per unit of risk. The funds that provide the highest return per unit of risk would be considered the best performer. For well-diversified portfolios in all asset categories, the standard deviation is the relevant measure of risk. When evaluating individual stocks and not so well diversified portfolios, the relevant measure of risk is the systematic or market risk, which can be assessed using the beta co-efficient (β). Beta signifies the relationship between covariance (stock, market) and variance of market. Two well-known measures of risk-adjusted return are:

12.3.2 Sharpe's Ratio

A ratio developed by Nobel laureate William F. Sharpe to measure risk-adjusted performance. It is calculated by subtracting the risk-free rate – such as that of the 10-year US Treasury bond – from the rate of return for a portfolio and dividing the result by the standard deviation of the portfolio returns.

Sharpe's measure is called the "Reward-to-Variability" Ratio. The returns from a portfolio are initially adjusted for risk-free returns. These excess returns attributable as reward for investing in risky assets are validated in terms of return per unit of risk. Sharpe's ratio is as follows:

Or $$S = \frac{E[R] - R_f}{\sigma} = \frac{\bar{r}_p - r_f}{\sigma_p}$$

Where: $\bar{r}_p$ = Expected portfolio return

r_f = Risk free rate

s_p = Portfolio standard deviation

The Sharpe ratio tells us whether the returns of a portfolio are due to smart investment decisions or a result of excess risk. This measurement is very useful because although one portfolio or fund can reap higher returns than its peers, it is only a good investment if those higher returns do not come with too much additional risk. The greater a portfolio's Sharpe ratio, the better its risk-adjusted performance will be.

A variation of the Sharpe ratio is the Sortino ratio, which removes the effects of upward price movements on standard deviation to instead measure only the return against downward price volatility.

Illustration 5:

Consider two portfolios A and B. On the basis of information given below, compare the performance of portfolios A and B.

Portfolio	Return I (R_M)	Risk-free rate (R_F)	Excess return ($R_F - R_M$)	Portfolio risk (SD)
A	21	8	13	10
B	17	8	9	8

Solution:

$$A = 13/10 = 1.3$$

$$B = 9/8 = 1.125$$

Reward per unit of risk in case of Portfolio A is relatively higher. Hence its performance is said to be good.

12.3.3 Treynor Portfolio Performance Measure (Aka: Reward to Volatility Ratio)

This measure was developed by Jack Treynor in 1965. Treynor (helped developed CAPM) argues that, using the characteristic line, one can determine the relationship between a security and the market. Deviations from the characteristic line (unique returns) should cancel out if you have a fully diversified portfolio.

Treynor's Composite Performance Measure: He was interested in a performance measure that would apply to all investors regardless of their risk preferences. He argued that investors would prefer a CML with a higher slope (as it would place them on a higher utility curve). The slope of this portfolio possibility line is:

$$T_i = \frac{R_M - R_F}{\beta_1}$$

Where: R = Market Return, RFR = Risk Free return, and β_1 = SD.

A larger T_i value indicates a larger slope and a better portfolio for all investors regardless of their risk preferences. The numerator represents the risk premium and the denominator represents the risk of the portfolio; thus the value, T, represents the portfolio's return per unit of systematic risk. All risk-averse investors would want to maximize this value.

The Treynor measure only measures systematic risk – it automatically assumes an adequately diversified portfolio.

You can compare the T measures for different portfolios. The higher the T value, the better the portfolio performance. For instance, the T value for the market is:

$$T_m = \frac{R_m \times RFR}{\beta_m}$$

In this expression, $\beta_m = 1$.

Illustration 6:

Returns and SDs for four portfolios (and the calculated Sharpe Index) are given below:

Compare the performance of these three portfolio.

Portfolio	Avg. Annual ROFR	SD of return	Sharpe measure
B	0.13	0.18	0.278
O	0.17	0.22	0.409
P	0.16	0.23	0.348
Market	0.14	0.20	0.30

Thus, portfolio O did the best, and B failed to beat the market. We could draw the CML given this information: CML = 0.08 + (0.30) SD

Treynor Measure vs. Sharpe Measure: The Sharpe measure evaluates the portfolio manager on the basis of both rate of return and diversification (as it considers total portfolio risk in the denominator). If we had a fully diversified portfolio, then both the Sharpe and Treynor measures will give us the same ranking. A poorly diversified portfolio could have a higher ranking under the Treynor measure than for the Sharpe measure.

12.3.4 Jensen's Differential Returns (On Jensen Measure)

Jensen's measure is an absolute measure of performance, adjusted for risk. This measure assesses the portfolio manager's predictive ability. The objective is to calculate the return that should be expected for the fund given the risk level and comparing it with the actual return realized over the period.

Jensen Measure of differential return with risk measured by Beta: The Jensen measure of differential returns for portfolios p_1 and p_2 is

The model used is; $R_{jt} + R_{ft} + a_1 + \beta_j + (R_{mt} - R_{ft}) + e \rightarrow 1$

Or

$$Rp_1 - Rp_2 = [R_F + (R_M - R_F)\beta p_1\ ] - [R_F + (R_M - R_F)\beta p_{21}],$$

which simplifies to

$$= Rp_1 - Rp_2 = (R_M - R_F)\ (\beta p_1 - \beta p_{21}).$$

Or $$(R_A\ R_F) = [R_A - R(\beta_A)\ I + [R(B_A) - R_F]$$

The variables are expressed in terms of realized return and risk.

R_{jt} — Average return on portfolio for period t

R_{ft} — Risk-free rate of interest for period t

a_1 — Intercept that measures the forecasting ability of the portfolio manager

b_j — A measure of systematic risk

R_{mt} — Average return on the market portfolio

e — Error term.

In both Sharpe and Treynor models, it is assumed that the intercept is at the origin. In the Jensen model, the intercept can be at any point, including the origin.

If the intercept has a positive value, it indicates that the superior return has been earned due to superior management skills.

$a_j = 0$ indicates neutral performance.

The manager has done as well as an unmanaged randomly selected portfolio with a buy-and-hold strategy. If intercept has negative value it indicates that the managed portfolio did not do as well as an unmanaged portfolio of equal systematic risk.

12.3.5 Applying the Jenson Measure

This requires that you use a different risk-free rate for each time interval during the sample period. You must subtract the risk-free rate from the returns during each observation period rather than calculating the average return and average risk-free rate as in the Sharpe and Treynor measures. Also, the Jensen measure does not evaluate the ability of the portfolio manager to diversify, as it calculates risk premiums in terms of systematic risk (beta). For evaluating diversified portfolios (such as most mutual funds) this is probably adequate. Jensen finds that mutual fund returns are typically correlated with the market at rates above 0.90.

Illustration 7:

Actual Return and Risk

Funds	$\mathbf{R_{ft}}$	$\mathbf{R_{jt}}$	$\mathbf{R_{mt}}$	**Beta**
Fund A	5	12	15	0.5
Fund B	5	20	15	1.0
Fund C	5	14	15	1.10

Solution:

From equation 1 return on the portfolio is:

$$R_{jt} + R_{ft} + \alpha_1 + \beta_j + (R_{mt} - R_{ft})$$

$$\alpha = r_p - r_{jt}$$

Fund A

$$R_{jt} = 5 + 0.5\ (15 - 5) = 10$$

$\alpha = 12 - 10 = 2\%$ (Excess Positive Return)

Fund B

$$R_{jt} = 5 + 1.0(15 - 5) = 15$$

$\alpha = 20 - 15 = 5\%$ (Excess Positive Return)

Fund C

$$R_{jt} = 5 + 1.10(15 - 5) = 16$$

$\alpha = 14 - 16 = -20\%$ (Negative Return)

The Jensen measure not only calculates the differential between actual and expected earnings, but also enables an analyst to determine whether the differential return could have occurred by chance or whether it is significantly different from zero in a statistical

sense. The (alpha value) value in Equation 1 can be tested to see if it is significantly different from zero by using a 't statistic'.

12.4 DETERMINANTS OF PORTFOLIO PERFORMANCE

Performance of the portfolio depends on certain critical decisions taken by a portfolio manager. An evaluation of these decisions helps us to determine the activities that need efficiency for better portfolio performance. The popular activities associated in this regard are:

1. Investment policy
2. Stock Selection
3. Market Timing

The risk-adjusted performance measures discussed earlier primarily provide an analysis on the overall performance of a portfolio without breaking it up into sources or components. Eugene Fama has given a framework towards this purpose. Let us see it now.

As we know that Security Market Line (SML) is likely to provide a relationship between the systematic risk (B) and return on an Asset, Fama used this framework to break the actual realised return into two parts. A part of the return may be due to the size of risk that the asset carries and the remaining due to the superior selectivity skills of the portfolio manager. The excess return-form of SML can be used to estimate the expected returns. If actual return is more or less than such expected returns, it can be attributed to superior or inferior stock selection. Then, total excess return on a portfolio (say A) = Selectivity + Risk

12.4.1 Risk Taking

To earn excess return, portfolio managers bear additional risk. By using the Capital Market Line (CML) we can determine the return commensurate with risk as measured by the standard deviation of return.

Illustration 8:

The standard deviation of the fund A is assumed to be 15% and the standard deviation of the market 21%; risk free rate is 2%. Find out normal return for Fund A, using total risk.

Solution:

The normal return for Fund A, using total risk would be:

$$r_f + (r_m + r_f)\ \sigma_p - \sigma_m$$

i.e. 2% + (9% – 2%) 15% – 21% = 7%

The difference between this normal return of 7% and 6.7% that was expected when only considering market risk is 7 – 6.7 = 0.3%.

$$\text{Net selectivity} = [r_A - r(B_A)] - [r(SA) - r\ (B_A)]$$

$$= (8\% - 6.7\%) - (7\% - 6.7\%)$$

$$= 1.3\% - 0.3\% = 1\%$$

Any fund's overall performance can be thus decomposed into: (i) due to selectivity, and (ii) due to risk taking.

12.5 MARKET TIMING

A portfolio manager's performance has been seen so far in the context of stock selection for superior performance. Managers can also generate superior performance from a portfolio by planning the investment and disinvestment activities by shifting from stocks to bonds or bonds to stocks based on good market timing sense. Positioning of a portfolio is to be adjusted by correctly adjusting the direction of the market, either in the bull or bear phases. Managers with a forecast of a declining market can position a portfolio either by shifting resources from stocks to bonds, or restructure the component stocks in such a way that the beta of the equity portion of the portfolio comes down.

One way of finding the performance of a portfolio in this regard is to simply look directly at the way the fund return behaves, relative to the return of the market. This method calls for calculating the returns of the portfolio and the market at different intervals and plot a scatter diagram to see the direction of relationship between these two. If a portfolio is constructed by concentrating on stock selection rather than keeping the market timing in mind, the average beta of the portfolio stands fairly constant and if we plot such a portfolio's returns and market returns, we observe a linear relationship. On the other hand, if a manager was able to successfully assess the market direction and reshuffle the portfolio accordingly, we would observe a situation of high portfolio betas at times of rise in market and low portfolio beta at times of decline in the market.

Portfolio managers can also achieve superior performance by picking up high beta stocks during a market upswing and moving out of equity, one could calculate the quarterly returns for a fund and for the market index like Bombay Stock Exchange's National Index of a 5-year period.

Check Your Progress 2

State whether the following statements are true or false:

1. Mutual funds have gained popularity in India since the early 90s.
2. All mutual funds are specially designed portfolio.
3. Modern portfolio theory provides the measures to measure the return on a portfolio as well as risk.
4. Benchmark portfolio is not a tool for meaningful evaluation of the performance of a portfolio manager.
5. Performance of portfolio does not depend on certain critical decisions taken by a portfolio manager.

12.6 BENCHMARK PORTFOLIOS FOR PERFORMANCE EVALUATION

Benchmark portfolio is a tool for the meaningful evaluation of the performance of a portfolio manager. The more the benchmark reflects the manager's stated style, the more accurately the performance due to a manager's skills can be assessed. Specialized benchmarks are called "normal portfolios." They are specially constructed by mutual consent of the client and the manager to reflect the client's needs and the manager's style. Some management firms develop a normal portfolio, which they can use for all clients, and some develop it separately for each type of client. When benchmarks are designed in advance, the portfolio manager knows what the specific objectives are and

tailors the portfolio accordingly. The benchmark should reflect the appropriate investment universe in which the manager works. Without a yardstick for proper comparison, it becomes difficult to distinguish between active management skills and random results.

Rather than using a market index like the Bombay Stock Exchange's Sensitive Index to the Economic Times Index, a benchmark portfolio would use a portfolio with predominantly value-oriented shares for a value manager, growth-oriented shares for a growth manager and small capitalization shares for a small cap (size) manager. It is quite possible for an investment manager to perform better than the benchmark, though the benchmark may itself under-perform in relation to a market index. The process of constructing a benchmark portfolio involves:

(a) Defining the universe of stock to be used for the benchmark portfolio, and

(b) Defining the weightage of the stocks in the universe.

Performance attribution analysis, as mentioned earlier, is a means of evaluating an investment manager's performance, the return and the sources of return relative to a benchmark portfolio. This analysis looks at an investment manager's total 'excess' return, or 'active management return' (AMR) relative to its benchmark over the given period.

12.7 LET US SUM UP

We have examined the issues associated with portfolio evaluation by constructing simple model of NAV and Dollar-Weighted Rate of Return; methods of computing portfolio return viz. Value-Weighted Return and Risk-adjusted Rate of Return. We have also distinguished between performance measurement and performance evaluation and highlighted the primary components of performance namely stock selection and market timing and also the concepts and method of construction of a benchmark portfolio for comparison and evaluation with a managed portfolio. And further, a detailed discussion is provided on risk-adjusted methods like Sharpe Treynor and Jensen's Measures. In addition a focus is made on the performance determinants.

12.8 LESSON END ACTIVITY

Distinguish between time weighted and dollar weighted rate of return, Under what performance measurement circumstances might the dollar weighted return be preferred to the time weighted.

12.9 KEYWORDS

Differential Return: The return that should be expected for the fund given the risk level and comparing it with the actual return realized over the period.

Dollar-Weight Rate of Return: The internal rate of return that equates the initial distribution and the cash flows that occur during the period with the ending value of the fund is the dollar-weighted rate of return.

Time-Weighted Return: It is the weighted average of the internal rates of return for the sub-periods between the cash flows and it is weighted by the length of the sub-periods.

Modern Portfolio Theory: It provides a variety of measures to measure the return on a portfolio as well as the risk.

Benchmark Portfolio: It is a tool for the meaningful evaluation of the performance of a portfolio manager.

12.10 QUESTIONS FOR DISCUSSION

1. Explain briefly the methods of calculating portfolio returns.
2. What is dollar-weighted rate of return method?
3. Explain the time-weighted rate of return method.
4. What is unit value method? How is unit value method different from the dollar-weighted rate method?
5. What are portfolio performance and risk-adjusted methods?
6. Explain Sharpe's Ratio, Treynor's Measure, and Jensen's Differential Return.
7. What are the determinants of portfolio performance?
8. Distinguish between time-weighted and dollar-weighted rate of return. Under what performance measurement circumstances might the dollar-weighted return be preferred to the time-weighted one?
9. Using a recent NSE and BSE website, find the closing value of the NIFTY stock and Sensex and compare the same. Write a comment on variation, if any.

CYP 1

1. individual 2. holding 3. four 4. length.

CYP 2

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

12.11 SUGGESTED READINGS

Sudhindra Bhat, *Security Analysis and Portfolio Management*, Excel Books, Delhi.

Kevin, S., *Security Analysis and Portfolio Management*, Prentice Hall of India.

Prasanna Chandra, *Investment Analysis and Portfolio Management*, Second Edition, Tata McGraw Hill.

Punithavathy Pandian, *Securities Analysis and Portfolio management*, Vikas.

Investment Management, V. K. Bhalla.

A. Davis, *Investors in a Changing Economy*, Prentice -Hall, 1968.

Williamson, J. Peter, *Investments: New Analytic Techniques*, London, Longman, 1970.

Cottle, CC., and Whitman, W.T., *Investment Timing: The Formula Plan Approach*, McGraw Hill.

LESSON

13

PORTFOLIO REVISION

CONTENTS

13.0 AIM AND OBJECTIVES

After reading this chapter you should be able to understand:

- Meaning of Portfolio Revision
- Need for Portfolio Revision
- Portfolio Revision Strategies
- Portfolio Revision Practices
- Constraints in Portfolio Revision
- Formula Plans

13.1 INTRODUCTION

In the entire process of portfolio management, portfolio revision is as important as portfolios analysis and selection. Keeping in mind the risk-return objectives, an investor selects a mix of securities from the given investment universe. In a dynamic world of investment, it is only natural that the portfolio may not perform as desired or opportunities might arise turning the desired into less that desired. In every such situation, a portfolio revision is warranted. Portfolio revision involves changing the existing mix of securities. The objective of portfolio revision is similar to the objective of portfolio selection i.e. maximizing the return for a given level of risk or minimizing the risk for a given level of return. The process of portfolio revision may also be similar to the process of portfolio selection. This is particularly true where active portfolio revision strategy is followed. Where passive portfolio revision strategy is followed, use of mechanical formula plans may be made. What are these formula plans? We shall discuss these and other aspects of portfolio revision in this unit. Let us begin by highlighting the need for portfolio revision.

13.2 NEED FOR PORTFOLIO REVISION

No plan can be perfect to the extent that it would not need revision sooner or later. Investment plans are certainly not. In the context of portfolio management, the need for revision is ever more because the financial markets are continually changing. Thus the need for portfolio revision might simply arise because the market witnessed some significant changes since the creation of the portfolio. Further, the need for portfolio revision may arise because of some investor-related factors such as (i) availability of additional wealth, (ii) change in the risk attitude and the utility function of the investor, (iii) change in the investment goals of the investors, and (iv) the need to liquidate a part of the portfolio to provide funds for some alternative uses. The other valid reasons for portfolio revision such as short-term price fluctuations in the market do also exist. There are, thus, numerous factors, which may be broadly called market related and investor-related, which spell need for portfolio revision.

13.3 PORTFOLIO REVISION STRATEGIES

As are there numerous factors motivating revision of portfolio, so are there numerous strategies of portfolio revision. Broadly speaking, investors may, depending on their investment objectives, skill and resources, follow active or passive strategies for portfolio revision. Active strategy of portfolio revision involves a process similar to portfolio analysis and selection, which is based on an analysis of fundamental factors covering economy, industries and companies as well as technical factors. As against this, under passive strategy some kinds of formula plans are followed for revision.

An active revision strategy seeks “beating the market by anticipating” or reacting to the perceived events or information. Passive revision strategy, on the other hand, seeks ‘performing as the market.’ The followers of active revision strategy are found among believers in the ‘market inefficiency’, whereas passive revision strategy is the choice of believers in ‘market efficiency.’ The frequency of trading transaction, as is obvious, will be more under active revision strategy than under passive revision strategy and so will be the time, money and resources required for implementing active revision strategy than for passive revision strategy. In other words, active and passive revision strategies differ in terms of purpose, process and cost involved. The choice between the two strategies is certainly not very straightforward. One has to compare relevant costs and benefits. On the face of it, active revision strategy might appear quite appealing but in actual practice, there exist a number of constraints in undertaking portfolio revision itself.

13.3.1 Portfolio Revision Practices

In the US, both active and passive portfolio revision strategies have been prevalent. Studies about portfolio revision strategies followed by US investors show that the efficient market hypothesis is slowly but continuously gaining believers and these converts revise their portfolio much less often than they were doing previously because of their rising faith in market efficiency. Institutional investors in the US, on the other hand, have shown a definite tendency in the recent past for active revision of their portfolios. This is reportedly motivated by their desire to achieve superior performance by frequent trading to take advantage of their supposedly superior investment skills.

Some research studies undertaken in the US about the market timing and portfolio revision suggested as follows:

F. Black (1973) found that monthly and weekly revision could be rewarding strategy. Though when transactions costs were considered, the results were less impressive, but of course, still significantly positive.

H.A. Latane et al. (1974) concluded that complete portfolio revision every six months would have been a rewarding strategy.

Sharpe (1975) wrote: "A manager who attempts to time the market must be right roughly three times out of four, in order to out perform the buy-and-hold portfolio. If the manager is right less often, the relative performance will be inferior because of transaction costs and the manager will often have funds in cash equivalents when they could be earning the higher returns available from common stock."

Institutional investors who continue to be dominant in the Indian stock market do not seem to resort to active portfolio revision mainly for statutory reasons. Another feature of their portfolio revision is that they continue to emphasize individual securities rather than portfolio risk-return changes.

Check Your Progress 1

Fill in the blanks:

1. Portfolio revision involves changing the existing mix of _____ .
2. The objective of portfolio revision is similar to the objective of portfolio _____ .
3. Active and passive revision strategies differ in terms of purpose, process, and _____ involved.
4. A manager who attempts to time the market must be right roughly three times out of four, in order to outperform the buy-and- hold _____ .

13.4 CONSTRAINTS IN PORTFOLIO REVISION

A look into the portfolio revision practices as discussed above highlight that there are a number of constraints in portfolio revision, in general and active portfolio revision, in particular. Let us indicate some common constraints in portfolio revision as follows:

Transaction cost: As you know, buying and selling of securities involve transaction costs, including brokers' fee. Frequent buying and selling for portfolio revision may push up transaction costs beyond gainful limits.

Taxes: In most countries, capital gains are taxed at concessional rates. But for any income to qualify as capital gains, it should be earned after the lapse of a certain period. In many cases, the period is 36 months. Frequently selling portfolio revision may mean foregoing capital gains tax concessions. Higher the tax differential (between rates of tax for income and capital gains), the higher the constraints rise. Even for tax switches, which mean that one stock is sold to establish a tax loss and a comparable security is purchased to replace it in the investor's portfolio, one must wait for a minimum period after selling a stock and before repurchasing it, to be declare the gain or loss. If the stock is repurchased before the minimum fixed period, it is considered a wash sale, and no gain or loss can be claimed for tax purposes.

Statutory Stipulation: In many countries like India, statutory stipulations have been made as to the percentage of investible funds that can be invested by investment companies/mutual funds in the shares/debentures of a company or industry. In such a situation, the initiative to revise the portfolio is most likely to get stifled under the burden of various stipulations. Government-owned investment companies and mutual funds are quite often called upon to support sagging markets (albeit counters) or to cool down heated markets, which put limits on the active portfolio revision by these companies.

No Single Formula: Portfolio revision is not an exact science. Even today, there does not exist a clear-cut answer to the overall question of whether, when and how to revise a portfolio. The entire process is fairly cumbersome and time-consuming. Investment literature does provide some formula plans, which we shall discuss in the following section, but they have their own assumptions and limitations.

13.5 FORMULA PLANS

13.5.1 Formula Investing

Investment technique is based on a predetermined timing or asset allocation model that eliminates emotional decisions. One type of formula investing, called dollar cost averaging, involves putting the same amount of money into a stock or mutual fund at regular intervals, so that more shares will be bought when the price is low and less when the price is high. Another formula investing method calls for shifting funds from stocks to bonds or vice versa as the stock market reaches particular price levels. If stocks rise to a particular point, a certain amount of the stock portfolio is sold and put in bonds. On the other hand, if stocks fall to a particular low price, money is brought out of bonds into stocks.

Somewhat similar to the constant-dollar plan is the constant-ratio formula. It is one of the oldest formulas in existence, having been used as long as 20 years ago. More important, it still stands up today, and is widely used, despite the drastic changes, which have taken place in the market.

It fulfils, perhaps, better than any other formula, the basic theoretical requirements of formula investing. It permits the investor to participate to some extent in bull markets, while at the same time protecting him from serious price declines. And because it is not married to a fixed-dollar amount in stocks (as in the constant-dollar plan) or a 'norm' (as in the variable-ratio plans to be discussed in the next chapter), the method has a high degree of flexibility. One reason for its durability and its effectiveness is that no forecast whatsoever is made about the character of future markets, other than that they will continue to fluctuate, which is hardly a hazardous assumption.

Because of the clear-cut advantages of this plan, it has been widely used by institutions, such as trust, endowment and pension funds. Its first use, as will be seen later, was in a college endowment fund. In past years, however, its popularity with some institutional

investors has waned (although others are still quite satisfied), and it has been adopted more and more by individuals.

Here is how it works: The total investment fund is divided into two equal portions, one half to be invested in stocks, the other in bonds. As the market rises, stocks are sold and bonds are bought to restore the 50-50 relationship. If the market goes down, the reverse procedure is followed, bonds being sold and stocks bought to return to the 50-50 ratio.

13.5.2 Basic Assumptions and Ground Rules of Formula Plan

The formula plans are based on the following assumption:

- One, the stock prices move up and down in cycle.
- Two, the stock prices and the high-grade bond prices move in the opposite directions.
- Three, the investors cannot or are not inclined to forecast direction of the next fluctuations in stock prices, which may be due to lack of skill and resources or their belief in market efficiency or both.

The use of formula plans call for the investor to divide his investment funds into two portfolios, one aggressive and the other conservative or defensive. The aggressive portfolio usually consists of stocks while conservative portfolio consists of bonds. The formula plans specify predesignated rules for the transfer of funds from that aggressive into the conservative and vice-versa such that it automatically causes the investors to sell stocks when their prices are rising and buy stocks when their prices are falling. Let us now discuss, one by one, the three formula plans.

13.5.3 Constant Dollar-Value Plan

An investment strategy designed to reduce volatility in which securities, typically mutual funds, are purchased in fixed dollar amounts at regular intervals, regardless of what direction the market is moving. Thus, as prices of securities rise, fewer units are bought, and as prices fall, more units are bought also called constant dollar plan, also called dollar cost averaging.

13.5.4 Dollar Cost Averaging

Periodic investment of a fixed dollar amount, as in a particular stock or fund or in the market as a whole, on the belief that the average value of the investment will rise over time and that it is not possible to foresee the intermediate highs and lows.

Dollar-Cost Averaging – DCA

It is a technique of buying a fixed dollar amount of a particular investment on a regular schedule, regardless of the share price. More shares are purchased when prices are low, and fewer shares are bought when prices are high. Also referred to as "constant dollar plan".

Investopedia says: "Eventually, the average cost per share of the security will become smaller and smaller. Dollar-cost averaging lessens the risk of investing a large amount in a single investment at the wrong time. In the UK, it is known as "pound-cost averaging."

The Constant-Dollar-Value Plan (CDVP) asserts that the dollar value (or rupee value in Indian context) of the stock portion of the portfolio will remain constant. This in operational terms, would mean that as the stock rises, the investor must automatically sell some of the shares to keep the value of his aggressive portfolio constant. If, on the other hand, the prices of the stocks fall, the investors must buy additional stocks to keep the value of the aggressive portfolio constant. By specifying that the aggressive portfolio

will remain constant in dollar value, the plan implies that the remainder of the total fund will be invested in the conservative fund. In order to implement this plan, an important question to answer is what will be the action points? Or, in other words, when will the investor make the transfer called for to keep the dollar value of the aggressive portfolio constant? Will it be made with every change in the prices of the stocks comprising the aggressive portfolio? Or, will it be set pre-specified period of time or percentage change in some economic or market index or percentage change in the value of the aggressive portfolio?

The investor must choose predetermined action points, also called revaluation points, very carefully; the action points can have significant effect on the returns of the investor. Action points placed at every change or too close would cause excessive transaction costs that reduce return and the action points place too far apart may cause the loss of opportunity to profit from fluctuations that take place between them. Let us take an example to clarify the working of constant-dollar-value-plan. The table below presents the relevant data.

Table 13.1: Example of a Constant-Dollar-Value Formula Plan

1	2	3	4	5	6	7
Stock Price Index	**Value of Buy-and-Hold Strategy (800 shares x Col. 1)** **(Rs.)**	**Value of Conservative Portfolio (Col.5-Col.4)** **(Rs.)**	**Value of Aggressive Portfolio (Col.JxCol.1)** **(Rs.)**	**Total Value of Constant Dollar Portfolio (Col.3+Col.4)** **(Rs.)**	**Revaluation Action**	**Total Number of Shares in Aggressive**
25	20,000	10,000	10,000	20,000		Portfolio 400
22	17,600	10,000	8,800	18,800		400
20	16,000	10,000	8,000	18,000		400
20	16,000	8,000	10,000	18,000	Buy 10 Shares at 20*	500
22	17,600	8,000	11,000	19,000		500
24	19,200	8,000	12,000	20,000		500
24	19,200	10,000	10,000	20,000	Sell 83.3 Shares at 24	416.7
26	20,800	10,000	10,830	20,830		416.7
28.8	23,040	10,000	12,000	22,000		416.7
28.8	23,040	12,000	10,000	22,000	Sell 69.5 Shares at 28.8	347.2
25	20,000	12,000	8,700	20,700		347.2

* To restore the stock portfolio to Rs. 10,000, Rs. 2,000 is transferred from the conservative portfolio and used to purchase 100 shares at Rs. 20 per share.

In our example, an investor with Rs. 20,000 for investment decides that the constant dollar (rupee) value of his aggressive portfolio will be Rs. 10,000. The balance of Rs. 10,000 will make up his conservative portfolio at the beginning. He purchases 400 shares selling at Rs. 25 per share. He also determines that he will take action to transfer funds from an aggressive portfolio to a conservative portfolio or vice-versa each time the value of his aggressive portfolio reaches 20% above or below the constant value of Rs. 10,000.

The position and actions of the investor during the complete cycle of the price fluctuations of stocks comprise the portfolio. Although the example refers to the investment in one stock, the concepts are identical for a portfolio of stocks, as the value change will be for the total portfolio. In this example, we have used fractional shares and have ignored transaction costs to simply the example. In order to highlight the revaluation actions of our investors, we have shown them 'boxed' in Table 13.1. The value of the buy-and-hold strategy is shown in column (2) to enable comparison with the total value of our investors' portfolio column (5) as per constant-dollar-value plan of portfolio revision. Notice the revaluation actions (represented by boxed areas in Table 13.1) taken when the price fluctuated to Rs. 20, 24 and 28.8, since the value of the aggressive fund became 20% greater or less than the constant value of Rs. 10,000. Notice also that the investor using the constant-dollar-value formula plan has increased the total value of his fund to Rs. 20,700 after the complete cycle, while the buy-and-hold strategy yielded only Rs. 20,700. Let us now illustrate another formula plan, namely, constant-ratio-plan.

13.5.5 Constant-Ratio Plan

This is an investment strategy in which the portfolio's composition by asset class is maintained at a certain level through periodic adjustments. When the balance is upset, it is periodically restored by moving money from over-performing assets to under performing ones. This system prevents one asset class from dominating the portfolio. This is one way to maintain a desirable asset allocation.

Table 13.2: Example of Constant-Ratio Formula Plan

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Stock Price Index	**Value of Buy-and-Hold Strategy (800 shares xCol.1)**	**Value of Conservative Portfolio (Col.5-Col.4)**	**Value of Aggressive Portfolio (Col.8xCol.1)**	**Total Value of Constant Ratio Portfolio (Col.3+Col.4)**	**Ratio (4): (3)**	**Revaluation Action**	**Total No. of Shares in Aggressive Portfolio**
	(Rs.)	**(Rs.)**	**(Rs.)**	**(Rs.)**			
25	20,000	10,000	10,000	20,000	1.00		400
23	18,400	10,000	9,200	19,200	0.92		400
22.5	18,000	10,000	9,000	19,000	0.90		400
22.5	18,000	9,500	9,500	19,000	1.00	Buy 22.2	422.2
						Shares	
						at 22.5 *	
20.25 20.25	16,200 16,200	9,500 9,020	8,540 9,020	18,040 18,040	0.90 1.00	Buy 23.7	422.2 445.9
						Shares at 20.25	
20	16,000	9,020	8,910	17,930	0.99		445.9
22.4	17,920	9,020	9,920	18,940	1.10		445.9
22.4	17,920	9,470	9,470	18,940	1.00	Sell 20.1 Shares at 22.4	445.9

Contd....

24.6	19,920	9,470	10,430	19,900	1.10		425.8
24.6	19,920	9,950	9,950	19,900	1.00	Sell 19.5 Shares at 24.6	406.3
27.0	21,600	9,950	10,950	20,900	1.10		406.3
27.0	21,600	10,450	10,450	20,900	1.00	Sell 18.5 Shares at 27.0	387.8
28.8	23,040	10,450	11,170	21,620	1.07		387.8
27.0	21,600	10,450	10,450	20,900	1.00		387.8
25	20,000	10,450	9,670	20,120	0.93		387.8

* To restore the ratio from .90 to 1.00, total value of the fund, Rs. 19,000, is simply split in two equal segments of Rs. 9,500; and Rs. 9500/ 9,500 = 1.00. The Rs. 500 transferred from the conservative portfolio will buy 22.2 Shares at the prevailing price of Rs. 22.50.

The constant-ratio plan specifies that the value of the aggressive portfolio to the value of the conservative portfolio will be held constant at the predetermined ratio. This plan automatically forces the investor to sell stocks as their prices rise, in order to keep the ratio of the value of their aggressive portfolio to the value of the conservative portfolio constant. Likewise, the investor is forced to transfer funds from conservative portfolios to aggressive portfolios as the price of stocks fall. We may clarify the operations of this plan with the help of an example. For the sake of our example, the starting point and other information are the same as in the previous example. The desired ratio is 1:1. The initial fund of Rs. 20,000 is thus divided into equal portfolios of Rs. 10,000 each. The action points are predetermined at + .10 from the desired ratio of 1.00. The table shows, in boxes, the actions taken by our investor to readjust the values of the two portfolios to re-obtain the desired ratio.

You may notice that the constant-ratio plan calls for more transactions than the constant-dollar-value plan did, but the actions triggered by this plan are less aggressive. This plan yielded an increase in total value at the end of the cycle compared with the total value yielded under constant-dollar-value plan. It did, however, outperform the buy-and-hold strategy. Let us now explain and illustrate variable-ratio plan.

13.5.6 Variable-Ratio Plan

Variable-ratio plan is a more flexible variation of constant ratio plan. Under the variable ratio plan, it is provided that if the value of aggressive portfolio changes by certain percentage or more, the initial ratio between the aggressive portfolio and conservative portfolio will be allowed to change as per the pre-determined schedule. Some variations of this plan provide for the ratios to vary according to economic or market indices rather than the value of the aggressive portfolio. Still others use moving averages of indicators.

In order to illustrate the working of variable ratio plan let us continue with the previous example with the following modifications:

The variable-ratio plan states that if the value of the aggressive portfolio rises by 20% or more from the present price of Rs. 25, the appropriate ratio of the aggressive portfolio will be 3:7 instead of the initial ratio of 1:1. Likewise, if the value of the aggressive portfolio decreases by 20% or more from the present price of Rs. 25, the appropriate percentage of aggressive portfolio to conservative portfolio will be. The table presents, in boxes, the actions taken by our investor to readjust the value of the aggressive portfolio as per variable-ratio plan.

Table 13.3: Example of Variable-Ratio Formula Plan

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Stock Price Index	**Value of Buy-and-Hold Strategy (800shares xCol.1)** **(Rs.)**	**Value of Conservative Portfolio (Col.5-Col.4)** **(Rs.)**	**Value of Aggressive Portfolio (Col.8xCol.1)** **(Rs.)**	**Total Value of Constant Ratio Portfolio (Col.3+Col.4)** **(Rs.)**	**Value of Stock as % of Total Fund (Col.4+ Col.5)** **(%)**	**Revaluation Action**	**Total No. of Shares in Aggressive Portfolio**
25	20,000	10,000	10,000	20,000	50		400
22	17,600	10,600	8,800	18,800	47		400
20	16,000	10,000	8,000	18,000	44.5		400
20	16,000	5,400	12,600	18,000	70	Buy 230 Shares at 20	630
22	17,600	5,400	13,860	19,260	72		630
25	20,000	5,400	15,760	21,160	74.5		630
25	20,000	10,580	10,580	21,160	50	Sell 207 Shares at 25	423
26	20,800	10,580	11,000	20,580	53		423
28.8	23,040	10,580	12,180	22,760	54		423
25	20,000	10,580	10,580	21,160	50		423

You may notice that the increase in the total value of the portfolio after the complete cycle under this plan is Rs. 1160, which is greater than the increase registered under the other two formula plans. The revaluation actions/transactions undertaken are also fewer under this plan compared to other two plans. Variable ratio plan may, thus, be more profitable comparable to constant-dollar-value plan and the constant-ratio plan. But, as is obvious, variable ratio plan demands more forecasting than the other formula plans. You must have observed, the variable ratio plan requires forecasting of the range of fluctuations both above and below the initial price (or say median price) to establish the varying ratios at different level of portfolio values. Beyond a point, it might become questionable as to whether the variable ratio plan is less complicated than the extensive analysis and forecasting that it was supposed to replace.

Check Your Progress 2

State whether the following statements are true or flase:

1. Transaction cost is the cost involved in the buying and selling of securities.
2. The problem of portfolio revision essentially boils down to timing the buying and selling the securities.
3. Portfolio revision is required more because the financial markets are continually changing.
4. An active revision strategy seeks 'beating the market by anticipating' or reacting to the perceived events or information.
5. Mechanical portfolio revision techniques involve three formula plans: constant-

13.5.7 Limitations

Indeed, none of the formula plans are a royal road to riches. First, as an effort to provide mechanical rules for portfolio revision, they make no provision for what securities should be selected for investment. Second, formula plans by their nature are inflexible. This inflexibility makes it difficult to know if and when to adjust the plan to new conditions emerging in the investment environment. Finally, in the absence of much faith in the market efficiency, particularly in the developing stock markets, there may not be many followers of formula plans for portfolio revision.

13.6 LET US SUM UP

The portfolio revision strategies adopted by investors can be broadly classified as 'active' and 'passive' revision strategies. This unit also points out that while both 'active' and 'passive' revision strategies are followed by investors and portfolio managers, "passive' strategy is followed by believers of market efficiency or those who lack portfolio analysis and selection skills and resources. Major constraints, which come in the way of portfolio revision, are transaction costs, taxes, statutory stipulations and lack of ideal formula. This unit also discusses and illustrates three formula plans of portfolio revision, namely, constant-dollar-value plan, constant-ratio plan and variable-ratio plan. Before closing the discussion about formula plans, it is noted that these formula plans are not a royal road to riches. They have their own limitations. The choice of portfolio revision strategy or plan is, thus, no simple question. The choice will involve cost benefit analysis.

No plan can be perfect to the extent that it would not need revision sooner or later. Investment plans certainly are not. In the context of portfolio management the need for revision is ever more because the financial markets are continually changing. Thus the need for portfolio revision might simply arise because market witnessed some significant changes since the creation of the portfolio. Further, the need for portfolio revision may arise because of some investor-related factors such as (i) availability of additional wealth, (ii) change in the risk attitude and the utility function of the investor, (iii) change in the investment goals of the investors, and (iv) the need to liquidate a part of the portfolio to provide funds for some alternative uses. The other valid reasons for portfolio revision such as short-term price fluctuations in the market do also exist. There are, thus, numerous factors, which may be broadly called market-related and investor-related, which spell need for portfolio revision.

13.7 LESSON END ACTIVITY

Study on Indian Investors Bond Portfolio management strategies with special reference to your area.

13.8 KEYWORDS

Portfolio Revision: It involves changing the existing mix of securities.

Transaction Cost: As you know, buying and selling of securities involve transaction costs, including brokers' fee. Frequent buying and selling for portfolio revision may push up transaction costs beyond gainful limits.

DCA: It is a technique of buying a fixed dollar amount of a particular investment on a regular schedule, regardless of the share price. More shares are purchased when prices are low, and fewer shares are bought when prices are high. Also referred to as "constant dollar plan".

CDVP: The Constant-Dollar-Value Plan (CDVP) asserts that the dollar value (or rupee value in Indian context) of the stock portion of the portfolio will remain constant.

Variable-Ratio Plan: If the value of aggressive portfolio changes by certain percentage or more, the initial ratio between the aggressive portfolio and conservative portfolio will be allowed to change as per the pre-determined schedule.

Constant Ratio Plan: This is an investment strategy in which the portfolio's composition by asset class is maintained at a certain level through periodic adjustments.

13.9 QUESTIONS FOR DISCUSSION

1. Explain portfolio revision.
2. What is the need for portfolio revision?
3. What are the portfolio revision strategies?
4. Write on portfolio revision practices.
5. Write about the constraints in portfolio revision.
6. What are the basic assumptions and ground rules of formula plans?
7. Write a short note on constant dollar-value plan.
8. What do you understand by dollar cost averaging?

Check Your Progress: Model Answers

CYP 1

1. securities 2. revision 3. cost 4. portfolio

CYP 2

1. True 2. True 3. True 4. True 5. True

13.10 SUGGESTED READINGS

Sudhindra Bhat, *Security Analysis and Portfolio Management*, Excel Books, Delhi.

Kevin, S., *Security Analysis and Portfolio Management*, Prentice Hall of India.

Prasanna Chandra, *Investment Analysis and Portfolio Management*, Second Edition, Tata McGraw Hill.

Punithavathy Pandian, *Securities Analysis and Portfolio management*, Vikas.

Investment Management, V. K. Bhalla.

A. Davis, *Investors in a Changing Economy*, Prentice -Hall, 1968.

Williamson, J. Peter, *Investments: New Analytic Techniques*, London, Longman, 1970.

Cottle, CC., and Whitman, W.T., *Investment Timing: The Formula Plan Approach*, McGraw Hill.

LESSON

14

CAPITAL ASSET PRICING MODEL

CONTENTS

14.0 AIM AND OBJECTIVES

After studying this lesson, you should be able to understand:

- Concepts of Risk-free Asset, Risk-free Lending and Borrowings
- The Capital Asset Pricing Model
- Testing the Capital Asset Pricing Model
- Capital Market Line
- Security Market Line
- Empirical Evidence on the Capital Asset Pricing Model
- Arbitrage Pricing Theory
- Modern Portfolio Theory
- Mean Variance Analysis Developed by Harry Markowitz
- Assumptions of Mean Variance Analysis
- Concept of Efficient Frontier
- Capital Market Line and Identification of Market Portfolio

14.1 INTRODUCTION TO CAPM

William F. Sharpe and John Linter developed the Capital Asset Pricing Model (CAPM). The model is based on the portfolio theory developed by Harry Markowitz. The model emphasises the risk factor in portfolio theory is a combination of two risks, systematic risk and unsystematic risk. The model suggests that a security's return is directly related to its systematic risk, which cannot be neutralised through diversification. The combination of both types of risks stated above provides the total risk. The total variance of returns is equal to market related variance plus company's specific variance. CAPM explains the behaviour of security prices and provides a mechanism whereby investors could assess the impact of a proposed security investment on the overall portfolio risk and return. CAPM suggests that the prices of securities are determined in such a way that the risk premium or excess returns are proportional to systematic risk, which is indicated by the beta coefficient. The model is used for analysing the risk-return implications of holding securities. CAPM refers to the manner in which securities are valued in line with their anticipated risks and returns. A risk-averse investor prefers to invest in risk-free securities. For a small investor having few securities in his portfolio, the risk is greater. To reduce the unsystematic risk, he must build up well-diversified securities in his portfolio.

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

The CAPM is usually expressed:

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

β (Beta), is the measure of asset sensitivity to a movement in the overall market; Beta is usually found via regression on historical data. Betas exceeding one signify more than average "riskiness"; betas below one indicate lower than average.

$E(R_m) – (R_f)$ is the market premium, the historically observed excess return of the market over the risk-free rate.

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 to establish the correct price for the asset. (*Here again, the theory accepts in its assumptions that a parameter based on past data can be combined with a future expectation.*)

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. In theory, 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; it is undervalued for a too low price.

14.1.1 Assumptions of CAPM

Assumptions to Capital Asset Pricing Model

Because the CAPM is a theory, we must assume for argument that:

1. All assets in the world are traded.
2. All assets are infinitely divisible.
3. All investors in the world collectively hold all assets.
4. For every borrower, there is a lender.
5. There is a riskless security in the world.
6. All investors borrow and lend at the riskless rate.
7. Everyone agrees on the inputs to the Mean-STD picture.
8. Preferences are well described by simple utility functions.
9. Security distributions are normal, or at least well described by two parameters.
10. There are only two periods of time in our world.

This is a long list of requirements, and together they describe the capitalist's ideal world. Everything may be bought and sold in perfectly liquid fractional amounts even human capital! There is a perfect, safe haven for risk-averse investors i.e. the riskless asset. This means that everyone is an equally good credit risk! No one has any informational advantage in the CAPM world.

14.1.2 Investment Implications

CAPM tells us that all investors will want to hold "capital-weighted" portfolios of global wealth. In the 1960s when the CAPM was developed, this solution looked a lot like a portfolio that was already familiar to many people: the S&P 500. The S&P 500 is a capital-weighted portfolio of most of the US' largest stocks. At that time, the US was the world's largest market, and thus, it seemed to be a fair approximation to the 'cake.' Amazingly, the answer was right under our noses – the tangency portfolio must be something like the S&P 500 Not co-incidentally, widespread use of index funds began about this time. Index funds are mutual funds and/or money managers who simply match the performance of the S&P. Many institutions and individuals discovered the virtues of indexing. Trading costs were minimal in this strategy: capital-weighted portfolios automatically adjust to changes in value when stocks grow, so that investors need not change their weights all the time – it is a "buy-and-hold" portfolio. There was also little evidence at the time that active portfolio management beat the S&P index – so why not?

14.1.3 Is the CAPM true?

Any theory is only strictly valid if its assumptions are true. There are a few nettlesome issues that call into question the validity of the CAPM:

- Is the world in equilibrium?
- Do you hold the value-weighted world wealth portfolio?
- Can you even come close?
- What about "human capital?"

While these problems may violate the letter of the law, perhaps the spirit of the CAPM is correct. That is, the theory may be a good prescription for investment policy. It tells investors to choose a very reasonable, diversified and low cost portfolio. It also moves them into global assets, i.e. towards investments that are not too correlated with their personal human capital. In fact, even if the CAPM is approximately correct, it will have a major impact upon how investors regard individual securities. Why?

14.2 PORTFOLIO RISK

Suppose you were a CAPM-style investor holding the world wealth portfolio, and someone offered you another stock to invest in. What rate of return would you demand to hold this stock? The answer before the CAPM might have depended upon the standard deviation of a stock's returns. After the CAPM, it is clear that you care about the effect of this stock on the TANGENCY portfolio. The Figure shows that the introduction of asset A into the portfolio will move the tangency portfolio from T(1) to T(2).

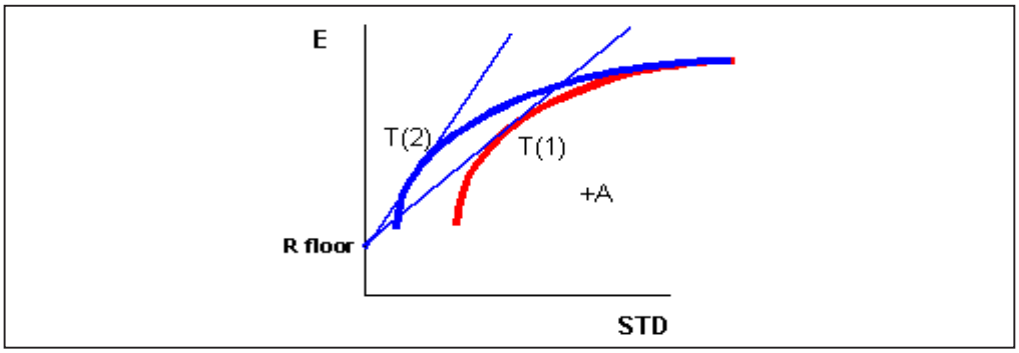


Figure 14.1: Portfolio Risk

The extent of this movement determines the price you are willing to pay (alternately, the return you demand) for holding asset A. The lower the average correlation A has with the rest of the assets in the portfolio, the more the frontier, and hence T, will move to the left. This is good news for the investor – if A moves your portfolio left, you will demand lower expected return because it improves your portfolio risk-return profile. This is why the CAPM is called the "Capital Asset Pricing Model." It explains relative security prices in terms of a security's contribution to the risk of the whole portfolio, not its individual standard deviation.

The CAPM is a theoretical solution to the identity of the tangency portfolio. It uses some ideal assumptions about the economy to argue that the capital weighted world wealth portfolio is the tangency portfolio, and that every investor will hold this same portfolio of risky assets. Even though it is clear they do not, the CAPM is still a very useful tool. It has been taken as a prescription for the investment portfolio, as well as a tool for estimating an expected rate of return. In the next chapter, we will take a look at the second of these two uses.

14.2.1 Further Explorations of the Capital Asset Pricing Model

I. Risk-Return Trade-off: A Technical Aside: They evaluate the attractiveness of a security based upon its contribution to portfolio risk, rather than its volatility per se. The intuition is that an asset with a low correlation to the tangency portfolio is desirable, because it shifts the frontier to the left.

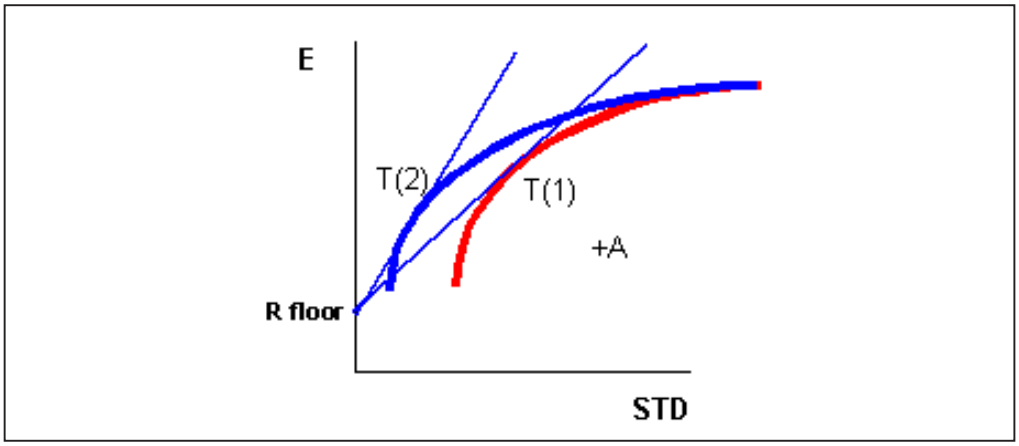


Figure 14.2: Risk-Return Trade-off

Stephen Ross formalized this institution in an article called Finance, published in *The New Palgrave*. It is a simple argument that shows the theoretical basis for the 'pricing' part of the Capital Asset Pricing Model.

Here goes: Suppose you are an investor who holds the market portfolio M and you are considering the purchase of a quantity dx of asset A, by financing it via borrowing at the riskless rate. This augments the return of the market portfolio by the quantity: $dE_m = [E_A - R_f]dx$

Where d symbolizes a small quantity change. This investment also augments the variance of the market portfolio. The variance of the market portfolio after adding the new asset is: $v + dv = v + 2dx\ cov(A,m) + (dx)^2\ var(a)$

The change in the variance is then: $dv = 2\ dx\ cov(A,m) + (dx)^2\ var(A)$

For small dx's this is approximately: $dv = 2\ dx\ cov(A, m)$

This gives us the risk-return trade-off to investing in a small quantity of A: Risk-Return Trade-off for $A = dE_m/dv = [E_A - R_f]dx/2\ dx\ cov(A, m)$

Risk-Return Trade-off for $A = dE_m/dv = [E_A - R_f]/2\ cov(A, m)$

Now, if the expected return of asset A is in equilibrium, then an investor should be indifferent between augmenting his or her portfolio with a quantity of A and simply levering up the existing market portfolio position. If this were not the case, then either the investor would not be willing to hold A, or A would dominate the portfolio entirely. We can calculate the same Risk-Return Trade-off for buying dx quantity of the market portfolio P instead of security A. Risk-Return Trade-off for $P = dE_m/dv = [E_m - R_f]/2\ var(m)$.

The equations are almost the same, except that the cov(A, m) is replaced with var(m). This is because the covariance of any security with itself is the variance of the security.

These Risk-Reward Trade-offs must be equal:

$$[E_A - R_f]/2\ \text{cov}(A, m) = [E_m - R_f]/2\ \text{var}(m)$$

Thus,
$$[E_A - R_f] = [\text{cov}(A, m)/\text{var}(m)][E_m - R_f]$$

The value cov(A, m)/var(m) is also known as the β of A with respect to m. β is a famous statistic in finance. It is functionally related to the correlation and the covariance between the security and the market portfolio in the following way:

$$\beta = \rho_{i,m} \frac{\sigma_i}{\sigma_m} = \frac{\sigma_{i,m}}{\sigma_m^2}$$

II. A Model of Expected Returns: In the preceding example, notice that we used the expression expected returns. That is, we found an equation that related the expected future return of asset A (in excess of the riskless rate) to the expected future return of the market (in excess of the riskless rate). This expected return is the return that investors will demand when asset prices are in the equilibrium described by the CAPM. For any asset i, the CAPM argues that the appropriate rate at which to discount the cash flows of the firm is that same rate that investors demand to include the security in their portfolio:

$$E[R_i] = R_f + b_i(E[R_m] - R_f)$$

One surprising thing about this equation is what is not in it. There is no measure of the security's own standard deviation. The CAPM says that you do not care about the volatility of the security. You only care about its beta with respect to the market portfolio! Risk is now re-defined as the quantity of exposure the security has to fluctuations in the market portfolio.

14.2.2 Assessing the CAPM

The CAPM is a classical model in finance. It is an equilibrium argument that, if true, answers most important investment questions. It tells us where to invest, how to invest and what discount rate to use for project cash flows. Not only that, it is a disarmingly simple model. The expected return of a security depends upon a simple statistic: ß. The relationship between risk and return is linear. Calculation of portfolio risk is trivial. At the same time, the CAPM is revolutionary. It tells us that the variance of a project is not a factor in determining the appropriate, risk-adjusted discount rate. It turns financial research from roll-up-your-sleeves fundamental analysis into a statistics problem. In short, the CAPM turned Wall Street on its head.

Check Your Progress 1

Fill in the blanks:

1. The CAPM is a _____ model in finance.
2. CAPM tells us that all investors want to hold _____ portfolios of global wealth.
3. CAPM means _____ .
4. The CAPM equation describes a linear relationship between risk and _____ .

14.3 SECURITY MARKET LINE (SML)

The CAPM equation describes a linear relationship between risk and return. Risk, in this case, is measured by beta. We may plot this line in mean and ß space: The Security Market Line (SML) expresses the basic theme of the CAPM i.e., expected return of a security increases linearly with risk, as measured by 'beta'. The SML is an upward sloping straight line with an intercept at the risk-free return securities and passes through the market portfolio. The upward slope of the line indicates that greater excepted returns accompany higher levels of beta. In equilibrium, each security or portfolio lies on the SML. The next figure shows that the return expected from portfolio or investment is a combination of risk free return plus risk premium. An investor will come forward to take risk only if the return on investment also includes risk premium. CAPM provides an intuitive approach for thinking about the return that an investor should require on an investment, given the assessed systematic or market risk.

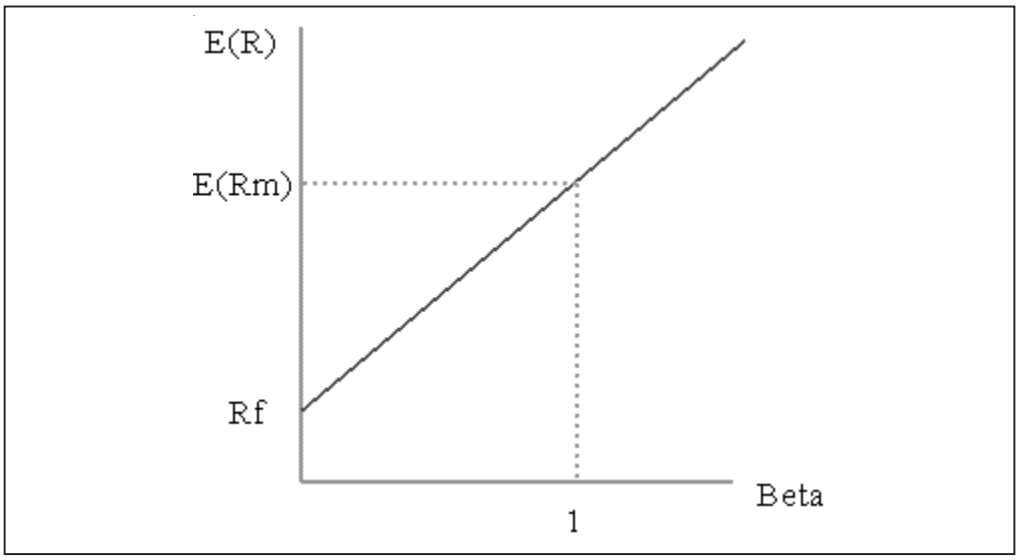


Figure 14.3: Expected Return from Portfolio

One remarkable fact that comes from the linearity of this equation is that we can obtain the beta of a portfolio of assets by simply multiplying the betas of the assets by their portfolio weights. For instance, the beta of a 50/50 portfolio of two assets, one with a beta of .8 and the other with a beta of 1 is .9. The line also extends out infinitely to the right, implying that you can borrow infinite amounts to lever up your portfolio.

Why is the line straight? Well, suppose it curved, as the blue line does in the figure below. The figure shows what could happen. An investor could borrow at the riskless rate and invest in the market portfolio. Any investment of this type would provide a higher expected return than a security, which lies on the curved line below. In other words, the investor could receive a higher expected return for the same level of systematic risk. In fact, if the security on the curve could be sold short, then the investor could take the proceeds from the short sale and enter into the levered market position generating an arbitrage in expectation.

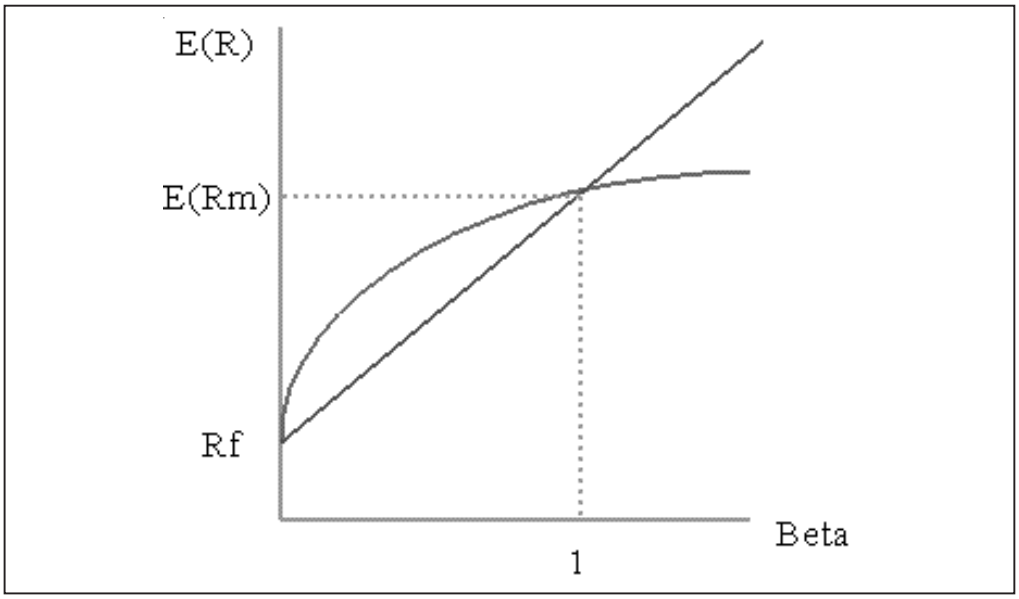


Figure 14.4: Higher Expected Return

14.3.1 Expectations vs Realizations

It is important to stress that the vertical dimension in the security market line picture is expected return. Things rarely turn out the way you expect. However, the CAPM equation also tells us about the realized rate of return. Since the realization is just the expectation plus random error, we can write:

$$R_i = R_f + \beta_i [R_m - R_f] + e_i$$

This is useful, because it tells us that when we look at past returns, they will typically deviate from the security market line – not because the CAPM is wrong, but because random error will push the returns off the line. Notice that the realized Rm does not have to behave as expected, either. So, even the slope of the security market line will deviate from the average equity risk premium. Sometimes it will even be negative!

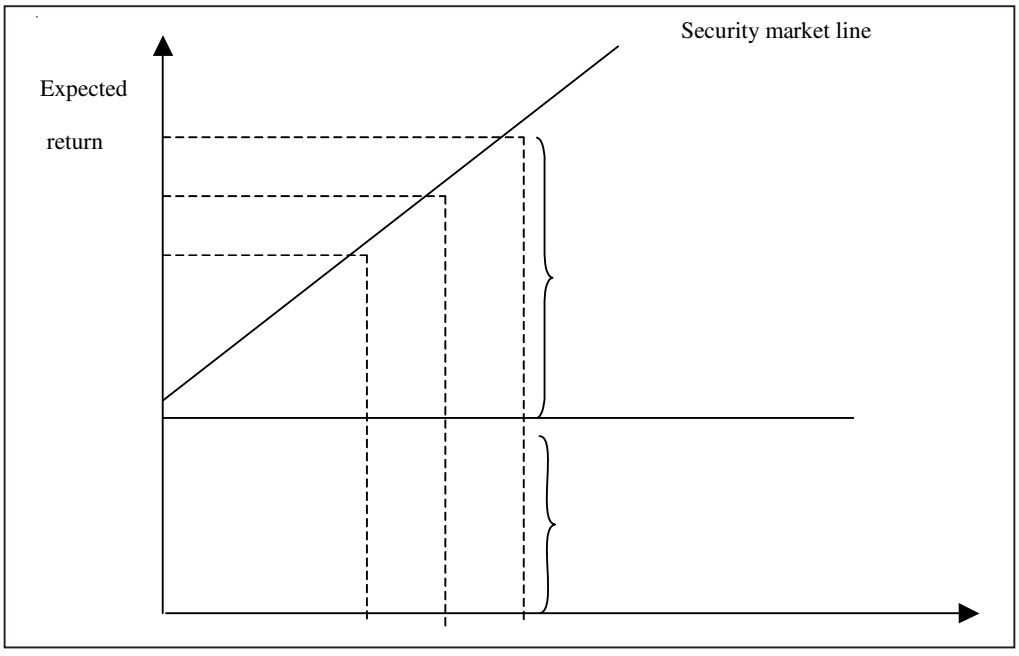


Figure 14.5: Expectations vs Realizations

(Rm)

Risk premium

Risk free return

O 0.5 1.0 1.5 Risk (beta)

14.3.2 Security Market Line

CAPM shows the risk and return relationship of an investment in the formula given below:

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

Where,

$E(R_i)$ = Expected rate of return on any individual security (or portfolio of securities)

R_f = Risk free rate of return

R_m = Expected rate of return on the market portfolio

$R_m - R_f$ = Risk Premium

β_i = Market sensitivity index of individual security (or portfolio of securities)

14.4 CAPITAL MARKET LINE (CML)

The Markowitz mean-variance model is modified by introducing into the analysis the concept of risk-free asset. If it is assumed that the investor has access to risk-free securities (for example, Treasury bills) in addition to the universe of risky securities, then he can construct a new set of portfolios as depicted by the line $R_f M$. At point R_f the investor is investing all his investible fund in risk-free securities, whilst at point M he is holding an all-equity portfolio. The combination of risk-free investment and risky investments in portfolio which may be achieved by points between these two limits are termed 'lending portfolios.' Let us now assume that the investor can lend and borrow funds at the same risk-free interest rate. In such circumstances the efficiency boundary simply becomes the straight line drawn from R_f that is a tangent to the original risky portfolio efficiency boundary. The efficiency boundary that arises out of this assumption of the identical risk free lending and borrowing rates leads to some very important conclusions and is termed as 'Capital Market Line' (CML).

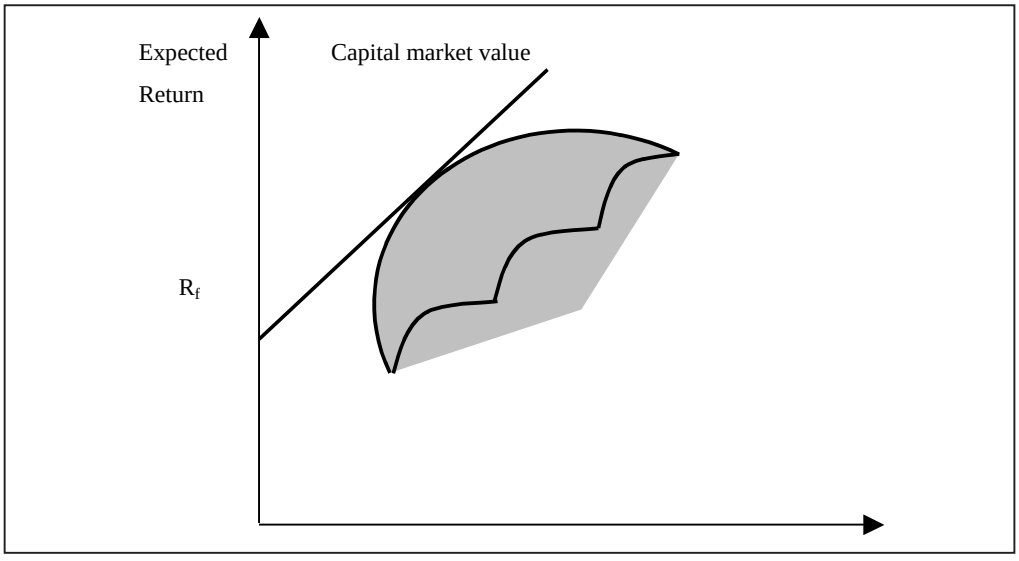


Figure 14.6: Capital Market Line

Illustration 1:

Dummy Ltd., an investment company, has invested in equity shares of a blue chip company. It's risk-free rate of return (R_f) = 10% , Expected total return (R_m) = 16%, Market sensitivity index (β) = 1.50, (of individual security)

Calculate the expected rate of return on the investment make in the security.

Solution:

Total expected return (R_m) = 16%

Risk free return (R_f) = 10%

Risk premium ($R_m - R_f$) = 6%

$$E(R_i) = R_f + b_i(R_m - R_f)$$

$$= 10 + 1.50(16 - 10) = 19\%$$

14.5 BETA FACTOR OF A MARKET PORTFOLIO

If the return from the market portfolio rises or falls, we should expect a corresponding rise or fall in the return from an individual share. The amount of this corresponding rise or fall depends on the beta factor of the share. The beta factor of an investor's portfolio is the total of the weighted average beta factors of each security in the portfolio. As the market portfolio represents all shares on the stock market, it follows that the beta coefficient of the market portfolio must be 1, and all other betas are viewed relative to this value. Thus, if the return from the market portfolio rise by says 2%, the coefficient would be:

$$\frac{\text{Increase in return on Investment}}{\text{Increase in return on market portfolio}} = \frac{2\%}{2\%} = 1$$

CAPM indicates the expected return of a particular security in view of its systematic or market risk. The value of a share price is determined in relation to investment in shares of individual companies, rather than as a portfolio.

In practice, for estimation of beta factor the following regression equation is used:

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

Where,

R_i = Rate of return of individual security

α_i = The intercept that equals the risk free rate (R_f)

β_i = Beta factor of the individual security

R_m = Market of return

e_i = Random error, which reflects the diversifiable risk of individual security

Illustration 2:

Wipro provides you the following informations. Calculate the expected rate of return of a portfolio:

Expected market return	15%
Risk-free rate of return	9%
Standard deviation of an asset	2.4%

Market Standard deviation	2.0%
Correlation co-efficient of portfolio with market	0.9

Solution:

Calculation Market Sensitivity Index (β_i)

Since, market sensitivity index is not given in the problem, it is calculated by applying the following formula:

$$\beta_i = \frac{\sigma_i}{\sigma_m} = r_m$$

Where, β_i = Market sensitivity index or Beta factor

σ_i = Standard deviation of an asset i.e., 0.024

σ_m = Market Standard deviation i.e., 0.02

r_{im} = Correlation coefficient of portfolio with market i.e., 0.90

$$\beta_i = \frac{0.024}{0.02} \times 0.90 = 1.08$$

We can calculate the expected rate of return of a portfolio by applying capital asset pricing model:

$$E(R_i) = R_f + b_i(R_m - R_f)$$

Where,

$E(R_j)$ = Expected rate of return of portfolio

R_f = Risk free rate of return Le., 9%

R_m = Expected return of market portfolio Le. 15%

β_i = Beta coefficient of investment Le. 1.08

By substituting, we get

$$E(R.) = 9 + 1.08\ (15 - 9) = 9 + 1.08(6) = 15.48 \text{ or } 15.48\%$$

14.6 BENEFITS AND LIMITATIONS OF CAPM

14.6.1 Benefits

CAPM model of portfolio management can be effectively used to:

- Investments in risky projects having real assets can be evaluated of its worth in view of expected return.
- CAPM analyses the riskiness of increasing the levels of gearing and its impact on equity shareholders returns.
- CAPM suggests the diversification of portfolio in minimisation of risk.

14.6.2 CAPM is Criticised for the Following Reasons

- In real world, assumptions of CAPM will not hold good.
- In practice, it is difficult to estimate the risk-free return, market rate of return, and risk premium.

- Investors can estimate the required rate of return on a particular investment in company's securities.
- CAPM is a single period model while most projects are often available only as large indivisible projects. It is, therefore, more difficult to adjust.

14.7 ARBITRAGE PRICING MODEL

The Arbitrage Pricing Model (APM) looks very similar to the CAPM, but its origins are significantly different. Whereas the CAPM is a single-factor model, the APM is a multi-factor model instead of just a single beta value; there is a whole set of beta values – one for each factor. Arbitrage Pricing Theory, out of which the APM arises, states that the expected return on an investment is dependent upon how that investment reacts to a set of individual macro-economic factors (the degree of reaction being measured by the betas) and the risk premium associated with each of those macro-economic factors. The APM, which was developed by Ross (1976), holds that there are four factors, which explain the risk/risk premium relationship of a particular security.

Basically, CAPM says that:

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

Where, λ is the average risk premium = $R_m - R_f$

However, APM holds that:

$$E(R_i) = R_f + \lambda_1\beta_{i1} + \lambda_2\beta_{12} + \lambda_3\beta_{13} + \lambda_4\beta_{14}$$

Where,

λ_1, λ_2, λ_3, and λ_4 the average risk premium for each of the four factors in the model and β_{i1}, β_{i2}, β_{i3} and β_{i4} are measures of the sensitivity of the particular security 'i' to each of the four factors.

Several factors appear to have been identified as being important (some of which, such as inflation and money supply, industrial production and personal consumption, do have aspects of being inter-related). In particular, researchers have identified:

- Changes in the level of industrial production in the economy
- Changes in the shape of the yield curve
- Changes in the default risk premium (i.e., changes in the return required on bonds\different perceived risks of default)
- Changes in the inflation rate
- Changes in the real interest rate
- Level of personal consumption
- Level of money supply in the economy

Illustration 3:

As an investment manager you are given the following informations:

Particulars	Initial price (Rs.)	Dividends (Rs.)	Market price at the year end (Rs.)	Beta (Risk factor)
Investment in equity shares of A Cement Ltd.	25	2	50	0.8
Steel Ltd.	35	2	60	0.7
Liquor Ltd.	45	2	135	0.5
B. Government of India bonds	1,000	140	1,005	0.99

Risk-free return may be taken at 14%.

You are required to calculate:

(i) Expected rate of returns of portfolio in each using Capital Asset Pricing Model (CAPM).

(ii) Average return of portfolio.

Solution:

(i) Calculation of Expected Rate of Return on Market Portfolio

Investments	Amount Invested (Rs.)	Dividends (Rs.)	Capital Gains (Rs.)
A. Equity shares of			
Cement Ltd.	25	2	25
Steel Ltd.	35	2	25
Liquor Ltd.	45	2	90
B. Government of India bonds	1,000	140	5
	1,105	146	145

Expected Rate of Return on Market Portfolio

$$\frac{\text{Dividends earned + Capital appreciation}}{\text{Initial Investment}} \times 100 = \frac{146+145}{1{,}105} \times 100 = 26.33\%$$

Now we can calculate the expected rate of return on individual portfolio, by applying CAPM.

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

Cement Ltd. = 14 + 0.8 (26.33 – 14) = 23.86%

Steel Ltd. = 14 + 0.7 (26.33 – 14) = 22.63%

Liquor Ltd. = 14 + 0.5 (26.33 – 14) = 20.17%

Govt. of India bonds = 14 + 0.99 (26.33 – 14) = 26.21%

(ii) Average Return of the Portfolio = $\frac{23.86 + 22.63 + 20.17 + 26.21}{4} = 23.22\%$

The average return is also calculated by finding out the average of beta factors of all securities in the portfolio.

Average of betas = = 0.7475

Average return = 14 + 0.7475 (26.33 – 14) = 23.22%

14.8 ARBITRAGE PRICING THEORY (APT)

Arbitrage Pricing Theory (APT) in finance is a general theory of asset pricing, which has become influential in the pricing of shares.

APT holds that the expected return of a financial asset can be modelled as a linear function of various macro-economic factors or theoretical market indices, where sensitivity to changes in each factor is represented by a factor specific beta coefficient. The model-derived rate of return will then be used to price the asset correctly – the asset price should equal the expected end-of-period-price discounted at the rate implied by model. If the price diverges, arbitrage should bring it back into line. The theory was initiated by the economist Stephen Ross in 1976.

14.8.1 APT Model

If APT holds, then a risky asset can be described as satisfying the following relation:

$$E(r_j) = r_j + b_{j1}RP_1 + b_{j2}RP_2 + ... + b_{jn}RP_n$$

$$r_j = E(r_j) + b_{j1}F_1 + b_{j2}F_2 + ... + b_{jn}F_n + \in_j$$

where

$E(r_j)$ is the risky asset's expected return,

RP_k is the risk premium of the factor,

r_f is the Risk-free

F_k is the macroeconomic factor,

b_{jk} is the sensitivity of the asset to factor k, also called factor loading,

and ε_j is the risky asset's idiosyncratic random stock with mean zero.

14.8.2 Arbitrage and the APT

Arbitrage is the practice of taking advantage of a state of imbalance between two (or possibly more) markets and thereby making a risk-free profit, Rational Pricing.

14.8.3 Arbitrage in Expectations

The APT describes the mechanism whereby arbitrage by investors will bring an asset that is mispriced, according to the APT model, back into line with its expected price. Note that under true arbitrage, the investor locks-in a guaranteed payoff, whereas under APT arbitrage as described below, the investor locks-in a positive expected payoff. The APT, thus, assumes "arbitrage in expectations" – i.e. that arbitrage by investors will bring asset prices back into line with the returns expected by the model portfolio theory.

14.8.4 Arbitrage Mechanics

In the APT context, arbitrage consists of trading in two assets – with at least one being mispriced. The arbitrageur sells the asset that is relatively too expensive and uses the proceeds to buy one which is relatively too cheap.

Under the APT, an asset is mispriced if its current price diverges from the price predicted by the model. The asset price today should equal the sum of all future cash flows discounted at the APT rate, where the expected return of the asset is a linear function of various factors, and sensitivity to changes in each factor is represented by a factor-specific beta coefficient.

A correctly priced asset here may be in fact a synthetic asset – a portfolio consisting of other correctly priced assets. This portfolio has the same exposure to each of the macroeconomic factors as the mispriced asset. The arbitrageur creates the portfolio by identifying x correctly priced assets (one per factor plus one) and then weighting the assets such that portfolio beta per factor is the same as for the mispriced asset.

When the investor is long the asset and short the portfolio (or vice versa) he has created a position which has a positive expected return (the difference between asset return and portfolio return) and which has a net-zero exposure to any macroeconomic factor and is, therefore, risk free (other than for firm specific risk). The arbitrageur is thus in a position to make a risk free profit:

Where Today's price is too low

The implication is that at the end of the period the portfolio would have appreciated at the rate implied by the APT, whereas the mispriced asset would have appreciated at more than this rate. The arbitrageur could therefore:

Today:
1. Short-sell the portfolio
2. Buy the mispriced-asset with the proceeds.

At the end of the period:

1. Sell the mispriced asset
2. Use the proceeds to buy back the portfolio
3. Pocket the difference.

Where today's price is too high

The implication is that at the end of the period the portfolio would have appreciated at the rate implied by the APT, whereas the mispriced asset would have appreciated at less than this rate. The arbitrageur could therefore:

Today:
1. Short sell the mispriced-asset
2. Buy the portfolio with the proceeds
3. At the end of the period:
    1. Sell the portfolio
    2. Use the proceeds to buy back the mispriced-asset
    3. Pocket the difference

14.8.5 Relationship with the Capital Asset Pricing Model

The APT along with the CAPM is one of two influential theories on asset pricing. The APT differs from the CAPM in that it is less restrictive in its assumptions. It allows for an explanatory (as opposed to statistical) model of asset returns. It assumes that each investor will hold a unique portfolio with its own particular array of betas, as opposed to the identical "market portfolio." In some ways, the CAPM can be considered a "special case" of the APT in that the securities market line represents a single-factor model of the asset price, where Beta is exposure to changes in value of the market.

Additionally, the APT can be seen as a "supply side" model, since its beta coefficients reflect the sensitivity of the underlying asset to economic factors. Thus, factor shocks would cause structural changes in the asset's expected return, or in the case of stocks, in the firm's profitability.

On the other side, the capital asset pricing model is considered a "demand side" model. Its results, although similar to those in the APT, arise from a maximization problem of

each investor's utility function, and from the resulting market equilibrium (investors are considered to be the "consumers" of the assets).

14.9 USING THE APT

14.9.1 Identifying the Factors

As with the CAPM, the factor-specific Betas are found via a linear regression of historical security returns on the factor in question. Unlike the CAPM, the APT, however, does not itself reveal the identity of its priced factors – the number and nature of these factors is likely to change over time and between economies. As a result, this issue is essentially empirical in nature. Several a priori guidelines as to the characteristics required of potential factors are, however, suggested:

1. Their impact on asset prices manifests in their unexpected movements.
2. They should represent undiversifiable influences (these are, clearly, more likely to be macroeconomic rather than firm-specific in nature).
3. Timely and accurate information on these variables is required.
4. The relationship should be theoretically justifiable on economic grounds.

Chen, Roll and Ross identified the following macro-economic factors as significant in explaining security returns:

- Surprises in inflation;
- Surprises in GNP as indicted by an industrial production index;
- Surprises in investor confidence due to changes in default premium in corporate bonds;
- Surprise shifts in the yield curve.

As a practical matter, indices or spot or futures market prices may be used in place of macro-economic factors, which are reported at low frequency (e.g. monthly) and often with significant estimation errors. Market indices are sometimes derived by means of factor analysis. More direct 'indices' that might be used are:

- Short-term interest rates;
- The difference in long-term and short-term interest rates;
- A diversified stock index such as the S&P 500 or NYSE Composite Index;
- Oil prices
- Gold or other precious metal prices
- Currency exchange rates

Check Your Progress 2

Indicate true or false for the following statements:

1. CAPM does not explain the behaviour of security prices.
2. An investor who invests in an asset that does not improve the risk-return characteristics of his existing portfolio will be called a rational investor.
3. The alpha coefficient (a) gives the vertical intercept point of the regression line.
4. The ATP differs from the CAPM in that it is less restrictive in its assumptions.
5. Harry Markowitz is regarded as the father of modern portfolio theory.

14.10 MODERN PORTFOLIO THEORY

Portfolio management is concerned with efficient management of investment in the securities. An investment is defined as the current commitment of funds for a period in order to derive a future flow of funds that will compensate the investing unit:

(a) For the time the funds are committed

(b) For the expected rate of inflation

(c) For the uncertainty involved in the future flow of funds

The portfolio management deals with the process of selection of securities from the number of opportunities available with different expected returns and carrying different levels of risk and the selection of securities is made with a view to provide the investors the maximum yield for a given level of risk or ensure minimise risk for a given level of return.

14.10.1 Markowitz Mean-Variance Model

Harry Markowitz is regarded as the father of modern portfolio theory. According to him, investors are mainly concerned with two properties of an asset: risk and return, but by diversification of portfolio it is possible to trade-off between them. The essence of his theory is that risk of an individual asset hardly matters to an investor. What really counts is the contribution it makes to the investor's total risk. By turning his principle into a useful technique for selecting the right portfolio from a range of different assets, he developed 'Mean Variance Analysis' in 1952. The thrust has been on balancing safety, liquidity and return depending on the taste of different investors. The portfolio selection problem can be divided into two stages, first finding the mean-variance efficient portfolios and secondly selecting one such portfolio. Investors do not like risk and the greater the riskiness of returns on an investment, the greater will be the returns expected by investors. There is a trade-off between risk and return, which must be reflected in the required rates of return on investment opportunities. The standard deviation (or variance) of return measures the total risk of an investment. It is not necessary for an investor to accept the total risk of an individual security. Investors can and do diversify to reduce risk. As number of holdings approach larger, a good deal of total risk is removed by diversification.

Assumptions

This model has taken into account of risks associated with investments – using variance or standard deviation of the return. This model is based on the following assumptions:

- The return on an investment adequately summarises the outcome of the investment.
- All investors are risk-averse. For a given expected return he prefers to take minimum risk, obviously for a given level of risk the investor prefers to get maximum expected return.
- Investors are assumed to be rational in so far as they would prefer greater returns to lesser ones given equal or smaller risk and risk averse. Risk aversion in this context means merely that, as between two investments with equal expected returns, the investment with the smaller risk would be preferred.

14.10.2 Efficient Frontier

Markowitz has formulised the risk return relationship and developed the concept of efficient frontier. For selection of a portfolio, comparison between a combination of portfolios is essential. As a rule, a portfolio is not efficient if there is another portfolio with:

- a higher expected value of return and a lower standard deviation (risk)
- a higher expected value of return and the same standard deviations (risk)
- the same expected value but a lower standard deviation (risk).

Markowitz has defined the diversification as the process of combining assets that are less than perfectly positively correlated in order to reduce portfolio risk without sacrificing any portfolio returns. If an investor's portfolio is not efficient he may:

- increase the expected value of return without increasing the risk.
- decrease the risk without decreasing the expected value of return, or
- obtain some combination of increase of expected return and decreased risk.

This is possible by switching to a portfolio on the efficient frontier.

If all the investments are plotted on the risk-return sphere, individual securities would be dominated by portfolios, and the efficient frontier would take shape, indicating investments which yield maximum return given the level of risk bearable, or which minimises risk given the expected level of return. The figure depicts the boundary of possible investments in securities A, B, C, D, E and F; and B, C, D are lying on the efficient frontier.

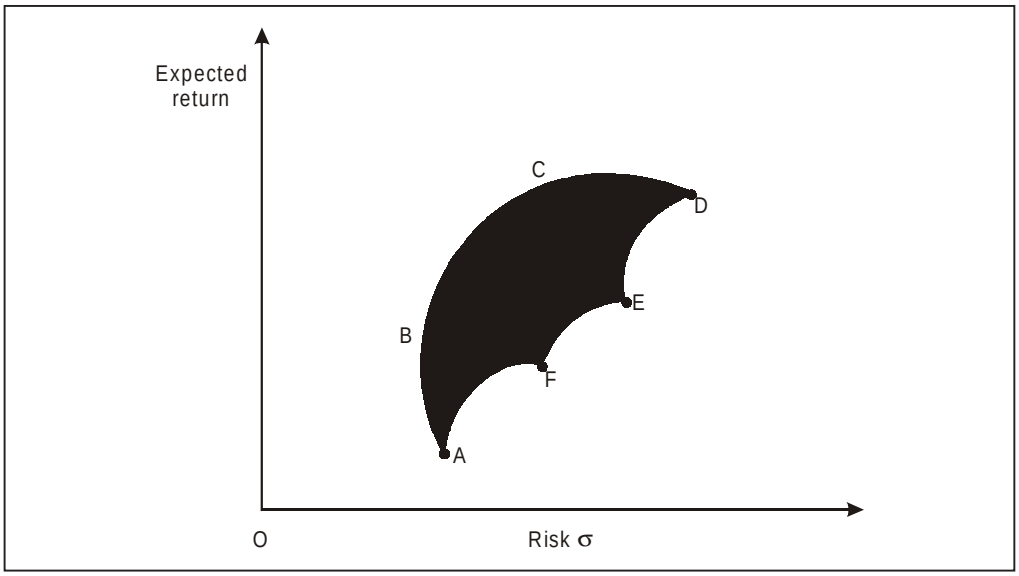


Figure 14.7: Markowitz Efficient Frontier

The best combination of expected value of return and risk (standard deviation) depends upon the investors' utility function. The individual investor will want to hold that portfolio of securities that places him on the highest indifference curves, choosing from the set of available portfolios. The dark line at the top of the set is the line of efficient combinations, or the efficient frontier. It depicts the trade-off between risk and expected value of return.

The optimal investment achieved at a point where the indifference curve is at a tangent to the efficient frontier. This point reflects the risk level acceptable to the investor in order to achieve a desired return and provide maximum return for the bearable level of risk. The concept of efficient frontier, and the optimal point location is explained with help of next figure. A, B, C, D, E and F define the boundary of all possible investments out of which investments in B, C and D are the efficient proposals lying on the efficient frontier. The attractiveness of the investment proposals lying on the efficient frontier depends on the investors' attitude to risk. At point B, the level of risk and return is at optimum level. The returns are the highest at point D, but simultaneously it carries higher risk than any other investment.

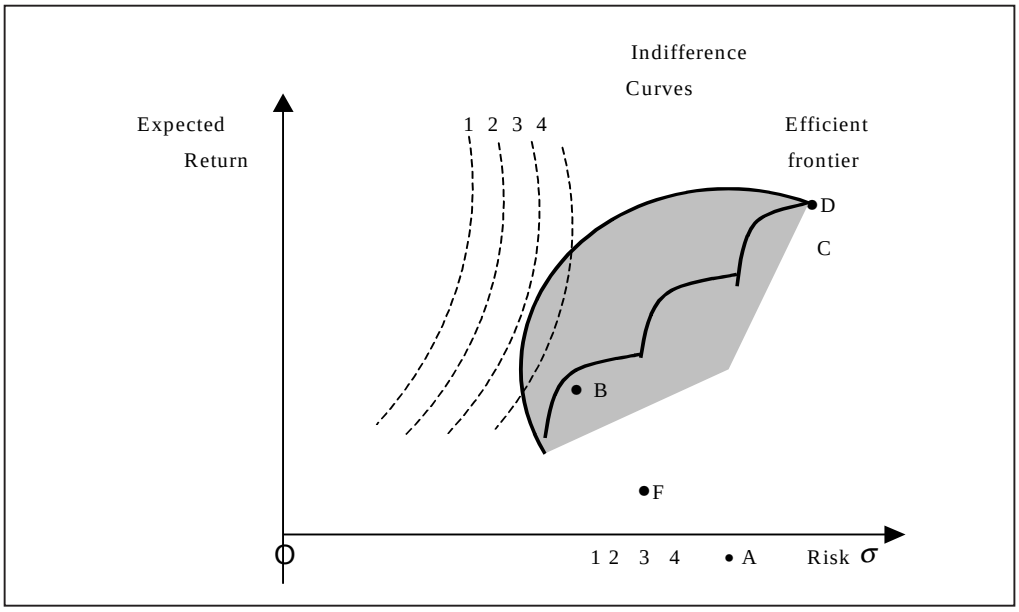


Figure 14.8: Attainable Portfolios

The shaded area represents all attainable portfolios, that is all the combinations of risk and expected return that may be achieved with the available securities. The efficient frontier denotes all possible efficient portfolios and any point on the frontier dominates any point to the right of it.

14.11 LET US SUM UP

Markowitz's great insight was that the relevant information about securities could be summarized by three measures: the mean return (taken as the arithmetic mean), the standard deviation of the returns and the correlation with other assets' returns.

CAPM explains the behaviour of security prices and provides a mechanism whereby investors could assess the impact of a proposed security investment on the overall portfolio risk and return. CAPM suggests that the prices of securities are determined in such a way that the risk premium or excess returns are proportional to systematic risk, which is indicated by the beta coefficient. The model is used for analysing the risk-return implications of holding securities. CAPM refers to the way in which securities are valued in line with their anticipated risks and returns.

14.12 LESSON END ACTIVITY

Study on the relevance of CAPM model in BSE and NSE.

14.13 KEYWORDS

CAPM: CAPM explains the behaviour of security prices and provides a mechanism whereby investors could assess the impact of a proposed security investment on the overall portfolio risk and return.

CML: The efficiency boundary that arises out of this assumption of the identical risk free lending and borrowing rates leads to some very important conclusions and is termed as 'Capital Market Line' (CML).

Beta Coefficient: Beta coefficient is a measure of the volatility of stock price in relation to movement in stock index of the market, therefore, beta is the index of systematic risk.

ATP: APT holds that the expected return of a financial asset can be modelled as a linear function of various macro-economic factors or theoretical market indices, where sensitivity to changes in each factor is represented by a factor specific beta coefficient.

APM: Arbitrage Pricing Model is a multifactor model used instead of just a single beta value.

14.14 QUESTIONS FOR DISCUSSION

1. Explain the benefits and limitations of CAPM.
2. Define CAPM. Write on its assumptions.
3. Write on Arbitrage Pricing Model.
4. Define Arbitrage Pricing Theory.
5. What are the differences between arbitrage and the APT?
6. Explain arbitrage mechanics.
7. As an investor, how do you use the APT?
8. Write on the modern portfolio theory.
9. Explain the Markowitz Mean-Variance Model.
10. Define the Efficient Frontier.

Check Your Progress: Model Answers

CYP 1

1. classical 2. capital -weighted 3. Capital Asset Pricing Model
4. return

CYP 2

1. F 2. F 3. F 4. T 5. T

14.15 SUGGESTED READINGS

Sudhindra Bhat, *Security Analysis and Portfolio Management*, Excel Books, Delhi.

Kevin, S., *Security Analysis and Portfolio Management*, Prentice Hall of India.

Prasanna Chandra, *Investment Analysis and Portfolio Management*, Second Edition, Tata McGraw Hill.

Punithavathy Pandian, *Securities Analysis and Portfolio management*, Vikas.

Investment Management, V. K. Bhalla.

A. Davis, *Investors in a Changing Economy*, Prentice -Hall, 1968.

Williamson, J. Peter, *Investments: New Analytic Techniques*, London, Longman, 1970.

Cottle, CC., and Whitman, W.T., *Investment Timing: The Formula Plan Approach*, McGraw Hill.