

**TABLE OF CONTENTS**

| <b>UNIT</b> | <b>LESSON</b> | <b>TITLE</b>                                      | <b>PAGE NO.</b> |
|-------------|---------------|---------------------------------------------------|-----------------|
| I           | 1.1           | Investment                                        | 3               |
|             | 1.2           | Investment Alternatives                           | 12              |
|             | 1.3           | Securities Market                                 | 27              |
|             | 1.4           | Stock Exchange                                    | 41              |
| II          | 2.1           | Fundamental Security Analysis - Economic Analysis | 71              |
|             | 2.2           | Industry Analysis                                 | 81              |
|             | 2.3           | Company Analysis                                  | 91              |
| III         | 3.1           | Technical Analysis                                | 127             |
|             | 3.2           | Efficient Market Theory                           | 156             |
| IV          | 4.1           | Portfolio Analysis                                | 171             |
|             | 4.2           | Portfolio Models                                  | 187             |
|             | 4.3           | Portfolio Construction                            | 208             |
| V           | 5.1           | Capital Asset Pricing Theory                      | 231             |
|             | 5.2           | Arbitrage Pricing Theory                          | 242             |
|             | 5.3           | Portfolio Evaluation                              | 252             |
|             | 5.4           | Portfolio Revision                                | 263             |

**MBA (Finance) – IV Semester****Paper code: MBFM 4001****Paper - XVI**

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**Investment and Portfolio Management**

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**Objectives**

- To have understanding on investment and avenues of investment
- To have exposure on analysis techniques of capital market and
- To understand various theories of portfolio management

**Unit - I**

Investment – Basics of Investment – Investment, Speculation and Gambling – Investment Categories – Investment avenues – Non marketable Financial Assets – Money Market Instruments – Bond/Debentures – Equity Shares – Schemes of LIC – Mutual Funds – Financial Derivatives – Real Assets – Real Estate – Art – antiques and others.

**Unit - II**

Fundamental Security Analysis – Economic Analysis – significance and Interpretation of the Economic Indicators – Industry Analysis – Industry Growth Cycle – Company analysis – Marketing – Accounting policies – Profitability – Dividend Policy – Capital Structure – Financial Analysis – Operating Efficiency – Management – Fundamental Security Analysis – Changes in the Financing Patterns of Indian Companies – Debt-Equity Ratio for India Companies.

**Unit - III**

Technical Analysis – Technical Tools – The Dow Theory – Primary Trend – The secondary Trend – Minor Trends – Support and Resistance Level – Indicators – Odd Lot Trading – Moving Average – Rate of Change – Charts – Technical indicators – Charting Techniques – Indicators of the Witchcraft Variety – Efficient Market Theory – Basic

Concepts – Random-Walk Theory – Weak Form of EMH – Semi-strong Form – Strong Form – The Essence of the Theory – Market Inefficiencies.

#### **Unit - IV**

Portfolio Analysis – Portfolio and Single asset Returns and Risk – Mean Variance Criterion – covariance – Beta (simple problems) – Portfolio Markowitz Model – simple Diversification – Risk and Return with Different correlation – Sharpe's Single Index Model – Sharpe's Optimal Portfolio – Construction of the Optimal Portfolio – Optimum Portfolio with short sales.

#### **Unit - V**

Asset Pricing Model Portfolio Evaluation – Capital Asset Pricing Model (CAPM) – Security Market Line – Assumptions – Arbitrage Pricing Model (APT) – Portfolio Performance Models – Sharpe's Performance Index – Treynor's Performance Index – Jensen's Performance Index.

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## UNIT – I

### Unit Structure

Lesson 1.1 - Investment

Lesson 1.2 - Investment Alternatives

Lesson 1.3 - Securities Market

Lesson 1.4 - Stock Exchange

### Learning Objectives

*This chapter is aimed at providing an understanding of*

- Concept of Investments
- Securities market
- Stock exchanges and their trading systems

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### Lesson 1.1 - Investment

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#### Introduction

Investment is the employment of funds on assets with the aim of earning income or capital appreciation. Investment has two attributes namely time and risk. Present consumption is sacrificed to get a return in the future. The sacrifice that has to be borne is certain but the return in the future may be uncertain. This attribute of investment indicates the risk factor. The risk is undertaken with a view to reap some return from the investment. For a layman, investment means some monetary commitment. A person's commitment to buy a flat or a house for his personal use may be an investment from his point of view. This cannot be considered as an actual investment as it involves sacrifice but does not yield any financial return.

To the economist, investment is the net addition made to the nation's capital stock that consists of goods and services that are used in the production process. A net addition to the capital stock means an increase in the buildings, equipments or inventories. These capital stocks are used to produce other goods and services.

Financial investment is the allocation of money of assets that are expected to yield some gain over a period of time. It is an exchange of financial claims such as stocks and bonds for money. They are expected to yield returns and experience capital growth over the years.

The financial and economic meanings are related to each other because the savings of the individual flow into the capital market as financial investments, to be used in economic investment. Even though they are related to each other, we are concerned only about the financial investment made on securities.

Thus, investment may be defined as “a commitment of funds made in the expectation of some positive rate of return”. Expectation of return is an essential element of investment.

Since the return is expected to be realized in future, there is a possibility that the return actually realized is lower than the return expected to be realized. This possibility of variation in the actual return is known as investment risk. Thus, every investment involves return and risk.

### **Characteristics of Investment**

All investments are characterized by certain features. Let us analyse these characteristic features of investment.

#### **Return**

All investments are characterized by the expectation of a return. In fact, investments are made with the primary objective of deriving a return. The return may be received in the form of yield plus capital appreciation.

The difference between the sale price and the purchase price is capital appreciation. The dividend or interest received from the investment is the yield. Different types of investments promise different rates of return. The return from an investment depends upon the nature of the investment, the maturity period and a host of other factors.

## Risk

Risk is inherent in any investment. This risk may relate to loss of capital, delay in repayment of capital, non-payment of interest, or variability of returns. While some investments like government securities and bank deposits are almost riskless, others are more risky.

The risk of an investment depends on the following factors.

1. The longer the maturity period, the larger is the risk.
2. The lower the credit worthiness of the borrower, the higher is the risk.
3. The risk varies with the nature of investment. Investments in ownership securities like equity shares carry higher risk compared to investments in debt instruments like debentures and bonds.

Risk and return of an investment are related. Normally, the higher the risk, the higher is the return.

## Safety

The safety of an investment implies the certainty of return of capital without loss of money or time. Safety is another feature which an investor desires for his investments. Every investor expects to get back his capital on maturity without loss and without delay.

## Liquidity

An investment which is easily saleable or marketable without loss of money and without loss of time is said to possess liquidity. Some investments like company deposits, bank deposits, P.O. Deposits, NSC, NSS, etc. are not marketable.

Some investment instruments like preference shares and debentures are marketable, but there are no buyers in many cases and hence their liquidity is negligible. Equity shares of companies listed on stock exchanges are easily marketable through the stock exchanges.

An investor generally prefers liquidity for his investments, safety of his funds, a good return with minimum risk or minimization of risk and maximization of return.

## Objectives of Investment

An investor has various alternative avenues of investment for his savings to flow to. Savings kept as cash are barren and do not earn anything. Hence, savings are invested in assets depending on their risk and return characteristics. The objectives of the investor are minimizing the risk involved in investment and maximize the return from the investment.

Our savings kept as cash are not only barren because they do not earn anything, but also loses its value to the extent of rise in prices. Thus, rise in prices or inflation erodes the value of money. Savings are invested to provide a hedge or protection against inflation. If the investment cannot earn as much as the rise in prices, the real rate of return would be negative. Thus, if inflation is at an average annual rate of ten percent, then the return from an investment should be above ten percent to induce savings to flow into investment.

Thus, the objectives of an investor can be stated as:

- Maximisation of return.
- Minimization of risk
- Hedge against inflation.

Investors, in general, desire to earn as large returns as possible with the minimum of risk. Risk here may be understood as the probability that actual returns realized from an investment may be different from the expected return. If we consider the financial assets available for investment, we can classify them into different risk categories. Government securities would constitute the low risk category as they are practically risk free. Debentures and preference shares of companies may be classified as medium risk assets. Equity shares of companies would form the high risk category of financial assets. An investor would be prepared to assume higher risk only if he expects to get proportionately higher returns. There is a trade-off between risk and return. The expected return of an investment is directly proportional to its risk. Thus, in the financial market, there are different financial assets with varying risk-return combinations.

## Investment Vs Speculation

Investment and speculation are two terms which are closely related. Both involve purchase of assets like shares and securities. Traditionally, investment is distinguished from speculation with respect to three factors, viz. (1) risk, (2) capital gain and (3) time period.

## **Risk**

It refers to the possibility of incurring a loss in a financial transaction. It arises from the possibility of variation in returns from an investment. Risk is invariably related to return. Higher return is associated with higher risk.

No investment is completely risk free. An investor generally commits his funds to low risk investment, whereas a speculator commits his funds to higher risk investments. A speculator is prepared to take higher risks in order to achieve higher returns.

## **Capital Gain**

The speculator's motive is to achieve profits through price changes, i.e. he is interested in capital gains rather than the income from the investment. If purchase of securities is preceded by proper investigation and analysis to receive a stable return and capital appreciation over a period of time, it is investment.

Thus, speculation is associated with buying low and selling high with the hope of making large capital gains. A speculator consequently engages in frequent buying and selling transactions.

## **Time Period**

Investment is long-term in nature, whereas speculation is short-term. An investor commits his funds for a longer period and waits for his return. But a speculator is interested in short-term trade gains through buying and selling of investment instruments.

Analysis of these distinctions helps us to identify the role of an investor and a speculator. An investor is interested in a good rate of return earned on a rather consistent basis for a relatively longer period of time. He evaluates the worth of a security before investing in it. A speculator seeks opportunities promising very large returns earned rather quickly. He is interested in market action and price movements. Consequently, speculation is more risky than investment.

Basically, both investment and speculation aim at good returns. The difference is in motives and methods. As a result, the distinction between investment and speculation is not very wide. Investment is sometimes described as a well grounded and carefully planned speculation.

## Investment Vs Gambling

Investment has also to be distinguished from gambling. Typical examples of gambling are horse races, card games, lotteries, etc. Gambling consists in taking high risks not only for high returns, but also for thrill and excitement. Gambling is unplanned and non scientific, without knowledge of the nature of the risk involved. It is surrounded by uncertainty and is based on tips and rumors. In gambling artificial and unnecessary risks are created for increasing the returns.

Investment is an attempt to carefully plan, evaluate and allocate funds to various investment outlets which offer safety of principal and moderate and continuous return over a long period of time. Gambling is quite the opposite of investment.

## Types of Investors

Investors may be individuals and institutions. Individual investors operate alongside institutional investors in the investment arena. However, their characteristics are different.

Individual investors are large in number but their investable resources are comparatively smaller. They generally lack the skill to carry out extensive evaluation and analysis before investing. Moreover, they do not have the time and resources to engage in such an analysis.

Institutional investors, on the other hand, are the organizations with surplus funds who engage in investment activities. Mutual funds, investment companies, banking and non-banking companies, insurance corporations, etc. are the organizations with large amounts of surplus funds to be invested in various profitable avenues.

These institutional investors are fewer in number compared to individual investors, but their investable resources are much larger. The institutional investors engage professional fund managers to carry out extensive analysis and evaluation of different investment opportunities.

As a result their investment activity tends to be more rational and scientific. They have a better chance of maximizing returns and minimizing risk.

The professional investors and the unskilled individual investors combine to make the investment arena dynamic.

## Investment Avenues

There are a large number of investment avenues for savers in India. Some of them are marketable and liquid while others are non marketable. Some of them are highly risky while some others are almost riskless. The investor has to choose proper avenues from among them depending on his preferences, needs and ability to assume risk.

The investment avenues can be broadly categorized under the following heads:

1. Corporate securities
2. Deposits in banks and non-banking companies
3. UTI and other mutual fund schemes
4. Post office deposits and certificates
5. Life insurance policies
6. Provident fund schemes
7. Government and semi-government securities.

## Corporate Securities

Corporate securities are the securities issued by joint stock companies in the private sector. These include equity shares, preference shares and debentures. Equity shares have variable dividend and hence belong to the high risk-high return category, while preference shares and debentures have fixed returns with lower risk.

## Deposits

Among the non-corporate investments, the most popular are deposits with banks such as savings accounts and fixed deposits. Savings deposits have low interest rates whereas fixed deposits have higher interest rates varying with the period of maturity.

Interest is payable quarterly or half-yearly. Fixed deposits may also be recurring deposits wherein savings are deposited at regular intervals. Some banks have reinvestment plans wherein the interest is reinvested as it gets accrued. The principal and accumulated interests are paid on maturity.

Joint stock companies also accept fixed deposits from the public. The maturity period varies from three to five years. Fixed deposits in companies have high risk since they are unsecured, but they promise higher returns than bank deposits.

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

### **UTI and Other Mutual Fund Schemes**

Mutual funds offer various investment schemes to investors. UTI is the oldest and the largest mutual fund in the country. Unit Scheme 1964, Unit Linked Insurance Plan 1971, Master Share, Master Equity Plans, Master gain, etc. are some of the popular schemes of UTI. A number of commercial banks and financial institutions have set up mutual funds. Recently mutual funds have been set up in the private sector also.

### **Post Office Deposits and Certificates**

The investment avenues provided by post offices are generally non-marketable. Moreover, the major investments in post office enjoy tax concessions also. Post office accepts savings deposits as well as fixed deposits from the public. There is also recurring deposit scheme which is an instrument of regular monthly savings.

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

Indira Vikas Patra and Kissan Vikas Patra are savings certificates issued by post officers.

### **Life Insurance Policies**

The Life Insurance Corporation (LIC) offers many investment schemes to investors. These schemes have the additional facility of life insurance cover. Some of the schemes of LIC are whole Life Policies, Convertible Whole Life Assurance Policies, Endowment Assurance Policies, Jeevan Saathi, Money Back Plan, Jeevan Dhara, Marriage Endowment Plan etc.

### **Provident Fund Schemes**

Provident fund schemes are compulsory deposit schemes applicable to employees in the public and private sectors. There are three kinds of provident funds applicable to different sectors of employment, namely Statutory Provident Fund, Recognised Provident Fund and Unrecognised Provident Fund.

In addition to these, there is a voluntary provident fund scheme which is open to any investor whether employed or not. This is known as the **Public Provident Fund (PPF)**. Any member of the public can join the scheme which is operated by the post offices and the State Bank of India.

### **Government and Semi-Government Securities**

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

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## Lesson 1.2 - Investment Alternatives

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### Negotiable Securities

#### Variable Income Securities

##### *Equity Shares*

The equity shares attract the interest of many. In the early nineties, the stock market was the best and safety place for the common individual to invest. Since 1996 the share market prices have been low. This made the retail investors to turn away from the stock market. The characteristic features of the equity are given in the previous chapter.

The stock market classifies shares into Growth shares, Income shares, Defensive shares, Cyclical shares and Speculative shares.

- 1) **Growth Shares** The stocks that have higher rate of growth than the industrial growth rate in profitability are referred to as growth shares. For example, the list of major gainers for 1996 is dominated by software sector stocks. The HCL and Info systems share prices increased sharply.
- 2) **Income Shares** These stocks belong to companies that have comparatively stable operations and limited growth opportunities. The bank shares and some of the fast moving consumer goods stocks such as Cadburys, Nestle and Hindustan Lever may be termed as income shares.
- 3) **Defensive Shares** Defensive stocks are relatively unaffected by the market movements. For example, a host of pharmaceutical stocks posted returns in excess of 50 per cent in 1998. The pharmaceutical industry owing to its inherent nature of demand is not affected by the down turn in the economy.
- 4) **Cyclical Shares** The business cycle affects the cyclical shares. The upward and downward movements of the business cycle affect the business prospects of certain companies and their stock prices. Such shares provide low to moderate current yield. Capital gain may be highly variable. For example, the automobile sector stocks are affected by the business cycles.

- 5) **Speculative Shares** Shares that have lot of speculative trading in them are referred to as speculative shares. During the bull and bear phases of the market, this type of shares attracts the attention of the trades.

The stocks, which fall under one category in one period, may switch over to another category in another period. The classification should not be considered rigid. For example, growth shares may be speculative shares.

### ***Fixed Income Securities***

#### ***I) Preference Shares***

A detailed description of the preference shares is given in chapter 1. Preference shares are no longer regarded as inferior to the equity capital. Corporate like Siemens has placed ₹ 150 Cr. Worth of preference shares. High tax paying companies or investors prefer to subscribe to the preference shares and investors with a low tax burden would prefer to go in for debt instruments. The conversion options provided in the by preference shares also make it attractive. The biggest advantage is the tax-exempt status of the preference share's dividend.

#### ***II) Debentures***

Corporate debentures are an option available to the investors who are sacrifice liquidity for higher return. Manufacturing companies like Gujarat Industries Power and TISCO have issued debentures. If the debentures are not actively traded in the debt segment of the capital market, the investors may have to hold the instrument till maturity. If the instruments were actively traded in the secondary market, it would have perhaps changed hands at a considerable premium, thereby lowering the yield on par with the present interest rate. These reasons contribute towards high coupon rates on debentures.

#### ***III) Bonds***

Bonds are similar to the debentures but they are issued by the public sector undertakings. The value of the bond in the market depends upon the interest rate and the maturity. The coupon rate is the nominal interest rate offered on the bonds. The coupon rate is contractual involving the terms and conditions of the issuance of the debt security. Being contractual it cannot be changed during the tenure of the instrument. The investors are not affected by lowering of the bank rates. When the bank rates are lowered, actually, the value of the bonds, which are carrying interest rates above the bank rate would appreci-

ate. IDBI and ICICI have issued various bonds to suit the needs of the investors. Some of them are deep discount bond, education benefit bond, retirement benefit bond and index bond.

#### *IV) IVPs AND KVPs*

These are saving certificates issued by the post office with the name Indira VikasPatra (IVP) and KisanVikasPatra (KVP). The IVPs are in the face value of ₹ 500, 1000 and 5000. The KVPs are in the denomination of ₹ 1000, 5000 and 10000. The capital is doubled in 5.5 years with the return of 13.47%. IVPs are like bearer bounds, transferable by hand delivery and therefore are attractive to the persons who prefer cash transactions. No income tax concession is available for this type of investment.

**6) Government Securities** The securities issued by the Central, State Government and Quasi Government agencies are known as Government securities or gilt edged securities. As Government guaranteed security is a claim on the Government, it is a secured financial instrument, which guarantees the income and the capital. The rate of interest on these securities is relatively lower because of their high liquidity and safety.

**7) Money Market Securities** Money market securities have very short term maturity say less than a year. Common money market instruments are:

- Treasury bills
- Commercial paper
- Certificate of deposit

#### *Treasury Bills*

A treasury bill is basically an instrument of short term borrowing by the Government of India. To develop the Treasury bill market and provide investors with financial instruments of varying short-term maturities and to facilitate the cash management requirements of various segments of the economy, in April 1997 treasury bills of varied maturities were introduced. 14-day Treasury bill on a weekly basis was introduced from June 6, 1997. In the second half of 1997-98, Treasury bill of 28-day was introduced on auction basis. Further, it was decided to reintroduced 182-day treasury bills through auctions. Generally, treasury bills are of 91-days. Since the interest rates offered on the offered on the treasury bills are very low, individuals very rarely invest in them.

## Commercial Papers

Commercial paper is a short-term negotiable instrument with fixed maturity period. It is an unsecured promissory note issued by the company either directly or through bank/merchant banks. The maturity period of commercial paper was originally three (minimum) to six (maximum) months from the date of issue. In Oct 1993, the maximum period was extended to one year. The commercial papers are sold at a discount and redeemed at their face value. The discounted value implicated the interest rate. The denomination of commercial paper is high. Mostly the companies and institutional investors favour them. The minimum maturity of CP was brought down from 3 months to 30 days.

## *Certificate of Deposit*

The certificate of deposit is a marketable receipt of funds deposited in a bank for a fixed period at a specified rate of interest. They are bearer documents and readily negotiable. The denominations of the CD and the interest rate on them are high. It is mainly preferred by institutional investors and companies rather than the individuals. The minimum size of the certificate is ₹ 10 lakh. The additional amount is issued in multiples of ₹ 5 lakh.

## Non-Negotiable Securities

### Deposits

Deposits earn fixed rate of return. Even though bank deposits resemble fixed income securities they are not negotiable instruments. Some of the deposits are dealt subsequently.

#### *a) Bank Deposits*

It is the simple investment avenue open for the investors. He has to open an account and deposit the money. Traditionally the banks offered current account, savings account and fixed deposit account. Current account does not offer any interest rate. The drawback of having large amounts in savings accounts is that the return is just 4.5 per cent. The savings account interest rate is regulated by the Reserve Bank of India and kept low because of the high cost of servicing them. The savings account is more liquid and convenient to handle. The fixed account carries high interest rate and the money is locked up for a fixed period. With increasing competition among the banks, the banks have bundled the plain savings account with the fixed account to cater to the needs of the small savers. Some of the hybrid accounts are given below in the Table.

### Hybrid Accounts Offered by Some Banks

| Bank          | Product             | Nature                                                                                                                              | Min. Dep. (₹ ) | Other Benefits                                                                                                              |
|---------------|---------------------|-------------------------------------------------------------------------------------------------------------------------------------|----------------|-----------------------------------------------------------------------------------------------------------------------------|
| ICICI Bank    | Maxi Cash           | Savings account savings with Auto sweep facility through which standing instructions can be issued to transfer surplus funds of FD. | 5,000          | ATM Card, Internet banking and assistance in investing funds in money market instruments, anywhere banking and cheque book. |
|               | Quantum Optima      | FD linked to savings account with Auto-sweep Reverse-sweep, Auto Renewal facilities                                                 | 25,000         | ATM Card, Anywhere banking, Internet Banking, & overdraft facility                                                          |
| IndusInd Bank | 2-in-1 Account      | Savings account with link to FD.                                                                                                    | 25,000         | Cheque book and overdraft facility                                                                                          |
|               | Cluster Deposits    | Savings linked FD with Auto-sweep and Reverse-sweep.                                                                                | 25,000         | Cheque book.                                                                                                                |
| HDFC Bank     | Super saver account | Savings linked to FD.                                                                                                               | 25,000         | Overdraft, cheque book, ATM and phone banking.                                                                              |
|               | Sweep-in-account    | Savings linked to FD with Reverse Sweep and add-on-deposit.                                                                         | 25,000         | ATM, Cheque book and phone banking.                                                                                         |

The deposits in the banks are considered to be safe because of the RBI regulation. The risk averse investors prefer the bank deposits.

#### **b) Post Office Deposits**

Like the banks, post office also offers fixed deposit facility and monthly income scheme. Post office Monthly Income Scheme is a popular scheme for the retired. An interest rate of 13% is paid monthly. The term of the scheme is 6 years, at the end of which a bonus of 10% is paid. The annualised yield to maturity works out to be 15.01% per annum. After three years, premature closure is allowed without any penalty. If the closure is after one year, a penalty of 5% is charged.

#### **c) NBFC Deposits**

In recent years, there has been a significant increase in the importance of non-banking financial companies in the process of financial intermediation. The NBFC comes under the purview of the RBJ. The amendment of RBI Act in Jan 1997, made registration compulsory for the NBFCs.

- a. **Period** The maturity period ranges from few months to five years. It varies from company to company. For example, the Birla Global Finance, the company belonging to Aditya Birla group accepts deposits with maturity from 3-5 years.
- b. **Maximum Limit** The limit for acceptance of deposit has been based on the credit rating of the company. The NBFCs not having net owned funds of ₹ 25 lakh are not entitled to accept deposits.
- c. **Interest** NBFCs offer interest rate higher than the commercial bank on public deposit. The interest rate differs according to maturity period. There is a disparity in the interest rate among the companies in accordance with the credit ratings and policies of the companies. Even the companies with similar credit ratings provide different interest rates for their deposits. Generally, companies with lower credit ratings offer higher interest rates to cover the risk. The following Table shows the interest rates offered by some of the finance companies as on July 2004.

**Interest Rates on Deposits Offered by Finance Companies**

| Company                  | 1 year | 2years | 3 years | Amount |
|--------------------------|--------|--------|---------|--------|
| Bajaj Auto Finance       | -      | -      | 6.5     | 25,000 |
| Birla Home Finance       | 6.00   | 6.25   | 6.50    | 20,000 |
| Canbanic Factors         | 6.79   | 7.04   | 25,000  |        |
| Can Fin Homes            | 5.25   | 5.50   | 5.75    | 5,000  |
| Chola Finance            | 6.50   | 7.00   | 7.50    | 10,000 |
| Dewan Housing Finance    | 6.10   | 6.35   | 6.60    | 10,000 |
| HUDCO                    | 6.25   | 6.50   | 6.75    | 50,000 |
| HDFC                     | 5.55   | 5.80   | 6.05    | 10,000 |
| IDBI                     | 5.50   | 5.75   | 6.25    | 25,000 |
| Lakshjni General Finance | 6.00   | 6.50   | 7.00    | 10,000 |
| M&M Financial Services   | 6.50   | 7.00   | 7.50    | 10,000 |
| PNB Housing Finance      | 5.75   | 6.00   | 6.00    | 20,000 |
| SRF                      | 7.00   | 7.00   | 7.00    | 10,000 |
| Sundaram Finance         | 6.00   | 6.50   | 7.00    | 10,000 |
| Sundaram Home            | 6.00   | 6.25   | 6.50    | 10,000 |
| TN Power Finance         | -      | 6.54   | 7.23    | 10,000 |

- d. **Security** Security of the deposits of the NBFCs is much lower than the deposits with banks. To improve the liquidity of NBFCs the percentage of liquid assets required to be maintained by them has been enhanced from 12.5 percent to 15 percent with effect from April 1999 respectively. Company Law Board is authorised to direct the defaulting NBFCs to repay the deposits. In spite of the strict rules and regulations laid down by RBI the default rate is high in the case of NBFCs.

### **Tax Sheltered Savings Scheme**

Tax sheltered savings schemes are of great importance to the investors in the tax-paying category. The tax sheltered savings schemes offer tax relief to those who participate in their schemes according to the income tax laws. The important tax sheltered savings schemes are

- Public Provident Fund Scheme
- National Savings Scheme
- National Savings Certificate VIII series

#### **a) Public Provident Fund Scheme (PPF)**

PPF earns an interest rate of 12 percent per year, which is exempted from the income tax under sec 88. The individuals and Hindu undivided families can participate in this scheme. The maximum limit per annum for the deposit is ₹ 60,000. The interest is accumulated in the deposit. It provides early withdrawal facilities from 7(1 year and every year thereafter, the account holder has an option to withdraw 50 per cent of the balance to his credit 4 years ago or 1 year ago whichever is lower. The facility makes PPF a self-sustaining account from 7th year onwards.

#### **b) National Savings Scheme (NSS)**

This scheme helps in deferring the tax payment. Individuals and 1-IUF are eligible to open NSS account in the designated post office. The NSS-87 gives 100 per cent income tax rebate but the interest as well as the capital are fully taxable if withdrawn during their lifetime. Investments in the NSS scheme, with a lock in period of 4 years qualify for a rebate of 20 per cent under Section 88 of the Income Tax Act, subject to a maximum of ₹ 12,000. The investment also earns an interest rate of 11 per cent pr year covered by Sec 80L. Compared to other tax savings' instruments the return offered by this scheme is lower.

On the liquidity aspect, withdrawal is permitted at any time after four years from the end of the financial year in which the account is opened. The entire amount can be withdrawn. The account can be closed on the expiry of 4 years. There is no fixed tenure for investment. One can also keep the account alive and earn interest at 11 percent per annum.

As a tax saving instrument “anytime” withdrawal after 4 years is the only interesting feature to the prospective investor. The tax deduction at source at the rate of 20 percent on the entire amount withdrawn has proved too costly to the investors.

### c) National Savings Certificate (NSC)

This scheme is offered by the post office. These certificates come in the denominations of ₹ 500, 1,000, 5,000 and 10,000. The contribution and the interest for the first 5 years are covered by Sec 88. The interest is cumulative at the rate of 12% per annum and payable biannually is covered by Sec 80L. No withdrawals are permitted. There is no deduction at maturity.

## Life Insurance

Life insurance is a contract for payment of a sum of money to the person assured (or to the person entitled to receive the same) on the happening of event insured against. Usually the contract provides for the payment of an amount on the date of maturity or at specified dates at periodic intervals or if unfortunate death occurs. Among other things, the contracts also provide for the payment of premium periodically to the corporation by the policy holders. Life insurance eliminates risk.

The major advantages of life insurance are given below:

- i) **Protection** Saving through life insurance guarantees full protection against risk of death of the saver. The full assured sum is paid, whereas in other schemes only the amount saved is paid.
- ii) **Easy Payments** For the salaried people the salary savings' schemes are introduced. Further, there is an easy instalment facility method of payment through monthly, quarterly, half yearly or yearly mode.
- iii) **Liquidity** Loans can be raised on the security of the policy.
- iv) **Tax Relief** Tax relief in Income Tax and Wealth Tax is available for amounts paid by way of premium for life insurance subject to the tax rates in force.

## Schemes of LIC

LIC offers a wide range of schemes to suit the needs of the individual investor.

### Basic Life Insurance Plans

**Whole Life Assurance Plan** it is a low cost insurance plan where the sum assured is payable on the death of the life assured and premiums are payable throughout life.

**Endowment Assurance Plan** Under this plan, the sum assured is payable on the date of maturity or on the death of the life assured, if earlier.

Both these plans are available with the facility of paying the premiums for a limited period.

### Term Assurance Plans

**Two-Year Temporary Assurance PLAN** Under this plan, term assurance for two years is available. The sum assured is payable only on the death of the life assured during the term.

**Convertible Term Assurance Plan** It provides term assurance for 5 to 7 years with an option to purchase a new, Limited Payment whole life Policy or an Endowment Assurance Policy at the end of the selected term; provided the policy is in full force.

**Bimasandesh** This is basically a Term Assurance Plan with the provision for return of premium paid, on the life assured surviving the term.

**Bimakiran** This plan is an improved version of BimaSandesh with an added attraction of loyalty addition, in-built accident cover and Free Term Cover after maturity, provided the policy is then in full force.

**Plans For Children** Various children's Deferred Assurance Plans are available viz, Jeevan Balya, and Jeevan Kishore. JeevanSubanya is a plan specially designed for girls. The Children's Money Back Assurance Plan is specially designed to provide for children's higher educational expenses with added attractions of guaranteed additions, loyalty additions and optional family benefit.

**Pension Plans** These plans provide for either immediate or deferred pension for life. The pension payment are made till the death of the annuitant (unless the policy has

provision of guaranteed period). Both the Deferred Annuity and Immediate Annuity plans are available with the return of the GIVE amount on death after vesting under the JeevanDhara Plan and return of Purchase Price on death under the JeevanAkshay Plan.

**Jeevansarita** This is a Joint-life-last survivor-annuity-cum-assurance plan (for husband and wife) where the claim amount is payable partly in lumpsum and partly in the form of an annuity. Balance sum is assured on the death of the survivor.

## Mutual Funds

Investment companies or investment trusts obtain funds from large number of investors through sale of units. The funds collected from the investors are placed under professional management for the benefit of the investors. The mutual funds are broadly classified into open-ended scheme and close-ended scheme.

### Open-Ended Schemes

The open-ended scheme offers its units on a continuous basis and accepts funds from investors continuously. Repurchase is carried out on a continuing basis thus, helping the investors to withdraw their money at any time. In other words, there is an uninterrupted entry and exit into the funds. The open-end scheme has no maturity period and they are not listed into stock exchanges. Investor can deal directly with the mutual fund for investment as well as redemption. The open-ended fund provides liquidity to the investors since the repurchase facility is available. Repurchase price is fixed on the basis of net asset value of the unit. In 1998 the open-ended schemes have crossed 80 in number.

### Closed – Ended Funds

The close-ended funds have a fixed maturity period. The first time investments are made when the close end scheme is kept open for a limited period. Once closed, the units are listed on a stock exchange. Investors can buy and sell their units only through stock exchanges. The demand and supply factors influence the prices of the units. The investor's expectation also affects the unit prices. The market price may not be the same as the net asset value.

Sometimes mutual funds with the features of close-ended and open-ended schemes are launched, known as interval funds. They can be listed in the stock exchange or may be available for repurchase during specific periods at net asset value or related prices.

## Other Classification

The open-ended and close-ended schemes are classified on the basis of their objectives. Some of them are given below

- i) **Growth Scheme** Aims to provide capital appreciation over medium to long term. Generally these funds invest their money in equities.
- ii) **Income Scheme** This scheme aims to provide a regular return to its unit holders. Mostly these funds deploy their funds in fixed income securities.
- iii) **Balanced Scheme** A combination of steady return as well as reasonable growth. The funds of these schemes are invested in equities and debt instruments.
- iv) **Money Market Scheme** This type of fund invests its money on money market instruments like treasury bills, commercial paper, etc.
- v) **Tax Saving Schemes** This type of scheme offers tax rebates to investors. Equity linked savings schemes and pension schemes provide exemption from capital gains on specific investment.
- vi) **Index Scheme** Here investment is made on the equities of the index. Benchmark index is BSE sensex or NSE-50. The return are approximately equal to the return on the index.

## Real Assets

### Gold and Silver

For ages, gold and silver have been considered as a form of investment. They are considered as best hedge against inflation. This is a favourite form of investment amongst the rural and semi-urban population. Besides, investors tend to invest in jewellery instead of pure gold. As a result, when they buy jewellery, the price realization is usually less than total purchase price (this is due to higher making charge of jewellery). The price of gold has declined in the later part of the nineties. Gold prices are suppressed because of large supplies overtaking the demand. The government has allowed imports of gold to certain banks and agencies and they have huge stocks of gold. The gold prices remained depressed in the international markets too in the late nineties. The following reasons are cited for the low price of gold in the international market.

- i) Weak demand from Asian countries which are the largest consumers of gold.
- ii) Continuing pressure on central banks to dishoard gold

- iii) Legislative measure like the Sweedish Government move to delink gold from Swiss Franc and lower gold reserves by the European Union.

According to World Gold Council (WGC), as against an increase of 9.0 percent in world demand, the demand for gold in India increased by 45.0 percent to a record level of 737 tones during 1997 from 507 tones in 1996, reflecting the increased response to the decline in prices. The substantial increase in domestic demand for gold was met by ease of supply facilities by (i) allowing non-resident Indians to import 10kg. of gold (as against 5kg. earlier) once in every six months with effect from January 1, 1997, (ii) allowing 12 authorised agencies to import gold under Open General Licence (OGL) without any limit on quantity and sell it in the local market against rupees after payment of approximately 5 percent duty and (iii) lower prices in the international market. The following table gives prices of gold and silver.

### Gold and silver Price

| Year/month | Gold (rupees per 10 grams)<br>Mumbai-Londonz |         |         | Silver (Rupees per kilogram)<br>Mumbai-London |          |         |
|------------|----------------------------------------------|---------|---------|-----------------------------------------------|----------|---------|
|            | Mumbai                                       | London  | Spread  | Mumbai                                        | New York | Spread  |
| 1990-91    | 3451.52                                      | 2164.26 | 1287.26 | 6760.79                                       | 2579.21  | 4181.58 |
| 1995-96    | 4957.60                                      | 4188.58 | 769.02  | 7220.50                                       | 5811.03  | 1409.47 |
| 1996-97    | 5070.71                                      | 4283.97 | 786.74  | 7165.07                                       | 5762.27  | 1402.42 |
| 1997-98    | 4347.07                                      | 3775.93 | 571.14  | 7352.27                                       | 6153.96  | 1198.31 |
| April 1998 | 4210.22                                      | 3941.42 | 268.79  | 8810.00                                       | 8024.88  | 785.12  |
| May 1998   | 4141.92                                      | 3887.10 | 255.82  | 7988.96                                       | 7161.03  | 827.93  |
| June 1998  | 4215.38                                      | 3968.86 | 246.53  | 7765.00                                       | 7144.01  | 620.99  |

Source: RBI Annual Number Sept. 1998

The monthly average price of silver in Mumbai market fell from ₹ 6969 pr kg. in April 1997 to ₹ 6332 per kg. in July 1997. Thereafter, it exhibited a near – steady increase to ₹ 8557 per Kg. in March 1998. The price of silver in the Mumbai and New York markets reached a high of ₹ 9350 per kg. and 731 cents per ounce, respectively, on February 5, 1998. The average spread between the domestic and international prices of silver declined to 19.5 percent in 1997-98 from 24.3 percent in 1996-97 with the prices in the domestic market moving in tandem with the international market prices.

The investment analysts feel that there will not be major rise in gold prices until 2000 unless there is a currency depreciation. They are optimistic about the rise in silver price.

## Real Estate

The real estate market offers a high return to the investors. The word real estate means land and buildings. There is a normal notion that the price of the real estate has increased by more than 12 percent over the past ten years. The population growth and the exodus of people towards the urban cities have made the prices to increase manifold. The price of the residential area land generally in South Mumbai ranges from a high of ₹ 19,400 per sq.ft. at Kemps Corner to a low of ₹ 8,400 per sq.ft. at Cuffe Parke in 1998. Recently, the recession in the economy has affected the price of the real estate. Prices, marked a substantial fall in 1998 from the 1997 prices. Reasons for investing in real estate are give below:

1. High capital appreciation compared to gold or silver particularly in the urban area.
2. Availability of loans for the construction of houses. The 1999-2000 budget provides huge incentives to the middle class to avail of housing loans. Scheduled banks now have to disburse 3 percent of their incremental deposits in housing finance.
3. Tax rebate is given to the interest paid on the housing loan. Further ₹ 75,000 tax rebate on a loan upto ₹ 5 lakhs which is availed of after April 1999. If an invests in a house for about ₹ 6-7 lakh, he provides a seed capital of about ₹ 1-2 lakh. The ₹ 5 lakh loan, which draws an interest rate of 15 percent, will work out to be less than 9.6 percent because of the ₹ 75,000, exempted from tax annually. In assessing the wealth tax, the value of the residential home is estimated at its historical cost and not on its present market value.
4. The possession of a house gives an investor a psychologically secure feeling and a standing among his friends and relatives.

Apart from making investment in the residential houses, the people in the higher income bracket invest their money in time share plans of the holiday resorts and land situated near the city limit with the anticipation of a capital appreciation. Farm houses and plantations also fall in the line. In spite of the fast capital appreciation investors generally do not invest in the real estate apart from owning one or two houses. The reasons are:

**Requirement of Huge Capital:** To purchase a land or house in the urban area, the investor needs money in lakhs whereas he can buy equity, gold or other form of investment by investing thousands of rupees.

**Malpractices:** Often-gullible investors become cheated in the purchase of land. The properties already sold are resold to the investors. The investor has lose the hard-earned money.

**Restriction of the Purchase:** The land ceiling Act restricts the purchase of agricultural land beyond a limit.

**Lack of Liquidity:** If the investor wants to sell the property, he cannot immediately realize the money. The waiting period may be months or years.

The points to be taken care of while purchasing the real estate are:

1. The plots should be approved by the local authority because on the unapproved layout construction of a house is not permitted.
2. Possibility of capital appreciation- It depends upon the locality and other facilities of the site.
3. Originality of title deeds- The site should be free from encumbrance. Encumbrance certificate for a minimum period of latest 15 years should be got from the Registrars Office.
4. Plinth area should be verified.
5. Credibility of the broker

The role of broker cannot be undermined because it is he who introduces to the parties and location of site. He should be faithful and loyal otherwise the investor finds himself in trouble.

## Art

Paintings are most sought after form of art. The price in the art market are rising and this rise is expected to continue. The trend in the market today is to invest in young upcoming painters whose prices will soar over the years. People who have bought paintings from young painters in the last few years are happy with the kind of financial as well aesthetic appreciation they have received over the years.

For example Manask Kamal Bishwash who used to sell A 22" x 30" mixed media on paper for ₹ 30,000 in 1997, commands a price of ₹ 45,000 in 1999. If an investor likes to buy paintings as a form of investments he has to consider the following points:

1. **Paintings of the young painters-** The works of established painters are costly and scope for appreciation in their values are limited. But prices of the good quality paintings of the young painters may increase quickly.
2. **Should possess the basic idea of the painting-** This is needed to decide the quality of the paintings. He should be able to judge the primary attributes of the paintings such as spontaneity, nature of strokes, colour combination and originality.
3. **The investor should have aestheticsense-**because he may or may not be able to resell the paintings. Therefore when he possesses the art piece the investor should have a sense of fulfillment.

## Antiques

In western countries' investment in antiques is more common than in India. The antique is an object of historical interest. It may be a coin, sculpture, manuscript or any other object of olden days. The owner of the antique has to register himself with Archeological Society of India. The society after examining the authenticity of the antique issues a "Certificate of registration". Any dealings I.e. purchase and sale of antique should be informed to the society. The government has the right to buy the antique from the owner, if it wants to keep it in the museum. In the case of investment, the investor has to be careful about the fake antique and the risk in the price of the antique is uncertain.

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### Lesson 1.3 - Securities Market

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Corporate securities and government securities constitute important investment avenues for savers. These are traded in the securities market. Creation of a portfolio and periodic revision of the portfolio involves buying and selling of securities in the securities market. An understanding of the working of securities market is, therefore, essential for practicing portfolio management. However, the functioning of the securities market is too vast a subject to be confined within a single chapter. An attempt is made in this chapter to explain the basic features of securities market.

#### Financial Market

A market is a place used for buying and selling goods. This is the commonest meaning of the word 'market'. The usual features of a market are a place, some buyers, some sellers, some commodity to be exchanged for money or some other commodity. What transpires in a market is an exchange of a commodity between a buyer and a seller. However, such an exchange can take place even without a common meeting place or physical space. Hence, a physical place is not an essential constituent of a market. It is rather the mechanism used for the exchange of goods.

In an ordinary market what is usually exchanged is a physical commodity such as fruits, grains, etc. In modern day markets, these commodities are valued in monetary terms and exchanged for money. A commodity that is in demand is exchanged between buyers and sellers in the market.

In an economy, the various economic units such as individuals in the household sector, business units in the industrial and commercial sector, and government organisations and departments in the government sector are engaged in various economic activities and transactions involving money. Some of them spend more money than they earn and end up in financial deficit while others earn more money than they spend, thus ending up in financial surplus. The deficit generators are usually the units in the industrial, commercial and government sectors. The surplus generators are mostly the units in the household sector. The deficit generators who are known as ultimate borrowers would like to borrow funds from the surplus generators who are the primary lenders. Such transfer of funds is possible and also necessary to sustain the development of the economy.

The transfer of funds between primary lenders and ultimate borrowers takes place through the creation of securities or financial assets. If an individual is not spending all his income on consumption, he will want to find a temporary repository for his current savings until they are required to finance future consumption. This involves the purchase of a financial asset or security. If the investor deposits the money in the fixed deposit of a commercial bank, the bank issues him a fixed deposit receipt which is a financial asset. The individual is purchasing a financial asset and thereby transferring the surplus funds at his disposal to a financial intermediary. The bank, in turn, may lend the money to a business unit through the creation of a loan agreement.

Let us consider another instance of transfer of funds. A company in need of funds may issue shares to mobilize funds. In a public issue of shares, any individual with surplus funds may participate. If shares are allotted to such an individual, the company which is the borrower of funds will issue a share certificate to the investor who is the lender of funds. In such a situation a financial asset in the form of a share certificate is being exchanged. This exchange represents a marketing transaction and presupposes a market which nevertheless has no physical location.

The commodity being exchanged is a financial asset instead of a physical asset. The lender of funds (or investor) is the buyer of the asset and the borrower of funds is the seller of the asset (or issuer of the security). The mechanism or system through which financial assets are created and transferred is known as the financial market. When the financial assets transferred are corporate securities and government securities, the mechanism of transfer is known as securities market.

### **Segments of Financial Market**

Different types of securities are traded in the securities market. These may include ownership securities, debt securities, short-term securities, long-term securities, government securities, non-government or corporate securities. The nature of return and risk involved in short-term securities is vastly different from that of long-term securities. Hence, on the basis of the maturity period of securities traded in the market, the securities market is segmented into money market and capital market.

Money market is the market for short-term financial assets with maturities of one year or less. Treasury bills, commercial bills, commercial paper, certificate of deposit, etc. are the short-term securities traded in the money market. These instruments being close substitutes for money, the market for their trading is known as money market.

Money market is the main source of working capital funds for business and industry. It provides a mechanism for evening out short-term surpluses and deficits. The short-term requirements of borrowers can be met by the creation of money market securities, which can be purchased by lenders with short-term surpluses to park their funds for short durations. In India, the money market has a narrow base with limited number of participants who are mostly financial institutions.

Capital market, on the other hand, is the market segment where securities with maturities of more than one year are bought and sold. Equity shares, preference shares, debentures and bonds are the long-term securities traded in the capital market. The capital market is the source of long-term funds for business and industry.

### **Types of Financial Market**

The financial market may be classified as primary market or secondary market depending on whether the securities traded are newly issued securities or securities already outstanding and owned by investors. Private companies and public sector enterprises, in need of money, may issue securities such as shares, debentures, bonds, commercial papers, etc. to raise required capital. Individual investors and institutional investors may invest in these securities. The market mechanism for the buying and selling of new issues of securities is known as primary market. This market is also termed as new issues market because it deals in new issues of securities.

The secondary market, on the other hand, deals with securities which have already been issued and are owned by investors, both individual and institutional. These may be traded between investors. The buying and selling of securities already issued and outstanding take place in stock exchanges. Hence, stock exchanges constitute the secondary market in securities.

### **Participants in the Financial Market**

A financial market is essentially a system by which financial securities are exchanged. This system is composed of participants, securities, markets, trading arrangements and regulations. The major participants are the buyers and sellers of securities or the investors (who are the buyers of securities) and the issuers (who are the sellers of securities). Financial intermediaries are the second major class of participants in the financial system. They play a crucial role in the smooth functioning of the financial system. The investors who are the primary lenders in the financial system would prefer to 'lend short', that is, invest their surplus for short durations as they generally have a preference for liquidity. On the contrary,

the issuers of securities who are the ultimate borrowers would prefer to 'borrow long', that is, borrow for long durations as the funds are generally required for financing long-term investment in fixed assets. This situation gives rise to a fundamental problem in the financial system which was described as the 'constitutional weakness' of unintermediated financial markets by Hicks (1939). The problem is to match the preferences of the surplus sector to lend short with those of the deficit sector to borrow long. It is the financial intermediaries who resolve this problem. They borrow for short durations from the primary lenders and lend for long durations to the ultimate borrowers. Through the intervention of the financial intermediaries, the ultimate borrower is able to get long-term funding and the primary lender is able to get liquidity on his lending.

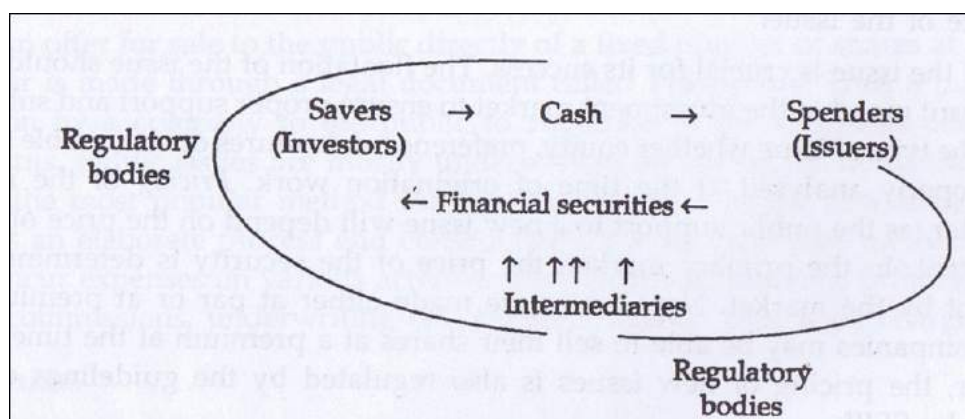
There are two types of financial intermediaries in the financial system, namely banking financial intermediaries and non-banking financial intermediaries such as insurance companies, housing finance companies, unit trusts and investment companies. However, it may be noted that the traditional distinction between banking and non-banking institutions is slowly disappearing. As a result of technological innovations and increasing competitive pressures, the traditional distinction between banking and non-banking activities is rapidly disappearing and a universal banking system in which a single institution provides the complete range of financial intermediation services is slowly emerging.

Another group of participants in the financial system comprises the individuals and institutions who facilitate the trading or exchange process in the system. They are primarily brokers who act as agents for the primary lenders or the ultimate borrowers in the purchase or sale of securities. There are also broker dealers who act on their own account by buying and selling securities for a profit. This group also includes institutions which act as registrars, managers, lead managers, share transfer agents, etc. at the time of issue of shares by companies.

### **Regulatory Environment**

The financial system in a country is subject to a set of regulations in the form of various Acts passed by the legislative bodies. The regulatory environment may differ from one country to another. In each country, the regulatory control of the financial system is exercised by designated regulatory authorities. In India, the Ministry of Finance, the Reserve Bank of India (RBI), the Securities and Exchange Board of India (SEBI), etc. are the major regulatory bodies exercising regulatory control and supervision over the functioning of the financial system in the country.

A simple diagrammatic representation of how a security is raised or originated in the financial market is attempted in Fig.



**Representation of origin of a security in the financial market.**

The securities thus issued may be traded or exchanged between investors in securities markets with the help of intermediaries, within the regulatory framework approved by the Government and other regulatory bodies.

New securities are directly issued by the issuing companies to the investors. All the participants in this process of issuing new shares to investors together constitute the primary market or new issues market. Let us analyse the functioning of this primary market.

### **Primary Market/New Issues Market**

When a new company is floated, its shares are issued to the public in the primary market as an Initial Public Offer (IPO). If the company subsequently decides to include debt in its capital structure by issuing bonds or debentures, these may also be floated in the primary market. Similarly, when a company decides to expand its activities using either equity finance or bond finance, the additional shares or bonds may be floated in the primary market.

The primary market or new issues market (NIM) does not have a physical structure or form. All the agencies which provide the facilities and participate in the process of selling new issues to the investors constitute the NIM.

The NIM has three functions to perform. They are:

1. Origination
2. Underwriting
3. Distribution.

## Origination

Origination is the preliminary work in connection with the floatation of a new issue by a company. It deals with assessing the feasibility of the project, technical, economic and financial, as also making all arrangements for the actual floatation of the issue. As part of the origination work, decisions may have to be taken on the following issues:

1. Time of floating the issue
2. Type of issue
3. Price of the issue.

Timing of the issue is crucial for its success. The floatation of the issue should coincide with the buoyant mood in the investment market to ensure proper support and subscription to the issue. The type of issue whether equity, preference, debentures or convertible securities, has to be properly analysed at the time of origination work. Pricing of the issue is a sensitive matter, as the public support to a new issue will depend on the price of the issue to a large extent. In the primary market, the price of the security is determined by the issuer and not by the market. New issues are made either at par or at premium. Well-established companies may be able to sell their shares at a premium at the time of a new issue. Further, the pricing of new issues is also regulated by the guidelines on capital issues issued by SEBI.

The origination function in the NIM is now being carried out by merchant bankers. In the 1980s, commercial banks in India created special divisions called merchant banking divisions to perform the origination function for floatation of new issues. But now there are separate institutions registered with SEBI as merchant bankers.

## Underwriting

The second function performed by NIM is underwriting which is the activity of providing a guarantee to the issuer to ensure successful marketing of the issue. An underwriter is an individual or institution which gives an undertaking to the stock issuing company to purchase a specified number of shares of the company in the event of a shortfall in subscription to the new issue. The stock issuing company can thus ensure full subscription to the new issue through underwriting agreements with different underwriters, even if there is no proper response to the new issue from the investors. Underwriting activity in the NIM is performed by large financial institutions such as LIC, UTI, IDBI, IFCI, general insurance companies, commercial banks and also by brokers. The underwriters earn commission from the issuing company for this activity.

## **Distribution**

The new issue market performs a third function besides the functions of origination and underwriting. This third function is that of distribution of shares. The distribution function is carried out by brokers, sub-brokers and agents. New issues have to be publicised by using different mass media, such as newspapers, magazines, television, radio, Internet, etc. New issues are also publicized by mass mailing. It has become a general practice to distribute prospectus, application forms and other literature regarding new issues among the investing public.

## **Methods of Floating New Issues**

The methods by which new issues of shares are floated in the primary market in India are:

1. Public issue
2. Rights issue
3. Private placement.

### **Public Issue**

Public issue involves sale of securities to members of the public. The issuing company makes an offer for sale to the public directly of a fixed number of shares at a specific price. The offer is made through a legal document called Prospectus. Thus a public issue is an invitation by a company to the public to subscribe to the securities offered through a prospectus. Public issues are mostly underwritten by strong public financial institutions. This is the most popular method for floating securities in the new issue market, but it involves an elaborate process and consequently it is an expensive method. The company has to incur expenses on various activities such as advertisements, printing of prospectus, banks' commissions, underwriting commissions, agents' fees, legal charges, etc.

### **Rights Issue**

The rights issue involves selling of securities to the existing shareholders in proportion to their current holding. As per section 81 of the Companies Act, 1956, when a company issues additional equity capital it has to be offered first to the existing shareholders on a pro rata basis. However, the shareholders may forfeit this special right by passing a special resolution and thereby enable the company to issue additional capital to the public through a public issue. Rights issue is an inexpensive method of floatation of shares as the offer is made through a formal letter to the existing shareholders.

## Private Placement

A private placement is a sale of securities privately by a company to a selected group of investors. The securities are normally placed, in a private placement, with the institutional investors, mutual funds or other financial institutions. The terms of the issue are negotiated between the company and the investors. A formal prospectus is not necessary in the case of private placement. Underwriting arrangements are also not required in private placement, as the sale is directly negotiated with the investors. This method is useful to small companies and closely held companies for issue of new securities, because such companies are unlikely to get good response from the investing public for their public issues. They can avoid the expenses of a public issue and also have their shares sold.

## Principal Steps in Floating a Public Issue

In a public issue, investors are allowed to subscribe to the shares being issued by the company during a specified period ranging from a minimum of three days to a maximum of ten days. The issue remains open during this period for subscription by the public. This is the principal activity in the process of a public issue. Before the issue is opened for public subscription, several activities/ legal formalities have to be completed. These are the pre-issue steps or obligations. Similarly, after the issue is closed, several activities are to be carried out to complete the process of public issue. These activities may be designated as the post-issue tasks. Thus, we can identify three distinct stages in the successful completion of a public issue.

1. Pre-issue tasks
2. Opening and closing of the issue
3. Post-issue tasks.

### Pre-Issue Tasks

These are the preparatory obligations to be complied with before the actual opening of the issue.

**Drafting and finalisation of the prospectus** Prospectus is an essential document in a public issue. The Companies Act 1956 defines a prospectus as: "Any document described or issued as a prospectus and includes any notice, circular, advertisement or other document inviting deposits from the public or inviting offers from the public for the subscription or purchase of any shares in or debentures of a body corporate". It is the offer document which contains all the information pertaining to the company which will be useful to the investors

to arrive at a proper decision regarding investing in the company. It is a communication from the issuer to the investor. The prospectus contains detailed information about the company, its activities, promoters, directors, group companies, capital structure, terms of the present issue, details of proposed project, details regarding underwriting arrangements, etc. SEBI has issued guidelines regarding the contents of the prospectus and these have to be complied with by the company.

The draft prospectus has to be approved by the Board of Directors of the company. The draft prospectus has also to be filed with SEBI and the Registrar of companies. The final prospectus has to be prepared as per the suggestions of SEBI and filed with SEBI and the Registrar of companies.

**Selecting the intermediaries and entering into agreements with them** Several intermediaries are involved in the process of a public issue. These intermediaries have to be registered with SEBI. Important categories of intermediaries are the following:

- 1. Merchant Banker:** Merchant banker is any person or institution which is engaged in the business of issue management either as manager, consultant, adviser, or by rendering corporate advisory service in relation to such issue management. Merchant bankers play an important role in the process of managing a public issue. It is the duty of the merchant bankers to ensure correctness of the information furnished in the prospectus as well as to ensure compliance with SEBI rules, regulations and guidelines regarding public issue of securities. Merchant bankers are registered with SEBI in four categories, with different eligibility criteria for each category.
- 2. Registrar to an Issue:** Registrar to an issue is any person or institution entrusted with the following functions in connection with a public issue:
  - (a) Collecting applications from investors.
  - (b) Keeping a record of applications and monies received from investors
  - (c) Assisting the stock issuing company in determining the basis of allotment of securities in consultation with the stock exchange.
  - (d) Finalising the list of persons entitled to allotment of securities.
  - (e) Processing and despatching allotment letters, refund orders, certificates and other related documents.
- 3. Share Transfer Agent:** Share transfer agent is a person or institution which maintains the records of holders of securities of a company on behalf of that company. The share transfer agent is authorised to effect the transfer of securities as well as the redemption of securities wherever applicable.

4. **BANKER TO AN ISSUE:** Banker to an issue is a scheduled bank entrusted with the following activities in connection with a public issue:
- (a) Acceptance of application and application monies
  - (b) Acceptance of allotment or call monies
  - (c) Refund of application monies
  - (d) Payment of dividend or interest warrants.

The intermediaries are service providers possessing professional expertise in the relevant areas of operation. The market regulator, SEBI, regulates the various intermediaries in the primary market through its regulations for these intermediaries.

SEBI has defined the role of each category of intermediary, the eligibility criteria for granting registration, their functions and responsibilities, and the code of conduct to which they are bound.

The stock issuing company has to select the intermediaries such as merchant banker, registrar to the issue, share transfer agent, banker to the issue, underwriters, etc. and sign separate agreements with each of them to engage them for the public issue.

### **Attending to Other Formalities**

The prospectus and application forms have to be printed and despatched to all intermediaries and brokers for wide circulation among the investing public. An initial listing application has to be filed with the stock exchange where the issue is proposed to be listed. An abridged version of the prospectus along with the issue opening and closing dates has to be published in newspapers.

### **Opening and Closing of The Issue**

The public issue is open for subscription by the public on the pre-announced opening date. The application forms and application monies are received at the branches of the bankers to the issue and forwarded by these bankers to the Registrar to the issue. Two closing dates are prescribed for the closing of the public issue.

The first of these is the 'earliest closing date' which should not be less than three days from the opening date. If sufficient applications are received by the company, the company may choose to close the issue on the earliest closing date itself. The other closing date is the final or latest closing date which shall not exceed ten days from the opening date.

### Post-Issue Tasks

After closing of the public issue, several activities are to be carried out to complete the process of public issue. They are:

1. All the application forms received have to be scrutinised, processed and tabulated.
2. When the issue is not fully subscribed to, it becomes the liability of the underwriters to subscribe to the shortfall. The liability of each underwriter has to be determined.
3. When the issue is oversubscribed, the basis of allotment has to be decided in consultation with the stock exchange.
4. Allotment letters and share certificates have to be despatched to the allottees. Refund orders have to be despatched to the applicants whose applications are rejected.
5. Shares have to be listed in the stock exchange for trading. For this purpose, the issuing company has to enter into a listing agreement with the stock exchange.

### Book Building

Companies may raise capital in the primary market by way of public issue, rights issue or private placement. A public issue is the selling of securities to the public in the primary market. The usual procedure of a public issue is through the fixed price method where securities are offered for subscription to the public at a fixed price. An alternative method is now available which is known as the book building process. Although book building has been a common practice in most of the developed countries, the concept is relatively new in India. SEBI announced guidelines for the book building process, for the first time, in October 1995.

Under the book building process, the issue price is not fixed in advance. It is determined by the offer of potential investors about the price which they are willing to pay for the issue. The price of the security is determined as the weighted average at which the majority of investors are willing to buy the security. Thus, under the book building process, the issue price of a security is determined by the demand and supply forces in the capital market.

SEBI guidelines define book building as: "A process undertaken by which a demand for the securities proposed to be issued by a body corporate is elicited and built up and the price for such securities is assessed for the determination of the quantum of such securities to be issued by means of a notice, circular, advertisement, document or information memoranda or offer document".

Book building is a process of price discovery. It puts in place a pricing mechanism whereby new securities are valued on the basis of the demand feedback following a period of marketing. It is an alternative to the existing system of fixed pricing.

A public issue of securities may be made through the fixed price method, the book building method, or a combination of both. In case the issuing company chooses to issue securities through the book building route, then as per SEBI guidelines the issuer company can select any of the following methods:

1. 100 per cent of the offer to the public through the book building process.
2. Seventy-five per cent of the offer to the public through the book building process and twenty-five per cent through the fixed price method at the price determined through book building.
3. Ninety per cent of the offer to the public through the book building process and ten per cent through the fixed price method.

The issue of the fixed price portion is conducted like a normal public issue after the book built portion is issued.

The steps involved in the process of book building may be listed out as follows:

1. The issuer appoints a merchant banker as the lead manager and book runner to the issue.
2. The book runner forms a syndicate of underwriters. The syndicate consists of book runner, lead manager, joint lead managers, advisors, co-managers and underwriting members.
3. A draft prospectus is submitted to SEBI without a price or price band. The draft prospectus is then circulated among eligible investors with a price band arrived at by the book runner in consultation with the issuer. Such a prospectus is known as a Red Herring prospectus.
4. The book runner conducts awareness campaigns, which include advertising, road shows and conferences.
5. Investors place their orders with syndicate members. These members collect orders from their clients on the amount of securities required by them as well as the price they are willing to pay.

6. The book runner builds up a record known as Book after receiving orders from members of the syndicate. He maintains detailed records in this regard. The book is thus built up to the size of the portion to be raised through the book building process. When the book runner receives substantial number of orders, he announces closure of the book. A book should remain open for a minimum of three working days. The maximum period for which the bidding process may be allowed is seven working days.
7. On the basis of the offers received, the book runner and the issuer company then determines the price at which the securities shall be sold.
8. The book runner finalises the allocation to syndicate members. Procurement agreements are signed between issuer and the syndicate members for the subscription to be procured by them.

The final prospectus along with the procurement agreements is then filed with the Registrar of companies within two days of the determination of the offer price.

9. The book runner collects from the institutional buyers and the underwriters the application forms along with the application monies to the extent of the securities proposed to be allotted to them/subscribed by them.

Book building is a process wherein the issuer of securities asks investors to bid for their securities at different prices. These bids should be within an indicative price band decided by the issuer. Here investors bid for different quantity of shares at different prices. Considering these bids, issuer determines the price at which the securities are to be allotted. Thus, the issuer gets the best possible price for his securities as perceived by the market or investors.

### **Role of Primary Market**

Primary market is the medium for raising fresh capital in the form of equity and debt. It mops up resources from the public (investors) and makes them available for meeting the long-term capital requirements of corporate business and industry. The primary market brings together the two principal constituents of the market, namely the investors and the seekers of capital. The savings or surplus funds with the investors are converted into productive capital to be used by companies for productive purposes. Thus, capital formation takes place in the primary market. The economic growth of a country is possible only through a robust and vibrant primary market.

In the secondary market, shares already purchased by investors are traded among other investors. Operations in the secondary market do not result in the accretion of capital resources of the country, but indirectly promotes savings and investments by providing liquidity to the investments in securities, i.e. the investors have the facility to liquidate their investments in securities in the secondary market.

### **Regulation of Primary Market**

For companies, raising capital through the primary market is time consuming and expensive. The issuer has to engage the services of a number of intermediaries and comply with complex legal and other formalities. The investor faces much risk while operating in the primary market. Fraudulent promoters may try to dupe the investors who opt to invest in a new issue. Investors in the primary market need protection from such fraudulent operators.

Up to 1992, the primary market was controlled by the Controller of Capital Issues (CCI) appointed under the Capital Issues Control Act, 1947. During that period, the pricing of capital issues was regulated by CCI. The Securities and Exchange Board of India (SEBI) was formed under the SEBI Act, 1992, with the prime objective of protecting the interests of investors in securities as well as for promoting and regulating the securities market. All public issues since January 1992 are governed by the rules, regulations and guidelines issued by SEBI.

SEBI has been instrumental in bringing greater transparency in capital issues. It has issued detailed guidelines to standardise disclosure obligations of companies issuing securities. Companies floating public issues are now required to disclose all relevant information affecting investors' interests. SEBI constantly reviews its guidelines to make them more market friendly and investor friendly.

Successful floatation of a new issue in the primary market requires careful planning, proper timing and comprehensive marketing efforts. The services of specialised institutions such as merchant bankers, registrars to the issue, underwriters, etc. are available to the issuer company to handle the task. There is effective regulation of SEBI at every stage of a public issue. There are also regulations to ensure fair practice by the intermediaries in the market.

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## Lesson 1.4 - Stock Exchanges

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Primary market is the market in which new issues of securities are sold by the issuing companies directly to the investors. Secondary market is the market in which securities already issued by companies are subsequently traded among investors. A person with funds for investment in securities may purchase the securities either in the primary market (from the issuing company at the time of a new issue of securities) or from the secondary market (from other investors holding the desired securities). Securities can be purchased in the primary market only at the time of issue of the security by the company, whereas in the secondary market securities can be purchased throughout the year. As a result, trading in a particular security in the primary market is an intermittent event depending upon the frequency of new issues of the security by the company, but trading in that security in the secondary market is continuous. The secondary market where continuous trading in securities takes place is the stock exchange. In this chapter we shall examine the functioning of stock exchanges in the country.

### What is a Stock Exchange

The stock exchanges were once physical market places where the agents of buyers and sellers operated through the auction process. These are being replaced with electronic exchanges where buyers and sellers are connected only by computers over a telecommunications network. Auction trading is giving way to “screen-based” trading, where bid prices and offer prices (or ask prices) are displayed on the computer screen. Bid price refers to the price at which an investor is willing to buy the security and offer price refers to the price at which an investor is willing to sell the security. Alternatively, a dealer in securities may declare the bid price and the offer price of a security, suggesting the price at which he is prepared to buy the security (bid price) and also the price at which he is prepared to sell the security (offer price). The bid-offer spread, the difference between the bid price and the offer price constitutes his margin or profit.

Securities of a company first become available on an exchange after the company conducts its Initial Public Offering (IPO). During the IPO, a company sells its securities to an initial set of investors in the primary market. These securities can then be sold and purchased in the stock exchanges. The exchange tracks the flow of orders for each security, and this flow of supply and demand for the security sets the price of the security.

A stock exchange may be defined or described in different ways. A simple description of a stock exchange is as follows: “A centralised market for buying and selling stocks where the price is determined through supply-demand mechanisms”.

A somewhat similar description of a stock exchange is the following: “An organisation that provides a facility for buyers and sellers of listed securities to come together to make trades in these securities”.

In a stock exchange, the trading in listed securities is carried out by qualified members who may act either as agents for customers or as principals for their own accounts.

Stock exchanges may, therefore, be described as “Associations of brokers and dealers in securities who transact business together”.

A more descriptive definition of a stock exchange is: “An organised market place for securities featured by the centralisation of supply and demand for the transaction of orders by member brokers for institutional and individual investors”.

According to the Securities Contracts (Regulation) Act, 1956, which is the main law governing stock exchanges in India, “stock exchange means any body of individuals, whether incorporated or not, constituted for the purpose of assisting, regulating or controlling the business of buying, selling or dealing in securities”.

### **Functions of Stock Exchanges**

A stock exchange has an important role to fulfil in the economic development of a country. It is essential for the smooth functioning of the private sector corporate economy. In the process of capital formation and in raising resources for the corporate sector, the stock exchange performs four essential functions.

Firstly, it provides a market place for purchase and sale of securities such as shares, bonds, debentures, etc. Investors desirous of buying securities would be able to buy securities in the primary market only occasionally, that is, at the time of issue of such securities by the company, whereas they would be able to buy securities in the stock exchanges at any time, as trading in stock exchanges is continuous. Similarly, holders of securities who are desirous of selling the securities would be able to sell them only in the stock exchanges, as the issuing companies do not ordinarily buy back the shares. Thus, stock exchanges provide the facility for continuous trading in securities.

Secondly, stock exchanges provide liquidity to the investments in securities, that is, it gives the investors a place to liquidate their holdings. This is essentially the basis for the joint stock enterprise system. Investors would not be interested to invest in corporate securities without the assurance provided by the stock exchanges to the owners of corporate securities that these securities can be sold in the stock exchanges at any time.

Thirdly, the stock exchanges help in the valuation of securities by providing the market quotations of the prices of securities. The market quotations represent the collective judgement on the value of the securities arrived at simultaneously by many sellers and buyers in the market. The value of shares is influenced by macro economic factors as well as micro economic factors, long-term economic trends as well as short-term fluctuations in economic variables. Speculative forces in the securities market also influence share valuations. Market quotations of share prices provide valuable information to prospective investors as well as shareholders regarding the value of shares traded in the stock exchanges.

Fourthly, stock exchanges play the role of a barometer, namely, an indicator of the state of health of the nation's economy as a whole. The shares of a large number of companies are listed for trading in the important stock exchanges of the country. The market quotations of individual shares represent their current valuation. The trend of price movements in the market is indicated by calculating stock market indices which represent the weighted average of prices of selected shares representing all the important industries. These stock market indices are used to represent the share market as a whole. Their movements and levels are indicative of the economic health of the nation to a great extent because movements of prices of shares are influenced by macro economic factors such as growth of GDP, financial and monetary policies, tax changes, political environment, etc.

The stock exchanges provide the linkage between the savings in the household sector and the investments in the corporate sector. They indirectly help in mobilising savings and channelising them into the corporate sector as securities.

### **Stock Market in India**

The Indian securities market has become one of the most dynamic and efficient securities market in Asia today. The Indian market now conforms to international standards in terms of operating efficiency. In this context, it would be informative to understand the origin and growth of the Indian stock market.

During the latter half of the 19th century, shares of companies used to be floated in India occasionally. There were share brokers in Bombay who assisted in the floatation of

shares of companies. A small group of stock brokers in Bombay joined together in 1875 to form an association called Native Share and Stockbrokers Association. The association drew up codes of conduct for brokerage business and mobilised private funds for investment in the corporate sector. It was this association which later became the Bombay Stock Exchange, which is the oldest stock exchange in Asia. This exchange is now known as The Stock Exchange, Mumbai, or BSE.

Ahmedabad was a major centre of cotton textile industry. After 1880, many new cotton textile mills were started in and around Ahmedabad. As new cotton textile enterprises were floated, the need for a stock exchange at Ahmedabad was strongly felt. Accordingly, in 1894, the brokers of Ahmedabad formed The Ahmedabad Share and Stockbrokers Association, which later became the Ahmedabad Stock Exchange, the second stock exchange of the country.

During the 1900s Kolkata became another major centre of share trading on account of the starting of several indigenous industrial enterprises. As a result, the third stock exchange of the country was started by the Kolkata stockbrokers at Kolkata in 1908. As industrial activity in the country gained momentum, existing enterprises in cotton textiles, woollen textiles, tea, sugar, paper, steel, engineering goods, etc. began to undertake expansion activities and new ventures were also floated. Yet another stock exchange was started in 1920 at Chennai. However, by 1923, it ceased to exist. Later, in 1937, the Madras Stock Exchange was revived as many new cotton textile mills and plantation companies were floated in South India. Three more stock exchanges were established before independence, at Indore in Madhya Pradesh in 1930, at Hyderabad in 1943 and at Delhi in 1947. Thus, at the time of independence, seven stock exchanges were functioning in the major cities of the country.

The number of stock exchanges virtually remained unchanged for nearly three decades from 1947 to 1977, except for the establishment of the Bangalore Stock Exchange in 1957. During the 1980s, however, many stock exchanges were established.

Some of them were:

1. Cochin Stock Exchange (1978)
2. Uttar Pradesh Stock Exchange (at Kanpur, 1982)
3. Pune Stock Exchange (1982)
4. Ludhiana Stock Exchange (1983)
5. Gauhati Stock Exchange (1984)

6. Kanara Stock Exchange (at Mangalore, 1985)
7. Magadh Stock Exchange (at Patna, 1986)
8. Jaipur Stock Exchange (1989)
9. Bhubaneswar Stock Exchange (1989)
10. Saurashtra Kutch Stock Exchange (at Rajkot, 1989)
11. Vadodara Stock Exchange (at Baroda, 1990).

Thus, from seven stock exchanges in 1947, the number of stock exchanges in the country increased to eighteen by 1990. Along with the increase in the number of stock exchanges, the number of listed companies and the capital of the listed companies has also grown, especially after 1985. Two more stock exchanges were set up at Coimbatore and Meerut during the 1990s, taking the total to twenty.

### **Over the Counter Exchange of India (OTCEI)**

The traditional trading mechanism (floor trading using open outcry system), which prevailed in the Indian stock exchanges, resulted in much functional inefficiency such as absence of liquidity, lack of transparency, undue delay in settlement of transactions, fraudulent practices, etc. With the objective of providing more efficient services to investors, the country's first electronic stock exchange which facilitates ringless, scripless trading was set up in 1992 with the name Over the Counter Exchange of India (OTCEI). It was sponsored by the country's premier financial institutions such as UTI, ICICI, IDBI, SBI Capital Markets, IFCI, GIC and its subsidiaries and Canbank Financial services.

The exchange was set up to aid enterprising promoters in raising finance for new projects in a cost effective manner and to provide investors with a transparent and efficient model of trading. The OTCEI had many novel features. It introduced screen based trading for the first time in the Indian stock market. Trading takes place through a network of computers of over the counter (OTC) dealers located at several places, linked to a central OTC computer using telecommunication links. All the activities of the OTC trading process are fully computerised.

Moreover, OTCEI is a national exchange having a country-wide reach. OTCEI has an exclusive listing of companies, that is, it does not ordinarily list and trade in companies listed in any other stock exchanges. For being listed in OTCEI the companies have to be sponsored by members of OTCEI. It was the first exchange in the country to introduce the practice of market making, that is, dealers in securities providing two-way quotes (bid prices and offer prices of securities).

## **National Stock Exchange of India (NSE)**

With the liberalisation of the Indian economy during the 1990s, it was inevitable that the Indian stock market trading system be raised to the level of international standards. The high powered committee on stock exchanges known as Pherwani Committee recommended, in 1991, the setting up of a new stock exchange as a model exchange and to function as a national stock exchange. It was envisaged that the new exchange should be completely automated in terms of both trading and settlement procedures.

On the basis of the recommendations of the Pherwani committee, a new stock exchange was promoted by the premier financial institutions of the country, namely IDBI, ICICI, IFCI, all insurance corporations, selected commercial banks and others. The new exchange was incorporated in 1992 as the National Stock Exchange (NSE). It started functioning in June 1994.

The purpose of setting up the new exchange was to create a world-class exchange and use it as an instrument of change in the Indian stock market through competitive pressure. Technology has been the backbone of NSE. It chose to harness technology in creating a new market design. Its trading system, called National Exchange for Automated Trading (NEAT), is a state-of-the-art client-server based application. The NSE also uses satellite communication technology for trading. Its trading system has shifted the trading platform from the trading hall in the premises of the exchange to the computer terminals at the premises of the trading members located at different geographical locations in the country. It has been instrumental in bringing about many changes in the trading system such as reduction of settlement cycle, dematerialisation and electronic transfer of securities, establishment of clearing corporations, professionalisation of trading members, etc.

All the stock exchanges in the country, starting with the Bombay Stock Exchange, have shifted to the new computerised trading system which facilitates screen-based trading. As a consequence, the stock market today uses the state-of-the-art information technology tools to provide an efficient and transparent trading, clearing and settlement mechanism at par with international standards. The National Stock Exchange has played a leading role as a change agent in transforming the Indian stock market to its present form. Since its inception, the NSE has been playing the role of a catalytic agent in reforming the stock market and evolving the best market practices. The NSE has brought about unparalleled transparency, speed and efficiency, safety and market integrity. In this process the NSE has become the largest stock exchange in the country, relegating the Bombay Stock Exchange to the second place.

### **Inter-Connected Stock Exchange of India (ISE)**

With the setting up of the National Stock Exchange in 1994, a transformation of the Indian stock market was initiated. Automated screen-based trading, rolling settlement on T + 2 cycle, dematerialisation of securities with electronic transfer of securities, etc. completely transformed the market structures and procedures. Gradually, the two national stock exchanges, BSE and NSE dominated the scene with practically all trading being routed through either of these exchanges. The regional stock exchanges became irrelevant as they could not compete with the breadth and depth of these two stock exchanges, and there was virtually no trading at any of the nineteen regional centres.

The members of the regional stock exchanges of the country started investing large amounts of money in automating their trading, clearing and settlement systems on account of regulatory compulsions. This situation prompted the regional stock exchanges to devise some way of reviving their fortunes. It was decided to evolve an inter-connected market system by pooling the resources of the regional stock exchanges. Fourteen regional stock exchanges (excluding Calcutta, Delhi, Ahmedabad, Ludhiana and Pune stock exchanges) joined together and promoted a new organisation called Inter-connected Stock Exchange of India Ltd. (ISE) in 1998. The ISE was recognised as a stock exchange by SEBI and it commenced trading in February, 1999. It then began to function as a national level stock exchange.

The objective of setting up ISE was to optimally utilise the existing infrastructure and other resources of participating stock exchanges which were until now underutilised. The ISE aims to provide cost-effective trading linkage/ connectivity to all the members of the participating exchanges on a national level. This will help to widen the market for the securities listed on the regional stock exchanges.

Through ISE an attempt is made to make the regional markets vibrant and liquid through the use of the state of the art technology and networking. The trading settlement and funds transfer operations of the ISE are completely automated. However, ISE has not succeeded in becoming a competitive market force to BSE and NSE. This is mainly because the participating regional stock exchanges did not close down their regional segments.

At present there are twenty-three stock exchanges in the country. Four of them can be considered as national level exchanges, namely, NSE, BSE, OTCEI and ISE; the remaining nineteen are regional stock exchanges (RSEs) located in important cities of the country. But it may be noted that most of the trading in securities in the country are transacted through the two largest stock exchanges, namely the National Stock Exchange (NSE) and the Stock

Exchange, Mumbai (BSE) which have trading terminals all over the country. Even in these exchanges, even though there are a large number of companies listed, active daily trading takes place only in the securities of a limited number of companies. The large volume of trading is accounted for by limited number of securities. For the vast majority of securities of listed companies, the stock exchanges fail to provide liquidity.

### **Organisation, Membership and Management of Stock Exchanges**

Basically, a stock exchange is an organised market for trading securities. It is also called a bourse. It is an association or organisation of individuals which is governed by certain rules and regulations. The manner of organisation and the rules of membership are important features of stock exchanges as also the governance system of the organisation.

Over the years, stock exchanges in the country have been organised in various forms such as voluntary non-profit making association, public limited company and company limited by guarantee. In India, the earliest stock exchanges were organised as voluntary non-profit making associations of persons. Later on, stock exchanges began to be organised as companies.

The membership of stock exchanges initially comprised of individuals and partnership firms. It was the stock brokers who became members of stock exchanges either in their individual capacity or by forming partnership firms. Later on companies were also allowed to become members of stock exchanges. Thus, stock exchanges now have both individual and institutional membership. Membership in stock exchanges is restricted and limited. It is acquired by paying the prescribed entrance fee/share value. Members are also supposed to make security deposit and pay annual subscription to the exchange. The quantum of entrance fee/share value, security deposit and annual subscription vary from exchange to exchange.

The management of each stock exchange is vested in a Governing Board which is the apex body deciding the policies of the exchange as also regulating the affairs of the exchange. The composition of the governing board is of a heterogeneous nature. It usually consists of elected directors (mostly from the broking community), SEBI nominees and public representatives. The governing board is usually presided over by an executive director or president. The executive director/ president as the Chief Executive Officer (CEO) of the exchange is responsible for the day-to-day administration of the exchange. The governing board may constitute executive committees of its members to supervise and monitor specific functions.

The BSE governing board has twenty members consisting of nine elected directors, three SEBI nominees, six public representatives, an executive director (CEO), and a non-executive chairman. The governing board of the National Stock Exchange comprises senior executives from promoter institutions, eminent professionals in the fields of law, economics, accountancy, finance, taxation, etc., public representatives, nominees of SEBI and one full-time executive of the exchange.

The governing board of an exchange has wide powers for the management and administration of the stock exchange concerned. These powers include wide ranging discretionary powers also.

The important powers of the governing body are:

1. Manage and control the functioning of the exchange.
2. Regulate trading in securities.
3. Admit, fine, suspend or expel members and take such disciplinary action as it deems fit.
4. Settle disputes, if any, amongst the members and between members and nonmembers.
5. Make or amend any rules, by-laws or regulations or suspend their operations with the approval of the government.
6. Interpret the rules, by-laws and regulations. The stock exchanges have to comply with the directions of the SEBI.

### **Listing of Securities**

For the securities of a company to be traded on a stock exchange, they have to be listed in that stock exchange. Listing is the process of including the securities of a company in the official list of the stock exchange for the purpose of trading.

At the time of issue of securities, a company has to apply for listing the securities in a recognised stock exchange. The Securities Contracts Regulation Act and rules, SERI guidelines, and the rules and regulations of the exchange prescribe the statutory requirements to be fulfilled by a company for getting its shares listed in a stock exchange. Important documents such as memorandum of association, articles of association, prospectus, directors' report, annual accounts, agreement with underwriters, etc. and detailed information about the company's activities, its capital structure, distribution of shares, dividends and bonus shares issued, etc. have to be submitted to the stock exchange along with the application for listing.

The stock exchange examines whether the company satisfies the criteria prescribed for listing. When the stock exchange finds that a company is eligible for listing its securities at the exchange, the company would be required to execute a listing agreement with the stock exchange. This listing agreement contains the obligations and restrictions imposed on the company as a result of listing. The company is also required to pay the annual listing fees every year.

The purpose of the listing agreement is to compel the company to keep the shareholders and investors informed about the various activities which are likely to affect the share prices of the company. A company whose securities are listed in a stock exchange is obliged to keep the stock exchange fully informed about all matters affecting the company. Moreover, the company has to forward copies of its audited annual accounts to the stock exchange as soon as they are issued.

The securities of companies listed on a stock exchange may be classified into different groups. For instance, the securities listed on the Bombay Stock Exchange (BSE) have been classified into A, B1, B2, F, G and Z groups. The equity shares listed in the exchange have been grouped under three groups, namely A, B1 and B2, based on certain qualitative and quantitative parameters which include number of trades, value traded, etc. The F group represents the fixed income securities. The G group includes Government securities for retail investors. The Z group includes companies which have failed to comply with the listing requirements of the exchange or have failed to resolve investor complaints or have not made arrangements with the depositories for dematerialisation of their securities.

### **Permitted Securities**

The securities of companies which have signed listing agreement with an exchange are traded at the exchange as listed securities. A stock exchange sometimes permits trading in certain securities which are not listed at the exchange but are actively traded in other stock exchanges. Such securities are known as permitted securities. This facility is provided to help market participants to trade in certain actively traded securities even though they are not formally listed at the exchange. Thus, a stock exchange may have certain listed securities and certain permitted securities, and trading may take place in these securities regularly.

### **Regulation of Stock Exchanges**

The stock exchanges play a very vital and sensitive role in the functioning of the economy, especially the private sector of the economy. The functioning of the exchanges,

therefore, needs to be transparent, fair and efficient. This is ensured through proper regulation of the working of stock exchanges. There are Acts, rules, regulations, by-laws and guidelines governing the functioning of secondary markets or stock exchanges in the country. There is also a regulator in the form of the Securities and Exchange Board of India (SEBI) to oversee and monitor the functioning of both the primary and secondary securities markets in India.

The Securities Contracts (Regulation) Act, 1956, and the rules made under the Act, namely the Securities Contracts (Regulation) Rules, 1957, constitute the main laws governing stock exchanges in India. The preamble to the Act states that it is “an act to prevent undesirable transactions in securities by regulating the business of dealing therein”. This Act provides for the direct and indirect control of virtually all aspects of securities trading and the functioning of stock exchanges.

The provisions of the Securities Contracts (Regulation) Act, 1956, were formerly administered by the Central Government. However, since the enactment of the Securities and Exchange Board of India Act, 1992, the Board established under this Act has been authorised to administer almost all the provisions of the Securities Contracts (Regulation) Act. The various provisions of the Act deal with recognition of stock exchanges, submission of relevant documents, approval of by-laws and rules made by stock exchanges, listing of securities in stock exchanges and such other matters relating to the trading of securities and the functioning of stock exchanges.

Taking into consideration the fact that the securities market in India had shown tremendous growth, the government decided to set up a separate board for the regulation and orderly functioning of the securities market in the country, in the model of the Securities and Investment Board (SIB) of UK and the Securities and Exchange Commission (SEC) of USA.

Initially, the Securities and Exchange Board of India was constituted as an interim administrative body in 1988. SEBI was given a statutory status on 30th January 1992 by an ordinance to provide for the establishment of SEBI. Later, in April 1992, the Securities and Exchange Board of India Act was passed. In this Act it is stipulated that it shall be the duty of the Board to protect the interests of investors in the securities market and to promote the development of and to regulate the securities market.

Thus, the SEBI has been constituted to promote orderly and healthy development of the securities market and to ensure adequate protection to the investors in the securities market. The Board plays a dual role, namely a regulatory role and a developmental role.

The SEBI is constituted with six members, including the chairman of the Board. Two members are officials of the central government ministries of Finance and Law, one member is an official of the Reserve Bank of India and two members are professionals having experience or special knowledge relating to securities markets and are appointed by the central government. The Board is empowered to regulate the business in stock exchanges, to register and regulate the working of stock market intermediaries such as stock brokers, sub-brokers, share transfer agents, bankers to an issue, trustees of trust deeds, registrars to an issue, merchant bankers, underwriters, etc.

The Board is also authorised to prevent and prohibit fraudulent and unfair trade practices in the market. It makes regulations and issues guidelines regarding the various aspects of the working of stock exchanges, and constantly monitors the activities in the securities market to ensure just and fair dealings. Transparency and equal opportunity to all market participants have been the goals of all developmental and regulatory activities of SEBI.

A stock exchange has the power to make by-laws for the regulation and control of contracts entered into by members and also for the regulation of trading in the exchange. However, these by-laws have to be approved by SEBI before implementation. Amendments to the by-laws should also be similarly approved.

The Depositories Act, 1996, is another important legislation affecting the functioning of stock exchanges. This Act provides for the setting up of depositories for electronic recording and transfer of securities. The paper-based securities and their transfer often resulted in delay in the settlement and transfer of securities and also led to bad delivery, theft, forgery, etc. The Depositories Act, 1996, was passed to change over to the electronic mode of security transfer through security depositories so as to improve the efficiency of the system.

The securities market in India is properly regulated to ensure that it functions efficiently and effectively. There are strict laws governing the functioning of stock exchanges; there is a vigilant regulator who oversees the implementation of these laws. As a result, investors now have confidence in the efficiency and robustness of the Indian stock market.

### **Trading System in Stock Exchange**

A stock exchange is a market for trading in securities. But it is not an ordinary market; it is a market with several peculiar features. In a stock exchange, buyers and sellers do not directly meet and interact with each other for making their trades. The investors (buyers

and sellers of securities) trade through brokers who are members of a stock exchange. In stock exchanges, trading procedures are fully automated and member brokers interact and trade through a networked computer system. Trading in a stock exchange takes place in two phases; in the first phase, the member brokers execute their buy or sell orders on behalf of their clients (or investors) and, in the second phase, the securities and cash are exchanged.

For the exchange of securities and cash between the traders, the services of two other agencies are required, namely the clearing house (corporation) of the stock exchange and the depositories. Further, unlike other ordinary markets, stock exchanges are markets where the prices of the items traded (namely, securities) fluctuate constantly. This fluctuation in security prices leads to speculative activities in the stock exchanges.

We need to understand clearly the trading system in stock exchanges, how the trades are settled through exchange of securities and cash, the role of the clearing corporation and the depositories, etc. We also need to understand the different types of speculative activities taking place in a stock exchange. The information about the prices of securities traded in a stock exchange is useful in understanding the behaviour of the stock markets.

### **Trading System**

The system of trading prevailing in stock exchanges for many years was known as floor trading. In this system, trading took place through an open outcry system on the trading floor or ring of the exchange during official trading hours.

**In floor trading**, buyers and sellers transact business face to face using a variety of signals. Under this system, an investor desirous of buying a security gets in touch with a broker and places a buy order along with the money to buy the security. Similarly, an investor intending to sell a security gets in touch with a broker, places a sell order and hands over the share certificate to be sold.

After the completion of a transaction at the trading floor between the brokers acting on behalf of the investors, the buyer investor would receive the share certificate and the seller investor would receive the cash through their respective brokers.

In the new electronic stock exchanges, which have a fully automated computerised mode of trading, floor trading is replaced with a new system of trading known as screen-based trading. In this new system, the trading ring is replaced by the computer screen and distant participants can trade with each other through the computer network. The member brokers can install trading terminals at any place in the country. A large number

of participants, geographically separated from each other, can trade simultaneously at high speeds from their respective locations. The screen-based trading systems are of two types

1. Quote driven system
2. Order driven system.

Under the quote driven system, the market-maker, who is the dealer in a particular security, inputs two-way quotes into the system, that is, his bid price (buying price) and offer price (selling price). The market participants then place their orders based on the bid-offer quotes. These are then automatically matched by the system according to certain rules.

Under the order driven system, clients place their buy and sell orders with the brokers. These are then fed into the system. The buy and sell orders are automatically matched by the system according to predetermined rules.

## **Types of Orders**

An investor can have his buy or sell orders executed either at the best price prevailing on the exchange or at a price that he determines. Accordingly, an investor may place two types of orders, namely, market order or limit order.

### **Market Orders**

In a market order, the broker is instructed by the investor to buy or sell a stated number of shares immediately at the best prevailing price in the market. In the case of a buy order, the best price is the lowest price obtainable; in the case of a sell order, it is the highest price obtainable. When placing a market order, the investor can be fairly certain that the order will be executed, but he will be uncertain of the price until after the order is executed.

### **Limit Orders**

While placing a limit order, the investor specifies in advance the limit price at which he wants the transaction to be carried out. In the case of a limit order to buy, the investor specifies the maximum price that he will pay for the share; the order has to be executed only at the limit price or a lower price. In the case of a limit order to sell shares, the investor specifies the minimum price he will accept for the share and hence, the order has to be executed only at the limit price or a price higher to it. Thus for limit orders to purchase shares the investor specifies a ceiling on the price, and for limit orders to sell shares the investor specifies a floor price.

Limit orders are generally placed “away from the market” which means that the limit price is somewhat removed from the prevailing market price. In the case of a limit order to buy, the limit price would be below the prevailing price and in the case of a limit order to sell, the limit price would be above the prevailing market price. The investor placing limit orders believes that his limit price will be reached and the order executed within a reasonable period of time. But the limit order may remain unexecuted.

There are certain special types of orders which may be used by investors to protect their profits or limit their losses. Two such special kinds of orders are stop orders (also known as stop loss orders) and stop limit orders.

### Stop Orders

A stop order may be used by an investor to protect a profit or limit a loss. For a stop order, the investor must specify what is known as a stop price. If it is a sell order, the stop price must be below the market price prevailing at the time the order is placed. If it is a buy order, the stop price must be above the market price prevailing at the time of placing the order. If, subsequently, the market price reaches or passes the stop price, the stop order will be executed at the best available price. Thus, a stop order can be viewed as a conditional market order, because it becomes a market order when the market price reaches or passes the stop price.

Examples will help to clarify the working of stop orders. Suppose an investor has 100 shares of a company which were purchased at ₹ 35 per share. The current market price of the share is ₹ 75. The investor thus has earned a profit of ₹ 40 per share on his share holdings. He would very much like to protect this profit without foregoing the opportunity of earning more profit if the price moves still upwards. This can be achieved by placing a stop sell order at a price below the, current market price of ₹ 75, for example at ₹ 70. Now, if the price subsequently falls to ₹ 70 or below, the stop sell order becomes a market order and it will be executed at the best price prevailing in the market. Thus, the investor will be able to protect the profit of around ₹ 35 per share. On the contrary, if the market price of the share moves upwards, the stop sell order will not be executed and the investor retains the opportunity of earning higher profits on his holding.

Stop orders can also be used to minimise loss in trading. Suppose that a share is currently selling for ₹ 125 and an investor expects a fall in the price of the share. He may place an order for sale of the share at the current market price of ₹ 125 hoping to cover up his position by purchasing the share at a lower price and thus make a profit on the deal. This type of a transaction is known as a short sale. If price of the share falls as anticipated by the

investor, he would make a profit. There is a possibility that the price may move upwards and in that case the investor has to purchase the share at a higher price to cover up his position and meet his sales commitment. This will result in a loss to the investor. This loss can be minimised by placing a stop buy order at a price above the current price of ₹ 125, for example at ₹ 130.

Now, if the price of the share rises to ₹ 130 or above, the stop buy order will become a market order and will be executed at the best price available in the market. Suppose that the stop buy order was executed at ₹ 131, then the loss of the investor is limited to ₹ 6 per share, that is, the difference between the selling price of ₹ 125 and the buying price of ₹ 131 per share.

One disadvantage of the stop orders is that the actual price at which the order is executed is uncertain and may be some distance away from the stop price.

### Stop Limit Orders

The stop limit order is a special type of order designed to overcome the uncertainty of the execution price associated with a stop order. The stop limit order gives the investor the opportunity of specifying a limit price for executing the stop orders: the maximum price for a stop buy order and the minimum price for a stop sell order. With a stop limit order, the investor specifies two prices, a stop price and a limit price. When the market price reaches or passes the stop price, the stop limit order becomes a limit order to be executed within the limit price. Hence, a stop limit order can be viewed as a conditional limit order.

Let us consider two examples. Consider a share that is currently selling at ₹ 60. An investor who holds the share may place a stop limit order to sell with stop price of ₹ 55 and limit price of ₹ 52. If the market price declines to ₹ 55 or lower, a limit order to sell the share at the limit price of ₹ 52 or higher would be activated. Here the order will be executed only if the share is available at ₹ 52 or above. Thus a stop limit order may remain unexecuted.

Consider an investor who desires to make a short sale of a particular share at its current market price of ₹ 85. That is, he intends to sell the share without owning it but hoping to buy it later from the market at a lower price. He may also place a stop limit order to buy the share to minimise his loss in case the share price moves upwards contrary to his expectations. He may specify a stop price of ₹ 90 and a limit price of ₹ 93 for his stop limit order to buy. If the price moves up to ₹ 90 or above, then a limit order to buy the share with limit price of ₹ 93 would be activated. The order would be executed at a price of ₹ 93 or lower, if such price is available in the market.

The disadvantage of a stop limit order is that it may remain unexecuted. The stop order results in certain execution at an uncertain price, while a stop limit order results in uncertain execution within a specified price limit.

Trading in stock exchanges takes place continuously during the official trading hours. Stock exchanges are open five days a week, from Monday through Friday. An investor may place orders for trade through his broker at any time during the official trading hours, but he needs to specify the time limit for the validity of the order. The time limit on an order is essentially an instruction to the broker about the time within which he should attempt to execute the order.

**Day Orders** A day order is an order that is valid only for the trading day on which the order is placed. If the order is not executed by the end of the day, it is treated as cancelled. All orders are ordinarily treated as day orders unless specified as other types of orders.

**Week Orders** These are orders that are valid till the end of the week during which the orders are placed. They expire at the close of the trading session on Friday of the week, unless they are executed by then.

**Month Orders** These are orders that are valid till the end of the month during which the orders are placed. Month orders expire at the close of the trading session on the last working day of the month.

**Open Orders** Open orders are orders that remain valid till they are executed by the brokers or specifically cancelled by the investor. They are also known as good till cancelled orders or GTC orders. However, brokers generally seek periodic confirmation of open orders from the investors.

**Fill or Kill Orders** These orders are also known as FoK orders. These orders are meant to be executed immediately. If not executed immediately, they are to be treated as cancelled.

## Settlement

Trading in stock exchanges is carried out in two phases. In the first phase, the execution of the orders submitted by clients takes place between brokers acting on behalf of the clients or investors. Buy orders are matched with sell orders. In the automated system, trading is carried out in an anonymous environment and the orders are matched by the computer system.

The buyer now has to hand over the money and receive the security; the seller on the other hand has to hand over the security and receive money on account of the sale of the security. This process of transfer of security and cash is done in the second phase which is known as the settlement of the trade. The settlement process involving delivery of securities and payment of cash is carried out through a separate agency known as the clearing house which functions in each stock exchange. The clearing house acts as the counter party for each trade. Member-brokers who sell securities have to deliver the securities to the clearing house and will receive cash from the clearing house. Similarly, the member-brokers who buy securities will have to pay cash to the clearing house and receive the securities from the clearing house. The stock exchanges now follow a settlement procedure known as Compulsory Rolling Settlement (CRS) as mandated by SEBI. The earlier procedure of settlement was “account period settlement” wherein all trades carried out or executed during an account period of a week or fortnight were settled on the last day of the account period. The account period used to vary from exchange to exchange.

Under the rolling settlement system, the trades executed on a particular day are settled after a specified number of business days or working days. Initially, a T + 5 settlement cycle was introduced, which was subsequently reduced to a T + 3 cycle. Currently, a T + 2 settlement cycle is adopted by the stock exchanges. This means that the settlement of transactions done on T, that is, the trade day, has to be done on the second business day after the trade day. The pay-in and pay-out of funds and securities has to take place on the second business day after the day of trade. For example, for an order executed on Tuesday of a week, the settlement (delivery of security and payment of cash) has to be done on Thursday. The pay-in and pay-out of funds and securities are marked through the clearing house.

On the first business day (T + 1) after the trade day (T), the exchange generates delivery and receive orders for transactions done by member-brokers. These provide the relevant information regarding the securities to be delivered /received by the member-brokers through the clearing house. Similarly, a money statement showing the details of payments/ receipts of monies by the member-brokers is also prepared by the exchange. The Delivery/ Receive orders and the Money Statement can be downloaded by the member-brokers.

On the second business day (T + 2) after the day of trade, the member-brokers are required to submit the pay-in instructions to the depositories for transfer of securities to the clearing house in the case of demat securities. In the case of securities in physical form, the certificates have to be delivered to the clearing house. For pay-in of funds by member-brokers, the bank accounts of member-brokers maintained with the authorised clearing banks are directly debited through the computerised system.

For pay-out of securities by the stock exchange, the member-brokers are required to collect them from the clearing house on the pay-out day, in case of physical securities. The clearing house arranges for crediting the securities to the demat accounts of member-brokers; in the case of demat securities. There is a facility for direct transfer of securities to the investors' accounts also.

For pay-out of funds by the stock exchange, the bank accounts of member-brokers with the authorised clearing banks are credited by the clearing house. In the rolling settlement system, pay-in and pay-out of both funds and securities are completed on the same day.

The member-brokers are required to make payment to clients for securities sold and deliver securities purchased by clients within one working day. This is the time frame permitted to member-brokers to settle their obligations with the clients as per the by-laws of the exchange

## **Speculation**

People who buy and sell securities in the stock exchanges may have different motivations for doing so. A person may be interested in getting a good rate of return, earned on a rather consistent basis, for a relatively long period of time. For this he will choose the shares of a company which is fundamentally strong and has the potential for growth in the future.

Such a person is a genuine investor who invests his money in securities for long-term returns. There may be other persons who have a short-term perspective on their trading activities on the stock exchanges. A person may be interested in making a quick short-term profit from the fluctuations in the prices of securities in the stock market. Such a person is known as a speculator. Speculators are traders who intend to make high returns within a short span of time, making use of the short-term fluctuations in security prices.

Speculators constantly monitor the movement of share prices in the market. On the basis of their analysis of share price movements and on the basis of the evaluation of various information regarding the performance of companies, the speculative traders speculate on the future course of prices. They believe that mispricing of securities occurs periodically in the market. Sometimes, some securities may be overpriced (that is, their price may be higher than their intrinsic value) and at other times some securities may be underpriced. Speculators attempt to exploit such mispricing of securities, because it is presumed that the mispricing would be corrected by the market eventually.

### **Long Buy**

If a speculator feels that a security is underpriced or that a security which is correctly priced at the moment is likely to show a rising trend, then he would like, to buy the security for the purpose of selling it at a higher price when the price rises as anticipated. The speculator in this case is said to take a long position with respect to that security. He is not interested in taking delivery of the security, but intends to sell it off as quickly as possible to gain some profit. Hence, he would not like to hold his long position for an extended period. He would like the mispricing to be corrected at the earliest, preferably, on the same day. Such kind of a speculative activity is known as long buy.

### **Short Sale**

On the contrary, if a speculator estimates that a security is overpriced and its price is likely to decline shortly, he would like to sell the security at the current price and buy it sometime later when the price declines so as to deliver the security sold at the time of settlement of the trade. Ordinarily, a person sells securities which he owns. Here, the speculator is selling a security which he does not own or possess in the hope that he would be able to deliver the security on the due date 'by buying it at a lower price within a short period of time. He hopes to gain some profit in the transaction. The speculator in this case is taking a "short position" with respect to the security by engaging in a 'short sale'.

Fundamentally, a short sale is the sale of a security that is not owned by the seller at the time of the transaction. A short seller has to cover up his position or eliminate the deficiency by buying the security sometime in the near future. He will be able to make a profit out of the short sale transaction only if he is able to buy the security at a lower price. If the price of a security moves up against his anticipations, he will suffer a loss.

Speculation involves high amount of risk. The speculators take long or short positions on the basis of their estimation or speculation about the future movement of prices. If the prices of securities do not move in the expected directions within a short time, the speculators suffer losses.

### **Types of Speculators**

Traders engaged in speculative activity in the stock market are described by different names based on the type of activity they generally engage in. The prominent among them are hawks, bears, stag and lame duck.

## **Bull**

A trader who expects a rise in prices of securities is known as a bull. He, therefore, takes a long position with respect to securities. He engages in long buy anticipating a rise in prices of securities. The bulls will be able to make profit only if the prices rise as anticipated; otherwise they will suffer losses. When there is an overbought condition in the market, that is, the purchases made by speculators exceed the sales made by them; the bulls begin to spread good rumours about companies so as to raise the price of their shares. This activity is called a bull campaign.

When the prices of securities are generally rising in the market, resulting in buoyancy and optimism in the stock market, the market is said to be in a bullish phase.

## **Bear**

A bear is a pessimist who expects a decline in the prices of securities. He, therefore, takes a 'short position' on securities by engaging in short sales. He attempts to cover up his short position by buying the securities at lower prices when prices decline. He may engage in a bear raid so as to bring down the prices of securities. Spreading unfavourable rumours about companies with the intention of creating a decline in their share prices is known as a bear raid. The bear will suffer a loss if the prices of securities rise after he takes a short position on securities. When there is a general decline in prices of securities in the stock market, the market is said to be bearish.

## **Lame Duck**

A lame duck is a bear who has made a short sale but is unable to meet his commitment to deliver the securities sold by him on account of rise in prices of securities subsequent to the short sale. He is said to be struggling like a lame duck.

## **Stag**

A stag is a trader who applies for shares in the new issues market just like a genuine investor. A stag is an optimist like the bull and expects a rise in the prices of securities that he has applied for. He anticipates that when the new shares are listed in the stock exchange for trading, they would be quoted at a premium, that is, above their issue price. As soon as the stag receives the allotment of shares, he would sell them at the stock exchange at the higher price and make a profit. A stag is said to be a premium hunter. The stag will, however, suffer a loss if prices of the new shares do not rise as anticipated when they are listed for trading.

## Margin Trading

Investors may purchase securities in the stock exchanges either using their own funds or funds borrowed from banks, brokers, etc. Conservative investors would prefer to use own funds for trading in securities. Other investors may use borrowed funds for buying securities when there is a good opportunity to buy some securities but ready cash may not be available.

Borrowing money from the bank or the broker for purchasing securities is known as margin trading. The investor pays a part of the value of the securities to be purchased; the balance is provided by the broker or the banker. The cash paid by the investor is the margin. For example, if an investor places buy orders for purchase of securities worth ₹ 50,000 and pays as cash ₹ 30,000 to the broker, the investor's margin is 60 per cent of the value of the securities. The balance amount is supplied by the broker.

In margin trading, the investor has to pay interest on the money borrowed to finance the securities transaction. Thus profit or gain from the transaction would be reduced to that extent. Even if there is no gain from the securities transaction, interest on the borrowed funds has to be paid. Margin trading is thus a risky venture.

## Depositories

Financial securities such as equity shares, bonds and debentures are issued by companies to the investors who purchase them. They used to be issued in the form of certificates specifying the name of the holder, the number of securities comprised in each certificate, the face value of the security, etc. When the securities are subsequently traded between investors, the seller of the security hands over the certificate to the buyer through the stock exchange clearing house. The buyer then forwards the certificate to the issuing company or its authorised transfer agents to get his name entered in the certificate as the holder of the security. In this practice, the security has a physical form, namely that of a paper certificate.

The physical form of securities is giving way to electronic form of securities wherein a security is represented by an entry in a depository account opened by the investor for the purpose. The transfer of securities on sale of a security is effected through a debit entry in the depository account of the seller and a credit entry in the depository account of the buyer. The securities are issued, held and transferred in dematerialised form or 'demat mode'. For the demat mode of shareholding, depositories play the most important role. Let us understand what depositories are and how they function.

A depository can be compared to a bank. A bank holds cash for customers and provides services related to transactions of cash. For this a customer opens an account in any of the branches of the bank. A depository holds securities for investors in electronic form and provides services related to transactions of securities. A depository interacts with clients through depository participants (DPs) which are organisations affiliated to a depository. An investor has to open a demat account with a depository participant to avail depository services of holding securities and transferring securities. There are two depositories in India namely:

1. National Securities Depository Limited (NSDL)
2. Central Depositories Services (of India) Limited (CDSL)

NSDL was India's first depository which started functioning on November 6, 1996. CDSL was inaugurated on July 15, 1999. The functioning of these depositories is supervised and regulated by SEBI. Each depository has several depository participants affiliated to it.

SEBI has now made it compulsory for trades in almost all listed securities to be settled in demat mode. For this purpose, registered members of stock exchanges open clearing member accounts or pool accounts with depositories. These pool accounts are used by member-brokers to hold securities from clients and deliver them to the clearing corporation. These accounts are also similarly used to receive securities from the clearing corporation for onward distribution to clients.

The demat accounts opened by investors with depository participants are known as beneficiary accounts. When an investor has sold a security through a member-broker, he has to deliver the security to the member-broker who, in turn, has to deliver it to the clearing corporation. The investor has to authorise his DP to transfer the security from his beneficiary account to the clearing member's pool account. Accordingly, the beneficiary account of the investor would be debited and the pool account of the clearing member would be credited. The clearing member gives authorisation to his DP to deliver the securities to the clearing corporation.

When an investor has purchased securities through member-brokers he has to receive the securities from the member-brokers. In the first instance, the clearing corporation will instruct its depository to credit the securities to the pool accounts of member-brokers who are entitled to receive them on pay-out day. The member-broker then instructs his DP to debit his pool account and credit the beneficiary account of the client with the securities to be transferred to the client.

An investor holding securities in the physical form, that is, in the form of certificates, has the facility to transfer it to the electronic form through the process of dematerialisation. The process of converting securities held in physical form (certificates) to an equivalent number of securities in electronic form and crediting the same to the investor's demat account is known as dematerialisation. This is done by the DP on a request from the investor. Securities in demat form (or electronic form) may again be converted back to the physical form (certificates), if desired. This process is known as rematerialisation. At the time of issue of new securities by a company, the securities allotted to an investor can be directly credited to his demat account.

According to the Depositories Act, 1996, an investor has the option to hold securities either in physical form or in dematerialised form. But holding securities in demat form has several advantages. It is safe and also convenient to hold securities in demat form. Transfer of securities in physical form involves despatching of certificates through the postal service. This may result in delay, loss of certificate in transit, theft of certificate, damage to the certificate, etc. In demat form, transfer of securities is instantaneous and effortless. Much paper work is done away with in demat mode.

### **Stock Market Quotations and Indices**

In stock exchanges, continuous trading in securities takes place and these trades occur at different prices. As a result, even on a single day, prices of securities may fluctuate. On any trading day, four prices can be easily identified, namely, opening price, closing price, the highest price of the day and the lowest price of the day. Apart from these short-term intra-day fluctuations, prices of securities exhibit certain secular trends when considered over a fairly long period of time. Prices may gradually increase over a long-term period; or they may decline over the long-term period. Ordinarily, prices move in a cyclical fashion, alternatively showing increasing and declining tendencies.

The short-term as well as long-term fluctuations in prices of securities are indicators of the variations in the underlying economic variables. Hence, it is necessary to closely observe and monitor the movement of prices in the securities market. Price information becomes quite valuable for this purpose. Price quotations of traded securities are available from the stock exchanges and are being published daily by most of the newspapers. Financial dailies give very detailed price quotations (opening and closing prices, highest and lowest prices, 52-week high and low prices, etc.), including the data on volume of daily trading.

In addition to the price quotations of individual securities, stock exchanges make available stock market indices, which are useful in understanding the level of prices and

the trend of price movements of the market as a whole. Stock market indices are meant to capture the overall behaviour of equity markets.

A stock market index is created by selecting a group of stocks that are capable of representing the whole market or a specified sector or segment of the market. The change in the prices of this basket of securities is measured with reference to a base period. There is usually a provision for giving proper weights to different stocks on the basis of their importance in the economy. A stock market index acts as the indicator of the performance of the overall economy or a sector of the economy.

The Stock Exchange, Mumbai (BSE) came out with a stock index in 1986, which is known as BSE SENSEX. It is an index composed with 30 stocks representing a sample of large, well-established and financially sound companies selected from different industry groups. The base year of BSE SENSEX is 1978-79 and the base value is 100.

The launch of BSE SENSEX in 1986 was followed up in January 1989 by another broader index, namely BSE National Index, comprising 100 stocks listed at five major stock exchanges in India at Mumbai, Kolkata, Delhi, Ahmedabad and Chennai. The base year of the BSE National Index was selected as 1983-84, and the base value was taken as 100. This index was renamed in October 1996 as BSE-100 index and is now calculated by taking the prices of 100 stocks listed at BSE only.

In 1994, two new index series, namely the BSE-200 and the Dollex-200 indices were launched by BSE. Meanwhile, there has been a steady increase in the number of listed companies and the market capitalisation of companies. New industry groups were also emerging.

The Stock Exchange, Mumbai, has been increasing the range of its indices with segment specific and sector specific indices such as BSE-PSU index to meet the requirements of market participants for more specific information on the market activities.

The major stock market indices available at the National Stock Exchange (NSE) are:

1. S and P CNX Nifty
2. CNX Nifty Junior
3. S and P CNX 500
4. CNX Midcap 200
5. S and P CNX Defty.

## **S and P CNX NIFTY**

It is an index calculated with a well-diversified sample of fifty stocks representing 23 sectors of the economy. The base period selected for Nifty is the close of prices on November 3, 1995, which marks the completion of one year of operations of NSE's capital market segment. The base value of the index has been set at 1000.

Nifty is managed by India Index Services and Products Ltd. (IISL), which is a joint venture between NSE and CRISIL. The index is known as S and P index because IISL has consulting and licensing agreement with Standard and Poor's (S and P), who are world leaders in index services.

## **CNX NIFTY Junior**

It is composed of the next most liquid fifty securities so much so S and P CNX Nifty and CNX Nifty Junior together account for the hundred most liquid securities traded at NSE. The two indices are constituted in such a way as to be disjoint sets, that is, a stock will never appear in both the indices at the same time.

## **CNX MIDCAP 200**

It is designed to capture the movement of the mid cap segment or medium-sized capitalisation companies. The medium capitalisation segment of the stock market is being perceived increasingly as an attractive investment segment with high growth potential.

The regional stock exchanges also bring out stock indices calculated from stocks listed and traded at those exchanges. Many prominent financial dailies also bring out their own stock market indices.

The price quotations and market index values are useful to investors and market analysts to understand the mood of the market and to take appropriate investment decisions.

## **Summary**

- Financial investment is the allocation of funds to assets and securities after considering their return and risk features.
- Investor plans for a long horizon after considering the fundamental factors and assumes moderate risk. Speculators are interested in short term gains and their buying and selling are based on the market price movement.

- The main objectives of rational investors are maximising returns and minimising risk. Safety of the principal, tradability and liquidity are his subsidiary objectives.
- The investor should have knowledge about the economy, the company and the market structure. Equity shares have the right to receive dividend and residual claim.
- Sweat equity is issued to employees or directors at a discount for their contributions in technical knowhow or other specified area.
- Right shares are issued to the existing shareholders at a price, on the pro-rata basis.
- Bonus shares are issued to the existing shareholders freely in addition to the dividend from the company's reserves.
- Preference stocks have fixed dividends but have a perpetual liability on the companies)
- Investment alternatives are many in number. They are negotiable financial securities and non-negotiable financial investments. Equity offers high return with high risk. Bonds provide steady and fixed flow of income. The securities issued by government are secured investments. Treasury bills carry a very low rate of interest.
- Commercial paper has short-term maturity and is favoured by companies and institutional investors.
- Certificate of deposit's denomination is high and the interest rate is also high.
- Banks' deposits are safe form of investment. At present accounts like maxi cash saving, quantum optima, in 1 accounts and cluster accounts are offered.
- The age-old post office deposits pay high interest rate. Post office monthly income scheme's annualised yield is higher.
- NBFC deposits offer high rates of interest. The risk associated with them is also high. RBI has laid down several rules to regulate them.
- Public provident fund scheme is the post office scheme with the early withdrawal facilities. In NSS, the main advantage is the deferred tax payment. Withdrawal of entire amount in a single period results in heavy taxation.
- Investment in National Savings Certificates provides tax exemption under Sec 80L.
- Life insurance provides wide variety life and accident cover. Deductions are allowed under U/S 80 DD.
- Mutual funds collect funds from investors and invest in equities or money market instruments as specified by the schemes.

- Gold and silver are the real asset form of investment. The appreciation of gold prices is rather very low in the past few years.
- Real estate is a lucrative form of investment with high capital appreciation.
- Knowledge about arts and antiques is the essential pre-requisite for investment in arts and antiques.

## Questions

1. What is investment? Is investment different from speculation? Explain.
2. State the economic and financial meaning of investment. In the stock market, can you differentiate the investor from the speculator?
3. Investment and speculation are somewhat different and yet similar in certain respect. Explain.
4. Discuss the factors that differentiate the investor from speculator and gambler.
5. What are the investors objectives in investing his funds in the stock market?
6. Explain the primary and subsidiary objectives of investment.
7. "The investment process involves a series of activities starting from the policy formulation" Discuss.
8. What are the five different aspects of investment?
9. Explain the process of investment undertaken by the investor.
10. Define securities. Give a brief account of different types of securities.
11. How do common stocks differ from preference stocks?
12. What are the various forms of investment alternatives? Give a detailed account of any five.
13. Define negotiable security. What are the negotiable securities available to the investor in the Indian capital market?
14. Differentiate between capital and money market securities. Explain the commonly available money market securities.
15. What are the advantages of placing money in the bank deposits? Discuss some of the new innovative deposits of the banks.
16. "Bank service and deposit innovations are numerous to attract the customers". Discuss.
17. Examine the tax sheltered schemes available in the market.

18. What is a stock exchange?
19. How is a stock exchange defined under the Securities Contracts (Regulation) Act?
20. Describe the functions of stock exchanges.
21. Trace the growth and development of the stock market in India.
22. Write short notes on:
  - a) OTCEI
  - b) NSE
  - c) ISE
  - d) Depositories Act, 1996
23. Distinguish between day order and open order.
24. Write short note on:
  - a) Short sale
  - b) Bull
  - c) Bear
  - d) Stag
  - e) BSE Sensex
  - f) S and P CNX Nifty

### **CASE STUDY**

You are the top technical analyst in your firm, and your boss has turned to you for an answer to difficult question. He wants to know which single indicator you think is the best and why you think so. What is your answer?

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## UNIT - II

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### Fundamental Security Analysis

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#### Unit Structure:

Lesson 2.1 Economic Analysis

Lesson 2.2 Industry Analysis

Lesson 2.3 Company Analysis

#### Learning Objectives

*After reading this chapter, students should*

- Understand the concept of economic analysis.
- Understand the various types of industries and its analysis.
- Know that what various analysis of financial statements.

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### Lesson 2.1 - Fundamental Security Analysis - Economic Analysis

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#### Introduction

The intrinsic value of an equity share depends on a multitude of factors. The earnings of the company, the growth rate and the risk exposure of the company have a direct bearing on the price of the share. These factors in turn rely on the host of other factors like economic environment in which they function, the industry they belong to, and finally companies' own performance.

The fundamental school of thought appraised the intrinsic value of shares through

- Economic Analysis
- Industry Analysis
- Company Analysis

### **Economy-Industry-Company Analysis Framework**

The analysis of economy, industry and company fundamentals constitute the main activity in the fundamental approach to security analysis. In this era of globalization we may add one more circle to the diagram to represent the international economy.

The logic of this three tier analysis is that the company performance depends not only on its own efforts, but also on the general industry and economy factors. A company belongs to an industry and the industry operates within the economy. As such, industry and economy factors affect the performance of the company.

The multitude of factors affecting the performance of a company can be broadly classified as:

1. Economy-wide factors such as growth rate of the economy, inflation rate, foreign exchange rates, etc. which affect all companies.
2. Industry-wide factors such as demand-supply gap in the industry, the emergence of substitute products, changes in government policy relating to the industry, etc. these factors such as the age of its plant, the quality of management.
3. Company specific factors such as the age of its plant, the quality of management brand image of its products, its labour-management relations, etc. these factors are likely to make a company's performance quite different from that of its competitors in the same industry.

Fundamental analysis thus involves three steps:

1. Economy Analysis
2. Industry Analysis
3. Company analysis

Let us see what each of these analyses implies.

## **Economy Analysis**

The performance of a company depends on the performance of the economy. If the economy is booming, incomes rise, demand for goods increases, and hence the industries and companies in general tend to be prosperous. On the other hand, if the economy is in recession, the performance of companies will be generally bad.

Investors are concerned with those variables in the economy which affect the performance of the company in which they intend to invest. A study of these economic variables would give an idea about future corporate earnings and the payment of dividends and interest part of his fundamental analysis.

## **Growth Rates of National Income**

The rate of growth of the national economy is an important variable to be considered by an investor. GNP (gross national product), NNP (net national product) and GDP (gross domestic product) are the different measures of the total income or total economic output of the country as a whole. The growth rates of these measures indicate the growth rate of the economy. The estimates of GNP, NNP and GDP and their rates are made available by the government from time to time.

The estimated growth rate of the economy would be a pointer towards the prosperity of the economy. An economy typically passes through different phases of prosperity known as the different stages of the economic or business cycle. The four stages of an economic cycle are depression, recovery, boom and recession. The stage of the economic cycle through which a country passes has a direct impact on the performance of industries and companies.

Depression is the worst of the four stages. During a depression, demand is low and declining. Inflation is often high and so are interest rates. Companies are forced to reduce production, shut down plant and lay off workers. During the recovery stage, the economy begins to revive after a depression. Demand picks up leading to more investments in the economy. Production, employment and profits are on the increase.

The boom phase of the economic cycle is characterized by high demand. Investments and production are maintained at a high level to satisfy the high demand. Companies generally post higher profits. The boom phase gradually slows down. The economy slowly begins to experience a downturn in demand, production, employment, etc. The profits of companies also start to decline. This is the recession stage of the business cycle.

While analyzing the growth rate of the economy, an investor would do well to determine the stage of the economic cycle through which the economy is passing and evaluate its impact on his investment decision.

## **Inflation**

Inflation prevailing in the economy has considerable impact on the performance of companies. Higher rates of inflation upset business plans, lead to cost escalation and result in a squeeze on profit margins.

On the other hand, inflation leads to erosion of purchasing power in the hands of consumers. This will result in lower demand for products. Thus, high rates of inflation in an economy are likely to affect the performance of companies adversely. Industries and companies prosper during times of low inflation.

Inflation is measured both in terms of wholesale prices through the wholesale price index (WPI) and in terms of retail prices through the consumer price index (CPI). These figures are available on weekly or monthly basis. As part of the fundamental analysis, an investor should evaluate the inflation rate prevailing in the economy currently as also the trend of inflation likely to prevail in the future.

## **Interest Rates**

Interest rates determine the cost and availability of credit for companies operating in an economy. A low interest rate stimulates investment by making credit available easily and cheaply. Moreover, it implies lower cost of finance for companies and thereby assures higher profitability. On the contrary, higher interest rates result in higher cost of production which may lead to lower profitability and lower demand.

The interest rates in the organized financial sector of the economy are determined by the monetary policy of the government and the trends in money supply. These rates are thus controlled and vary within certain ranges.

But the interest rates in the unorganized financial sector are not controlled and may fluctuate widely depending upon the demand and supply of funds in the market. Further, long-term interest rates differ from short-term interest rates.

An investor has to consider the interest rates prevailing in the different segments of the economy and evaluate their impact on the performance and profitability of companies.

## **Government Revenue, Expenditure and Deficits**

As the government is the largest investor and spender of money, the trends in government revenue, expenditure and deficits have a significant impact on the performance of industries and companies. Expenditure by the government stimulates the economy by creating jobs and generating demand. Since a major portion of demand in the economy is generated by government spending, the nature of government spending is of great importance in determining the fortunes of many an industry.

However, when government expenditure exceeds its revenue, there occurs a deficit. This deficit is known as budget deficit. All developing countries suffer from budget deficits as government spend large amount of money to build up infrastructure. But budget deficit is an important determinant of inflation, as it leads to deficit financing which fuels inflation.

## **Exchange Rates**

The performance and profitability of industries and companies that are major importers or exporters are considerably affected by the exchange rates of the rupee against major currencies of the world. A depreciation of the rupee improves the competitive position of Indian products in foreign markets, thereby stimulating exports. But it would also make imports more expensive. A company depending heavily on imports may find devaluation of the rupee affecting its profitability adversely.

The exchange rates of the rupee are influenced by the balance of trade deficit, the balance of payments deficit and also the foreign exchange reserves of the country. The excess of imports over exports is called balance of trade deficit. The balance of payments deficit represents the net difference payable on account of all transactions such as trade, services and capital transaction. If these deficits increase, there is a possibility that the rupee may depreciate in value.

A country needs foreign exchange reserves to meet several commitments such as payment for imports and servicing of foreign debts. Balance of payment deficit typically leads to decline in foreign exchange reserves as the deficit has to be met from the reserve. The size of the foreign exchange reserve is a measure of the strength of the rupee on external account. Large foreign exchange reserves help to increase the value of the rupee against other currencies.

The exchange rates of the rupee against the major currencies of the world are published daily in the financial press. An investor has to keep track of the trend in exchange

rates of rupee. An analysis of the balance of trade deficit, balance of payments deficit and the foreign exchange reserves will help to project the future trends in exchange rates.

### **Infrastructure**

The development of an economy depends very much on the infrastructure available. Industry needs electricity for its manufacturing activities, roads and railways to transport raw materials and finished goods, communication channels to keep in touch with suppliers and customers.

The availability of infrastructural facilities such as power, transportation and communication systems affects the performance of companies. Bad infrastructure leads to inefficiencies, lower productivity, wastage and delays. An investor should assess the status of the infrastructural facilities available in the economy before finalizing his investment plans.

### **Monsoon**

The Indian economy is essentially an agrarian economy and agriculture forms a very important sector of the Indian economy. Because of the strong forward and backward linkages between agriculture and industry, performance of several industries and companies are dependent on the performance of agriculture. Moreover, as agricultural incomes rise, the demand for industrial products and services will be good and industry will prosper.

But the performance of agriculture to a very great extent depends on the monsoon. The adequacy of the monsoon determines the success or failure of the agricultural activities in India. Hence, the progress and adequacy of the monsoon becomes a matter of great concern for an investor in the Indian context.

### **Economic and Political Stability**

A stable political environment is necessary for steady and balanced growth. No industry or company can grow and prosper in the midst of political turmoil. Stable long-term economic policies are what are needed for industrial growth. Such stable policies can emanate only from stable political systems as economic and political factors are inter-linked. A stable government with clear cut long – term economic policies will be conducive to good performance of the economy.

## **Economic Forecasting**

Economy analysis is the first stage of fundamental analysis and starts with an analysis of historical performance of the economy. But as investment is a future-oriented activity, the investor is more interested in the expected future performance of the overall economy and its various segments. For this, forecasting the future direction of the economy becomes necessary. Economic forecasting thus becomes a key activity in economy analysis.

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

## **Forecasting Techniques**

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

### **Anticipatory Surveys**

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

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

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

### **Barometric or Indicator Approach**

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

The leading indicators are those time series data that reach their high points (peaks) or their low points (troughs) in advance of the high points and low points of total economic activity. The coincidental indicators reach their peaks and troughs at approximately the same time as the economy, while the lagging indicators reach their turning points after the economy has already reached its own turning points. In this method, the indicators act as barometers to indicate the future level of economic activity. However, careful examination of historical data of economic series is necessary to ascertain which economic variables have led, lagged behind or moved together with the economy.

The US Department of Commerce, through its Bureau of Economic Analysis, has prepared a short list of the different indicators. Some of them are given below for illustrative purpose.

#### ***Leading Indicators***

- Average weekly hours of manufacturing production workers
- Average weekly initial unemployment claims
- Contracts and orders for plant and machinery
- Number of new building permits issued
- Index of S and P 500 stock prices
- Money supply (M2)
- Change in sensitive materials prices
- Change in manufactures' unfilled orders (durable goods industries)
- Index of consumer expectations

### ***Coincidental Indicators***

Employees on non-agricultural pay rolls  
Personal income less transfer payments  
Index of industrial production  
Manufacturing and trade sales

### ***Lagging Indicators***

Average duration of unemployment  
Ratio of manufacturing and trade inventories to sales  
Average prime rate  
Commercial and industrial loans outstanding  
Change in consumer price index for services

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

The indicator approach has its own limitations. It is useful in forecasting the direction of the change in aggregate economic activity, but it does not indicate the magnitude or duration of the change. Further, the leading indicators may give false signals. Moreover, different leading indicators may give conflicting signals. The indicator approach becomes useful for economic forecasting only if data collection and presentation are done quickly. Any delay in presentation of data defeats the purpose of the indicators.

### **Econometric Model Building**

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

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

In applying this technique, the analyst is forced to define clearly and precisely the interrelationships between the economic variables. The accuracy of the forecast derived

from this technique would depend on the validity of the assumptions made by the analyst regarding economic interrelationships and the quality of his input data.

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

### **Opportunistic Model Building**

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

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

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

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

The opportunistic model building approach makes use of other forecasting techniques to build up the various components. A vast amount of judgement and ingenuity is also applied to make the overall forecast reliable.

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

Economy analysis is an important part of fundamental analysis. It gives the investor an overall picture of the expected performance of the economy in the near future. This is a valuable input to investment decision-making.

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## Lesson 2.2 - Industry Analysis

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An industry is a group of firms that have similar technological structure of production and produce similar products. For the convenience of the investors, the broad classification of the industry is given in financial dailies and magazines. Companies are distinctly classified to give a clear picture about their manufacturing process and products. The table gives the industry wise classification given in Reserve Bank of India Bulletin.

### Industry Groups

|    | Industries                                   |
|----|----------------------------------------------|
| 1  | Food Products                                |
| 2  | Beverages, Tobacco and Tobacco products      |
| 3  | Textiles                                     |
| 4  | Wood and wood products                       |
| 5  | Leather and leather products                 |
| 6  | Rubber and plastic products                  |
| 7  | Chemical and chemical products               |
| 8  | Non-metallic mineral products                |
| 9  | Basic metals, alloys and metal products      |
| 10 | Machinery and Machine tools                  |
| 11 | Transport equipment and parts                |
| 12 | Other Miscellaneous manufacturing industries |

The table shows that each industry is different from the other. Textile industry is entirely different from the steel industry or the power industry in its product and process.

These industries can be classified on the basis of the business cycle i.e., classified according reactions to the different phases of the business cycle. They are classified into growth, cyclical, defensive and cyclical growth industry.

## **Growth Industry**

The growth industries have special features of high rate of earnings and growth in expansion, independent of the business cycle. The expansion of the industry mainly depends on the technological change. For instance, inspite of the recession in the Indian economy in 1997-98, there was a spurt in the growth of information technology. It defied the business cycle and continued to grow. Like wise in every phase of the history certain industries like colour televisions, pharmaceutical and telecommunication industries have shown remarkable growth.

## **Cyclical Industry**

The growth and the profitability of the industry move along with the business cycle. During the boom period they enjoy growth and during depression they suffer a set back. For example, the white goods like fridge, washing machine and kitchen range products command a good market in the boom period and the demand for them slackens during the recession

## **Defensive Industry**

Defensive industry defies the movement of the business cycle. For example, food and shelter are the basic requirements of humanity. The food industry withstands recession and depression. The stocks of the defensive industries can be held by the investor for income earning purpose. They expand and earn income in the depression period too, under the government's umbrella of protection and are counter cyclical in nature.

## **Cyclical Growth Industry**

This is new type of industry that is cyclical and at the same time growing. For example, the automobile industry experiences periods of stagnation, decline but they grow tremendously. The change in technology and introduction of new models help the automobile industry to resume their growth path.

## **Industry Life Cycle**

The industry life cycle theory is generally attributed to Julius Grodensky. The life cycle of the industry is separated into four well defined stages such as

- Pioneering stage
- Rapid growth stage

- Maturity and stabilization stage
- Declining stage

### **Pioneering Stage**

The prospective demand for the product is promising in this stage and the technology of the product is low. The demand for the product attracts many producers to produce the particular product. There would be severe competition and only fittest companies survive this stage. The producers try to develop brand name, differentiate the product and create a product image. This would lead to non-price competition too. The severe competition often leads to the change of position of the firms in terms of market shares and profit. In this situation, it is difficult to select companies for investment because the survival rate is unknown.

### **Rapid Growth Stage**

This stage starts with the appearance of surviving firms from the pioneering stage. The companies that have withstood the competition grow strongly in market share and financial performance. The technology of the production would have improved resulting in low cost of production and good quality products. The companies have stable growth rate in this stage and they declare dividend to the share holders. It is advisable to invest in the shares of these companies. The pharmaceutical industry has improved its technology and the top companies in this sector are giving dividend to the shareholders. Likewise power industry and telecommunication industry can be cited as examples of expansion stage. In this stage the growth rate is more than the industry's average growth rate.

### **Maturity and Stabilization Stage**

In the stabilization stage, the growth rate tends to moderate and the rate of growth would be more or less equal to the industrial growth rate or the gross domestic product growth rate. Symptoms of obsolescence may appear in the technology. The keep going, technological innovations in the production process and products should be introduced. The investors have to closely monitor the events that take place in the maturity stage of the industry.

### **Declining Stage**

In this stage, demand for the particular product and the earnings of the companies in the industry decline. Now-a-days very few consumers demand black and white T.V.

innovation of new products and change in consumer preferences lead to this stage. The specific feature of the declining stage is that even in the boom period; the growth of the industry would be low and decline at a higher rate during the recession. It is better to avoid investing in the shares of the low growth industry even in the boom period. Investment in the shares of these types of companies leads to erosion of capital

### **Factors to be Considered**

Apart from industry life cycle analysis, the investor has to analyse some other factors too. They are as listed below

- Growth of the industry
- Cost structure and profitability
- Nature of the product
- Nature of the competition
- Government policy
- Labour
- Research and development

### **Growth of the Industry**

The historical performance of the industry in terms of growth and profitability should be analysed. Industry wise growth is published periodically by the Centre for Monitoring Indian Economy. The past variability in return and growth in reaction to macro economic factors provide an insight into the future. Even though history may not repeat in the exact manner, looking into the past growth of the industry, the analyst can predict the future. The information technology industry has witnessed a tremendous growth in the past so also the scrip prices of the IT industry. With the Y2K millennium bug creating a huge business opportunity even beyond the year 2000, the sector is expected to maintain its growth momentum.

### **Cost Structure and Profitability**

The cost structure, that is the fixed and variable cost, affects the cost of production and profitability of the firm. In the case of oil and natural gas industry and iron and steel industry the fixed cost portion is high and the gestation period is also lengthy. Higher the fixed cost component, greater sales volume is required to reach the firm's breakeven point. Once the breakeven point is reached and the production is on the track, the profitability can

be increased by utilizing the capacity to full. Once the maximum capacity is reached, again capital has to invest in the fixed equipment. Hence, lower the fixed cost, adjustability to the changing demand and reaching the break even points are comparatively easier.

### **Nature of the Product**

The products produced by the industries are demanded by the consumers and other industries. If industrial goods like pig iron, iron sheet and coils are produced, the demand for them depends on the construction industry. Likewise, textile machine tools industry produces tools for the textile industry and the entire demand depends upon the health of the textile industry. Several such examples can be cited. The investor has to analyse the condition of related goods producing industry and the end user industry to find out the demand for industrial goods.

In the case of consumer goods industry, the change in the consumers' preference, technological innovations and substitute products affect the demand. A simple example is that the demand for the ink pen is affected by the ball point pen with the change in the consumer preference towards the easy usage of pen.

### **Nature of the Competition**

Nature of competition is an essential factor that determines the demand for the particular product, its profitability and the price of the concerned company scrips. The supply may arise from indigenous producers and multinationals. In the case of detergents, it is produced by indigenous manufactures and distributed locally at a competitive price. This poses a threat to the company made products. The multinational are also entering into the field with sophisticated product process and better quality product. Now the companies' ability to withstand the local as well as the multinational competition counts much. If too many firms are present in the organized sector, the competition would be severe. The competition would lead to a decline in the price of the product. The investor before investing in the scrip of a company should analyse the market share of the particular company's product and should compare it with the top five companies.

### **Government Policy**

The government policies affect the very nerve of the industry and the effects differ from industry to industry. Tax subsidies and tax holidays are provided for export oriented products. Government regulates the size of the production and the pricing of certain products. The sugar, fertilizer and pharmaceutical industries are often affected

by the inconsistent government policies. Control and decontrol of sugar price affect the profitability of the sugar industry. In some cases entry barriers are placed by the government. In the airways, private corporate are permitted to operate the domestic flights only. When selecting an industry, the government policy regarding the particular industry should be carefully evaluated. Liberalization and delicensing have brought immense threat to the existing domestic industries in several sectors.

### **Labor**

The analysis of labor scenario in a particular industry is of great importance. The number of trade unions and their operating mode has impact on the labour productivity and modernization of the industry. Textile industry is known for its militant trade unions. If the trade unions are strong and strikes occur frequently, it would lead to fall in the production. In an industry of high fixed cost, the stoppage of production may lead to loss.

When trade unions oppose the introduction of automation, in the product market the company may stand to lose with high cost of production. The unhealthy labour relationship leads to loss of customers' goodwill too.

Skilled labour is needed for certain industries. In the case of Indian labour market, even in computer technology or in any other industry skilled and well-qualified labour is available at a cheaper rate. This is one of the many reasons attracting the multinationals to set up companies in India.

### **Research and Development**

For any industry to survive the competition in the national and international markets, product and production process have to be technically competitive. This depends on the R & D in the particular company or industry. Economies of scale and new market can be obtained only through R & D. the percentage of expenditure made on R & D should be studied diligently before making an investment.

### **Pollution Standards**

Pollution standards are very high and strict in the industrial sector. For some industries it may be heavier than others; for example, in leather, chemical and pharmaceutical industries the industrial effluents are more.

## SWOT Analysis

The above mentioned factors themselves would become strength, weakness, opportunity and threat (SWOT) for the industry. Hence, the investor should carry out a SWOT analysis for the chosen industry. Take for instance, increase in demand for the industry's product becomes its strength, presence of numerous players in the market, i.e. competition becomes the threat to a particular company in the respective industry. The progress in the research and development in that particular industry is an opportunity and entry of multinationals in the industry and cheap imports of the particular products are threat to that industry. In this way the factors have to be arranged and analysed. To make the industry analysis more explanatory it has been carried out on the pharmaceutical industry and SWOT analysis results are also given.

## Pharmaceutical Industry

### Growth of the Industry

The industry has witnessed healthy growth in the recent past and investment in pharmaceutical industry is continuing. The product output is also increasing and operational and business management efficiency also seem to have improved. This is shown by the increase in the output of the industry as given in table

**Value of Production of Bulk Drugs and Formulations  
during the Years 1993-94 to 1997-98 (Rs in Crs.)**

| Year    | Bulk drugs | Growth % | Formulations | Growth % |
|---------|------------|----------|--------------|----------|
| 1993-94 | 1,320      | 14.8     | 6,900        | 15       |
| 1994-95 | 1,518      | 15       | 7,935        | 15       |
| 1995-96 | 1,822      | 20       | 9,125        | 15       |
| 1996-97 | 2,186      | 19.9     | 10,494       | 15       |
| 1997-98 | 2,623      | 20       | 12,068       | 15       |

*Source: IDMA Annual 1998*

### Structure of the Industry

Pharmaceutical industry adopts high technology and produces high value added products. The process is very complex in nature. The processes are classified into primary and secondary. The primary process requires uninterrupted power supply, maintaining of conditions under which the molecules react and yield a new product, excellent manufacturing conditions and well-trained personnel. Specific plants costs less but, they have the risk of

obsolescence. Multipurpose plants are expensive and have no risk of obsolescence but, they have the risk of cross contamination. The secondary process is the conversion of bulk drugs into formulations. The secondary process is not much technology intensive and has low capital cost. Hence, there are many players in the market.

### **Nature of the Product**

The products of the pharmaceutical industry are broadly classified into bulk drugs, formulations and intravenous fluids. Bulk drugs are like Ciproflaxacin, Ibuprofen, Ranitidine, Ethanbutol, etc. The major manufactures of the products are Ranbaxy, Cipla, Cadilla, Dr.Reddys' Lab and Lupin. Some companies manufacture formulations from bulk drugs and market them under brands. Companies also manufacture formulations for other companies. Some of the companies in the formulation segment are Ranbaxy, Cipla, Wockhardt, Lupin etc.

Intravenous fluids are preparations which aid in quick replenishment of body fluids. Bulk drugs and formulations companies produce intravenous fluids also. The formulations are produced by firms from all over the country. Andhra Pradesh stands first in the production of bulk drugs.

### **Demand for the Product**

The Indian pharmaceutical market which was worth Rs90 billion in 1997, is growing at 13.7% rate. But only three out of ten Indians have access to allopathic drug. Even in this segment vast majority of them belong to urban area. Investments in medical and public health declined from 2% of the total capital outlay in the sixth five year plan to 1.75% in the Eighth five year plan. In the year 1996-97, the portion in the annual budget was of 1.7%.

The less than 15 age segment of the population is expected to grow at 0.5% but the fastest growth is expected in the 50-59 groups. This has led to a shift in the demand from the life saving drugs to life enhancing drugs. It is referred to as a shift from age old diseases to old age diseases.

### **Competition**

The industry is having 2400 players within the organised sector and around 15,000 in small-scale sector. The low entry barriers, government's encouragement given to small sector units and low capital cost are the reason for the presence of large number of units in the pharmaceutical sector. This has lead to price crash in the bulk drug.

Apart from internal competition, the industry is facing international competition too. There is a large import of bulk drugs from China. The Chinese products are a significant competitor for the Indian pharmaceutical industry. Multinational corporations like Pfizer, Abbot labs and Novartis also pose threat to the local producers.

### **Government Policy**

The drug companies operate in a highly politicised environment. The product development, prices, safety are regulated by the government. The pharmaceutical industry functions under the Drug Price Control Order. The prices of drugs are regulated to make them available to the masses at affordable prices. The DPCO is issued from time to time to keep the policy in tune with the changing demands.

The Patent Law in India provides patent only for process and there is no product patent. But, with signing of GATT, India is required to amend the Patent Law. Once the product patent comes into force, the reverse engineering route to introduce new molecules will not be available to Indian companies.

### **Research and Development**

The average sum spent by the 15 largest Indian pharmaceutical companies for R & D is around 2 percent of turnover. This is drastically low and research is mainly concentrated towards the area of process development rather than on new molecular searching.

### **Strength**

- **Despite economic slowdown**, the industry registered double digit growth rate.
- Indian pharmaceutical market is growing at 13.7%.
- Net exporter of bulk drugs and formulations.
- Low cost in process development and R & D.
- Third largest scientific pool in the world.

### **Weakness**

- Decline in plan investment in medical and public health.
- Only three out of ten Indians have access to allopathic drugs.
- Various price controls.

### Opportunity

- With increase in purchasing power, health care expenditure would increase.
- Non Japan Asia's share of world health care spends will double.
- Patent law will lead to consolidation of industry.

### Threat

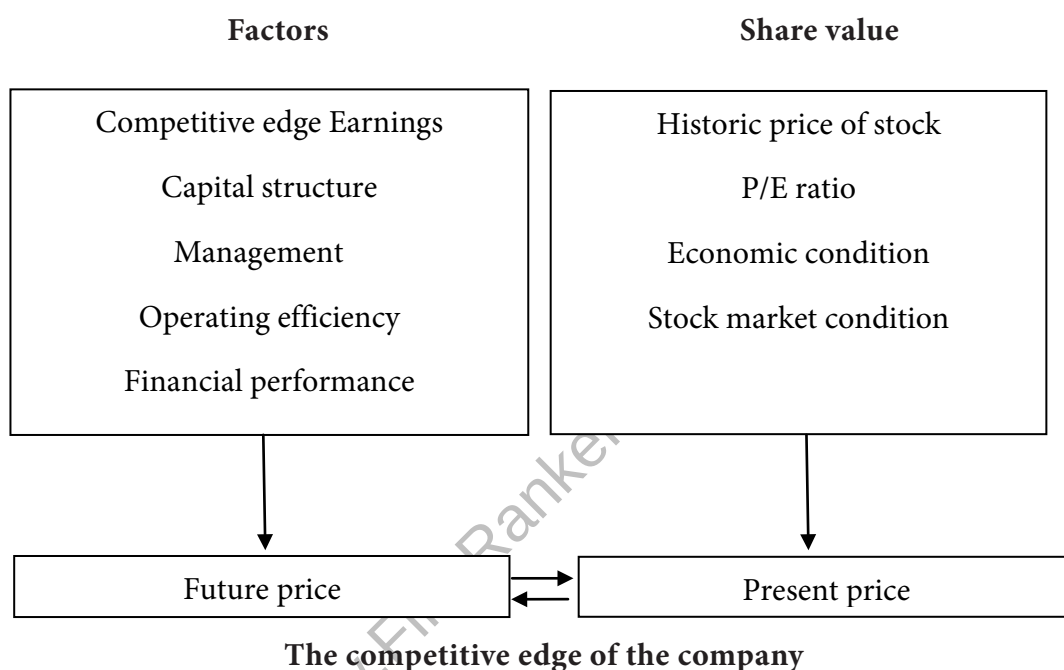
- Fall in the price of bulk drugs and imports from China.
- 60 major products may lose patent protection.
- Ambiguity regarding the timing and content of the Indian Patent Act amendment.

\*\*\*\*

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## Lesson 2.3 - Company Analysis

In the company analysis the investor assimilates the several bits of information related to the company and evaluates the present and future values of the stock. The risk and return associated with the purchase of the stock is analysed to take better investment decisions. The valuation process depends upon the investors' ability to elicit information from the relationship and inter-relationship among the company related variables. The present and future values are affected by a number of factors and they are given in fig



### The Competitive Edge of the Company

Major industries in India are composed of hundreds of individual companies. The in the information technology industry even though the number of companies is large, few companies like Tata InfoTech, Satyam computers, Infosys, NIIT etc., control the major market share. Like-wise in all industries, some companies rise to the position of eminence and dominance. The large companies are successful in meeting the competition. Once the companies obtain the leadership position in the market, they seldom lose it. Over the time they would have proved their ability to withstand competition and to have a sizeable share in the market. The competitiveness of the company can be studied with the help of

- The market share
- The growth of annual sales
- The stability of annual sales

### **The Market Share**

The market share of the annual sales helps to determine a company's relative competitive position within the industry. If the market share is high, the company would be able to meet the terms of sales in 1997. While analyzing the market share, the size of the company also should be considered because the smaller companies may find it difficult to survive in the future. The leading companies of today's market will continue to lead at least in the near future. The companies in the market should be compared with like product groups otherwise, the results will be misleading. A software company should be compared with other software companies to select the best in that industry.

### **Growth of Sales**

The company may be a leading company, but if the growth in sales is comparatively lower than another company, it indicates the possibility of the company losing the leadership. The rapid growth in sales would keep the shareholder in a better position than one with the stagnant growth rate. The company of large size with inadequate growth in sales will not be preferred by the investors. Growth in sales is usually followed by the growth in profits. Investor generally prefers size and the growth in sales because the larger size companies may be able to withstand the business cycle rather than the company of smaller size.

The growth in sales of the company is analysed both in rupee terms and in physical terms. Physical term is very essential because it shows the growth in real terms. The rupee term is affected by the inflation. Companies with diversified sales are compared in rupee terms and percentage of growth over time.

### **Stability of Sales**

If a firm has stable sales revenue, other things being remaining constant, will have more stable earning and wide variations in capacity utilization, financial planning and dividend. Periodically all the financial newspapers provide information about the market share of different companies in an industry. The fall in the market share indicates the declining trend of the company, even if the sales are stable in absolute terms. Hence, the stability of sales also should be compared with its market share and the competitors' market shares.

## Sales Forecast

The Company may be in a superior position commanding more sales both in monetary terms and physical terms but the investor should have an idea whether it will continue in future or not. For this purpose, forecast of sales has to be done. He can forecast the sales in different ways.

1. The investor can fit a trend line either linear or non linear whichever is suitable.
2. Historical percentage of company sales to the industry sales can be analysed. Even simple least square technique could be used to find out the function  $C_s = f(I)$  i.e.  $C_s$  – company sales;  $I$  – Industry sales.
3. The sales growth can be compared with the macro-economic variables like gross domestic product, per capita income and population growth.
4. The different components of demand for the company's product have to be analysed because the demand may arise from different sources. For some product the demand may be from the consumers as well as from the industries. For example, steel and petroleum products are demand by consumers and industries.
5. The demand for the substitutes and competitors' product also should be analysed using least square techniques.

## Earnings of the Company

Sales alone do not increase the earnings but the costs and expenses of the company also influence the earnings of the company. Further, earnings do not always increase with the increase in sales. The company's sales might have increased but its earnings per share may decline due to the rise in costs. The rate of change in earnings differs from the rate of change of sales. Sales may increase by 10% in a company but earnings per share may increase only by 5%. Even though there is a relationship between sales and earnings, it is not a perfect one. Sometimes, the volume of sales may decline but the earnings may improve due to the rise in the unit price of the article. Hence, the investor should not depend only on the sales, but should analyse the earnings of the company.

The income for the company is generated through operating sources and non-operating sources. The sources of operating income vary from industry to industry. For the service industry no tangible product is involved and income is generated through sales of services. Take the case of commercial bank, its income is the interest on loans and investments. Interest income is referred to operating income. But in the case of industries producing tangible goods earnings arise from the sale of goods.

The companies, in addition to the revenue from sales, may get revenue from other sources too. The non-operating income may be generated from interest from bonds, rentals from lease, dividends from securities and sale of assets. The investor should analyse the income source diligently whether it is from the sale of assets or it is from investments. Sometimes earning per share may seem to be attractive in a particular year but in actual case the revenue generated through sales may be comparatively lower than in the previous year. The earnings might have been generated through the sale of assets.

The investor should be aware that income of the company may vary due to the following reasons.

- Change in sales
- Change in costs
- Depreciation method adopted
- Depletion of resources in the case of oil, mining, forest products, gas etc.
- Inventory accounting method
- Replacement cost of inventories
- Wages, salaries and fringe benefits
- Income taxes and other taxes.

## Capital Structure

The equity holders' return can be increased manifold with the help of financial leverage, i.e., using debt financing along with equity financing. The effect of financial leverage is measured by computing leverage ratios. The debt ratio indicates the position of the long term and short term debts in the company finance. The debt may be in the form of debentures and term loans from financial institutions.

## Preference Shares

In the early days the preference share capital was never a significant source of capital. At present, many companies resort to preference shares. The preference shares induct some degree of leverage in finance. The leverage effect of the preference shares is comparatively lesser than the debt because the preference share dividends are not tax deductible. If the portion of preference share in the capital is larger, it tends to create instability in the earnings of the equity shares when the earnings of the company fluctuate. Sometimes the preference share may be convertible preference share; in that case it dilutes the earnings per share. So the investor should look into the preference share component of the capital structure.

## Debt

Long term debt is an important source of finance. It has the specific benefit of low cost of capital because interest is tax deductible. The leverage effect of debt is highly advantageous to the equity holders. During the boom period the positive side of the leverage effect increases the earnings of the share holders. At the same time, during recession the leverage effect induces instability in earnings per share and can lead to bankruptcy. Hence, it is important to limit the debt component of the capital to a reasonable level. The limit depends on the firm's earning capacity and its fixed assets.

### *i) Earnings Limit of Debt*

The earnings determine whether the debt is excessive or not. The earnings indicate the probability of insolvency. The ratio used to find out the limit of the debts is the interest coverage ratio i.e., the ratio of net income after taxes to interest paid on debt. The ratio shows the firm's ability to pay the interest charges, the number of times interest is covered by earnings.

### *ii) Assets Limit to Debt*

This asset limit is found out by fixed assets to debt ratio. The financing of fixed assets by the debt should be within a reasonable limit. For industrial units the recommended ratio level is below 0.5.

## Management

Good and capable management generates profit to the investors. The management of the firm should efficiently plan, organize, actuate and control the activities of the company. The basic objective of management is to attain the stated objectives of company are achieved, investors will have a profit. A management that ignores profit does more harm to the investors than one that over emphasizes it.

The good management depends on the qualities of the manager. Koontz and O'Donnell suggest the following as a special trait of an able manager:

- Ability to get along with people
- Leadership
- Analytical competence

- Industry
- Judgement
- Ability to get things done

Since the traits are difficult to measure, managerial performance is evaluated against setting and accomplishing a verifiable objective. If the investor needs greater proof of excellence of management, he has to analyse management ability. The analysis can be carried out on the following ways:

- a) The background of managerial personnel contributes much to the success of the management. The manager's age, educational background, advancement within the company, levels of responsibility achieved and the activities in the social sphere can be studied.
- b) The record of management over the past years has to be reviewed. For several companies what the top management have done during its tenure in office are given in the financial weeklies and monthlies along with critical comments. This gives an insight into the ability of the top management.
- c) The management's skill to have market share ahead of others is a proof of managerial success. The investor can rely on this type of management and choose the stock.
- d) The next criterion the investor should analyse is the company's strength to expand. A firm may expand from within and diversify products in the known lines. Sometimes it may acquire an other company to expand its market. The horizontal or vertical expansion of the production is a health sign of an efficient management.
- e) The management's ability to maintain efficient production by proper utilization of plant and machinery has to be analysed. Suitable inventory planning and scheduling have to be drafted and worked out by the management.
- f) The management's capacity to finance the company adequately has to be studied. Accomplishing the financial requirement is a direct reflection of managerial ability. The management should adopt a realistic dividend policy in relation to earnings. A realistic dividend policy boosts the image of the company's stock in the market.
- g) The functional ability of management to work with employees and union is another area of concern. A union poses a threat to the smooth functioning of the firm. In this context the management should be able to maintain harmonious relationship with the employees and unions.

- h) The management's adaptability to scientific management and quality control techniques should be analysed. The management should be able to give due weightage to maintain technical competence.

After analyzing the above mentioned factors, the investor should select companies that possess excellent management and maintain the competitive position of the company in the market. The investor should also remember that the individual traits of a single manager alone cannot make the company profitable and there should be a strong management system to do so.

### **Operating Efficiency**

The operating efficiency of a company directly affects the earnings of a company. An expanding company that maintains high operating efficiency with a low break-even point earns more than the company with high break-even point. If a firm has stable operating ratio, the revenues also would be stable.

Efficient use of fixed assets with raw materials, labour and management would lead to more income from sales. This leads to internal fund generation for the expansion of the firm. A growing company should have low operating ratio to meet the growing demand for its product.

### **Operating Leverage**

If the firm's fixed cost is high in the total cost the firm is said to have a high degree of operating leverage. Leverage means the use of a lever to raise a heavy object with a small force. High degree of operating leverage implies, other factors being held constant, relatively small change in sales result in a large change in return on equity. This can be explained with the help of the following example.

Let us take firm A and B. The firm A has relatively small amount of fixed charges say, ₹ 40,000. Firm A would not have much automated equipment, so its depreciation and maintenance costs are low. The variable cost per cent is higher than it would be if the firm used more automated equipment, In the other case firm B has high fixed costs, ₹ 1,20,000.

Here the firm uses automated equipment (with which one operator can turn out many units at the same labour cost) to a much larger extent. The break-even occurs at 40,000 units in firm A and 60,000 units in firm B. The selling price (P) is ₹ 4; the variable cost is ₹ 3 for firm A and ₹ 2 for firm B percent.

The break-even occurs when ROE (return on equity) = 0, and hence, when earnings before interest and taxes (EBIT) = 0.

$$\text{EBIT} = 0 = PQ - VQ - F$$

Here P is the average sales price per unit of output, Q is units of output, V is the variable cost per unit, and F is the fixed operating costs. The break-even quantity is  $= F / (P - V)$

$$\text{For Firm A} = \frac{\text{₹ } 40,000}{\text{₹ } 4 - \text{₹ } 3} = 40,000 \text{ units}$$

$$\text{Firm B} = \frac{\text{₹ } 2,20,000}{\text{₹ } 4 - \text{₹ } 2} = 60,000 \text{ units}$$

To a large extent, operating leverage is determined by technology. For example, telephone companies, iron and steel companies and electric utilities have heavy investments in fixed assets leading to high fixed costs and operating leverage. On the other hand cosmetics companies, and consumer goods producing companies may need significantly lower fixed costs, and hence lower operating leverage.

The investor should understand the operating leverage of the firm because the firm with high operating leverage is affected much by the cyclical decline. The operating efficiency of the firm determines the profit expectation of the company.

## Financial Analysis

The best source of financial information about a company is its own financial statements. This is a primary source of information for evaluating the investment prospects in the particular company's stock. Financial statement analysis is the study of a company's financial statement from various viewpoints. The statement gives the historical and current information about the company's operations. Historical financial statement helps to predict the future. The current information aids to analyse the present status of the company.

The two main statements used in the analysis are:

- Balance sheet
- Profit and loss account

## The Balance Sheet

The balance sheet shows all the company's sources of funds (liabilities and stockholders' equity) and uses of funds at a given point of time. The balance sheet can either be in the horizontal form or vertical form. Table show the balance sheet of Sky Company in horizontal and vertical form respectively.

### Balance sheet of Sky Ltd as on 31<sup>st</sup> March, 1999

#### In horizontal form (₹ Lakhs)

| Liabilities                 | 1999     | 1998     | Assets                   | 1999     | 1998     |
|-----------------------------|----------|----------|--------------------------|----------|----------|
| <b>Share capital:</b>       |          |          | <b>Fixed assets less</b> |          |          |
| Equity                      | 10,000   | 20,000   | Depreciation             | 1,20,000 | 1,10,000 |
| Preference                  | 20,000   | 10,000   | Current assets:          |          |          |
| Reserves and surplus        | 30,000   | 30,000   | Inventories              | 44,000   | 40,000   |
| Profit Loss account         | 49,825   | 40,000   | Sundry debtors           | 33,025   | 30,000   |
| <b>Loan funds:</b>          |          |          |                          |          |          |
| 12% Debentures              | 38,000   | 40,000   | Marketable               | 10,8000  | 15,000   |
| Term loans                  | 19,000   | 20,000   | Securities               |          |          |
| <b>Current liabilities:</b> |          |          |                          |          |          |
| Bills Payable               | 9,000    | 8,000    | Cash                     | 8,000    | 5,000    |
| Sundry creditors            | 15,000   | 12,000   |                          |          |          |
| Other current               | 25,000   | 20,000   |                          |          |          |
| <b>Liabilities</b>          |          |          |                          |          |          |
|                             | 2,15,825 | 2,00,000 |                          | 2,15,825 | 2,00,000 |

#### Vertical form ₹ In Lakhs

#### Balance sheet as on 31<sup>st</sup> March, 1999

#### I. Sources of Funds

##### 1. Shareholder's fund:

|                        |        |          |
|------------------------|--------|----------|
| (a) Equity capital     | 20,000 |          |
| (b) Preference capital | 10,000 |          |
| (c) Reserves & surplus | 30,000 |          |
| (d) P/L account        | 49,825 | 1,09,825 |

|                               |        |          |
|-------------------------------|--------|----------|
| 2. Loans funds:               |        |          |
| (a) 12% Debentures            | 38,000 |          |
| (b) Term loans                | 19,000 | 57,000   |
| Total                         |        | 1,66,825 |
| II. Application of funds      |        |          |
| 1. Fixed assets               |        |          |
| 2. Current assets:            |        |          |
| (a) Inventories               | 44,000 |          |
| (b) Sundry debtors            | 33,025 |          |
| (c) Securities                | 10,800 |          |
| (d) Cash                      | 8,000  | 95,825   |
| 3. Less: current liabilities  |        |          |
| (a) Bills payable             | 9,000  |          |
| (b) Sundry creditors          |        | 15,000   |
| (c) Other current liabilities | 25,000 | 49,000   |
| (d) Net working capital       |        | 46,825   |
| Total                         |        | 1,66,825 |

The balance sheet provides an account of the capital structure of the Sky Company. The network and the outstanding long term debt are known from the balance sheet. The debt has certain advantages in terms of cost and market acceptability. The use of debt creates financial leverage beneficial or detrimental to the shareholders depending on the size and stability of earnings.

If revenues are stable and certain, a large amount of debt can be carried and it is beneficial to the shareholder. If the earnings fluctuate, the debt should be low in the capital structure, so that the payment of interest may not be detrimental to the shareholders. It is better for the investor to avoid a company with excessive debt component in its capital structure. From the balance sheet, liquidity position of the company can also be assessed with the information on current assets and current liabilities. The overall ability to pay its short term obligations can be found out.

### **The Profit and Loss Account**

Analysis of the financial condition of the company requires a report on the flow of funds too. The income statement reports the flow of funds from business operations that

takes place in between two points of time. It lists down the items of income and expenditure. The difference between the income and expenditure represents profit or loss for the period. It is also called income and expenditure statement. Profit and loss account of the Sky Ltd., is given in table. The investor should be aware of the limitations of the financial statements.

### **Limitations of Financial Statements**

1. The financial statements contain historical information. This information is useful; but an investor should be concerned more about the present and future.
2. Financial statements are prepared on the basis of certain accounting concepts and conventions. An investor should know them.
3. The statements contain only information that can be measured in monetary units. For example, the loss incurred by a firm due to flood or fire is included because it can be expressed in monetary terms. The loss incurred by the company due to the loss of reputation is not given in the statement because it cannot be measured in monetary unit.
4. Sometimes management may resort to manipulation of data and window dressing. This can be carried out by
  - a. Method of charging depreciation
  - b. Valuation of inventory
  - c. Revaluation of fixed asset
  - d. Changing the accounting year

An investor should scrutinize the financial statements to find out the manipulations, if any. The auditors' report and notes to the balance sheet give vital clue to the investor in this regard. Analysis of financial statements should be undertaken only after nullifying the effects of any such manipulation.

### **Analysis of Financial Statement**

The analysis of financial statements reveals the nature of relationship between income and expenditure, and the sources and application of funds. The investor determines the financial position and the progress of the company through analysis. The investor is interested in the yield and safety of his capital. He cares much about the profitability and the management's policy regarding the dividend.

Towards this end, he can use the following simple analysis.

- Comparative financial statements
- Trend analysis
- Common size statements
- Fund flow analysis
- Cash flow analysis
- Ratio analysis

### **Comparative Financial Statement**

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

### **Trend Analysis**

Here percentages are calculated with a base year. This would provide insight into the growth or decline of the sale or profit over the years. Sometimes sales may be increasing continuously, and the inventories may also be rising. This would indicate the loss of market share of the particular company's product. Likewise sales may have an increasing trend but profits may remain the same. Here the investor has to look into the cost and management efficiency of the company.

### **Common Size Statement**

Common size balance sheet shows the percentage of each asset item to the total assets and each liability item to the total liabilities. Similarly, a common size income statement shows each item of expense as a percentage of net sales. With common size statement comparison can be made between two different size firms belonging to the same industry. For a same company over the years common size statement can be prepared.

### **Fund Flow Analysis**

The balance sheet gives a static picture of the company's position on a particular date. It does not reveal the changes that have occurred in the financial position of the unit over a period of time.

The investor should know,

- a) How are the profit utilized?
- b) Financial source of dividend
- c) Source of finance for capital expenditures
- d) Source of finance for repayment of debt
- e) The destiny of the sale proceeds of the fixed assets and
- f) Use of the proceeds of the share for debenture issue or fixed deposits raised from public.

These items of information are provided in the funds flow statement. It is a statement of the sources and applications of funds. It highlights the changes in the financial condition of a business enterprise between two balance sheet dates. The investor could see clearly the amount of funds generated or lost in operations. He could see how these funds have been divided into three significant uses like taxes, dividends and reserves. Moreover, the application of long term funds towards the acquisition of current assets can be found out. This would reveal the real picture of the financial position of the company.

### **Cash Flow Statement**

The investor is interested in knowing the cash inflow and outflow of the enterprise. The cash flow statement is prepared with the help of balance sheet, income statement and some additional information. It can be either prepared in the vertical form or in the horizontal form. Cash flows related to operations and other transactions are calculated. The statement shows the causes of changes in cash balance between two balance sheet dates. With the help of this statement the investor can review the cash movements over an operating cycle. The factors responsible for the reduction of cash balances in spite of increase in profits or vice versa can be found out.

### **Example**

The balance sheet and the profit and loss account of the Sky Ltd are given in table. As an investor in the company's scrips, you can prepare

- a) Common size balance sheet
- b) Fund flow statement
- c) Cash flow statement and analyse them.

**Profit and Loss Account of Sky Ltd as on 31<sup>st</sup> March 1999 (Rs in Lakhs)**

|                                             |          |          |
|---------------------------------------------|----------|----------|
| Net sales                                   |          | 2,40,000 |
| Less: Cost of goods sold*                   | 1,40,000 |          |
| Selling expenses                            | 35,000   |          |
| Administrative expenses                     | 25,000   |          |
| Interest                                    | 8,350    | 2,08,350 |
| Profit before tax                           |          | 31,650   |
| Less Income tax @ 50%                       |          | 15,825   |
| Profit after tax                            |          | 15,825   |
| Preference dividend                         | 1,000    |          |
| Net profit available to equity shareholders | 14,825   |          |
| Less: Dividing to equity shareholders       | 5,000    |          |
| Retained earnings                           |          | 9,825    |
| *Cost of goods includes depreciation amount | 10,000/- |          |

**Common Size Balance sheet of Sky Ltd as on 31<sup>st</sup> march 1999 (₹ in Lakhs)**

| Particulars                 | As on 31.03.1999 |         | As on 31.03.1998 |       |
|-----------------------------|------------------|---------|------------------|-------|
|                             | Amount           | % total | Amount           | total |
| <b>Capital and Reserves</b> |                  |         |                  |       |
| Share capital               | 20,000           | 9.3     | 10,000           | 5.0   |
| Preference capital          | 10,000           | 4.6     | 20,000           | 10.0  |
| Reserves                    | 30,000           | 13.9    | 30,000           | 15.0  |
| P/L account                 | 49,825           | 23.1    | 40,000           | 20.0  |
|                             | 1,09,825         | 50.9    |                  | 50.0  |
| <b>Long-Term Debt</b>       |                  |         |                  |       |
| 12% Debentures              | 38,000           | 17.6    | 40,000           | 20.0  |
| Term Loans                  | 19,000           | 8.8     | 20,000           | 10.0  |
|                             | 57,000           | 26.4    | 60,000           | 30.0  |
| <b>Current Liabilities</b>  |                  |         |                  |       |
| Bills Payable               | 9,000            | 4.1     | 8,000            | 4.0   |
| Sundry creditors            | 15,000           | 7.0     | 12,000           | 6.0   |
| Other current liabilities   | 25,000           | 11.6    | 20,000           | 10.0  |
|                             | 49,000           | 22.7    | 40,000           | 20.0  |
| <b>Total</b>                | 2,15,825         | 100%    | 100,000          | 100%  |

**Assets**
**Current assets:**

|                      |        |      |        |      |
|----------------------|--------|------|--------|------|
| Cash                 | 8,000  | 3.7  | 5,000  | 2.5  |
| Investment           | 10,800 | 5.0  | 15,000 | 7.5  |
| Debtors              | 33,025 | 15.3 | 30,000 | 15.0 |
| Inventory            | 44,000 | 20.4 | 40,000 | 20.0 |
| Total current assets | 95,825 | 44.4 | 90,000 | 45.0 |

**Fixed Assets**

|                                |                 |             |                 |             |
|--------------------------------|-----------------|-------------|-----------------|-------------|
| Gross fixed assets             | 2,40,000        |             | 2,20,000        |             |
| Less: Accumulated depreciation | 1,20,000        |             | 1,20,000        |             |
|                                | 1,20,000        | 55.6        | 1,10,000        | 55.0        |
| <b>Total</b>                   | <b>2,15,825</b> | <b>100%</b> | <b>2,00,000</b> | <b>100%</b> |

**Statement of Changes in W.C**

(Rs in Lakhs)

| Particulars                    | 1998   | 1999   | change in W.C |          |
|--------------------------------|--------|--------|---------------|----------|
|                                |        |        | Increase      | Decrease |
| <b>Current Assets</b>          |        |        |               |          |
| Cash                           | 5,000  | 8,000  | 3,000         |          |
| Investment                     | 15,000 | 10,800 |               | 4,200    |
| Debtors                        | 30,000 | 33,025 | 3,025         |          |
| Inventory                      | 40,000 | 44,000 | 4,000         |          |
| Total current assets           | 90,000 | 95,825 |               |          |
| <b>Current Liabilities</b>     |        |        |               |          |
| Bills payable                  | 8,000  | 9,000  | 1,000         |          |
| Sundry creditors               | 12,000 | 15,000 |               | 3,000    |
| Other current liabilities      | 20,000 | 25,000 |               | 5,000    |
| Total current liabilities (CL) | 40,000 | 49,000 |               |          |
| CA-CL                          | 50,000 | 46,825 | 3,175         |          |
|                                |        | 3175   |               |          |
|                                | 50,000 | 50,000 | 13,200        | 13,200   |

**Fund Flow Statement (Rs in Lakhs)**

| Sources                     |        | Uses                         |        |
|-----------------------------|--------|------------------------------|--------|
| Funds from operations       | 41,650 | Purchase of fixed assets     | 20,000 |
| Decrease in Working Capital | 3,175  | Redemption of 12% Debentures | 2,000  |
|                             |        | Repayment of term loans      | 1,000  |

|                           |               |
|---------------------------|---------------|
| Payment of tax            | 15,825        |
| Payment of Pref. Dividend | 1,000         |
| Payment of Equity Divi.   | 5,000         |
| <u>44,825</u>             | <u>44,825</u> |

**Dr. Funds from Operations P & L App. a/c (Rs in lakhs)**

|                          |               |                          |               |
|--------------------------|---------------|--------------------------|---------------|
| To Depreciation          | 10,000        | By Bal.b/d               | 40,000        |
| To Income tax            | 15,825        | (Opening Balance)        |               |
| To Pref. Dividend        | 1,000         | By Funds from operations | 41,650        |
|                          |               | (Balancing figure)       |               |
| To Equity Dividend       | 5,000         |                          |               |
| To Balance c/d (Cl.bal.) | <u>49,825</u> |                          |               |
|                          | <u>81,650</u> |                          | <u>81,650</u> |

**Cash Flow Statement (Rs in lakhs)**

| Sources                   |               | Uses                      |               |
|---------------------------|---------------|---------------------------|---------------|
| Opening Balance of cash   | 5,000         | Increase in S. Debtors    | 3,025         |
|                           |               | Increase in Inventory     | 4,000         |
| Add:                      |               | Purchase of Fixed assets  | 20,000        |
| Decrease in Investments   | 4,200         | Debentures                | 2,000         |
| Increase in Bills payable | 1,000         | Repayment of term loans   | 1,000         |
| Decrease in Investments   | 4,200         | Debentures                | 2,000         |
| Increase in Bills payable | 1,000         | Repayment of term loans   | 1,000         |
| Increase in Sundry Crs.   | 3,000         | Payment of Income Tax     | 15,825        |
| Increase in other         |               | Payment of Pref. Dividend | 1,000         |
| Current liabilities       | 5,000         | Payment of Equity         | 5,000         |
|                           |               | Dividend                  |               |
|                           |               |                           | 51,850        |
|                           |               | Closing balance of cash   | <u>8,000</u>  |
|                           | <u>59,850</u> |                           | <u>59,850</u> |
| Retaining Earnings        |               |                           | 9,825         |
| Add:                      |               |                           |               |
| Non-Cash/Non-operating    |               |                           |               |
| expenditures              |               |                           |               |
| Depreciation              | 10,000        |                           |               |
| Income Tax                | 15,825        |                           |               |
| Pref. Dividend            | 1,000         |                           | 31,825        |
| Equity Dividend           | 5,000         |                           | 41,650        |

Less:

|                                |        |
|--------------------------------|--------|
| Non-cash/Non-operating incomes | Nil    |
| Cash from Profit               | 41,650 |

- a) The change in the capital components caused the fluctuations in the profit. The common size balance sheet reveals that there is a reduction in the long term loans, while the current liabilities increased. The fixed assets have also increased.
- b) The fund flow statement shows that the majority of the fund is obtained from business operations. The funds are applied for used like acquisition or fixed assets and redemption of debentures. Profit and working capital are sufficient to pay dividend and taxes.
- c) Cash flow statement indicates that the company is following the policy of sales on credit basis because the inventory and the sundry debtors have increased.

### Ratio Analysis

Ratio is a relationship between two figures expressed mathematically. Financial ratio provides numerical relationship between two relevant financial data. Financial ratios are calculated from the balance sheet and loss account. The relationship can be either expressed as a percent or as a quotient. Ratios summarise the data for easy understanding, comparison and interpretation. Financial ratios may be divided into six groups.

They are listed below:

- Liquidity Ratios
- Turnover Ratios
- Leverage Ratios
- Profit Margin Ratios
- Return on Investment Ratios
- Valuation Ratios

### Liquidity Ratio

Liquidity means the ability of the firm to meet its short term obligations. Current ratio and acid test ratio are the most popular ratios used to analyse the liquidity. The liquidity ratio indicates the liquidity in a rough fashion and the adequacy of the working capital.

The ratios for the Sky Ltd are given below:

$$\begin{aligned}
 \text{Current ratio} &= \frac{\text{Current assets}}{\text{Current liabilities}} \\
 &= \frac{95825}{49000} = 1.96:1 \\
 \\ 
 \text{Acid test ratio} &= \frac{\text{Current assets} - \text{Inventories}}{\text{Current Liabilities}} \\
 &= \frac{51825}{49000} = 1.06:1
 \end{aligned}$$

For the current ratio the minimum value set is 1.33. Compared to that the liquidity position of Sky Ltd. is favourable. The acid test ratio of 1.06 shows that the company is able to meet current liabilities. Yet, the company has to work out plans to reduce the inventory level a little below the present level.

#### Turnover Ratios

The turnover ratios show how well the assets are used the extent of excess inventory, if any. These ratios are also known as activity ratios or asset management ratios. Commonly calculated ratios are sales to current assets, sales to fixed assets, sales to inventory, receivable to sales and total assets to turnover. Each ratio has a specific application. Sales to current asset ratio shows the utilization of the current assets and sales to fixed asset ratio indicates the fixed asset utilization. The sales to inventory management. The receivable to sales gives a view of the receivable management.

The value of the calculated ratios for the Sky Ltd company are given below:

$$\begin{aligned}
 \text{Inventory turnover ratio} &= \frac{\text{Net Sales}}{\text{Inventory}} = \frac{240000}{440000} = 5.45: \text{times} \\
 \\ 
 \text{Receivables turnover ratio} &= \frac{\text{Net Sales}}{\text{Receivable}} = \frac{240000}{33025} = 7.27: \text{times} \\
 \\ 
 \text{Fixed asset turnover ratio} &= \frac{\text{Net Sales}}{\text{Fixed asset}} = \frac{240000}{120000} = 2.1: \text{times} \\
 \\ 
 \text{Total assets turnover ratio} &= \frac{\text{Net Sales}}{\text{Total assets}} = \frac{240000}{215825} = 1.1: \text{times}
 \end{aligned}$$

## The Leverage Ratios

The investors are generally interested to find out the debt portion of the capital. The debt affects the dividend payment because of the outflow of profit in the form of interest. The financial leverage affects the risk and return aspects of holding the shares. The total debt to total assets ratio indicates the percentage of borrowed funds in the firm's assets.

$$\begin{aligned}\text{Debt to asset ratio} &= \frac{\text{Total debt}}{\text{Total assets}} \\ &= \frac{1,06,000}{2,15,825} \times 100 = 49.9\%\end{aligned}$$

It shows that 49 percent of the assets owned by the Sky Company is financed with borrowed money.

The debt to equity ratio compares the creditors' funds with owners' funds

$$\begin{aligned}\text{Debt to equity ratio} &= \frac{\text{Total debt}}{\text{Net worth}} \\ &= \frac{1,06,000}{1,09,825} = 0.97:1\end{aligned}$$

It indicates that the creditors also have placed equal amount of money as that of the equity holders. A portion of the debt fund consists of interest free trade credit. Hence, the long term debt should be compared with the networkth.

The long term debt to equity ratio specifically indicates the proportion of long term borrowings.

$$\begin{aligned}\text{Long term debt to equity} &= \frac{\text{Long term debt}}{\text{Networth}} \\ &= \frac{57,000}{1,09,825} = 0.52: 1\end{aligned}$$

The long term debt portion is comparatively lower than the networkth. Sky Ltd operations depend more on the owners' equity than on the borrowed funds.

### Interest Coverage Ratio

This shows how many times the operating income covers the interest payment.

$$\begin{aligned}\text{Interest coverage ratio} &= \frac{\text{E B I T}}{\text{Interest}} \\ &= \frac{40,000}{8,350} = 4.79 : \text{times}\end{aligned}$$

The Sky Ltd's earnings before interest and tax are sufficient to service the debt the extent of 4.79 times.

### Profitability Ratio

Profitability ratios relate the firm's profit with factors that generate the profits. The investor is very particular in knowing net profit to sales, net profit to total assets and net profit to equity. The profitability ratios measure the overall efficiency of the firm.

#### Net Profit Margin Ratio

This ratio indicates the net profit per rupee of sales revenue

$$\begin{aligned}\text{Net Profit Margin} &= \frac{\text{P A T}}{\text{Sales}} \\ &= \frac{15,825}{2,40,000} \times 100 = 7\%\end{aligned}$$

The net profit margin of the Sky Ltd company is 7 paise in a rupee sold.

#### Return on Assets

The return on asset measures the overall efficiency of capital invested in business.

$$\begin{aligned}\text{Return on assets} &= \frac{\text{Net income}}{\text{Total assets}} \\ &= \frac{15,825}{2,15,825} \times 100 = 7.33\%\end{aligned}$$

For every rupee invested in assets, the yield is 7.33 percent.

### Return on Equity

Here, the net profit is related to the firm's capital

$$\begin{aligned}\text{Return on equity} &= \frac{\text{Net Profit}}{\text{Net worth}} \\ &= \frac{15825}{109825} \times 100 = 14.4\%\end{aligned}$$

The return on equity is 14.4 percent. The return on assets and the return on equity will be identical if the company carries out all of its operations with owners funds. The difference between the two ratios is caused by financial leverage. When both the ratios are compared, the ROE is greater than ROA. It indicates that the Sky Ltd has employed borrowed funds efficiently to lever the rate of return to the advantage of shareholders.

### Valuation Ratios

The shareholders are interested in assessing the value of the shares. The value of the share depends on the performance of the firm and the market factors. The performance of the firm in turn depends on a host of factors. Hence, the valuation ratios provide a comprehensive measure of the performance of the firm itself. In the subsequent section, some of the valuation ratios are dealt in detail.

#### Book Value Per Share

This ratio indicates the share of equity shareholders after the company has paid all its liabilities, creditors, debenture holders and preference shareholders. At the time of liquidation, the shareholders can know what remains after making all the payments. In ordinary time also it helps the shareholder to find out his real position in the company.

$$\begin{aligned}\text{Book value per share} &= \frac{\text{Equity share capital} + \text{Reserve}}{\text{Total number of equity shares outstanding}} \\ \text{OR} \\ &= \frac{\text{Networth} - \text{Preference share capital}}{\text{Total number of equity shares outstanding}} \\ &= \frac{50000 \text{ (Rs in lakhs)}}{2000 \text{ (number in lakhs)}} \\ &= ₹ 25\end{aligned}$$

Here, the book value of the share is 2.5 times higher than its par value of ₹ 10. When the book value of the share is higher than the par value, it is a healthy sign. The profits and accumulated reserves lead to high book value. Book value may be less for firms having long gestation period and when there are accumulated losses.

When the book value of the share is high, companies may issue bonus shares to the existing shareholders out of the reserves. Right issues also can bring down the book value of the share.

### Dividend to Market Price

Dividend is the regular income received by the shareholder. The shareholder would like to know the relationship between the market price and the dividend. Suppose “A” company pays ₹ 4 per share and the market value is ₹ 50. Then

$$\begin{aligned}\text{Dividend yield} &= \frac{\text{Dividend per share}}{\text{Market price per share}} \times 100 \\ &= \frac{4 \times 100}{50} = 8\%\end{aligned}$$

Even though the “A” company provides 40 percent dividend its actual yield is low because of the high market price. Whenever companies plough back their profits to settle the loans or for expansion program, the yield would be low. At the same time, if the company distributes profits to shareholders the yield may be high. This may not be proper indicator. The earnings per share is treated as a better guide in investment decisions.

### Earnings Per Share

Earnings per share is the earnings after tax divided by the number of common shares outstanding.

$$\text{EPS} = \frac{\text{E A T}}{\text{Number of shares outstanding}}$$

Lerner and Carleton have given a model for the EPS.

$$\text{EPS} = \frac{(I - T) [R + (R - 1) L/E] E}{\text{Number of common shares outstanding}}$$

|     |   |                                                          |
|-----|---|----------------------------------------------------------|
| EPS | - | Earnings per share                                       |
| T   | - | Effective tax rate (Tax exposure/EBT)                    |
| R   | - | Before tax return on assets (EBIT/A)                     |
| I   | - | Effective interest rate (Interest expense / liabilities) |
| E   | - | Equity                                                   |

The model gives a comprehensive outlook of the earnings per share. According to the model the earnings per share is effected by the following factors.

- Utilisation of assets in the company
- Margin on sales
- Effective cost of the borrowed funds
- Debt-equity ratio
- Equity base of the company
- Effective tax rate paid by the company

### Growth in Earnings

Further, the growth in earnings also influences the value of the stock. The growth in earnings depends on the earnings retained and reinvested in the firm.

The rate of return on equity also influences the growth rate

$$\text{Growth rate} = \text{Retention rate} \times \text{Return on equity} = \text{RR} \times \text{ROE}$$

The same can be rewritten as follows:

$$\text{Growth rate} = \text{RR} \times \frac{\text{Sales}}{\text{Total assets}} \times \frac{\text{Total assets}}{\text{Equity}} \times \frac{\text{Net income}}{\text{Sales}}$$

$$\text{RR} = \text{Retained earnings} / \text{Net income} = \frac{\text{RE}}{\text{NI}}$$

Substituting and rearranging we get

$$\text{Growth Rate} = \frac{\text{RE}}{\text{NI}} \times \frac{\text{NI}}{\text{Sales}} \times \frac{\text{Sales}}{\text{TA}} \times \frac{\text{TA}}{\text{EQ}} = \frac{\text{RE}}{\text{EQ}}$$

This analysis is known as DuPont analysis because it was popularized by DuPont Company.

## Price Earnings Ratio

One of the most common financial parameters used in the stock market is the price-earnings ratio (P/E). It relates the share price with earnings per share. Most of the news papers along with the stock price quotations give the P/E ratio too. The P/E ratio is the multiplying factor that the market is willing to offer to the company's future earnings. In the "A" company's earnings per share is ₹ 6 and price ₹ 50, then:

$$\begin{aligned}\text{Price - Earnings Ratio} &= \frac{\text{Market price per share}}{\text{Earnings per share}} \\ &= \frac{\text{₹ 50}}{\text{₹ 6}} = 8.33 \text{ times}\end{aligned}$$

The P/E of 8.33 means that the market is prepared to pay ₹ 8.33 for every rupee of future earnings. The past performance is the base for the estimate. High P/E ratio indicates high expectation of the market regarding the growth of future earnings of the company. The P/E ratio has links with other financial parameters like dividend payout, dividend growth rate and the cost of company's funds. Large dividend payouts, high dividend growth rates and low cost of funds will result in high P/E ratios.

The investors generally compare the P/E ratio of the company with that of the industry and market. A P/E ratio lower than industry means that the stock is underpriced. Investors should be careful in comparing the scrip's P/E with the industry's P/E because sometimes, the industry P/E may be high due to overheated market. In such a situation, the industry's P/E should be moderated to acceptable levels. The investor can also forecast the future P/E ratio and compare it with the present P/E to assess the extent of under pricing of the particular share. Forecast can be done by studying fundamental factors and applying statistical techniques using past P/E data. The comparison of the estimated P/E ratio with the actual P/E ratio leads to one of these three conclusions given below:

1. If the current P/E ratio is larger than the E (P/E) ratio, the stock is overpriced. It is better to sell the shares before the fall in price.
2. If the current P/E ratio is smaller than the E (P/E) ratio, the stock is underpriced and it could be a best buy with the expectation of the rise in price.
3. If the current P/E ratio equals the E(P/E) ratio, the stock is correctly priced. No significant changes in prices are likely to occur.

## Intrinsic Value

The true economic worth of the share is its intrinsic value. The fundamental analysis find out the intrinsic value of a share of using the following formula:

Intrinsic value of a share = normalized EPS x Expected P/E ratio

The expected P/E ratio can be found out by

$$E(P/E) = \frac{\text{Cash dividend} / E(\text{EPS})}{\text{Discount rate} - \text{growth rate}} = \frac{D/E(\text{EPS})}{K - g}$$

The numerator is:

Payout ratio = Cash dividend per share / Expected earnings per share = D/E (EPS)

To forecast the P/E, the analyst should have the following details:

- Stock's risk – adjusted discount rate (K)
- Growth rate (g)
- Cash dividend per share (D)
- Earnings per share (EPS)
- Pay out ratio (D/E)

The simple technique adopted by the analyst is as follows:

Intrinsic value = Average P/E ratio over the years x Present earnings per share

OR

= Average P/BV ratio over the years x Present book value per share

This calculation is based on the assumptions that

- 1 The trend in the profitability of the immediate past and the present will continue to be the same.
- 2 The average P/E, P/BV and average earnings to equity ratio remain constant over a period of time.

## Summary

- Fundamental analysis is the study of economic factors, industrial environment and the factors related to the company.
- The state of the economy determines the growth of gross domestic product and investment opportunities.
- An economy with favourable savings, investments, stable prices, balance of payments, and infrastructure facilities provides a best environment for common stock investment.
- The leading, coincidental and lagging indicators help to forecast the economic growth. A rising stock market indicates a strong economy ahead.
- Industrial growth follows a pattern. Buying of shares beyond the pioneering stage and selling of shares before the stagnation stage are ideal for the investors.
- The cost structure, research and development and the government policies regarding the industries influence the growth and profitability of the industries. SWOT analysis reveals the real status of the industry.
- The competitive edge of the company could be measured with the company's market share, growth and stability of its annual sales.

## Solved Problems

1. The financial details of the Light Company are given in the following table. Find out the specific reason for the stock prices to stagnate between 1997-1999

|                                      | 1999    | 1998  | 1997   | 1996  |
|--------------------------------------|---------|-------|--------|-------|
| Dividend per share                   | ₹ 1.62  | 1.58  | ₹ 1.42 | 1.26  |
| Payout rate (DPS/EPS)                | 53.8%   | 65.8% | 39.3%  | 39.4% |
| Earnings per share EAT/No. of shares | ₹ 3.01  | 2.40  | 3.61   | 3.2   |
| Book Value per share                 | ₹ 19.18 | 17.68 | 17.91  | 15.65 |
| Rate of Return on Enquiry            | 15.9%   | 13.6% | 20.3%  | 20.4% |
| Effective Tax rate                   | 67%     | 50%   | 61%    | 39%   |
| Rate of Return on Access             | 13.2%   | 14.9% | 17.2%  | 18.1% |
| Profit Margin (EBIT Sales)           | 7.7%    | 8.3%  | 9.9%   | 10.3% |

|                                                        |       |       |       |       |
|--------------------------------------------------------|-------|-------|-------|-------|
| Gross Profit Margin                                    | 57.5% | 56.1% | 53.9% | 52.6% |
| Total Asset Turn over                                  | 1.70  | 1.79  | 1.73  | 1.75  |
| Financial leverage (Total debt/Equity)                 | 1.59  | 1.54  | 1.47  | 1.39  |
| Effective Interest Rate                                | 6.5%  | 6.8%  | 6.3%  | 6.3%  |
| Stock Price (at year end) On on March 31 <sup>st</sup> | ₹ 51  | ₹ 50  | ₹ 50  | ₹ 36  |

### Solution

In the given table, the dividend per share has increased over the years. The dividend payout has increased. The earnings per share fluctuates. It has declined from 1997 and showed slight improvement in the year 1999.

In spite of the dividends paid, the share prices languished around Ra 50. The specific information that reveals the reason is the rate of return on assets. The rate of return on assets has declined from 18.1 % in 1996 to 13.2% in 1999.

The return on assets is the end result of the mixture of events that take place within the firm. The greater the return on assets, the higher the market value for the firm's share, other things remaining constant. Every firm tries to maximise the return on the assets, because funds are employed in the farm of assets. The return on assets depends on the turnover of assets into sales or intensity of utilization of assets in creating sales. Further, the return on assets indicates the productivity of funds.

The margin on sales has declined over the years. This may be due to the competition in the market. specific reasons might have contributed for the share price languishing around ₹ 50.

2. Following are data for Anand Products (Rs in lakhs)

| 1998                    |      | 1998           |      |
|-------------------------|------|----------------|------|
| Assets                  | 6000 | Revenues       | 6600 |
| Short term Liabilities  | 450  | Operating Exp. | 5950 |
|                         |      | EBIT           | 650  |
| 8% Debenture            | 1250 | Interest       | 150  |
| 10% Bonds               | 500  | EBT            | 500  |
| Common Stock (₹ 10 par) | 3500 | Taxes          | 200  |
| Surplus                 | 300  | Dividend       | 50   |

- a) Find out the following ratios:
- Asset turnover
  - Effective interest rate
  - Effective tax rate
  - Debt/equity ratio
  - Dividend payout rate
- b) What growth rate of EBIT can be expected?

### Solution

$$\begin{aligned}
 \text{Asset turnover} &= 6600/6000 = 1.1 \\
 \text{Effective interest rate} &= 150/2200 = 0.07 \\
 \text{Effective tax rate} &= 200/500 = 0.4 \\
 \text{Debt/Equity} &= 2200/3500 = 0.63 \\
 \text{Dividend payout} &= .14/0.86 = 16.28\% \\
 \text{Earnings per share} &= 300/350 = 0.86\% \\
 \text{Dividend per share} &= 50/350 = 0.14\% \\
 \text{Growth in EBIT} &= \text{Retention rate} \times \text{Return on assets} \\
 \text{ROA} = \text{EBIT/ASSETS} &= 650/6000 = 0.11 \\
 \text{Ret Rate} &= 1 - .16 = 0.84 \\
 \text{Growth in EBIT} &= .837 \times .11 \\
 &= 0.0921 \\
 &= 9.21\%
 \end{aligned}$$

3. A naive investor wants to analyse the capital structure of a company. He has the following information ABC Company.

|                         | 1990  | 1995  | 1998  |
|-------------------------|-------|-------|-------|
| Long-term debt (11%)    | 12.27 | 9.46  | 11.19 |
| Preferred stock (10%)   | 0.13  | 0.13  | 0.12  |
| Common stock (Par ₹ 10) | 0.01  | 0.14  | 12.6  |
| Capital surplus         | 5.67  | 6.35  | 6.19  |
| Retained earnings       | 33.93 | 60.31 | 125.2 |
| Dividend paid           | 3.005 | 3.684 | 10.08 |

The present price of the share in Mumbai stock market is ₹ 450. There is a rumour in the market that the ABC Company may issue bonus shares shortly. The investor wants the answers for the following

- Is there any ground for such rumour?
- Is the capital structure sound?
- Is it proper to purchase the shares?

Analyse the given data and advise him.

### Solution

The table above gives how ABC Company has raised its long-term funds. Preparation of a common size statement will provide a clear answer to the questions of the investor.

#### Common size statement

(Figures in percentage)

|                         | 1990   | 1995   | 1998   |
|-------------------------|--------|--------|--------|
| Long-term debt (11%)    | 21.15  | 12.38  | 7.21   |
| Preferred stock (10%)   | 0.28   | 0.17   | 0.08   |
| Common stock (par ₹ 10) | 10.36  | 0.18   | 8.11   |
| Capital surplus         | 9.77   | 8.32   | 3.99   |
| Retained earnings       | 58.50  | 78.95  | 80.61  |
|                         | 100.00 | 100.00 | 100.00 |

- The actual figures give a picture that the debt portion has increased in 1998 compared to 1995. Debt has increased, but the amount of debt was modest, and the company was able to double its capital structure in a short period of time. There is no excessive debt in the capital structure.
- The retained earnings has increased from 58.50% in 1990 to 80.61% in 1998. The bulging retained earnings provides the ground for the rumour for bonus share. The rumour may come true, if the company likes to reduce the retained earnings which is a likely event.
- The P/E ratio of the share can be compared

$$\text{Earnings per share} = \frac{\text{Retained earnings} \div \text{Dividends}}{\text{Number of outstanding shares}}$$

$$= 135.28/1.26$$

$$= ₹ 107.35$$

$$\text{Price earnings ratio} = \text{Price/Earning per share}$$

$$= 450/107.36 = 4.19$$

Since the price earnings multiple is low, there is every possibility of a rise in the price and investor can buy this share.

### Case 1

Mahima wants to invest in the one of the three companies given below. She is very particular about the current financial position of the company. She believes that no company should be considered for investment unless it has a good current financial position. You are asked to examine the following data and choose a company for her.

#### Current financial analysis of X, Y, Z companies

| Ratio                           | X    |      | Y    |      | Z    |      |
|---------------------------------|------|------|------|------|------|------|
|                                 | 1998 | 1999 | 1998 | 1999 | 1998 | 1999 |
| Current Ratio                   | 2.1  | 2.5  | 2.0  | 2.26 | 2.71 | 2.53 |
| Acid test Ratio                 | 1.27 | 1.42 | 1.38 | 1.50 | 1.90 | 1.76 |
| Composition of current assets % |      |      |      |      |      |      |
| Cash                            | 13   | 13   | 34   | 29   | 34   | 34   |
| Receivables                     | 38   | 36   | 24   | 26   | 33   | 32   |
| Inventory                       | 45   | 47   | 33   | 35   | 31   | 31   |
| Other Current Assets            | 4    | 4    | 9    | 10   | 2    | 3    |
| Net sales to inventory          | 3.90 | 3.77 | 4.45 | 4.23 | 5.65 | 5.25 |
| Net sales to working Capital    | 3.29 | 2.97 | 3.10 | 2.81 | 2.87 | 2.85 |

The data reveal that X is conservative. Inventory is low in all the three companies. The net sales to inventory ratio is stable indicating good sales per rupee of inventory held. This is a desirable trait.

The net sale to working capital has declined in all the three companies. This indicates that the companies have more than adequate working capital in relation to sales. The data show that all the three companies are in good financial position.

More penetrative analysis indicates that Z company is comparatively more liquid than others. The current ratio of Z company has improved, whereas the current ratios of other companies have declined. Simple ranking will provide an easy clue for the picking of the best.

### Ranking of the current financial position

#### Comparative current financial analysis

|                               | X | Y | Z |
|-------------------------------|---|---|---|
| Current ratio                 | B | C | A |
| Acid test ratio               | C | B | A |
| Composition of current assets | C | B | A |
| Net sales to inventory        | C | B | A |
| Net sales to working capital  | C | B | A |
| Overall liquidity             | C | B | A |

Current and acid test ratios are ranked on the basis of highest percentage. Composition of current asset A rank given for greater cash and equivalent. The remaining ratios are given highest ranking for highest value. The ranking shows that the Z company is the most liquid than other companies. The advice given to Mahima is that Z company's current position is good.

### Case 2

An investor wants to make his investment in "A" company based on his analysis of the balance sheet and the income statement. The details are given below:

Balance Sheet of "A" company - 1999

(₹ in million)

|                       |      |
|-----------------------|------|
| Current assets        | 400  |
| Fixed assets          | 1000 |
| Total assets          | 1400 |
| Current liabilities   | 200  |
| Long-term liabilities | 600  |
| (@9% interest)        |      |
| Net worth             | 600  |
| Total liabilities and |      |
| Networth              | 1400 |

### Income statement of "A" company

|                          | 1999             | 1998  |
|--------------------------|------------------|-------|
|                          | (Rs in millions) |       |
| Sales                    | 1,920            | 1,740 |
| Less: Cost of goods sold | 1,200            | 1,000 |
| Gross profit             | 720              | 740   |
| Less: Operating expenses | 640              | 600   |
| EBIT                     | 80               | 140   |

Assume that, "A" company pays ₹ 54 million per year as interest expense, is in the 30% tax bracket and pays out 40 per cent of its after tax earnings as cash dividends. Carry out the financial analysis and find out the answer for the following questions:

- What is the reason for the fall in the EBIT in 1999?
- What is the rate of growth of earnings if the company does not raise capital externally?

### Solution

The real reason for the fall in the EBIT could be found out by preparing the common size income statement and comparative percentage analysis. Both the analyses are given below:

### Common size income statement (Rs in millions)

|                    |       |      |       |      |
|--------------------|-------|------|-------|------|
| Sale               | 1,920 | 100% | 1,740 | 100% |
| Cost of goods sold | 1,200 | 63%  | 1,000 | 57%  |
| Gross profit       | 720   | 37%  | 740   | 43%  |
| Operating expenses | 640   | 33%  | 600   | 35%  |
| EBIT               | 80    | 4%   | 140   | 8%   |

### Percentage change (Rs in million)

|                    | 1998  | 1999  | Percentage change |
|--------------------|-------|-------|-------------------|
| Sales              | 1,740 | 1,920 | 10%               |
| Cost of goods sold | 1,000 | 1,200 | 20%               |
| Gross profit       | 740   | 720   | (3)%              |
| Operating expenses | 600   | 640   | 7%                |
| EBIT               | 140   | 80    | (43)%             |

The percentage change calculation indicates that “A” company had 43% decline that in EBIT even though its sales increased by 10%. The fall in the profit is due to the 20% increase in the cost of goods sold. The common size statement indicates that the decrease in profits would have been even more if operating expenses had not declined from 35% of sales to 33%.

c) The earnings after income tax has to be calculated for 1999 as follows:

|                                  |                                              |
|----------------------------------|----------------------------------------------|
| EBIT                             | (₹ ml)                                       |
| Less:                            | 80.0                                         |
| Interest expense (9% x 600)      | 54.0                                         |
| Taxable income                   | 26.0                                         |
| Less: 30% taxes (30% of ₹ 26 in) | 7.8                                          |
| Earnings after tax               | 18.2                                         |
| Return on equity                 | = Net Income/Equity = (18.2/600)*100 = 3.03% |

$$\begin{aligned} \text{Growth rate} &= \text{Percentage of retained earning} \times \text{ROE} \\ &= (100\% - 40\%) \times 3.03 = 1.8\% \end{aligned}$$

### Self Assessment Questions

1. What is meant by fundamental analysis? How does fundamental analysis differ from technical analysis?
2. Explain the utility of the economic analysis and state the economic factors considered for this analysis.
3. Do you think that knowing the current status of economy is useful in analysing stock market movements? If so, explain.
4. How is the economic growth related to stock prices?
5. How do various indicators predict the prospect for investment in stocks?
6. Why is industry analysis important? Why should it follow the economic analysis?
7. Explain the factors that have the most significant effect on the industry's earnings.
8. How would you classify shares into growth, cyclical and defensive? Name some stocks in each group and explain.

9. "Industry life cycle exhibits the status of the industry and gives the clue to entry and exit for investors" Elucidate
10. What is 'SWOT' analysis? Carry out swot analysis for any industry of your choice
11. What are the methods adopted to analyse the financial statements of a company?
12. Why is it important to understand competitive position of the product of the company in purchasing the shares of the company?
13. How is the competitive position of a company within an industry determined?
14. What are the factors that affect the earnings per share of the company?
15. How can leverage policies affect earnings performance?
16. Discuss any four factors considered to be most important in appraising companies in different industries.
17. What is meant by P/E ratio? What is the logic of using this concept in investment decisions?
18. The debt component in capital structure has no impact on the share valuation of a company. Comment.
19. How does debt bring about financial leverage in the earnings of common stock? What are the advantages and disadvantages of leverage from the point of view of equity holders?
20. How does management of a company affect its stock prices?
21. How does ratio analysis reflect the financial health of a company?

### **CASE STUDY**

Calipso Capital Management (CCC), an investment management firm with offices throughout Ohio, is headquartered in Cincinnati. CCC normally actively manages accounts for high income individuals with assets of ₹5,00,000 or more. Peter Myers, managing director of CCC, thought the increased interest of clients in security options required more than routine advice because he knew that many clients did not fully appreciate the risks and hedging aspects of buying and selling puts and calls. He had personally spent many hours explaining the vocabulary and technical trading aspects of option vehicles to clients who found the area exciting but nonetheless arcane.

## Bio-genetics Corp. Option Quotes

Stock Price : 162

| Strike<br>Price | Calls |      |     | Puts |      |     |
|-----------------|-------|------|-----|------|------|-----|
|                 | Apr   | July | Oct | Apr  | July | Oct |
| 140             | 23    | --   | --  | --   | --   | --  |
| 150             | 16    | 21   | 25  | 1    | 4    | --  |
| 160             | 9     | 14   | 20  | 3    | 7    | --  |
| 170             | 3     | 9    | 13  | 9    | 10   | 9   |
| 180             | 1     | 5    | 9   | --   | 20   | 11  |

**Note:** Blank spaces denote option not offered or not traded.

Janet Barnes joined the firm three months ago after spending one year in Dean Writter's training program in Cleveland. She received a broad training with emphasis in options and futures instruments. Myers through Barnes would be an important member of the firm in its dealings with clients interested in securities options.

The first task that Barnes faced was preparing an analysis of various strategies in the options of Bio-genetics Corp., a company about which a young dentist in Berea had called. The dentist owned the stock and wanted to explore various strategies to either hedge or enhance his position.

Data provided in Exhibit 1 relate to key information on Bio-Genetics puts and calls. Bio-Genetics stock is currently at 162, pays no dividends, and has a beta of 1:3. The volatility of the stock is estimated at 30 percent. The rate on two-month Treasury bills is 6 percent.

**Questions**

- Which options are in-the-money? Which are out-of-the money?
- Compute the margin requirement for a short position in the Apt/140 call option.

\*\*\*\*

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## UNIT – III

### Unit Structure

Lesson 3.1 - Technical Analysis

Lesson 3.2 - Efficient Market Theory

### Learning Objectives

*After going through this chapter the readers would*

- Understand the concept of technical analysis
- Understand the concept of technical tools
- Be able to know about the efficient market theory

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### Lesson 3.1 Technical Analysis

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#### Introduction

The share price movement is analyzed broadly with two approaches, namely, fundamental approach and the technical approach. Fundamental approach analyses the share prices on the basis of economic, industry and company statistics. If the price of the share is lower than its intrinsic value, investor buys it. But, if he finds the price of the share higher than the intrinsic value he sells and gets profit. The technical analyst mainly studies the stock price movement of the security market. If there is an uptrend in the price movement investor may purchase the scrip. With the onset of fall in price he may sell it and move from the scrip. Basically, technical analysts and the fundamental analysts aim at good return on investment.

## Technical Analysis

It is a process of identifying trend reversals at an earlier stage to formulate the buying and selling strategy. With the help of several indicators they analyzed the relationship between price - volume and supply-demand for the overall market and the individual stock. Volume is favorable on the upswing i.e. the number of shares traded is greater than before and on the downside the number of shares traded dwindles. If it is the other way round, trend reversals can be expected.

### Assumptions

- 1) The market value of the scrip is determined by the interaction of supply and demand.
- 2) The market discounts everything. The price of the security quoted represents the hopes, fears and inside information received by the market players. Inside information regarding the issuing of bonus shares and right issues may support the prices. The loss of earnings and information regarding the forthcoming labour problem may result in fall in price. These factors may cause a shift in demand and supply, changing the direction of trends.
- 3) The market always moves in trend. Except for minor deviations, the stock prices move in trends. The price may create definite patterns too. The trend may lie either increasing or decreasing. The trend continues for some time and then it reverses.
- 4) Any layman knows the fact that history repeats itself. It is true to the stock market also. In the rising market investors' psychology have tip beats and they purchase the shares in greater volumes, driving the prices higher. At the same time, in the down trend they may be very eager to get out of the market by selling them and thus plunging the share price further. The market technicians assume that past prices predict the future.

### History of Technical Analysis

The technical analysis is based on the doctrine given by Charles H. Dow in 1884, in the Wall Street Journal. He wrote a series of articles in the Wall Street Journal. A.J. Nelson, a close friend of Charles Dow formalized the Dow Theory for economic forecasting.

The analysts used charts of individual stocks and moving averages in the early 1920's. Later on, with the aid of calculators and computers, sophisticated techniques came into vogue.

## Technical Tools

Generally used technical tools are Dow Theory, volume of trading, short selling, odd lot trading, bars and line charts, moving averages and oscillators. In this section some of the above mentioned tools are analyzed.

### Dow Theory

Dow developed his theory to explain the movement of the indices of Dow Jones Averages. He developed the theory on the basis of certain hypotheses. The first hypothesis is that, no single individual or buyer can influence the major trend of the market.

However, an individual investor can affect the daily price movement by buying or selling huge quantum of particular scrip. The intermediate price movement also can be affected to a lesser degree by an investor.

His second hypothesis is that the market discounts everything. Even natural calamities such as earthquake, plague and fire also get quickly discounted in the market. The Pokhran blast affected the share market for a short while and then the market returned back to normalcy.

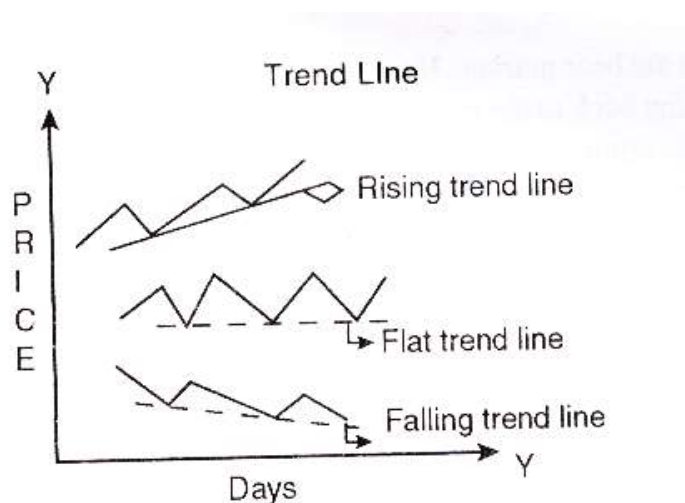
His third hypothesis is that the theory is not infallible. It is not a tool to beat the market but provides a way to understand it better.

The theory According to Dow Theory the trend is divided into primary, intermediate and short term trend. The primary trend may be the broad upward or downward movement that may last for a year or two. The intermediate trends are corrective movements, which may last for three weeks to three months. The primary trend may be interrupted by the intermediate trend. The short term trend refers to the day to day price movement. It is also known as oscillators or fluctuations. These three types of trends are compared to tide, waves and ripples of the sea.

### *Trend*

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

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



### ***Trend Reversal***

The rise or fall in share price cannot go on forever. The share price movement may reverse its direction. Before the change of direction, certain pattern in price movement emerges. The change in the direction of the trend is shown by violation of the trend line. Violation of the trend line means the penetration of the trend line.

If a scrip price cuts the rising trend line from above, it is a violation of trend line and signals the possibility of fall in price. Like – wise if the scrip pierces the trend line from below this signal the rise in price.

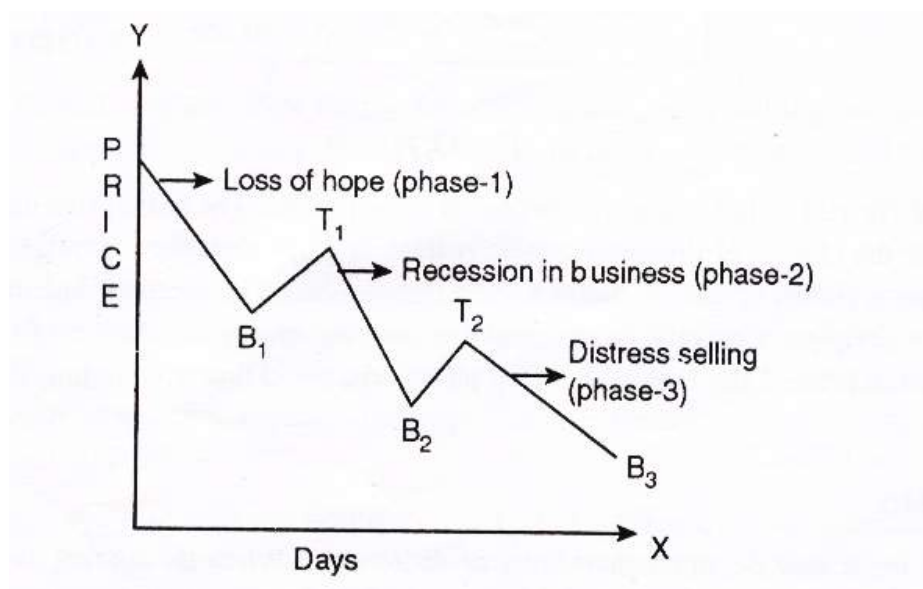
### ***Primary Trend***

The security price trend may be either increasing or decreasing. When the market exhibits the increasing trend, it is called bull market. The bull market shows three clear cut peaks. Each peak is higher than the previous peak. The bottoms are also higher than the previous bottoms. The reactions following the peak used to halt before the previous bottoms.

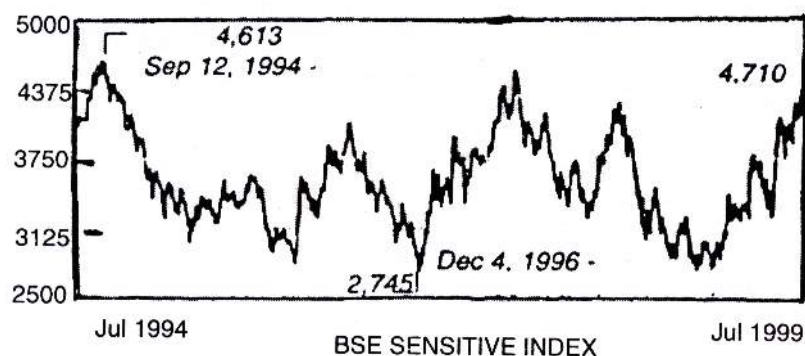
The phases leading to the three peaks are revival, improvement in corporate profit and speculation. The revival period encourages more and more investors to buy scrip's their expectations about the future being high. In the second phase, increased profits of corporate would result in further price rise. In the third phase, prices advance due to inflation and speculation. The figure gives the three phases of bull market.

The reverse is true with the bear market. Here, the first phase of fall starts with the abandonment of hopes. The chances of prices moving back to the previous high level seemed to be low. This would result in the sale of shares. In the second phase, companies are reporting lower profits and dividends. This would lead to selling pressure.

The final phase is characterized by the distress sale of shares. During the bear phase of 1996, in the Bombay Stock Exchange more than 2/3 of stocks were inactive. Most of the scrips were sold below their par values. The figure gives the bear market. Here the tops and bottoms are lower than the previous ones. The bull and bear phases of the Indian stock market are given in Figure.



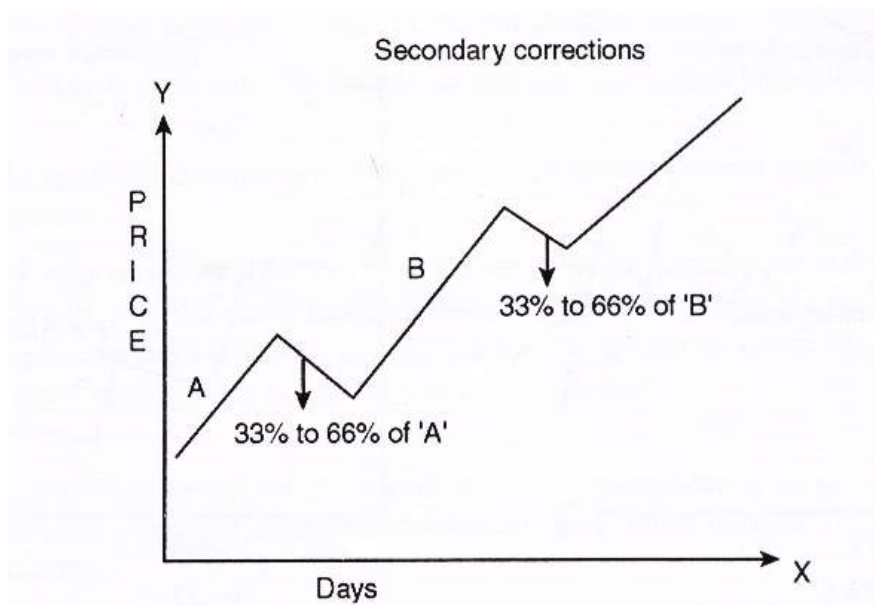
Bear and Bull Markets



### *The Secondary Trend*

The secondary trend or the intermediate trend moves against the main trend and leads to correction. In the bull market the secondary trend would result in the fall of about 33-66% of the earlier rise. In the bear market, the secondary trend carries the price

upward and corrects the main trend. The correction would be 33% to 66% of the earlier fall. Intermediate trend corrects the overbought and oversold condition. It provides the space to the market. Compared to the time taken for the primary trend, secondary trend is swift and quicker.



### Minor Trends

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

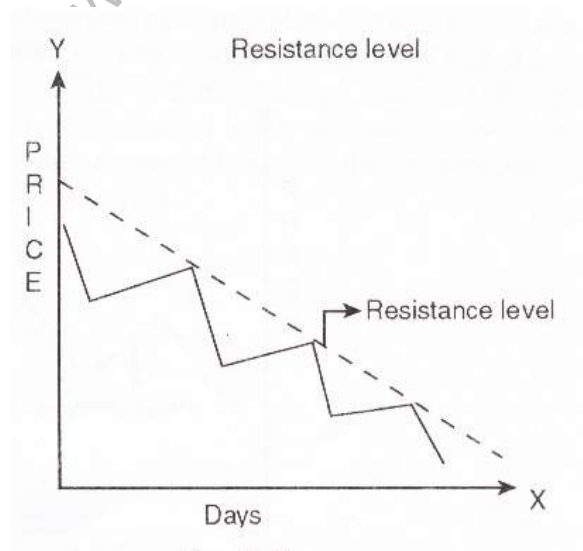
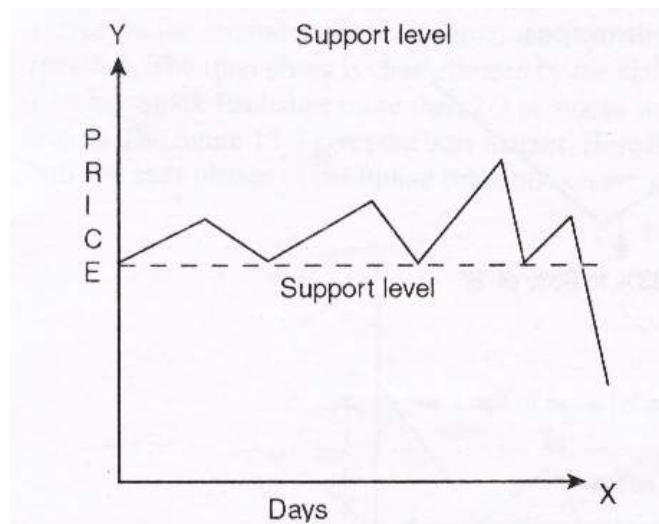
### Support and Resistance Level

Anybody interested in the technical analysis should know the support and resistance level. A support level exists at a price where considerable demand for that stock is expected to prevent further fall in the price level. The fall in the price may be halted for the time being or it may result even in price reversal. In the support level, demand for the particular scrip is expected.

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

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

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



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

If the scrip penetrates the previous top and moves above, it is the violation of resistance level. At this point, buying pressure would be more than the selling pressure. If the scrip was to move above the double top or triple top formation, it indicates bullish market.

The support and the resistance level need not be formed only on tops or bottoms. They can be on the trend lines or gaps of the chart. Gaps are defined as those points or price levels where the scrip has not changed hands. In the rising or falling price level gaps are formed. If the prices are in the upward move and the high of any day is lower than the next day's low, the gap is said to have occurred.

For example, if the high price of the Instant Company's scrip on March 1st is ₹ 200 and on March 2nd low is 225, a gap is said to have occurred on the bar chart. This indicates that the stock is not traded between the level ₹ 200 and ₹ 225. This gap indicates further rise in price level. Likewise in a falling price, a gap is formed if the low price on day 1 is higher than the high price of day 2. Suppose the low price on Monday is ₹ 150 and the high price on the Tuesday is ₹ 130, a gap is said to have occurred and indicates that there was no transaction between the level of ₹ 150 and ₹ 130.

## Indicators

Technical indicators are used to find out the direction of the overall market. The overall market movements affect the individual share price. Aggregate forecasting is considered to be more reliable than the individual forecasting. The indicators are price and volume of trade. The volume of trade is influenced by the behavior of price.

### *Volume of Trade*

Dow gave special emphasis on volume. Volume expands along with the bull market and narrows down in the bear market. If the volume falls with rise in price or vice-versa, it is a matter of concern for the investor and the trend may not persist for a longer time. Technical analyst used volume as an excellent method of confirming the trend. The market is said to be bullish when small volume of trade and large volume of trade follow the fall in price and the rise in price.

Large rise in price or large fall in price leads to large increase in volume.

Large volume with rise in price indicates bull market and the large volume with fall in price indicates bear market.

If the volumes decline for five consecutive days, then it will continue for another four days and the same is true in increasing volume.

### ***The Breadth of the Market***

The breadth of market is the term often used to study the advances and declines that have occurred in the stock market. Advances mean the number of shares whose prices have increased from the previous day's trading. Declines indicate the number of shares whose prices have fallen from the previous day's trading. This is easy to plot and watch indicator because data are available in all business dailies.

The net difference between the number of stock advanced and declined during the same period is the breadth of the market. A cumulative index of net differences measures the market breadth. The following table gives the breadth of the market.

**Breadth of the Market — Bombay Stock Exchange**

| Day     | Advance | Declines | Net  | Breadth | BSE Index |
|---------|---------|----------|------|---------|-----------|
| 21-2-00 | 1486    | 774      | 712  | 712     | 5876.89   |
| 22-2-00 | 1310    | 966      | 344  | 1056    | 5883.33   |
| 23-2-00 | 898     | 1225     | -327 | 729     | 5642.46   |
| 24-2-00 | 1108    | 1091     | 17   | 746     | 5810.17   |
| 25-2-00 | 931     | 1279     | -348 | 398     | 5623.08   |

The advance/decline can be drawn as a graph. The A/D line does not exactly show when a reaction will occur but it indicates that it will occur soon. The A/D line is compared with the market index. Generally in a bull market, a bearish signal is given when the A/D line slopes down while the BSE Sensex is rising. In a bear market, a bullish signal is given when the A/D line begins rising as the Sensex is declining to a new low.

Harvey A. Krow has computed advances and declines as a ratio. He divided the advances by the declines. Any number greater than 1.00 indicates advances are exceeding decline. Values below 0.99 indicate declines are more than the advances. Ten day and 200 day moving average of the A/D ratios are also computed. A ratio of 0.75 signals short term buying opportunity and there will be intermediate rally in the beginning of the bearish trend.

In the later stages of bear market the ratio declines below 0.5.

Except in the first phase of bull market a rise above 1.25 indicates selling opportunities.

### ***Short Sales***

Short selling is a technical indicator known as short interest. Short sales refer to the selling of shares that are not owned. The bears are the short sellers who sell now in the hope of purchasing at a lower price in the future to make profits. The short sellers have to cover up their positions. Short positions of scrips are published in the business newspapers. When the demand for a particular share increases, the outstanding short positions also increase and it indicates future rise of prices. These indications cannot be exactly correct, but they show the general situations.

Short sales of a particular month is selected and compared with the average daily volume of the preceding month. This ratio shows, how many days of trading it would take to use up total short sales. If the ratio is less than 1, market is said to be weak or overbought and a decline can be expected. The value between 1 and 0.5 shows neutral condition of the market. Values above 1 indicate bullish trend and if it is above 2 the market is said to be oversold. At market tops, short selling is high and at market bottoms short selling is low.

### **Odd Lot Trading**

Shares are generally sold in a lot of hundred. Shares, sold in smaller lots, fewer than 100 are called odd lot. Such buyers and sellers are called odd lotters. Odd lot purchases to odd lot sales (Purchase % Sales) is the odd lot index. The increase in odd lot purchase results in an increase in the index. Relatively more selling leads to fall in the index. It is generally considered that the professional investor is more informed and stronger than the odd lotters. When the professional investors dominate the market, the stock market is technically strong. If the odd lotters dominate the market, the market is considered to be technically weak. The notion behind is that odd lot purchase is concentrated at the top of the market cycle and selling at the bottom. High odd lot purchase forecasts fall in the market price and low purchases/sales ratios are presumed to occur toward the end of bear market.

Several studies have indicated that the odd lotters do not move into the market at the peak and move out at bottom. In October 1987, Newyork stock market crashed. During the weeks prior to the crash contrary to the odd lot theory, odd lotters were selling more shares than they bought when market prices increased. After the crash, odd-lotters sensibly became big buyers when stock prices were near their lows. These rational trading patterns defy the opinion about odd lot theory.

## Moving Average

The market indices do not rise or fall in straight line. The upward and downward movements are interrupted by counter moves. The underlying trend can be studied by smoothening of the data. To smooth the data moving average technique is used.

The word moving means that the body of data moves ahead to include the recent observation. If it is five day moving average, on the sixth day the body of data moves to include the sixth day observation eliminating the first day's observation. Likewise it continues. In the moving average calculation, closing price of the stock is used.

### Calculation of Five-Day Moving Average for Reliance's Stock

| Day        | Price | Average |
|------------|-------|---------|
| Feb 4, '99 | 255   | -       |
| 6          | 261   | -       |
| 7          | 269   | 266.2   |
| 8          | 273   | 270.8   |
| 11         | 273   | 272.8   |
| 12         | 278   | 273.2   |
| 13         | 271   | 274.0   |
| 14         | 271   | 273.8   |

The moving averages are used to study the movement of the market as well as the individual scrip price. The moving average indicates the underlying trend in the scrip. The period of average determines the period of the trend that is being identified. For identifying short-term trend, 10 day to 30 day moving averages are used. In the case of medium term trend 50 day to 125 day are adopted. 200 day moving average is used to identify long term trend.

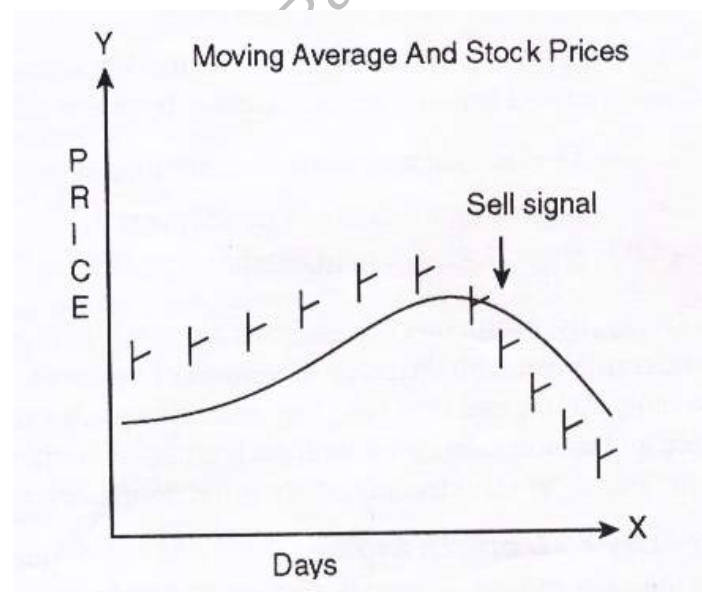
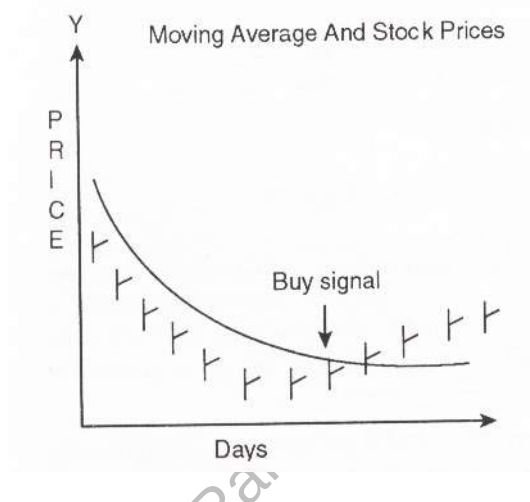
### Index and Stock Price Moving Average

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

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

### ***Stock Price And Stock Prices' Moving Average***

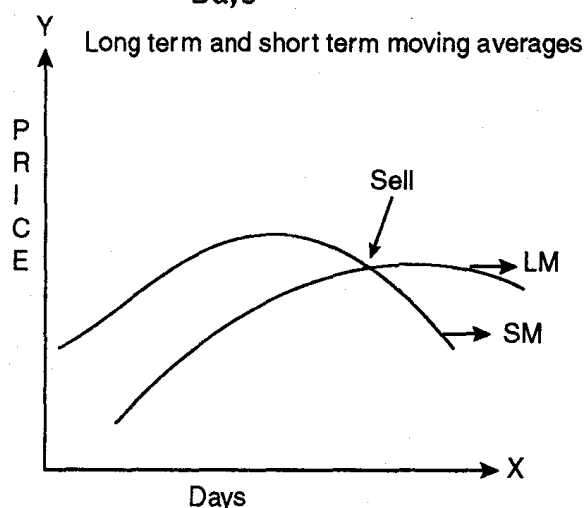
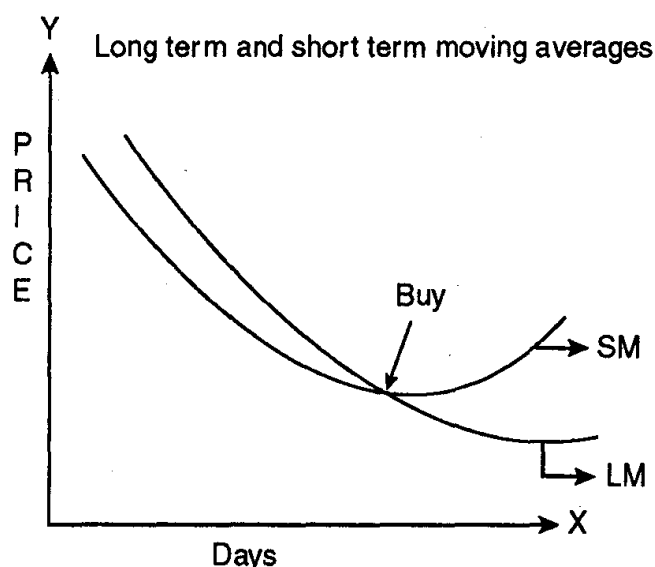
Buy and sell signals are provided by the moving averages. Moving averages are used along with the price of the scrip. The stock price ma intersects the moving average at a particular point. Downward penetration of the rising average indicates the possibility of a further fall. Hence sell signal is generated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



### Comparison of the Two Moving Averages

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

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



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

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

### ***Oscillators***

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

- Overbought and oversold conditions of the scrip or the market.
- Signaling the possible trend reversal.
- Rise or decline in the momentum.

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

### ***Relative Strength Index (RSI)***

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

$$RSI = 100 - \frac{100}{1 + \bar{r}}$$

$$\bar{r} = \frac{\text{Average Gain per Day}}{\text{Average Loss per Day}}$$

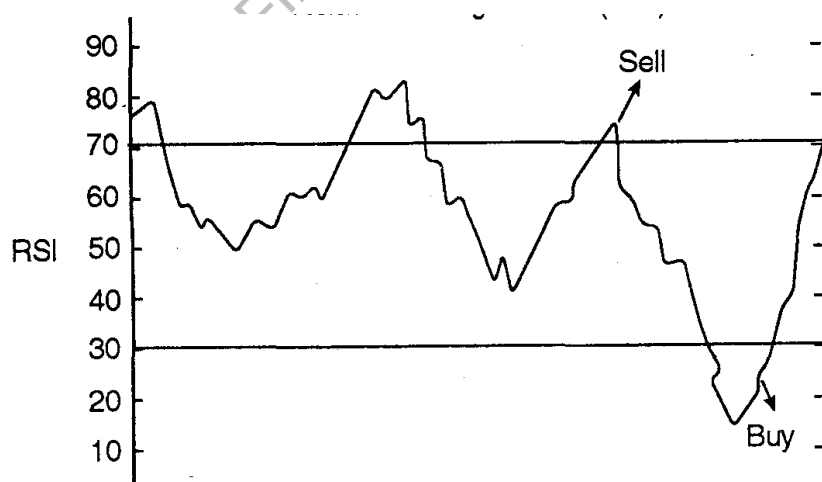
The RSI can be calculated for any number of days depending on the wish of the technical analyst and the time frame of trading adopted in a particular stock market. RSI is calculated for 5, 7, 9 and 14 days. If the time I period taken for calculation is more, the possibility of getting wrong signals is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

### Calculation of Day RSI for ACC

| Date  | Price | Gain      | Loss     |
|-------|-------|-----------|----------|
| Feb 4 | 300   | -         | -        |
| 6     | 304   | 4         | -        |
| 7     | 319   | 15        | -        |
| 8     | 317   | -         | 2        |
| 11    | 319   | 2         | -        |
| 12    | 333   | 14        | -        |
| 13    | 331   | -         | 2        |
| 14    | 332   | 1         | -        |
| 18    | 348   | 16        | -        |
| 19    | 346   | -         | 2        |
|       |       | 52/9=5.78 | 6/9=0.67 |

$$\begin{aligned}
 RSI &= 100 - \frac{100}{I + 8.627} \\
 &= 100 - 10.387 = 89.613
 \end{aligned}$$

The broad rule is, if the RSI crosses seventy there may be downturn and it is time to sell. If the RSI falls below thirty it is time to pick up the scrip. The figure show the buy and sell signals of a RSI chart.



If the share price is falling and RSI is rising, a divergence is said to have occurred. Divergence indicates the turning point of the market. If the RSI is rising in the overbought

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

### Rate of Change

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

### Procedure

Procedure ROC can be calculated by two methods. In the first method, current closing price is expressed as a percentage of the twelve days or weeks in past. Suppose the price of AB company's share is ₹ 12 and price twelve days ago was ₹ 10 then the ROC is obtained by using the equation:  $12/10 \times 100 = 120\%$ . In the second method, the percentage variation between the current price and the price twelve days in the past is calculated. It is nothing but  $12/10 \times 100 - 100 = 20\%$ . By this method both positive and negative values can be arrived.

### Roc Graph

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

#### Calculation of 7 Day ROC for ACC

| Date           | Price  | ROC – I<br>Method (in per cent) | ROC – II<br>Method (in per cent) |
|----------------|--------|---------------------------------|----------------------------------|
| Aug 1999<br>20 | 235.20 | -                               | -                                |
| 21             | 232.8  | -                               | -                                |

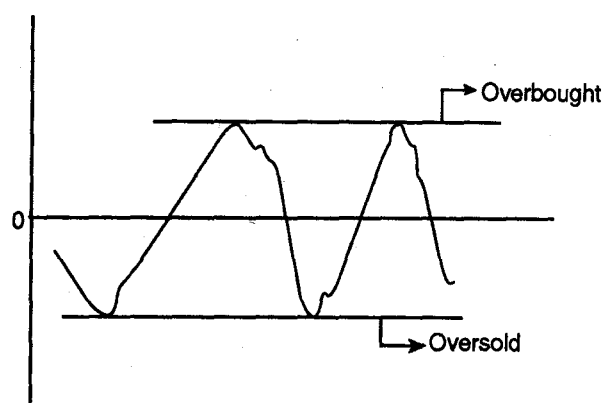
|       |        |        |       |
|-------|--------|--------|-------|
| 24    | 236.65 | -      | -     |
| 25    | 234.20 | -      | -     |
| 26    | 231.70 | -      | -     |
| 27    | 244.75 | -      | -     |
| 28    | 257.95 | -      | -     |
| 31    | 254.90 | 108.38 | 8.38  |
| Sep-1 | 249.85 | 107.30 | 7.30  |
| 2     | 244.60 | 103.36 | 3.36  |
| 3     | 234.05 | 99.94  | -.06  |
| 4     | 234.25 | 101.10 | 1.10  |
| 7     | 235.80 | 96.34  | -3.66 |
| 8     | 232.70 | 90.21  | -9.79 |

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

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

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

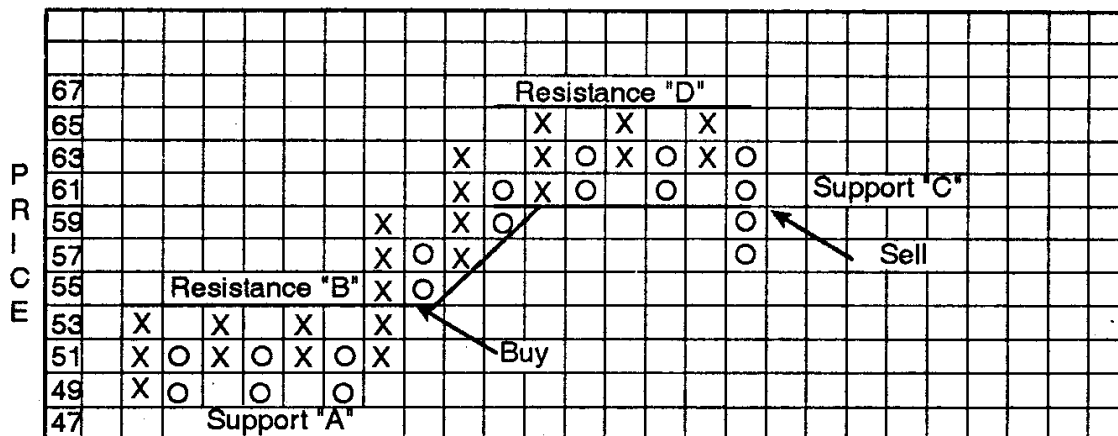
### ROC-Overbought and Oversold Zones





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

### Point and Figure chart



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

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

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

### **Bar Charts**

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

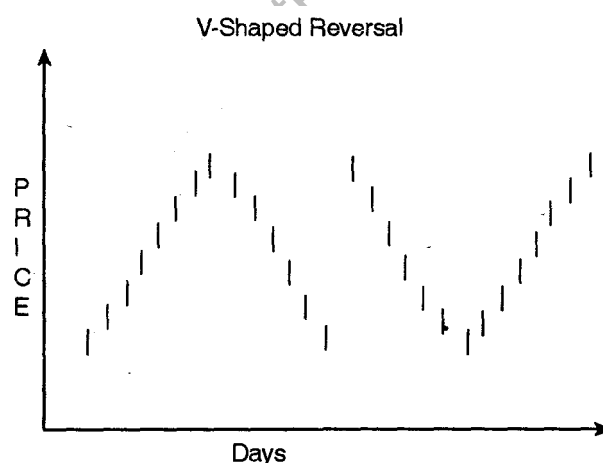
A line is drawn to connect both the points a horizontal nub is drawn to mark the closing price. Line charts are used to indicate the price movements. The line chart is a simplification of the bar chart. Here a line is drawn to connect the successive closing prices.

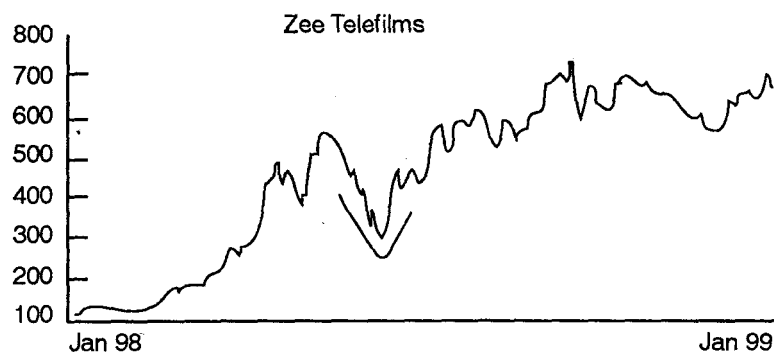
### **Chart Patterns**

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

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

In it, the bottom or top moves more slowly over a broader area.





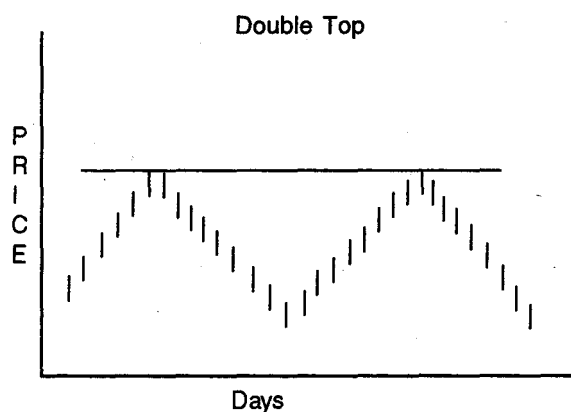
### ***Tops and Bottoms***

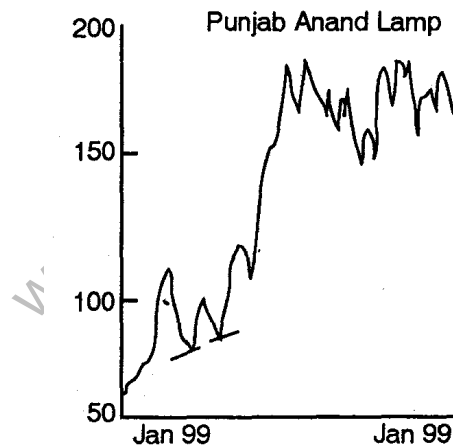
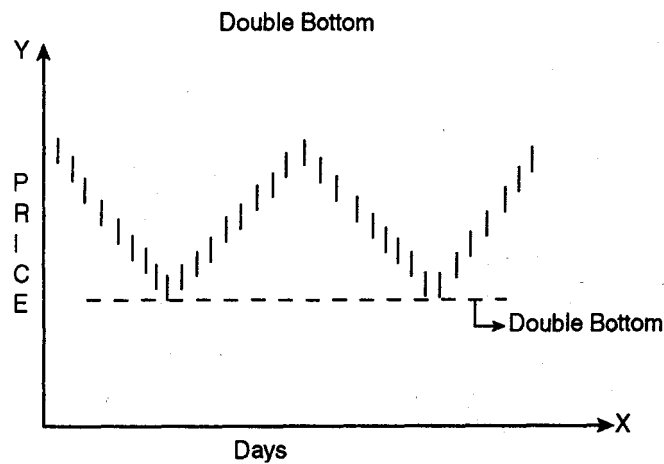
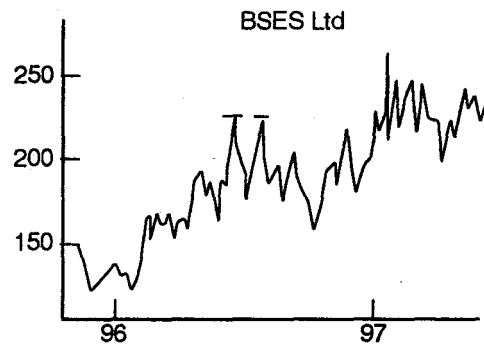
Top and bottom formation is interesting to watch but what is more important, is the middle portion of it. The investor has to buy after up trend has started and exit before the top is reached. Generally tops and bottoms are formed at the beginning or end of the new trends. The reversal from the tops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

### ***Double Top and Bottom***

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

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





### *Head and Shoulders*

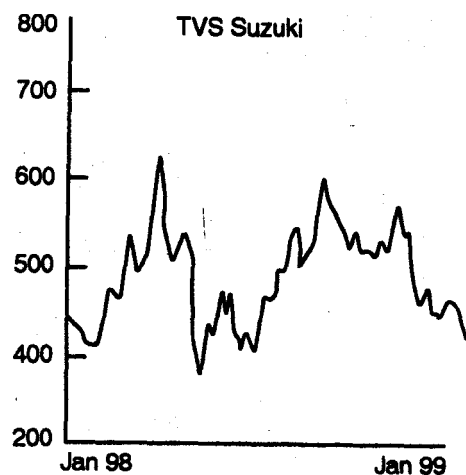
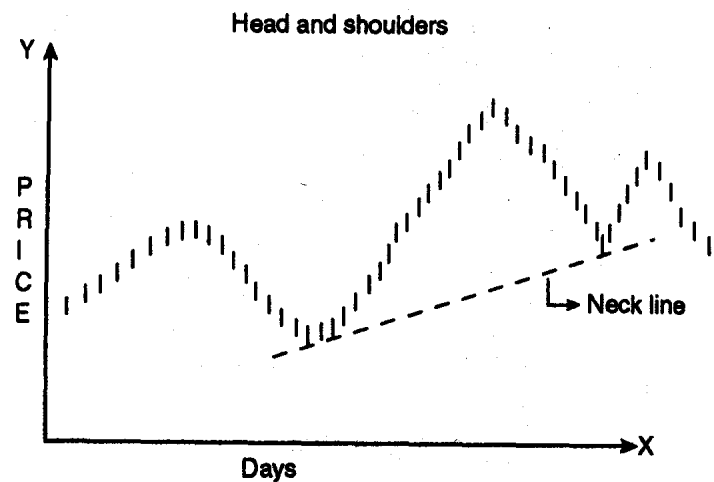
This pattern is easy to identify and the signal generated by this pattern is considered to be reliable. In the head and shoulder pattern there are three rallies resembling the left shoulder, a head and a right shoulder. A neckline is drawn connecting the lows of the tops. When the stock price cuts the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

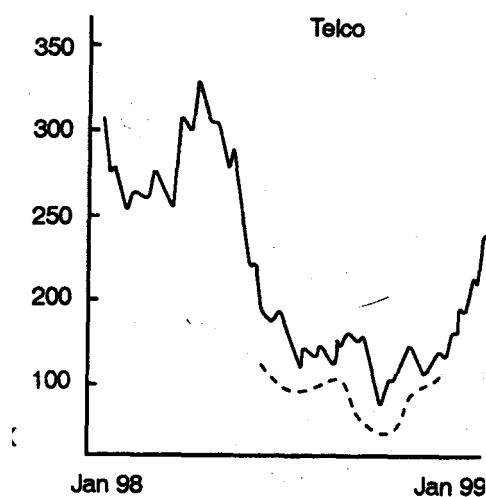
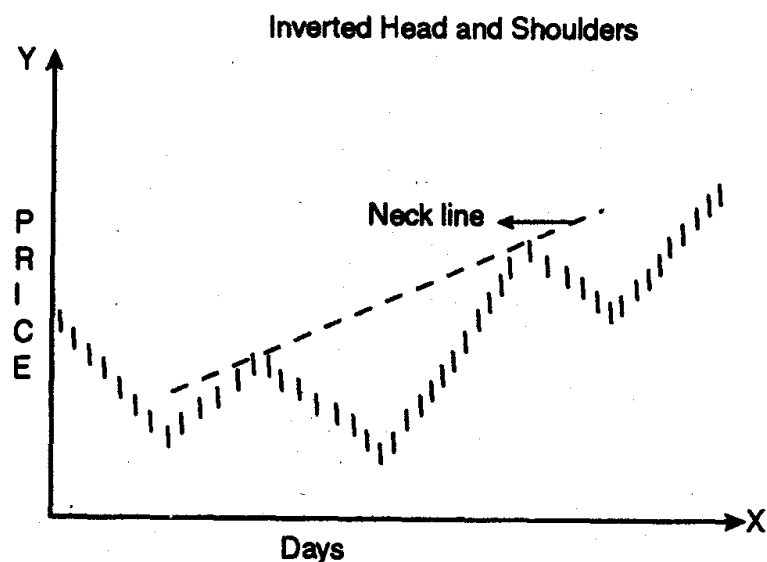
The upward movement of the price for some duration creates the left shoulder. At the top of the left shoulder people who bought during the uptrend begin to sell resulting in a dip.

Near the bottom there would be reaction and people who have not bought in the first up trend start buying at relatively low prices thus pushing the price upward. The alternating forces of demand and supply create new ups and lows. The following figures explain the head and shoulders pattern.

### *Inverted Head and Shoulders*

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





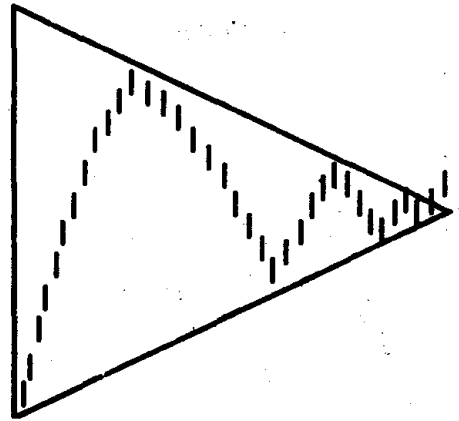
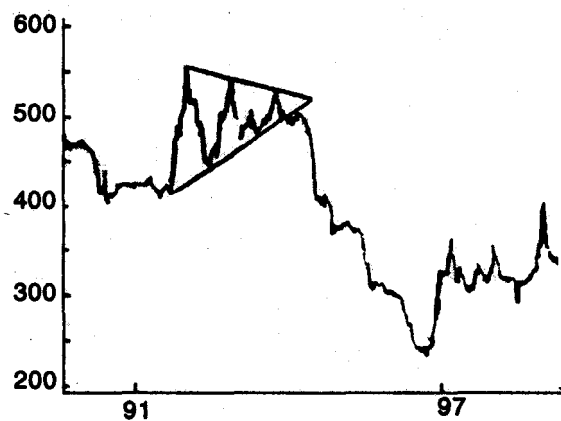
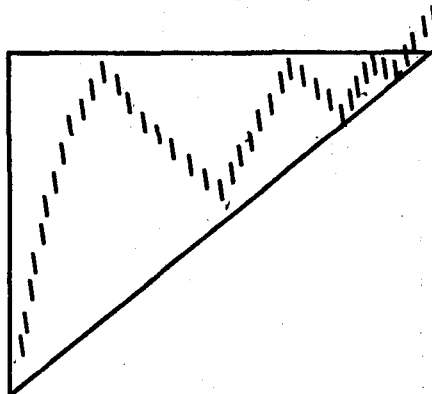
## Triangles

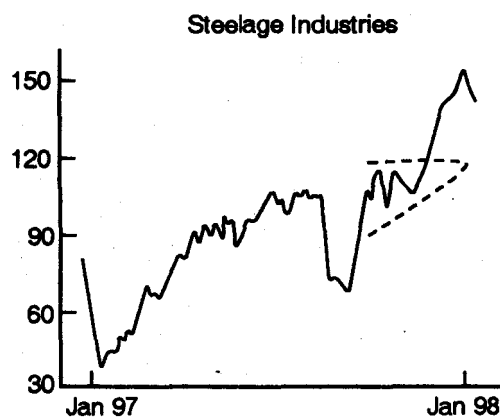
The triangle formation is easy to identify and popular in technical analysis. The triangles are of symmetrical, ascending, descending and inverted.

### Symmetrical Triangle

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

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

**Symmetrical triangle****Indian Rayon****Ascending Triangle**



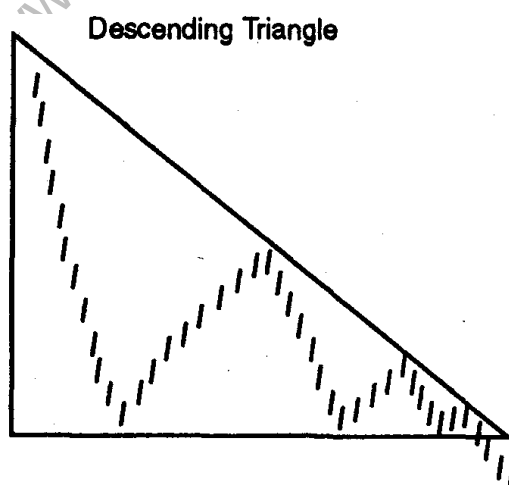
### Ascending Triangle

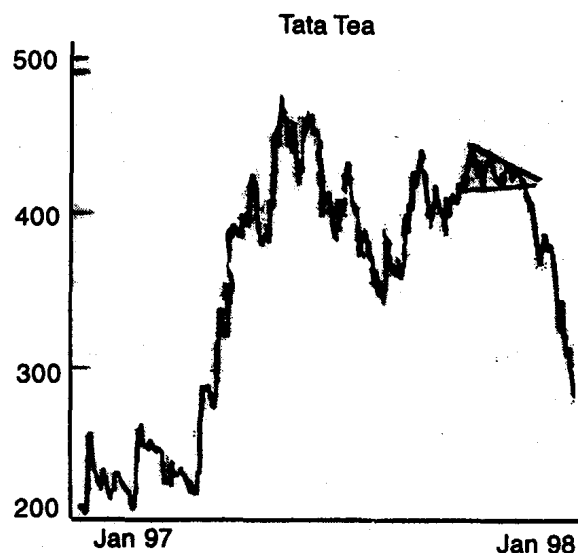
The upper trend line is almost a horizontal trend line connecting the tops and the lower trend line is a rising trend line connecting the rising bottoms. When the demand for the scrip overcomes the supply for it, then there will be a break out.

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

### Descending Triangle

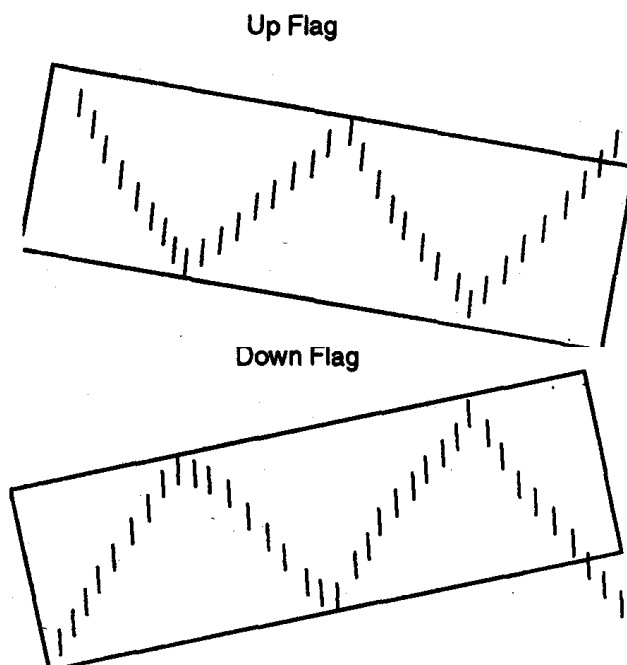
Connecting the lower tops forms the upper trend line. The upper trend line would be a falling one. The lower trend line would be almost horizontal connecting the bottoms. The lower line indicates the support level. The possibility for a downward breakout is high in this pattern. The pattern indicates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



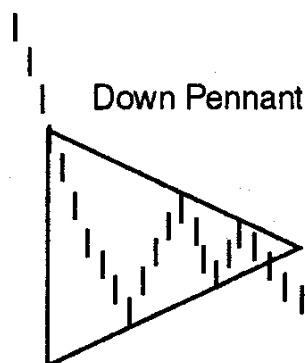


## Flags

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

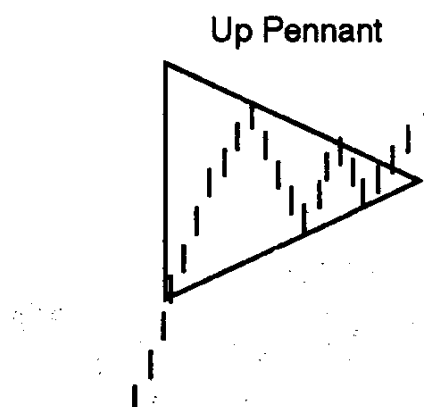


A flag resembles a parallelogram. A bullish flag is formed by two trend lines that stoop downwards. The break Out would occur on the upper side of the trend line. In a bearish flag both the trend lines would be stooping upwards. The breakout occurs in the downward trend line.



### *Pennant*

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



### **Technical Analysis and Fundamental Analysis**

1. Fundamental analysts' analyses the stock based on the specific goals of the investors. They study the financial strength of corporate, growth of sales, earnings and profitability. They also take into account the general industry and economic conditions.
2. The technical analysts mainly focus the attention on the past history of prices. Generally technical analysts choose to study two basic market data-price and volume.
3. The fundamental analysts estimate the intrinsic value of the shares and purchase them when they are undervalued. They dispose the shares when they are overpriced and earn profits. They try to find out the long term value of shares.

Compared to fundamental analysts, technical analysts mainly predict the short term price movement rather than long term movement. They are not committed to buy and hold policy.

4. Fundamentalists are of the opinion that supply and demand for stocks depend on the underlying factors. The forecasts of supply and demand depend on various factors.

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

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

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### **Lesson 3.2 - Efficient Market Theory**

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Stock prices are determined by a number of factors such as fundamental factors, technical factors and psychological factors. The behavior of stock prices is studied with the help of different methods such as fundamental analysis and technical analysis. Fundamental analysis seeks to evaluate the intrinsic value of securities by studying the fundamental factors affecting the performance of the economy, industry and companies. Technical analysis believes that the past behavior of stock prices gives an indication of the future behavior. It tries to study the patterns in stock price behavior through charts and predict the future movement in prices. There is a third theory on stock price behavior which questions the assumptions of technical analysis.

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

#### **Random Walk Theory**

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

The basic premise in random walk theory is that the information on changes in the economy, industry and company performance is immediately and fully spread so that all investors have full knowledge of the information. There is an instant adjustment in stock prices either upwards or downwards. Thus, the current stock price fully reflects all available information on the stock. Therefore, the price of a security two days ago can in no way help in speculating the price two days later. The price of each day is independent. It may be unchanged, higher or lower from the previous price, but that depends on new pieces of information being received each day.

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

### **The Efficient Market Hypothesis**

This hypothesis states that the capital market is efficient in processing information. An efficient capital market is one in which security prices equal their intrinsic values at all times, and where most securities are correctly priced. The concept of an efficient capital market has been one of the dominant themes in academic literature since the 1960s. According to Elton and Gruber, “when someone refers to efficient capital markets, they mean that security prices fully reflect all available information”. According to Eugene Fama,<sup>2</sup> in an efficient market, prices fully reflect all available information. The prices of securities observed at any time are based on correct evaluation of all information available at that time.

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

Fundamentalists believe that it may take several days or weeks before investors can fully assess the impact of new information. As a consequence, the price may be volatile for a number of days before it adjusts to a new level. This provides an opportunity to the analyst who has superior analytical skills to earn excess returns.

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

### **Forms of Market Efficiency**

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

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

### **Empirical Tests of Weak Form Efficiency**

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

The weak form of the efficient market hypothesis is thus a direct repudiation of technical analysis.

Two approaches have been used to test the weak form of the efficient market hypothesis. One approach looks for statistically significant patterns in security price changes. The alternative approach searches for profitable short-term trading rules.

## Serial Correlation Test

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

## Run Test

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

For example, the sequence  $+++--$  has two runs. In other words, a change of sign indicates a new run. The sequence  $--++0--+++$  has five runs; a run of three  $-$ 's, followed by a run of two  $+$ 's, another run of one 0, a fourth run of three  $-$ 's and a fifth run of four  $+$ 's. In a run test, the actual number of runs observed in a series of stock price movements is compared with the number of runs in a randomly generated number series. If no significant differences are found, then the security price changes are considered to be random in nature.

## Filter Tests

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

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

Likewise, if the news received is unfavorable, the price of the stock will decline to a lower equilibrium level. If investors sell the stock as it breaks the lower barrier, they will avoid much of the decline. Technicians set up trading strategies based on such patterns to earn excess returns.

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

The returns generated by trading according to the filter rule are compared with the returns earned by an investor following the buy and hold strategy. If trading with filters results in superior returns that would suggest the existence of patterns in price movements and negate the weak form EMH.

### **Distribution Pattern**

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

In the 1960s the efficient market theory was known as the random walk theory. The empirical studies regarding share price movements were testing whether prices followed a random walk.

Two articles by Roberts and Osborne, both published in 1959, stimulated a great deal of discussion of the new theory then called random walk theory.

Roberts' study compared the movements in the Dow Jones Industrial Average (an American stock market index) with the movement of a variable generated from a random walk process. He found that the random walk process produced patterns which were very similar to those of the Dow Jones index.

Osborne's study found a close resemblance between share price changes and the random movement of small particles suspended in a solution, which is known in Physics as the Brownian motion. Both the studies suggested that share price changes are random in nature and that past prices had no predictive value.

During the 1960s there was an enormous growth in serial correlation testing. None of these found any substantial linear dependence in price changes. Studies by Moore, Fama and Hagerman and Richmond are some of the early studies in this area. Moore found an average serial correlation coefficient of  $-0.06$  for price changes measured over weekly intervals. Fama's study tested the serial correlation for the thirty stocks comprising the Dow Jones industrial average for the five years prior to 1962. The average serial correlation coefficient was found to be  $0.03$ . Both the coefficients were not statistically different from zero; thus both the studies supported the random walk theory.

Fama also used run tests to measure dependency. The results again supported the random walk theory. Many studies followed Moore's and Fama's work each of which used different databases. The results of these studies were much the same as those of Moore and Fama.

Hagerman and Richmond conducted similar studies on securities traded in the 'over-the-counter' market and found little serial correlation. Serial correlation tests of dependence have also been carried out in various other stock markets around the world. These have similarly revealed little or no serial correlation.

Much research has also been directed towards testing whether mechanical trading strategies are able to earn above average returns. Many studies have tested the filter rules for its ability to earn superior returns. Early American studies were those by Alexander, who originally advocated the filter strategy, and by Fama and Blume. There were similar studies in the United Kingdom by Dryden and in Australia by Praetz. All these studies have found that filter strategies did not achieve above average returns. Thus, the results of empirical studies have been virtually unanimous in finding little or no statistical dependence and price patterns and this has corroborated the weak form efficient market hypothesis

### **Empirical Tests of Semi-Strong Form Efficiency**

The semi-strong form of the efficient market hypothesis says that current prices of stocks not only reflect all informational content of historical prices, but also reflect all publicly available information about the company being studied. Examples of publicly available information are—corporate annual reports, company announcements, press releases, announcements of forthcoming dividends, stock splits, etc. The semi-strong hypothesis maintains that as soon as the information becomes public the stock prices change and absorb the full information. In other words, stock prices instantaneously adjust to the information that is received.

The implication of semi-strong hypothesis is that fundamental analysts cannot make superior gains by undertaking fundamental analysis because stock prices adjust to new pieces of information as soon as they are received. There is no time gap in which a fundamental analyst can trade for superior gains. Thus, the semi-strong hypothesis repudiates fundamental analysis.

Semi-strong form tests deal with whether or not security prices fully reflect all publicly available information. These tests attempt to establish whether share prices react precisely and quickly to new items of information. If prices do not react quickly and adequately, then an opportunity exists for investors or analysts to earn excess returns by using this information. Therefore, these tests also attempt to find if analysts are able to earn superior returns by using publicly available information.

There is an enormous amount and variety of public information. Semi-strong form tests have been performed with respect to many different types of information. Much of the methodology used in semi-strong form tests has been introduced by Fama, Fisher, Jensen and Roll. Theirs was the first of the studies that were directly concerned with the testing of the semi-strong form of EMH. Subsequent to their study, a number of refinements have been developed in the test procedure.

The general methodology followed in these studies has been to take an economic event and measure its impact on the share price. The impact is measured by taking the difference between the actual return and expected return on a security. The expected return on a security is generally estimated by using the market model (or single index model) suggested by William Sharpe. The model used for estimating expected returns is the following:

$$R_i = a_i + b_i R_m + e_i$$

Where

$R_i$  = Return on security i.

$R_m$  = Return on a market index.

$a_i$  &  $b_i$  = Constants.

$e_i$  = Random error.

This analysis is known as Residual analysis. The positive difference between the actual return and the expected return represents the excess return earned on a security. If the excess return is close to zero, it implies that the price reaction following the public

announcement of information is immediate and the price adjusts to a new level almost immediately. Thus, the lack of excess returns would validate the semi-strong form EMH.

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

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

Ball and Brown tested the stock market's ability to absorb the informational content of reported annual earnings per share information. They found that companies with good earnings report experienced price increase in stock, while companies with bad earnings report experienced decline in stock prices. But surprisingly, about 85 per cent of the informational content of the earnings announcements was reflected in stock price movements prior to the release of the actual earnings figure. The market seems to adjust to new information rapidly with much of the impact taking place in anticipation of the announcement.

Joy, Litzenberger and McEnally tested the impact of quarterly earnings announcements on the stock price adjustment mechanism. Some of their results, however, contradicted the semi-strong form of the efficient market hypothesis. They found that the favorable information contained in published quarterly earnings reports was not always instantaneously adjusted in stock prices. This may suggest that the market does not adjust share prices equally well for all types of information.

By way of summary it may be stated that a great majority of the semi- strong efficiency tests provide strong empirical support for the hypothesis; however, there have been some contradictory results too. Most of the reported results show that stock prices do adjust rapidly to announcements of new information and that investors are typically unable to utilize this information to earn consistently above average returns.

## Tests of Strong Form Efficiency

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

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

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

Jaffe, Lorie and Niederhoffer studied the profitability of insider trading (i.e. the investment activities of people who had inside information on companies). They found that insiders earned returns in excess of expected returns. Although there have been only a few empirical studies on the profitability of using inside information, the results show, as expected, that excess returns can be made. These results indicate that markets are probably not efficient in the strong form.

Many studies have been carried out regarding the performance of American mutual funds using fairly sophisticated evaluation models. All the major studies have found that mutual funds did no better than randomly constructed portfolios of similar risk. Firth studied the performance of Unit Trusts in the United Kingdom during the period 1965—75. He also found that unit trusts did not outperform the market index for their given levels of risk. A small research has been conducted into the profitability of investment recommendations by investment analysts. Such studies suggest that few analysts or firms of advisers can claim above average success with their forecasts.

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

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

In conclusion, it may be stated that the strong form hypothesis is invalid as regards inside information, but valid as regards private information other than inside information.

### **EMH Vs. Fundamental and Technical Analyses**

There are three broad theories concerning stock price movements. These are the fundamental analysis, technical analysis and efficient market hypothesis. Fundamental analysts believe that by analyzing key economic and financial variables they can estimate the intrinsic worth of a security and then determine what investment action to take. Fundamental analysis seeks to identify under priced securities and overpriced securities. Their investment strategy consists in buying under priced securities and selling overpriced securities, thereby earning superior returns.

A technical analyst maintains that fundamental analysis is unnecessary. He believes that history repeats itself. Hence, he tries to predict future movements in share prices by studying the historical patterns in share price movements.

The efficient market hypothesis is expressed in three forms. The weak form of the EMH directly contradicts technical analysis by maintaining that past prices and past price changes cannot be used to forecast future price changes because successive price changes are independent of each other. The semi-strong form of the EMH contradicts fundamental analysis to some extent by claiming that the market is efficient in the dissemination and processing of information and hence, publicly available information cannot be used consistently to earn superior investment returns.

The strong form of the EMH maintains that not only is publicly available information useless to the investor or analyst but all information is useless.

Even though the EMH repudiates both fundamental analysis and technical analysis, the market is efficient precisely because of the organized and systematic efforts of thousands of analysts undertaking fundamental and technical analysis. Thus, the paradox of efficient market hypothesis is that both fundamental and technical analyses are required to make the market efficient and thereby validate the hypothesis.

## **Competitive Market Hypothesis**

An efficient market has been defined as one where share prices always fully reflect available information on companies. In practice, no existing stock market is perfectly efficient. There are evident shortcomings in the pricing mechanism. Often, the complete body of knowledge about a company's prospects is not publicly available to market participants. Further, the available information would not be always interpreted in a completely accurate fashion. The research studies on EMH have shown that price changes are random or independent and hence unpredictable. The prices are also seen to adjust quickly to new information. Whether the price adjustments are correct and accurate, reflecting correctly and accurately the meaning of publicly available information is difficult to determine.

All that can be validly concluded is that prices are set in a very competitive market, but not necessarily in an efficient market. This competitive market hypothesis provides scope for earning superior returns by undertaking security analysis and following portfolio management strategies.

## **Market Inefficiencies**

Many studies have proved the prevalence of the market efficiency. At the same time, several studies contradict the concept of market efficiency. For example, the studies conducted Joy, Lichtenberger and Mc. Enally over the period of 1963-1968 gave different results. The authors have examined the quarterly earnings of the stock prices. The earning of one quarter was compared with the same quarter of the previous year. If the current year's earnings were 40% or more than the earnings for the same quarter in the previous year, the earnings were classified as good earnings than anticipated. If the current quarter's earnings were below 40% of the previous year's earnings, they are classified as bad than expected.

Then the abnormal returns were calculated from 13 weeks prior to the announcement of the earnings to 26 weeks after the announcement of the earnings. The stocks whose earnings are substantially greater than anticipated gave positive abnormal returns. The stocks whose earnings are below the anticipated earnings generated negative abnormal returns.

The author's main claim is that after the announcement of the earnings, stocks that reported earnings substantially above those of the previous year continued to earn positive abnormal returns. According to the study, the investors could have earned positive abnormal returns of around 6.5 per cent over the next 26 weeks simply by buying stocks that have reported earnings 40% above the previous quarterly earnings. Meanwhile for those stocks with earnings substantially below the previous year, the cumulative average

abnormal return remained relatively stable. This shows evidence against the semi-strong market hypothesis because it states that when the information is made public the analyst could not earn abnormal profits. A study made by C.P. Jones, R. S. Randleman for the period 1971-1980 had also given similar results to those of JLM.

Low PE effect many studies have provided evidences that stocks with low price earnings ratios yield higher returns than stocks with higher PEs. This is known as low PE effect. A study made by Basu in 1977 was risk adjusted return and even after the adjustment there was excess return in the low price-earnings stocks. If historical information of P/E ratios is useful to the investor in obtaining superior stock returns, the validity of the semi-strong form of market hypothesis is questioned. His results stated that low P/E portfolio experienced superior returns relative to the market and high P/E portfolio performed in an inferior manner relative to the overall market. Since his result directly contradicts semi-strong form of efficient market hypothesis, it is considered to be important.

Small firm effect the theory of the small firm effect maintains that investing in small firms (those with low capitalization) provides superior risk adjusted returns. Bans found that the size of the firm has been highly correlated with returns. Bans examined historical monthly returns of NYSE common stocks for the period 1931-1975. He formed portfolios consisting of 10 smallest firms and the 10 largest firms and computed the average return for these portfolios. The small firm portfolio has outperformed the large firm portfolio.

Several other studies have confirmed the existence of a small firm effect. The size effect has given rise to the doubts regarding the risk associated with small firms. The risk associated with them is underestimated and they do not trade as frequently as the those of the large firms. Correct measurement of risk and return of small portfolios tends to eliminate at least 50% of the small firm effect.

The weekend effect French in his study had examined the returns generated by the Standard and poor Index for each day of the week. Stock prices tend to rise all week long to a peak on Fridays. The stocks are traded on Monday at reduced prices, before they begin the next week's price rise. Buying on Monday and selling on Friday from 1953 to 1977 would have generated average annual return 3.4% while simple buy and hold would have yielded 5.5% annual return. If the transaction costs are taken into account, the naive buy and hold strategy would have provided higher return. Yet the knowledge of the weekend effect is still of v Purchases planned on Thursday or Friday can be delayed until Monday, while sale planned for Monday can b delayed until the end of the week. The weekend effect is a small but significant deviation from perfectly random price movements and violates the weekly efficient market hypothesis.

Similar to this Venkatesh B. of the BL Research Bureau has stated that the Bombay Stock Exchange reveal a discernible pattern. Usually, Monday, is characterized by trading blues, and Friday by frenzied activity The Friday rush is more to do with speculators covering their open position. If the short sellers to cover their position within this period, their open positions are called to auction where prices are dear.

## Summary

- The technical analysts studies the behaviour of the price of the stock to determine the future price of the –stock
- According to Charles H. Dow, stock price movements are divided into three: the primary movement, the secondary movement and the daily fluctuations.
- A primary trend may be a bull market moving in a steady upward direction, or a bear market steadily dropping.
- A secondary trend or secondary reaction is the movement of the market contrary to the primary trend.
- Support level is the barrier for further decline. It provides a base for an up move. The resistance level is the level in which advances are temporarily stopped and the sellers overcome the demand.
- Volume of the trade confirms the trend. Fall of volume with the rise in price indicates trend reversal and vice-versa.
- Breadth of the market is the net number of stocks advancing versus, those declining in the market. If the A/D line slopes downward while the Sensex is rising, it gives a bearish signal and vice-versa.
- Moving averages are used as a technical indicator. It smoothens out the short term fluctuations, helpful in comparing the stock price movement with the index movement and discovering the trend.
- Oscillators show the market or scrip momentum to find out the overbought and oversold conditions of the market or scrip. Relative strength index and rate of change index are the commonly used oscillators.
- Charts are the major analytical tools used in technical analysis. Point and figure chart is one-dimensional chart drawn to predict the extent and direction of the price movement. Ordinary bar charts generate numerous patterns. These patterns indicate the trend and the trend reversals.

**Self Assessment Questions**

- 1) The stock market has a life of its own and the study of it rewards the investor'- Comment.
- 2) How does technical analysis differ from the fundamental analysis?
- 3) Explain in detail the Dow Theory and how is it used to determine the direction of stock market?
- 4) Can stock prices have a support level and resistance level? If so, explain.
- 5) 'Moving averages not only smoothen the data, but also predict the market'. Comment.
- 6) How do volume and breadth of the market indicate the trend of the market?
- 7) How are odd lot and short sales index used to determine the direction of the market?
- 8) 'Oscillators are valuable tools in assessing overbought and oversold position of the market'. Discuss.
- 9) What is a point and figure chart, and how is it used?
- 10) 'Chart patterns are helpful in predicting the stock price movement'. Comment.
- 11) "According to some technicians, investors who buy in quantities less than 100 shares are good investors to follow" Is this statement true or false and why?
- 12) How can increasing short interest give a bullish interpretation? Why.

**CASE STUDY**

Brain Vandergriff is a portfolio manager for Southside bank and trust Company. He currently is considering purchasing shares of Deere (maker of farm equipment) and Zenith (a producer of electronic equipment) common stock for inclusion in several portfolios he manages. As an alternative, he also is considering purchasing Deere and Zenith convertible bonds. The portfolios under consideration are mostly equity portfolios having the objective of aggressive growth. Vandergriff expects Deere to benefit from the recent growth in demand for agricultural equipment abroad. Zenith may be on the come-back trail after its earnings growth faltered in the late 1980s. He also expects interest rates to remain stable during the next year.

| Convertible      | DEERE | ZENTH |
|------------------|-------|-------|
| Coupon           | 5.50% | 6.25% |
| Maturity (Years) | 8     | 18    |

|                            |        |       |
|----------------------------|--------|-------|
| Rating                     | A-     | CCC   |
| Conversion rate (# shares) | 30.53  | 32    |
| Market price (% part)      | 222.50 | 66.25 |
| Investment Value           | 85.43  | 64.95 |
| Call price                 | 105    | 106   |

| Common Stock |       |      |
|--------------|-------|------|
| Market price | 72.88 | 6.88 |
| Dividend     | 2.00  | 0.00 |
| Beta         | 1.05  | 1.45 |

### Questions

- Analyze these two convertibles.
- Recommend the convertible debentures that, in your opinion, would be more desirable for purchase by an aggressive, growth-oriented investor. Justify your recommendation.

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## UNIT – IV

### Unit Structure

Lesson 4.1 - Portfolio Analysis

Lesson 4.2 - Portfolio Models

Lesson 4.3 - Portfolio Construction

### Learning Objectives

*After reading this chapter, students should*

- Understand the concept of portfolio analysis.
- Know about the various models in portfolio.
- Understand the risk and return concept.

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### Lesson 4.1 - Portfolio Analysis

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#### Introduction

Individual securities have risk return characteristics of their own. The future return expected from a security is variable and this variability of returns is termed risk. It is rare to find investors investing their entire wealth in a single security. This is because most investors have an aversion to risk. It is hoped that if money is invested in several securities simultaneously, the loss in one will be compensated by the gain in others. Thus, holding more than one security at a time is an attempt to spread and minimize risk by not putting all our eggs in one basket.

Most investors thus tend to invest in a group of securities rather than a single security. Such a group of securities held together as an investment is what is known as a portfolio.

The process of creating such a portfolio is called diversification. It is an attempt to spread and minimize the risk in investment. This is sought to be achieved by holding different types of securities across different industry groups.

From a given set of securities, any number of portfolios can be constructed. A rational investor attempts to find the most efficient of these portfolios. The efficiency of each portfolio can be evaluated only in terms of the expected return and risk of the portfolio as such. Thus, determining the expected return and risk of different portfolios is a primary step in portfolio management. This step is designated as portfolio analysis.

### Expected Return of a Portfolio

As a first step in portfolio analysis, an investor needs to specify the list of securities eligible for selection or inclusion in the portfolio. Next he has to generate the risk-return expectations for these securities. These are typically expressed as the expected rate of return (mean) and the variance or standard deviation of the return.

The expected return of a portfolio of assets is simply the weighted average of the return of the individual securities held in the portfolio. The weight applied to each return is the fraction of the portfolio invested in that security.

Let us consider a portfolio of two equity shares P and Q with expected returns of 15 per cent and 20 per cent respectively.

If 40 per cent of the total funds are invested in share P and the remaining 60 per cent, in share Q, then the expected portfolio return will be:

$$(0.40 \times 15) + (0.60 \times 20) = 18 \text{ per cent}$$

The formula for the calculation of expected portfolio return may be expressed as shown below:

$$r_p = \sum_{i=1}^n x_i r_i$$

Where

$r_p$  = Expected return of the portfolio

$x_i$  = Proportion of funds invested in security i.

$r_i$  = Expected return of security  $i$ .

$n$  = Number of securities in the portfolio

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

### Risk of a Portfolio

The variance of return and standard deviation of return are alternative statistical measures that are used for measuring risk in investment. These statistics measure the extent to which returns are expected to vary around an average over time. The calculation of variance of a portfolio is a little more difficult than determining its expected return.

The variance or standard deviation of an individual security measures the riskiness of a security in absolute sense. For calculating the risk of a portfolio of securities, the riskiness of each security within the context of the overall portfolio has to be considered.

This depends on their interactive risk, i.e. how the returns of a security move with the returns of other securities in the portfolio and contribute to the overall risk of the portfolio.

Covariance is the statistical measure that indicates the interactive risk of a security relative to others in a portfolio of securities. In other words, the way security returns vary with each other affects the overall risk of the portfolio.

The covariance between two securities X and Y may be calculated using the following formula:

$$\text{Cov}_{xy} = \frac{[R_x - \bar{R}_x][R_y - \bar{R}_y]}{N}$$

Where:

$\text{Cov}_{xy}$  = Covariance between  $x$  and  $y$ .

$R_x$  = Return of security  $x$ .

$R_y$  = Return of security  $y$

$\bar{R}_x$  = Expected or mean return of security  $x$ .

$\bar{R}_y$  = Expected or mean return of security  $y$ .

$N$  = Number of observations.

The calculation of covariance is illustrated below:

### Calculation of Covariance

| Year | R <sub>x</sub> | Deviation<br>R <sub>x</sub> - R <sub>x</sub> | R...3<br>y | Deviation<br>R <sub>y</sub> - R <sub>y</sub> | Product of deviations<br>(R <sub>x</sub> - R <sub>x</sub> ) (R <sub>y</sub> - R <sub>y</sub> ) |
|------|----------------|----------------------------------------------|------------|----------------------------------------------|------------------------------------------------------------------------------------------------|
| 1    | 10             | -4                                           | 17         | 5                                            | -20                                                                                            |
| 2    | 12             | -2                                           | 13         | 1                                            | -2                                                                                             |
| 3    | 16             | 2                                            | 10         | -2                                           | -4                                                                                             |
| 4    | 18             | 4                                            | 8          | -4                                           | -16                                                                                            |

$$\begin{aligned} \text{Cov}_{xy} &= \frac{\sum_{i=1}^n [R_x - R_x][R_y - R_y]}{N} \\ &= -42 / 4 = -10.5 \end{aligned}$$

The covariance is a measure of how returns of two securities move together. If the returns of the two securities move in the same direction consistently the covariance would be positive. If the returns of the two securities move in opposite direction consistently the covariance would be negative. If the movements of returns are independent of each other, covariance would be close to zero.

Covariance is an absolute measure of interactive risk between two securities. To facilitate comparison, covariance can be standardized. Dividing the covariance between two securities by product of the standard deviation of each security gives such a standardised measure. This measure is called the coefficient of correlation. This may be expressed as:

$$r_{xy} = \frac{\text{Cov}_{xy}}{\sigma_x \sigma_y}$$

where

$r_{xy}$  = Coefficient of correlation between x and y.

$\text{Cov}_{xy}$  = Covariance between x and y.

$\sigma_x$  = Standard deviation of x.

$\sigma_y$  = Standard deviation of y.

It may be noted from the above formula that covariance may be expressed as the product of correlation between the securities and the standard deviation of each of the securities. Thus,

$$\text{Cov}_{xy} = r_{xy} \sigma_x \sigma_y$$

The correlation coefficients may range from - 1 to 1. A value of -1 indicates perfect negative correlation between security returns, while a value of +1 indicates a perfect positive correlation. A value close to zero would indicate that the returns are independent.

The variance (or risk) of a portfolio is not simply a weighted average of the variances of the individual securities in the portfolio. The relationship between each security in the portfolio with every other security as measured by the covariance of return has also to be considered. The variance of a portfolio with only two securities in it may be calculated with the following formula.

$$\sigma_p^2 = x_1^2 \sigma_1^2 + x_2^2 \sigma_2^2 + 2x_1 x_2 (r_{12} \sigma_1 \sigma_2)$$

Where

- $\sigma_p^2$  = Portfolio variance.
- $x_1$  = Proportion of funds invested in the first security.
- $x_2$  = Proportion of funds invested in the second security.
- $\sigma_1^2$  = Variance of first security.
- $\sigma_2^2$  = Variance of second security.
- $\sigma_1$  = Standard deviation of first security.
- $\sigma_2$  = Standard deviation of second security.
- $r_{12}$  = Correlation coefficient between the returns of first and second security.

Portfolio standard deviation can be obtained by taking the square root of portfolio variance.

Let us take an example to understand the calculation of portfolio variance and portfolio standard deviation. Two securities P and Q generate the following sets of expected returns, standard deviations and correlation coefficient:

| P                     | Q          |
|-----------------------|------------|
| $r = 15$ percent      | 20 percent |
| $\sigma = 50$ percent | 30 percent |
| $r_{pq} = -0.60$      |            |

A portfolio is constructed with 40 per cent of funds invested in P and the remaining 60 per cent of funds in Q.

The expected return of the portfolio is given by:

$$r_p = \sum_{i=1}^n x_i r_i$$

$$= (0.40 \times 15) + (0.60 \times 20) = 18 \text{ percent}$$

The variance of the portfolio is given by:

$$\sigma_p^2 = x_1^2 \sigma_1^2 + x_2^2 \sigma_2^2 + 2x_1 x_2 (r_{12} \sigma_1 \sigma_2)$$

$$= (0.40)^2 (50)^2 + (0.60)^2 (30)^2 + 2(0.40)(0.60)(-0.60)(50)(30)$$

$$= 400 + 324 - 432 = 292$$

The standard deviation of the portfolio is:

$$s_p = \sqrt{292} = 17.09 \text{ per cent.}$$

The return and risk of a portfolio depends on two sets of factors (a) the returns and risks of individual securities and the covariance between securities in the portfolio, (b) the proportion of investment in each security.

The first set of factors is parametric to the investor in the sense that he has no control over the returns, risks and covariances of individual securities. The second sets of factors are choice variables in the sense that the investor can choose the proportions of each security in the portfolio.

### Reduction of Portfolio Risk Through Diversification

The process of combining securities in a portfolio is known as diversification. The aim of diversification is to reduce total risk without sacrificing portfolio return. In the example considered above, diversification has helped to reduce risk. The portfolio standard deviation of 17.09 is lower than the standard deviation of either of the two securities taken separately, which were 50 and 30 respectively.

To understand the mechanism and power of diversification, it is necessary to consider the impact of covariance or correlation on portfolio risk more closely. We shall examine three cases: (a) when security returns are perfectly positively correlated, (b) when security returns are perfectly negatively correlated, and (c) when security returns are not correlated.

### Security Returns Perfectly Positively Correlated

When security returns are perfectly positively correlated the correlation coefficient between the two securities will be +1. The returns of the two securities then move up or down together.

The portfolio variance is calculated using the formula:

$$\sigma_p^2 = x_1^2 \sigma_1^2 + x_2^2 \sigma_2^2 + 2x_1 x_2 (r_{12} \sigma_1 \sigma_2)$$

Since  $r_{12} = 1$ , this may be rewritten as:

$$\sigma_p^2 = x_1^2 \sigma_1^2 + x_2^2 \sigma_2^2 + 2x_1 x_2 \sigma_1 \sigma_2$$

The right hand side of the equation has the same form as the expansion of the identity  $(a + b)^2$ , namely  $a^2 + 2ab + b^2$ . Hence, it may be reduced as

$$\sigma_p^2 = (x_1 \sigma_1 + x_2 \sigma_2)^2$$

The standard deviation then becomes

$$\sigma_p = x_1 \sigma_1 + x_2 \sigma_2$$

This is simply the weighted average of the standard deviations of the individual securities.

Taking the same example that we considered earlier for calculating portfolio variance, we shall calculate the portfolio standard deviation when correlation coefficient is +1.

Standard deviation of security P = 50

Standard deviation of security Q = 30

Proportion of investment in P = 0.4

Proportion of investment in Q = 0.6

Correlation coefficient = +1.0

Portfolio standard deviation may be calculated as:

$$\begin{aligned} \sigma_p &= x_1 \sigma_1 + x_2 \sigma_2 \\ &= (0.4) (50) + (0.6) (30) \\ &= 38 \end{aligned}$$

Being the weighted average of the standard deviations of individual securities, the portfolio standard deviation will lie between the standard deviations of the two individual securities. In our example, it will vary between 50 and 30 as the proportion of investment in each security changes.

For example, if the proportion of investment in P and Q are 0.75 and 0.25 respectively, portfolio standard deviation becomes:

$$\sigma_p = (0.75)(50) + (0.25)(30) = 45$$

Thus, when the security returns are perfectly positively correlated, diversification provides only risk averaging and no risk reduction because the portfolio risk cannot be reduced below the individual security risk. Hence, diversification is not a productive activity when security returns are perfectly positively correlated.

### Security Returns Perfectly Negatively Correlated

When security returns are perfectly negatively correlated, the correlation coefficient between them becomes -1. The two returns always move in exactly opposite directions.

The portfolio variance may be calculated as:

$$\sigma_p^2 = x_1^2 \sigma_1^2 + x_2^2 \sigma_2^2 + 2x_1 x_2 (r_{12} \sigma_1 \sigma_2)$$

Since  $r_{12} = -1$ , this may be rewritten as:

$$\sigma_p^2 = x_1^2 \sigma_1^2 + x_2^2 \sigma_2^2 - 2x_1 x_2 (\sigma_1 \sigma_2)$$

The right hand side of the equation has the same form as the expansion of the identity  $(a - b)^2$ , namely  $a^2 - 2ab + b^2$ . Hence, it may be reduced as:

$$\sigma_p^2 = (x_1 \sigma_1 - x_2 \sigma_2)^2$$

The standard deviation then becomes:

$$\sigma_p = x_1 \sigma_1 - x_2 \sigma_2$$

For the illustrative portfolio considered above, we can calculate the portfolio standard deviation when the correlation coefficient is  $-1$ .

$$\sigma_p = (0.4)(50) - (0.6)(30) = 2$$

The portfolio risk is very low. It may even be reduced to zero. For example, if the proportion of investment in P and Q are 0.375 and 0.625 respectively, portfolio standard deviation becomes:

$$\sigma_p = (0.375)(50) - (0.625)(30) = 0$$

Here, although the portfolio contains two risky assets, the portfolio has no risk at all. Thus, the portfolio may become entirely risk free when security returns are perfectly negatively correlated. Hence, diversification becomes a highly productive activity when securities are perfectly negatively correlated, because portfolio risk can be considerably reduced and sometimes even eliminated. But, in reality, it is rare to find securities that are perfectly negatively correlated.

### Security Returns Uncorrelated

When the returns of two securities are entirely uncorrelated, the correlation coefficient would be zero.

The formula for portfolio variance is:

$$\sigma_p^2 = x_1^2 \sigma_1^2 + x_2^2 \sigma_2^2 + 2x_1 x_2 (r_{12} \sigma_1 \sigma_2)$$

Since  $r_{12} = 0$ , the last term in the equation becomes zero; the formula may be rewritten

$$\sigma_p^2 = x_1^2 \sigma_1^2 + x_2^2 \sigma_2^2$$

The standard deviation then becomes:

$$\sigma_p = \sqrt{x_1^2 \sigma_1^2 + x_2^2 \sigma_2^2}$$

For the illustrative portfolio considered above the standard deviation can be calculated when the correlation coefficient is zero.

$$\begin{aligned} \sigma_p &= \sqrt{(0.4)^2(50)^2 + (0.6)^2(30)^2} \\ &= \sqrt{400 + 324} \\ &= 26.91 \end{aligned}$$

The portfolio standard deviation is less than the standard deviations of individual securities in the portfolio. Thus, when security returns are uncorrelated, diversification reduces risk and is a productive activity.

We may now tabulate the portfolio standard deviations of our illustrative portfolio having two securities P and Q, for different values of correlation coefficients between them. The proportion of investments in P and Q are 0.4 and 0.6 respectively. The individual standard deviations of P and Q are 50 and 30 respectively.

#### Portfolio Standard Deviations

| Correlation coefficients | Portfolio standard deviations |
|--------------------------|-------------------------------|
| 1.0                      | 38.00                         |
| 0.6                      | 34.00                         |
| 0.0                      | 26.91                         |
| -0.6                     | 17.09                         |
| -1.0                     | 2.00                          |

From the above analysis we may conclude that diversification reduces risk in all cases except when the security returns are perfectly positively correlated. As correlation coefficient declines from +1 to -1, the portfolio standard deviation also declines. But the risk reduction is greater when the security returns are negatively correlated.

#### Portfolios With More Than Two Securities

So far we have considered a portfolio with only two securities. The benefits from diversification increase as more and more securities with less than perfectly positively correlated returns are included in the portfolio. As the number of securities added to a portfolio increases, the standard deviation of the portfolio becomes smaller and smaller. Hence, an investor can make the portfolio risk arbitrarily small by including a large number of securities with negative or zero correlation in the portfolio.

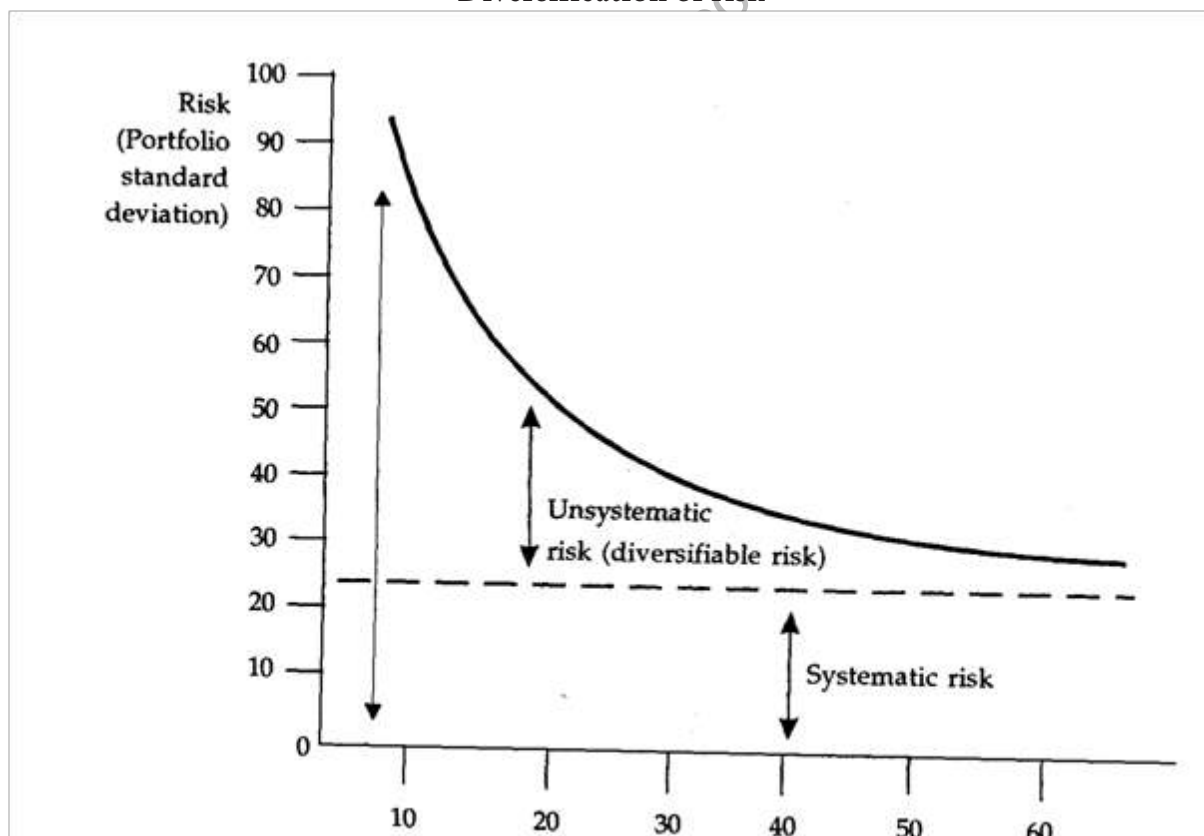
But, in reality, no securities show negative or even zero correlation. Typically, securities show some positive correlation that is above zero but less than the perfectly positive value (+ 1). As a result, diversification (that is, adding securities to a portfolio) results in some reduction in total portfolio risk but not in complete elimination of risk. Moreover, the effects of diversification are exhausted fairly rapidly. That is, most of the reduction in portfolio standard deviation occurs by the time the portfolio size increases to

25 or 30 securities. Adding securities beyond this size brings about only marginal reduction in portfolio standard deviation.

Adding securities to a portfolio reduces risk because securities are not perfectly positively correlated. But the effects of diversification are exhausted rapidly because the securities are still positively correlated to each other though not perfectly correlated. Had they been negatively correlated, the portfolio risk would have continued to decline as portfolio size increased. Thus, in practice, the benefits of diversification are limited.

The total risk of an individual security comprises two components, the market related risk called systematic risk and the unique risk of that particular security called unsystematic risk. By combining securities into a portfolio the unsystematic risk specific to different securities is cancelled out. Consequently, the risk of the portfolio as a whole is reduced as the size of the portfolio increases. Ultimately when the size of the portfolio reaches a certain limit, it will contain only the systematic risk of securities included in the portfolio. The systematic risk, however, cannot be eliminated. Thus, a fairly large portfolio has only systematic risk and has relatively little unsystematic risk. That is why there is no gain in adding securities to a portfolio beyond a certain portfolio size. Figure depicts the diversification of risk in a portfolio.

**Diversification of risk**



The figure shows the portfolio risk declining as the number of securities in the portfolio increases, but the risk reduction ceases when the unsystematic risk is eliminated.

### Risk-Return Calculations of Portfolios With More Than Two Securities

The expected return of a portfolio is the weighted average of the returns of individual securities in the portfolio, the weights being the proportion of investment in each security. The formula for calculation of expected portfolio return is the same for a portfolio with two securities and for portfolios with more than two securities. The formula is:

$$r_p = \sum_{i=1}^n x_i r_i$$

Where

$r_p$  = Expected return of portfolio.

$x_i$  = Proportion of funds invested in each security.

$r_i$  = Expected return of each security.

$n$  = Number of securities in the portfolio.

Let us consider a portfolio with four securities having the following characteristics

| Security | Returns (per cent) | Proportion of investment |
|----------|--------------------|--------------------------|
| A        | 12                 | 0.2                      |
| B        | 17                 | 0.3                      |
| C        | 23                 | 0.1                      |
| D        | 20                 | 0.4                      |

The expected return of this portfolio may be calculated using the formula:

$$r_p = \sum_{i=1}^n x_i r_i$$

$$\begin{aligned} r_p &= (0.2)(12) + (0.3)(17) + (0.1)(23) + (0.4)(20) \\ &= 17.8 \text{ per cent} \end{aligned}$$

The portfolio variance and standard deviation depend on the proportion of investment in each security, as also the variance and covariance of each security included in the portfolio.

The formula for portfolio variance of a portfolio with more than two securities is as follows:

$$\sigma_p^2 = \sum_{i=1}^n \sum_{j=1}^n x_i x_j \sigma_{ij}$$

Where

$\sigma_p^2$  = Portfolio variance.

$x_i$  = Proportion of funds invested in security i (the first of a pair of securities)

$x_j$  = Proportion of funds invested in security j (the second of a pair of securities)

$\sigma_{ij}$  = The covariance between the pair of securities i and j.

$n$  = Total number of securities in the portfolio.

The double summation  $\sum_{i=1}^n \sum_{j=1}^n$

indicates that  $n^2$  numbers of values are to be summed up. These values are obtained by substituting the values of  $x_i$ ,  $x_j$  and  $\sigma_{ij}$  for each possible pair of securities.

The method of calculation can be illustrated through an example.

A convenient way to obtain the result is to set up the data required for calculation in the form of a variance-covariance matrix. Let us consider a portfolio with three securities A, B and C. The proportions of investment in each of these securities are 0.20, 0.30 and 0.50 respectively. The variance of each security and the covariance of each possible pair of securities may be set up as a matrix as follows:

**Variance-Covariance Matrix**

| Weight<br>↓ |   | →   |     |     |
|-------------|---|-----|-----|-----|
|             |   | 0.2 | 0.3 | 0.5 |
|             |   | A   | B   | C   |
| 0.2         | A | 52  | 63  | 36  |
| 0.3         | B | 63  | 39  | 74  |
| 0.5         | C | 36  | 74  | 45  |

The entries along the diagonal of the matrix represent the variances of securities A, B and C. The other entries in the matrix represent the covariance of the respective pairs of securities such as A and B, A and C, B and C.

Once the variance-covariance matrix is set up, the computation of portfolio variance is a comparatively simple operation.

Each cell in the matrix represents a pair of two securities. For example, the first cell in the first row of the matrix represents A and A; the second cell in the first row represents securities A and B, and so on. The variance or covariance in each cell has to be multiplied by the weights of the respective securities represented by that cell. These weights are available in the matrix at the left side of the row and the top of the column containing the cell. This process may be started from the first cell in the first row and continued for all the cells till the last cell of the last row is reached. When all these products are summed up, the resulting figure is the portfolio variance. The square root of this figure gives the portfolio standard deviation.

The variance of the illustrative portfolio given above can now be calculated.

$$\begin{aligned}\sigma_p^2 &= (0.2 \times 0.2 \times 52) + (0.2 \times 0.3 \times 63) + (0.2 \times 0.5 \times 36) \\ &\quad + (0.3 \times 0.2 \times 63) + (0.3 \times 0.3 \times 38) + (0.3 \times 0.5 \times 74) \\ &\quad + (0.5 \times 0.2 \times 36) + (0.5 \times 0.3 \times 74) + (0.5 \times 0.5 \times 45) \\ &= 53.71.\end{aligned}$$

The portfolio standard deviation is:

$$\sigma_p = \sqrt{53.71} = 7.3287$$

We have seen earlier that covariance between two securities may be expressed as the product of correlation coefficient between the two securities and standard deviations of the two securities.

Thus,

$$\sigma_{ij} = r_{ij} \sigma_i \sigma_j$$

Where

$\sigma_{ij}$  = Covariance between security i and security j.

$r_{ij}$  = Correlation coefficient between security i and security j.

$\sigma_i$  = Standard deviation of security i.

$\sigma_j$  = Standard deviation of security j.

Hence, the formula for computing portfolio variance may also be stated in the following form:

$$\sigma_p^2 = \sum_{i=1}^n \sum_{j=1}^n x_i x_j r_{ij} \sigma_i \sigma_j$$

To illustrate the use of this formula let us calculate the portfolio variance and standard deviation for a portfolio with the following characteristics.

| Security | $x_i$ | $\sigma_i$ | Correlation coefficients |
|----------|-------|------------|--------------------------|
| P        | 0.35  | 7          | P and Q = 0.7            |
| Q        | 0.25  | 16         | P and R = 0.3            |
| R        | 0.40  | 9          | Q and R = 0.4            |

It may be noted that correlation coefficient between P and P, Q and Q, R and R is 1. The variance-covariance matrix may be set up as follows:

| Weight |   | → | 0.35     | 0.25     | 0.40     |
|--------|---|---|----------|----------|----------|
|        |   | ↓ | P        | Q        | R        |
| 0.35   | P |   | 1x7x7    | 0.7x7x16 | 0.3x7x9  |
| 0.25   | Q |   | 0.7x16x7 | 1x16x16  | 0.4x16x9 |
| 0.40   | R |   | 0.3x9x7  | 0.4x9x16 | 1x9x9    |

The portfolio variance can now be calculated using this variance-covariance matrix as shown below:

$$\begin{aligned}
 \sigma_p^2 &= (0.35 \times 0.35 \times 1 \times 7 \times 7) + (0.35 \times 0.25 \times 0.7 \times 7 \times 16) \\
 &\quad + (0.35 \times 0.40 \times 0.3 \times 7 \times 9) + (0.25 \times 0.35 \times 0.7 \times 16 \times 7) \\
 &\quad + (0.25 \times 0.25 \times 1 \times 16 \times 16) + (0.25 \times 0.40 \times 0.4 \times 16 \times 9) \\
 &\quad + (0.40 \times 0.35 \times 0.3 \times 9 \times 7) + (0.40 \times 0.25 \times 0.4 \times 9 \times 16) \\
 &\quad + (0.40 \times 0.40 \times 1 \times 9 \times 9) \\
 &= 65.4945
 \end{aligned}$$

The portfolio standard deviation is:

$$\sigma_p = \sqrt{65.4945} = 8.09$$

A portfolio is a combination of assets. From a given set of  $n$  securities, any number of portfolios can be created. The portfolios may comprise of two securities, three securities, all the way up to ' $n$ ' securities. A portfolio may contain the same securities as another portfolio but with different weights. Thus, new portfolios can be created either by changing the securities in the portfolio or by changing the proportion of investment in the existing securities.

Each portfolio is characterized by its expected return and risk. Determining the expected return and risk (variance or standard deviation) of each portfolio that can be created from a set of selected securities is the first step in portfolio management and is called portfolio analysis.

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## Lesson 4.2 - The Markowitz Model

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Most people agree that holding two stocks is less risky than holding one stock. For example, holding stocks from textile, banking, and electronic companies is better than investing all the money on the textile company's stock. But building up the optimal portfolio is very difficult. Markowitz provides an answer to it with the help of risk and return relationship.

### Assumptions

The individual investor estimates risk on the basis of variability of returns i.e. the variance of returns. Investor's decision is solely based on the expected return and variance of returns only.

For a given level of risk, investor prefers higher return to lower return. Likewise, for a given level of return investor prefers lower risk than higher risk.

### The Concept

In developing his model, Markowitz had given up the single stock portfolio and introduced diversification. The single security portfolio would be preference if the investor is perfectly certain that his expectation of highest return would turn out to be real. In the world of uncertainty, most of the risk-averse investors would like to join Markowitz rather than keeping a single stock, because diversification reduces the risk. This can be shown with the help of the following illustration.

Take the stock of ABC company and XYZ company. The returns expected from each company and their probabilities of occurrence, expected returns and the variances are given. The calculation procedure is given in the table.

|                    | Stock ABC      | Stock XYZ      |
|--------------------|----------------|----------------|
| Return %           | 11 or 17       | 20 or 8        |
| Probability        | .5 each return | .5 each return |
| Expected Return    | 14             | 14             |
| Variance           | 9              | 36             |
| Standard deviation | 3              | 6              |

|                        |                                 |                   |
|------------------------|---------------------------------|-------------------|
| ABC Expected return    | $= .5 \times 11 + .5 \times 17$ | $= 14$            |
| XYZ Expected return    | $= .5 \times 20 + .5 \times 8$  | $= 14$            |
| ABC variance           | $= .5 (11-14)^2 + .5 (17-14)^2$ | $= 9$             |
| XYZ variance           | $= .5 (20-14)^2 + .5 (8-14)^2$  | $= 36$            |
| ABC standard deviation | $= \sqrt{\text{Variance}}$      | $= \sqrt{9} = 3$  |
| XYZ standard deviation | $= \sqrt{\text{Variance}}$      | $= \sqrt{36} = 6$ |

ABC and XYZ companies stocks have the same expected return of 14%. XYZ company's stock is much riskier than ABC stock, because the standard deviation of the former being 6 and latter 3. When ABC return is high XYZ return is low and vice-versa i.e. when there is 17% return from ABC, there would be 8% return from XYZ. Likewise when ABC return is 11% XYZ return is 20%. If a particular investor holds only ABC or XYZ he would stand to lose in the time of bad performance.

Suppose the investor holds two thirds of ABC and one third of XYZ, the return can be calculated as follows

N

$$R_p = \sum_{t=1}^N X_t R_t$$

$R_p$  = return on the portfolio

$X_t$  = proportion of total portfolio invested in security 1.

$R_t$  = expected return of security 1.

Let us calculate the expected return for the both the possibilities.

$$\text{Possibility 1} = \frac{2}{3} \times 11 + \frac{1}{3} \times 20 = 14$$

$$\text{Possibility 2} = \frac{2}{3} \times 17 + \frac{1}{3} \times 8 = 14$$

In both the situations, the investor stands to gain if the worst occurs, than by holding either of the security individually.

Holding two securities may reduce the portfolio risk too. The portfolio risk can be calculated with the help of the following formula.

$$\sigma_p = \sqrt{X_1^2 \sigma_1^2 + X_2^2 \sigma_2^2 + 2 X_1 X_2 (r_{12} X_2 \sigma_2)}$$

$\sigma_p$  = portfolio standard deviation

$X_1$  = percentage of total portfolio value in stock  $X_1$

$X_2$  = percentage of total portfolio value in stock  $X_2$

$$\begin{aligned}\sigma_1 &= \text{standard deviation of stock } X_1 \\ \sigma_2 &= \text{standard deviation of stock } X_2 \\ r_{12} &= \text{correlation co-efficient of } X_1 \text{ and } X_2 \\ r_{12} &= \frac{\text{covariance of } X_{12}}{\sigma_1 \sigma_2}\end{aligned}$$

Using the same example given in the return analysis, the portfolio risk can be estimated. Let us assume ABC as  $X_1$  and XYZ as  $X_2$ . Now the covariance is:  $X_{12}$

$$\begin{aligned}\text{Cov of } X_{12} &= \frac{1}{N} \sum_{t=1}^N (R_1 - \bar{R}_1)(R_2 - \bar{R}_2) \\ &= \frac{1}{2}[(11-14)(20-14)(17-14)(18-14)] \\ &= \frac{1}{2}[(-18) + (-18)] = -36/2 = -18 \\ R &= \frac{\text{covariance of } X_{12}}{\sigma_1 \sigma_2} = -18/3 \times 6 = -1\end{aligned}$$

The correlation co-efficient indicates the similarity or dissimilarity in the behavior of  $X_1$  and  $X_2$  stocks. In correlation, co-variance is not taken as an absolute value but relative to the standard deviation of individual securities. It shows, how much X and Y vary together as a proportion of their combined individual variations measured by  $\sigma_1$  and  $\sigma_2$ . In our example, the correlation co-efficient is -1.0 which indicates that there is a perfect negative correlation exists between the securities and they tend to move in the same direction. If the correlation is 1, perfect positive correlation exists between the securities and they tend to in the same direction. If the correlation co-efficient is zero, the securities' returns are independent. Thus, the correlation between two securities depends upon the covariance between the two securities and the standard deviation of each security.

Now, let us proceed to calculate the portfolio risk. Combination of two securities reduces the risk factor if less degree of positive correlation exists between them. In our case, the correlation coefficient is -1.

$$\begin{aligned}\sigma_p &= \sqrt{X_1^2 \sigma_1^2 + X_2^2 \sigma_2^2 + 2X_1 X_2(r_{12}\sigma_1 \sigma_2)} \\ &= \sqrt{(2/3)^2 \times 9 + (1/3)^2 \times 36 + 2 \times 2/3 \times 1/3 (-1 \times 3 \times 6)} \\ &= \sqrt{4 + 4 + (-8)} \\ &= \sqrt{0}\end{aligned}$$

The portfolio risk is nil if the securities are related negatively. This indicates that the risk can be eliminated if the securities are perfectly negatively correlated. The standard deviation of the portfolio is sensitive to (1) the proportions of funds devoted to each stock (2) the standard deviation of each security and (3) co-variance between two stocks.

The change in portfolio proportions can change the portfolio risk. Taking the same example of ABC and XYZ stock, the portfolio standard deviation is calculated for different proportions.

| Stock ABC<br>(X1) | Stock XYZ<br>(X2) | Portfolio Standard<br>Deviation |
|-------------------|-------------------|---------------------------------|
| 100               | 0                 | 3                               |
| 66.66             | 33.3              | 0                               |
| 50.0              | 50.0              | 1.5                             |
| 0                 | 100               | 6                               |

By skillful balancing of the investment proportions in different securities, the portfolio risk can be brought down to zero. The proportion to be invested in each security can be found out by  $X_1 = \sigma_2 \div (\sigma_1 + \sigma_2)$  the precondition is that the correlation co-efficient should be -1.0. Otherwise it is

$$X_1 = \frac{\sigma_2^2 - (r_{12} \sigma_1 \sigma_2)}{\sigma_1^2 + \sigma_2^2 - (2 r_{12} \sigma_1 \sigma_2)}$$

If the correlation co-efficient is less than the ratio of smaller standard deviation to larger standard deviation, then the combination of two securities provides a lesser standard deviation of return than when either of the security is taken alone. In our example,

$$-1 < 3/6 \text{ i.e. } -1 < +.50$$

If the standard deviation ratio is 4/6 and the correlation co-efficient is +.8, the combination of securities is not profitable because

$$+.8 > 4/6 \text{ i.e. } +.8 > .66$$

### Varying Degrees of Correlation

Here in order to learn more about the relationship between securities, different degrees of correlation co-efficients are analyzed. Extreme cases like +1, 1, intermediate values and no correlation are calculated for two securities namely X and Y. We assume that the investor has specific amount of money to invest and that can be allocated in any proportion between the securities. Security X has an expected rate of return of 5% and a standard deviation of 4%. While for security Y, the expected return is 8% and the standard deviation of return is 10%.

Let us first work out the expected return and the portfolio risk for different values of correlation coefficients for varying proportions of the securities X and Y. Portfolio return is calculated with the equation:

$$R_p = X_x R_x + X_y R_y$$

If there is 75% investment on X and 25% on Y, then  $R_p = .75(5\%) + 0.25(8\%) = 5.75\%$  then the  $\sigma_p$  would be found out by using equation

$$\begin{aligned}\sigma_p &= \sqrt{X_x^2 \sigma_x^2 + X_y^2 \sigma_y^2 + 2X_x X_y (r_{xy} \sigma_x \sigma_y)} \\ &= \sqrt{3/4 \times 3/4 \times 16 + 1/4 \times 1/4 \times 100 + 2 \times 3/4 \times 1/4 (1 \times 4 \times 10)} \\ &= 5.5\end{aligned}$$

Table gives the values of  $R_p$  and  $\sigma_p$  for varying degrees of correlation co-efficients.

| Proportion of<br>X security in<br>portfolio X | Proportion of<br>Y security in<br>portfolio 1-X | $R_p$ | $\sigma_p$<br>Rxy<br>+1 | $\sigma_p$<br>Rxy<br>-1 | $\sigma_p$<br>Rxy<br>0 | $\sigma_p$<br>+.5 |
|-----------------------------------------------|-------------------------------------------------|-------|-------------------------|-------------------------|------------------------|-------------------|
| 1.00                                          | 0.00                                            | 5.00  | 4.0                     | 4.0                     | 4.0                    | 4.0               |
| 0.75                                          | 0.25                                            | 5.75  | 5.5                     | 0.5                     | 3.9                    | 4.8               |
| 0.50                                          | 0.50                                            | 6.50  | 7.0                     | 3.0                     | 5.4                    | 6.25              |
| 0.25                                          | 0.75                                            | 7.25  | 8.5                     | 6.5                     | 7.6                    | 8.1               |
| 0.00                                          | 1.00                                            | 8.00  | 10.0                    | 10.0                    | 10.0                   | 10.0              |

### Simple Diversification

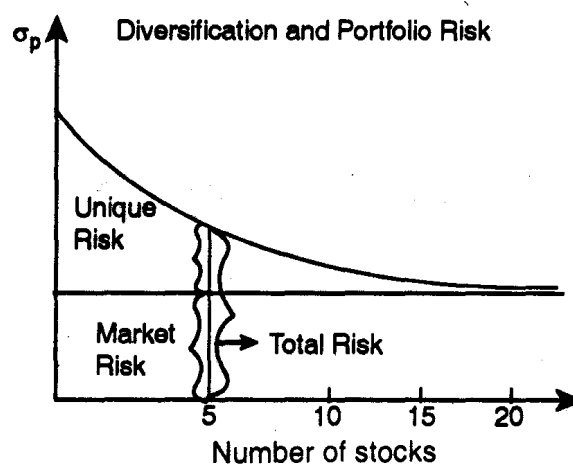
Portfolio risk can be reduced by the simplest kind of diversification. Portfolio means the group of assets an investor owns. The assets may vary from stocks to different types of bonds. Some times the portfolio may consist of securities of different industries. When different assets are added to the portfolio, the total risk tends to decrease. In the case of common stocks, diversification reduces the unsystematic risk or unique risk. Analysts opine that if 15 stocks are added in a portfolio of the investor, the unsystematic risk can be reduced to zero. But at the same time if the number exceeds 15, additional risk reduction cannot be gained. But diversification cannot reduce systematic or undiversifiable risk.

The naive kind of diversification is known as simple diversification. In the case of simple diversification, securities are selected at random and no analytical procedure is used.

Total risk of the portfolio consists of systematic and unsystematic risk and this total risk is measured by the variance of the rates of returns over time. Many studies have shown that the systematic risk forms one quarter of the total risk.

The simple random diversification reduces the total risk. The reason behind this is that the unsystematic price fluctuations are not correlated with the market's systematic fluctuations. The figure shows how the simple diversification reduces the risk. The standard deviations of the portfolios are given in Y axis and the number of randomly selected portfolio securities in the X axis.

The standard deviation was calculated for each portfolio and plotted. As the portfolio size increases, the total risk line Starts declining. It flattens out after a certain point. Beyond that limit, risk cannot be reduced. This indicates that spreading out the assets beyond certain level cannot be expected to reduce the portfolio's total risk below the level of undiversifiable risk.



### Problems of Vast Diversification

Spreading the investment on too many assets will give rise to problems such as purchase of poor performers, information inadequacy, high research cost and transaction cost.

### Purchase of Poor Performers

While buying numerous stocks, sometimes the investor may also buy stocks that will not yield adequate return.

## Information Inadequacy

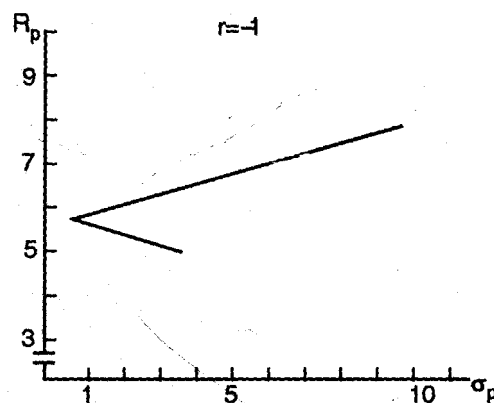
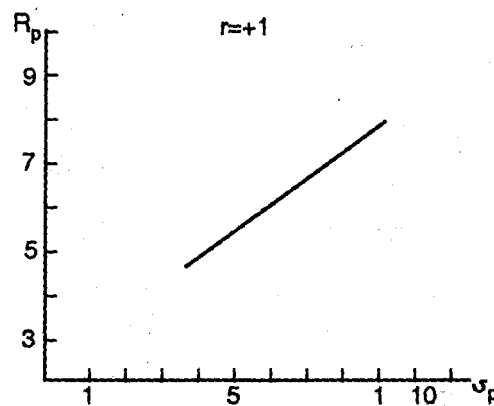
If there are too many securities in a portfolio, it is difficult for the portfolio manager to get information about their individual performance. The portfolio manager has to be in touch with the details regarding the individual company performance. To get all the information simultaneously is quite High research cost If a large number of stocks are included, before the inclusion itself the returns and risk of the individual stock have to be analysed. Towards this end, lot of information has to be gathered and kept in store and these procedures involve high cost.

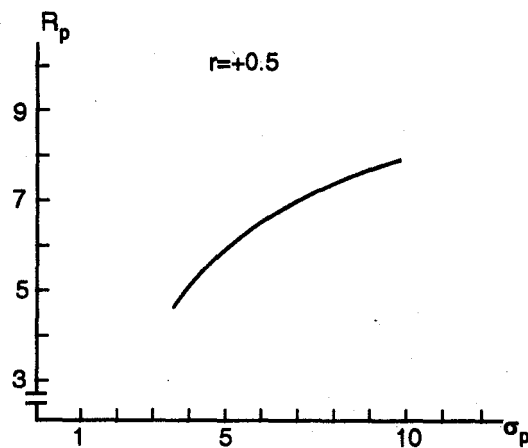
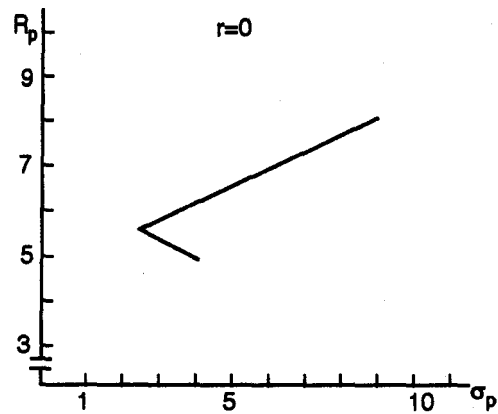
## High Transaction Cost

When small quantities of stocks are purchased frequently, the investor has to incur higher transaction cost than the purchase of large blocks at less frequent intervals. In spite of all these difficulties big financial institutions purchase hundreds of different stocks. Likewise, mutual funds also invest in different stocks.

## Risk and Return With Different Correlation

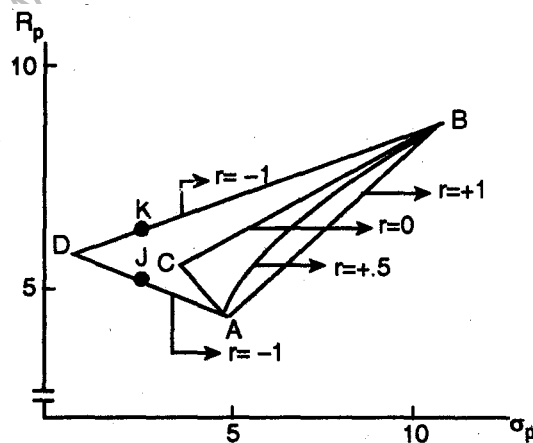
The four figures indicate the relationship between risk and return.





All the graphs show the portfolio risks under varying levels of correlation co-efficients. All the figures can be assembled together and placed in a single figure. The following figure expresses the relationship between expected returns and standard deviations of returns for various correlation coefficients.

### Two Security Portfolios with Different Correlation Coefficients



In the figure, portfolio return is given on the vertical axis and portfolio risk on the horizontal axis. Point A represents 100 per cent holdings of X and point B represents 100 per cent holdings of Y. The intermediate points along the line segment AB represent portfolios containing various combinations of two securities.

The straight line  $r = +1$  shows that the portfolio risk increases with the increase in portfolio return. Here, the combination of two securities could not reduce the portfolio risk because of their positive correlation. Again, the ratio of smaller standard deviation to larger deviation is less than the correlation coefficient.

$1 > 4/10 = 0.4$  which indicates that benefit cannot be derived by combining both the securities. In this case if an investor wishes to minimize his risk, it would be better for him to invest all the money in security X where the risk is comparatively lower.

The  $r_{xy} = 0$  line is a hyperbola. Along the line segment ACB, the  $r = 0$ . CB contains portfolios that are superior to those along the line segment AC. Markowitz says that all portfolios along the ACB line segment are feasible but some are more efficient than others. The line segment ADB indicates ( $r = -1$ ) perfect inverse correlation and it is possible to reduce portfolio risk to zero. Portfolios on the line segment DB provide superior returns than on the line segment AD. For example, take two points on both the line segments K and J. The point K is superior to the point J because with the same level of risk the investor earns more return on point K than on point J.

Thus, Markowitz diversification can lower the risk if the securities in the portfolio have low correlation coefficients.

### Markowitz Efficient Frontier

The risk and return of all portfolios plotted in risk-return space would be dominated by efficient portfolios. Portfolio may be constructed from available securities. All the possible combinations of expected return and risk compose the attainable set. The following example shows the expected return and risk of different portfolios.

#### Portfolio Risk and Return

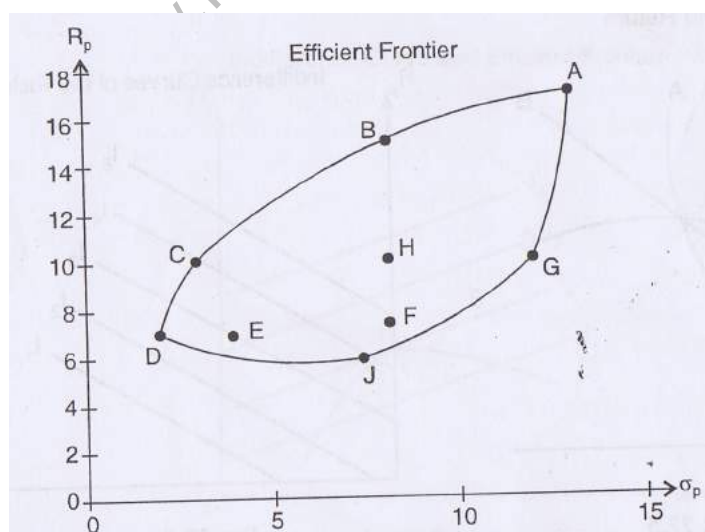
| Portfolio | Expected Return ( $R_p$ ) % | Risk ( $\sigma_p$ ) |
|-----------|-----------------------------|---------------------|
| A         | 17                          | 13                  |
| B         | 15                          | 8                   |
| C         | 10                          | 3                   |

|   |    |     |
|---|----|-----|
| D | 7  | 7   |
| E | 7  | 4   |
| F | 7  | 8   |
| G | 10 | 12  |
| H | 9  | 8   |
| J | 6  | 7.5 |

The attainable sets of portfolios are illustrated in figure. Each of the portfolios along the line or within the line ABCDEFGJ is possible. It is not possible for the investor to have portfolio outside of this perimeter because no combination of expected return and risk exists there.

When the attainable sets are examined, some are more attractive than others. Portfolio B is more attractive than portfolios F and H because B offers more return on the same level of risk. Likewise, C is more attractive than portfolio G even though same level of return is got in both the points; the risk level is lower at point C. In other words, any portfolio which gives more return for the same level of risk or same return with lower risk is more preferable than any other portfolio.

Among all the portfolios, the portfolios which offer the highest return at particular level of risk are called efficient portfolios. Here the efficient portfolios are A, B, C and D, because at these points no other portfolio offer higher return. The ABCD line is the efficient frontier along which all attainable and efficient portfolios are available. Now the question raised is which portfolio the investor should choose? He would choose a portfolio that maximizes his utility. For that utility analysis has to be done.



## Utility Analysis

Utility is the satisfaction the investor enjoys from the portfolio return. An ordinary investor is assumed to receive greater utility from higher return and vice-versa. The investor gets more satisfaction or more utility in  $X + 1$  rupees than from  $X$  rupee.

If he is allowed to choose between two certain investments, he would always like to take the one with larger outcome. Thus, utility increases with increase in **return**.

The utility function makes certain assumptions about an investors' taste for risk. The investors are categorised into risk averse, risk neutral and risk seeking investor. All the three types can be explained with the help of a **fair gamble**.

In a fair gamble which cost ₹ 1, the on are A and B events. A event will yield ₹ 2. Occurrence of B event is a dead loss i.e 0. The chance of occurrence of both the events are 50% and 50%.

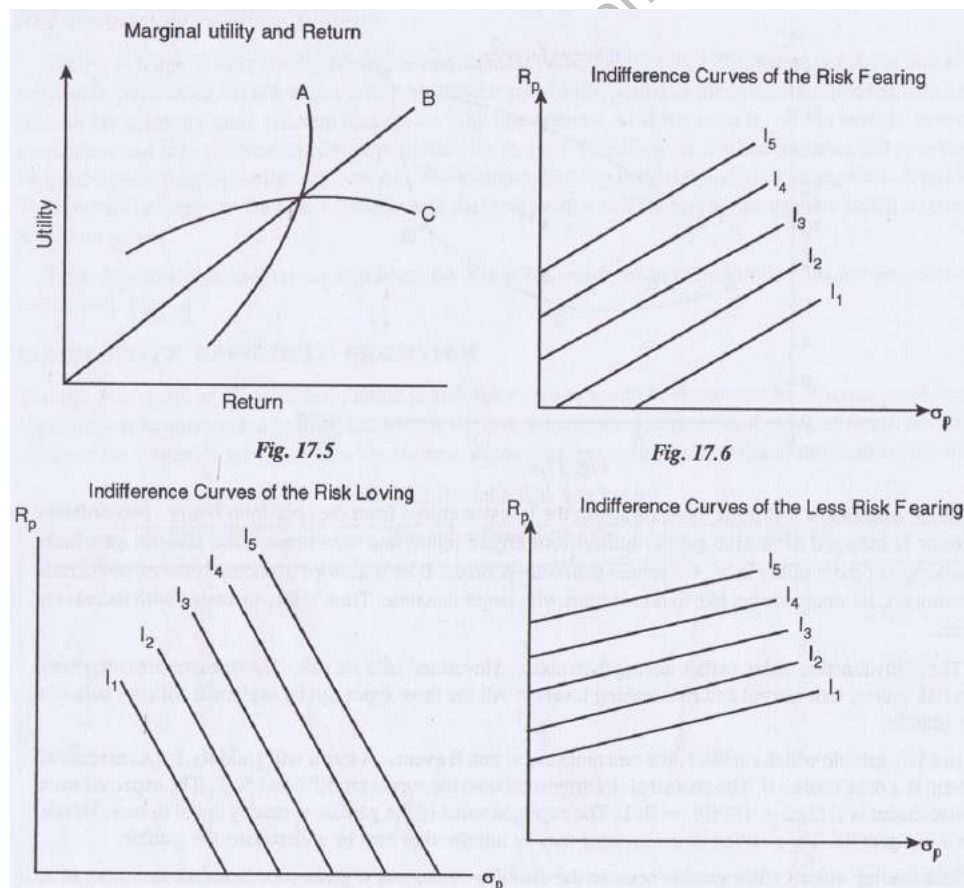
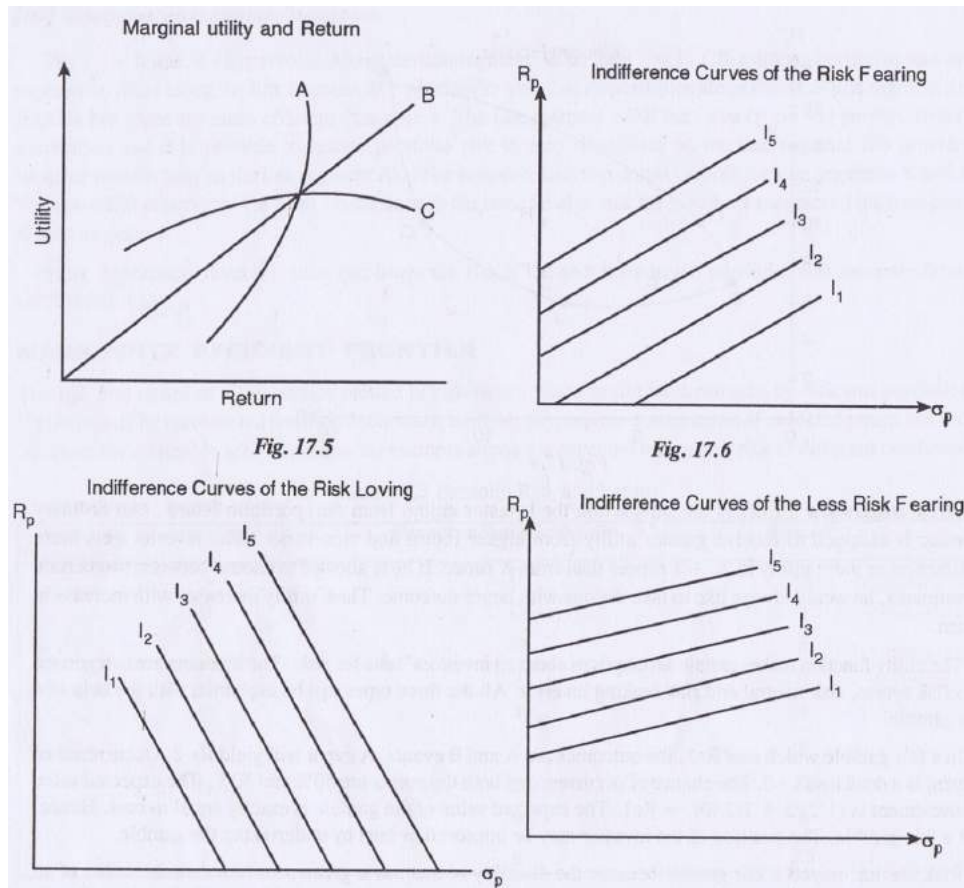
The expected value of investment is  $(1/2) 2 + 1/2 (0) = ₹ 1$ . The expected value of the gamble is exactly equal to cost. Hence, it is a fair gamble. The position of the investor may, be improved or hurt by undertaking the gamble.

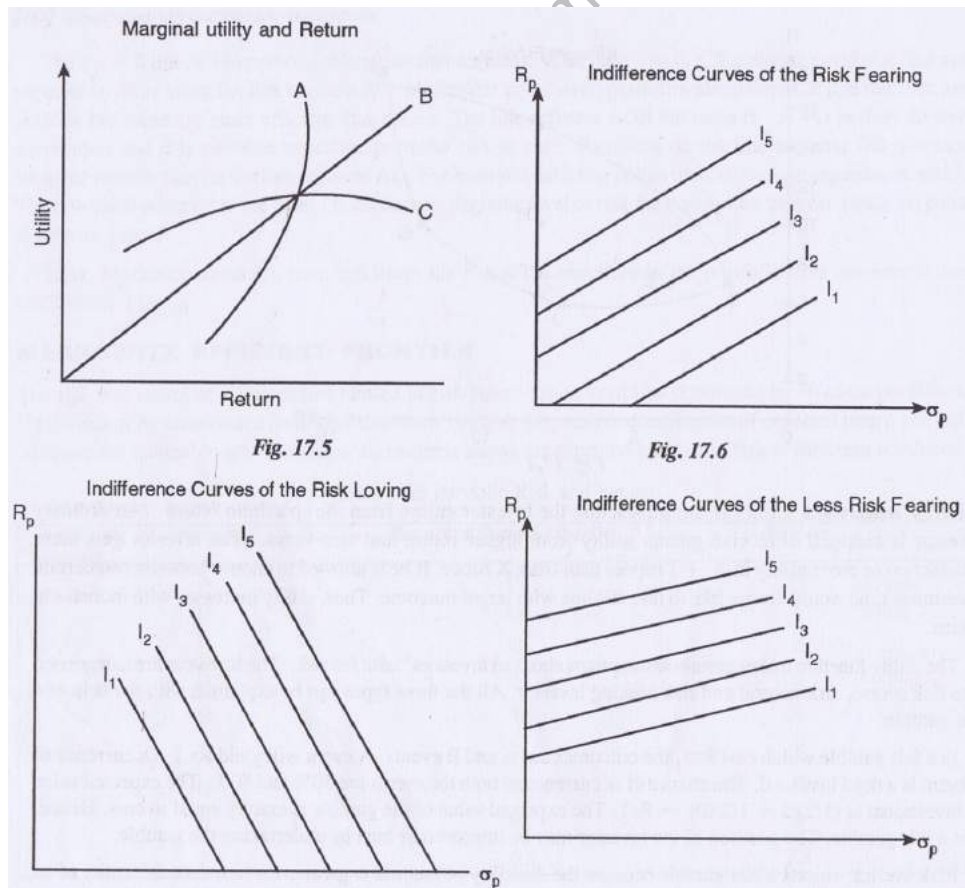
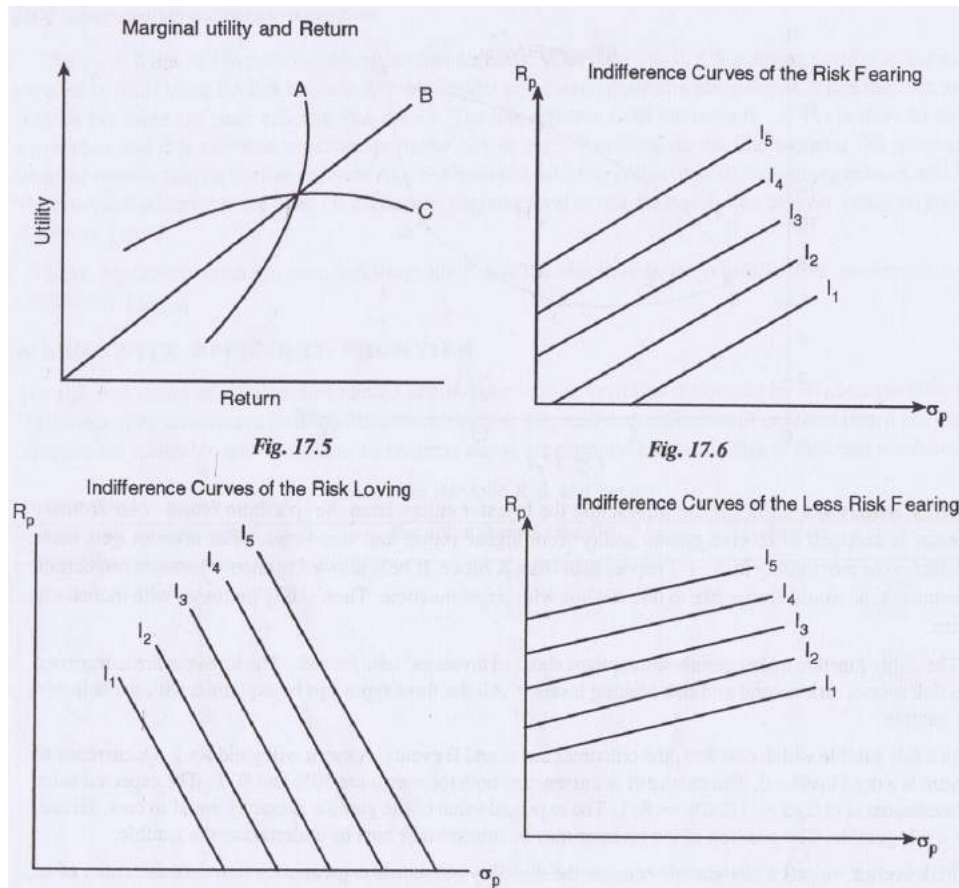
Risk avertor rejects a fair gamble because the disutility of the loss is greater for him than the utility of an equivalent gain. Risk neutral investor means that he is indifferent to whether a fair gamble is undertaken or not.

The risk seeking investor would select a fair gamble i.e. he would choose to invest. The expected utility of investment is higher than the expected utility of not investing. These three different types of investors are shown in figure.

The curves ABC are three different slopes of utility curves. The upward sloping curve A shows increasing marginal utility. The straight line B shows constant utility, and curve C shows diminishing marginal utility. The constant utility, a linear function means doubling of returns would double the utility and it indicates risk neutral situation.

The increasing marginal utility suggests that the utility increases more than proportion to increase in return and shows the risk lover. The curve C shows risk averse investor. The utility he gains from additional return declines gradually. The figures show the utility curves of the different investors.

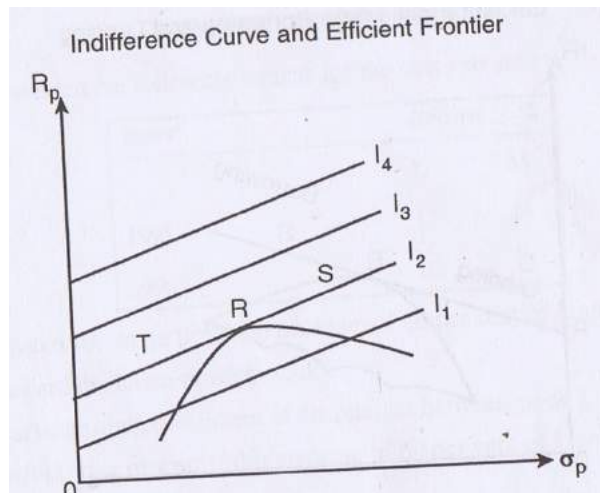




Investors generally like to get more returns for additional risks assumed and the lines would be positively sloped. The risk lover's utility curves are negatively sloped and converge towards the origin. For the risk fearing, lower the risk of the portfolio, happier he would be. The degree of the slope of indifference curve indicates the degree of risk aversion. The conservative investor needs larger return to undertake small increase in risk (Figure) The aggressive investor would be willing to undertake greater risk for smaller return. Even though the investors dislike risk, their trade off between risk and return differs.

### Indifference Map and the Efficient Frontier

Each investor has a series of indifference curves. His final choice out of the efficient set depends on his attitude towards risk. The figure shows the efficient frontier and the indifference map.



The utility of the investor or portfolio manager increases when he moves up the indifference map from  $I_1$  to  $I_4$ . He can achieve higher expected return without an increase in risk. In the figure 122 touches the efficient frontier at point R. Even though the points I and S are in the  $I_1$  curve, R is the only attainable portfolio which maximises the utility of the investor. Thus, the point at which the efficient frontier tangentially touches the highest indifference curve determines the most attractive portfolio for the investor.

### Leveraged Portfolios

In the above model, the investor is assumed to have a certain amount of money to make investment for a fixed period of time. There is no borrowing and lending opportunities. When the investor is not allowed to use the borrowed money, he is denied the opportunity of having financial leverage.

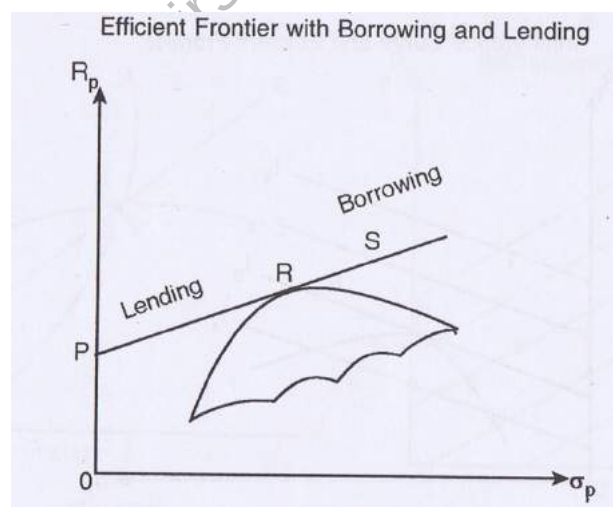
Again, the investor is assumed to be investing only on the risky assets. Riskless assets are not included in the portfolio. To have a leveraged portfolio, investor has to consider not only risky assets but also risk free assets. Secondly, he should be able to borrow and lend money at a given rate of interest.

### What is Risk Free Asset?

The features of risk free asset are:(a) absence of default risk and interest risk and (b) full payment of principal and interest amount. The return from the risk free asset is certain and the standard deviation of the return is nil. The relationship between the rate of return of the risk free asset and risky asset is zero. These types of assets are usually fixed income securities. But fixed income securities issued by private institutions have the chance of default. If the fixed income securities are from the government, they do not possess the default risk and the return from them are guaranteed. Further, the government issues securities of different maturity period to match the length of investors holding period. The risk free assets may be government securities, treasury bills and time deposits in banks.

### Inclusion of Risk Free Asset

Now, the risk free asset is introduced and the investor can invest part of his money on risk free asset and the remaining amount on the risky asset. It is also assumed that the investor would be able to borrow money at risk free rate of interest. When risk free asset is included in the portfolio, the feasible efficient set of the portfolios is altered. This can be explained in the Figure.



In the figure, OP is gained with zero risk and the return is earned through holding risk free asset. Now, the investor would attempt to maximise his expected return and risk

relationship by purchasing various combinations of riskless asset and risky assets. He would be moving on the line connecting attainable portfolio R and risk free portfolio P i.e. the line PR. When he is on the PR, part of his money is invested in fixed income securities i.e. he has lent some amount of money and invested the rest in the risky asset within the point PR. He is depending upon his own funds. But, if he moves beyond the point R to S he would be borrowing money. Hence the portfolios located between the points RP are lending portfolios and beyond the point R consists of borrowing portfolios. Holding portfolio in PR segment with risk free securities would actually reduces risk more than the reduction in return.

### Single Index Model

Casual observation of the stock prices over a period of time reveals that most of the stock prices move with the market index. When the Sensex increases, stock prices also tend to increase and vice-versa. This indicates that some underlying factors affect the market index as well as the stock prices. Stock prices are related to the market index and this relationship could be used to estimate the return on stock. Towards this purpose, the following equation can be used

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

where

$R_i$  - expected return on security i

$\alpha_i$  - intercept of the straight line or alpha co-efficient

$\beta_i$  - slope of straight line or beta co-efficient

$R_m$  - the rate of return on market index

$e_i$  - error term

According to the equation, the return of a stock can be divided into t components, the return due to the market and the return independent of the market.  $\beta_i$  indicates the sensitiveness of the stock return to the changes in the market return. For example  $\beta_i$  of 1.5 means that the stock returns is expected to increase by 1.5% when the market index return increases by 1% and vice-versa. Likewise,  $\beta_i$  of 0.5 expresses that the individual stock return would change by 0.5 per cent when there is a change of 1 per cent in the market return.  $\beta_i$  of 1 indicate that the market return and the security return are moving in tandem. The estimates of  $\beta_i$  and  $\alpha_i$  are obtained from regression analysis.

The single index model is based on the assumption that stocks vary together because of the common movement in the stock market and there are no effects beyond the market (i.e. any fundamental factor effects) that account the stocks co-movement. The expected return, standard deviation and co-variance of the single index model represent the joint movement of securities. The mean return is

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

$$\text{The variance of security's return, } \sigma^2 = \beta_i^2 \sigma_m^2 + \sigma_{ei}^2$$

The covariance of returns between securities i and j is

$$\sigma_{ij} = \beta_i \beta_j \sigma_m^2$$

The variance of the security has two components namely, systematic risk or market risk and unsystematic risk or unique risk. The variance explained by the index is referred to as systematic risk. The unexplained variance is called residual variance or unsystematic risk. Systematic risk =  $\beta_i^2 \times$  variance of market index.

$$= \beta_i^2 \sigma_m^2$$

Unsystematic risk = Total variance — Systematic risk.

$$e_i^2 = \sigma_i^2 - \text{systematic risk.}$$

Thus, the total risk = Systematic risk + Unsystematic risk.

$$\sigma_i^2 = \beta_i^2 \sigma_m^2 + e_i^2$$

From this, the portfolio variance can be derived

$\sigma_p^2$  = variance of portfolio

$\sigma_m^2$  = expected variance of index

$e_i^{2m}$  = variation in security's return not related to the market index

$x_i$  = the portion of stock i in the portfolio

Likewise expected return on the portfolio also can be estimated. For each security  $\alpha_i$  and  $\beta_i$  should be estimated. N

$$RP = \frac{\sum_{i=1}^N x_i (\alpha_i + \beta_i R_m)}{\sum_{i=1}^N x_i}$$

Portfolio return is the weighted average of the estimated return for each security in the portfolio. The  $f$  weights are the respective stocks' proportions in the portfolio.

A portfolio's alpha value is a weighted average of the alpha values for its component securities using the  $F$  proportion of the investment in a security as weight.

$$\sigma_p = \frac{\sum_{i=1}^N x_i \alpha_i}{\sum_{i=1}^N x_i}$$

$\sigma_p$  - Value of the alpha for the portfolio

$x_i$  - Proportion of the investment on security  $i$

$\alpha_i$  - Value of alpha for security  $i$

$N$  - The number of securities in the portfolio

Similarly, a portfolio's beta value is the weighted average of the beta values of its component stocks using relative share of them in the portfolio as weights.

$$\sigma_p = \sum_{i=1}^N x_i \beta_i$$

$\beta_p$  is the portfolio beta.

### Sharpe's Optimal Portfolio

Sharpe had provided a model for the selection of appropriate securities in a portfolio. The selection of any stock is directly related to its excess return-beta ratio.

$$\frac{R_i - R_f}{\beta_i}$$

Where

$R_i$  = the expected return on stock  $i$

$R_f$  = the return on a riskless asset

$\beta_i$  = the expected change in the rate of return on stock  $i$  associated with one unit change in the market return

The excess return is the difference between the expected return on the stock and the riskless rate of interest such as the rate offered on the government security or treasury bill. The excess return to beta ratio measures the additional return on a security (excess of the riskless asset return) per unit of systematic risk or non-diversifiable risk. This ratio provides a relationship between potential risk and reward.

Ranking of the stocks are done on the basis of their excess return to beta. Portfolio managers would like to include stocks with higher ratios. The selection of the stocks depends on a unique cut-off rate such that all stocks with higher ratios of  $R_i - R_f / \beta_i$  are included and the stocks with lower ratios are left off. The cut-off point is denoted by  $C^*$ .

The steps for finding out the stocks to be included in the optimal portfolio are given below

1. Find out the “excess return to beta” ratio for each stock under consideration.
2. Rank them from the highest to the lowest.
3. Proceed to calculate C for all the stocks according to the ranked order using the following formula.

$$C_i = \frac{\sigma_m^2 \sum_{i=1}^N \frac{(R_i - R_f) \beta_i}{\sigma_{ei}^2}}{1 + \sigma_m^2 \sum_{i=1}^N \frac{\beta_i^2}{\sigma_{ei}^2}}$$

$\sigma_m^2$  = variance of the market index

$\sigma_{ei}^2$  = variance of a stock's movement that is not associated with the movement of market index i.e. stock's unsystematic risk.

4. The cumulated values of C start declining after a particular C and that point is taken as the cut-off point and that stock ratio is the cut-off ratio C.

This is explained with the help of an example.

Data for finding out the optimal portfolio are given below:

| Security Number | Mean Return<br>$R_i$ | Excess Return<br>$R_i - R_f$ | Beta<br>$\beta$ | Unsystematic Risk<br>$\sigma_{ei}^2$ | Excess Return to Beta<br>$\frac{R_i - R_f}{\beta_i}$ |
|-----------------|----------------------|------------------------------|-----------------|--------------------------------------|------------------------------------------------------|
| 1               | 19                   | 14                           | 1.0             | 20                                   | 14                                                   |
| 2               | 23                   | 18                           | 1.5             | 30                                   | 12                                                   |
| 3               | 11                   | 6                            | 0.5             | 10                                   | 12                                                   |
| 4               | 25                   | 20                           | 2.0             | 40                                   | 10                                                   |
| 5               | 13                   | 8                            | 1.0             | 20                                   | 8                                                    |
| 6               | 9                    | 4                            | 0.5             | 50                                   | 8                                                    |
| 7               | 14                   | 9                            | 1.5             | 30                                   | 6                                                    |

The riskless rate of interest is 5 per cent and the market variance is 10. Determine the cut-off point.

| Security Number | $\frac{R_i - R_f}{\beta_i}$ | $\frac{(R_i - R_f) \times \beta_i}{\sigma e_i^2}$ | $\sum \frac{N (R_i - R_f) \beta_i}{i=1 \sigma e_i^2}$ | $\frac{\beta_i^2}{\sigma e_i^2}$ | $\frac{\beta_i^2}{\sigma e_i^2}$ | $C_i$ |
|-----------------|-----------------------------|---------------------------------------------------|-------------------------------------------------------|----------------------------------|----------------------------------|-------|
| 1               | 14                          | 0.7                                               | 0.7                                                   | 0.05                             | 0.05                             | 4.67  |
| 2               | 12                          | 0.9                                               | 1.6                                                   | 0.075                            | 0.125                            | 7.11  |
| 3               | 12                          | 0.3                                               | 1.9                                                   | 0.025                            | 0.15                             | 7.60  |
| 4               | 10                          | 1.0                                               | 2.9                                                   | 0.1                              | 0.25                             | 8.29  |
| 5               | 8                           | 0.4                                               | 3.3                                                   | 0.05                             | 0.3                              | 8.25  |
| 6               | 8                           | 0.04                                              | 3.34                                                  | 0.005                            | 0.305                            | 8.25  |
| 7               | 6                           | 0.45                                              | 3.79                                                  | 0.075                            | 0.38                             | 7.90  |

C calculations are given below

For Security 1

$$C_1 = \frac{10 \times .7}{1 + (10 \times .05)} = 4.67$$

Here 0.7 is got from column 4 and 0.05 from column 6. Since the preliminary calculations are over, it is easy to calculate the C

$$C_2 = \frac{10 \times .1.6}{1 + (10 \times .125)} = 7.11$$

$$C_3 = \frac{10 \times 1.9}{1 + (10 \times .125)} = 7.11$$

$$C_4 = \frac{10 \times 2.9}{1 + (10 \times .25)} = 8.2$$

$$C_5 = \frac{10 \times 3.3}{1 + (10 \times .3)} = 8.25$$

$$C_6 = \frac{10 \times 3.34}{1 + (10 \times .305)} = 8.25$$

$$C_7 = \frac{10 \times 3.79}{1 + (10 \times .38)} = 7.90$$

The highest  $C_i$  value is taken as the cutoff point i.e.  $C^*$ . The stocks ranked above  $C^*$  have high excess returns to beta than the cut-off  $C$ . and all the stocks ranked below  $C^*$  have low excess returns to beta. Here, the cut-off rate is 8.29. Hence, the first four securities are selected. If the number of stocks is larger there is no need to calculate  $C_i$  values for all the stocks after the ranking has been done. It can be calculated until the  $C^*$  value is found and after calculating for one or two stocks below it, the calculations can be terminated.

The  $C_i$  can be stated with mathematically equivalent way.

$$C_i = \frac{\beta_{ip} (R_p - R_f)}{\beta_i}$$

$\beta_{ip}$  - the expected change in the rate of return on stock  $i$  associated with 1 per cent change in the return on the optimal portfolio.

$R_p$  - the expected return on the optimal portfolio

$\beta_{ip}$  and  $R_p$  cannot be determined until the optimal portfolio is found. To find out the optimal portfolio, the formula given previously should be used. Securities are added to the portfolio as long as

$$\frac{R_i - R_f}{\beta_i} > C_i$$

The above equation can be rearranged with the substitution of equation:

$$C_i = \frac{\beta_{ip} (R_p - R_f)}{\beta_i}$$

Now we have,

$$R_i - R_f > \beta_{ip} (R_p - R_f)$$

The right hand side is the expected excess return on a particular stock based on the expected performance of the optimum portfolio. The term on the left hand side is the expected excess return on the individual stock. Thus, if the portfolio manager believes that a particular stock will perform better than the expected return based on its relationship to optimal portfolio, he would add the stock to the portfolio.

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### Lesson 4.3 - Portfolio Construction

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Portfolio is a combination of securities such as stocks, bonds and money market instruments. The process of blending together the broad asset classes so as to obtain optimum return with minimum risk is called portfolio construction. Diversification of investments helps to spread risk over many assets. A diversification of securities gives the assurance of obtaining the anticipated return on the portfolio. In a diversified portfolio, some securities may not perform as expected, but others may exceed the expectation and making the actual return of the portfolio reasonably close to the anticipated one. Keeping a portfolio of single security may lead to a greater livelihood of the actual return somewhat different from that of the expected return. Hence, it is a common practice to diversify securities in the portfolio.

#### Approaches in Portfolio Construction

Commonly, there are two approaches in the construction of the portfolio of securities viz, traditional approach and Markowitz efficient frontier approach. In the traditional approach, investor's needs in terms of income and capital appreciation are evaluated and appropriate securities are selected to meet the needs of the investor. The common practice in the traditional approach is to evaluate the entire financial plan of the individual. In the modern approach, portfolios are constructed to maximize the expected return for a given level of risk. It views portfolio construction in terms of the expected return and the risk associated with obtaining the expected return.

#### The Traditional Approach

The traditional approach basically deals with two major decisions. They are:

- (a) Determining the objectives of the portfolio.
- (b) Selection of securities to be included in the portfolio.

Normally, this is carried out in four to six steps. Before formulating the objectives, the constraints of the investor should be analysed. Within the given framework of constraints, objectives are formulated. Then based on the objectives, securities are selected. After that, the risk and return of the securities should be studied. The investor has to assess the major risk categories that he or she is trying to minimize. Compromise on risk and non-risk

factors has to be carried out. Finally relative portfolio weights are assigned to securities like bonds, stocks and debentures and then diversification is carried out. The flow chart 4.5 explains this

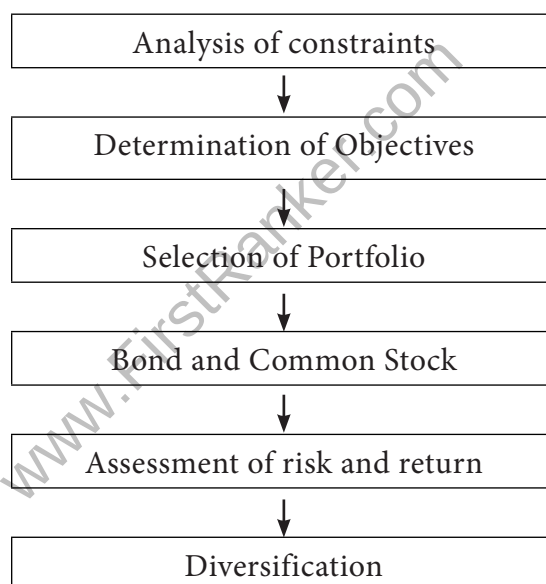
### Analysis of Constraints

The constraints normally discussed are: income needs, liquidity time horizon, safety, tax considerations and the temperament.

### Income Needs

The income needs depend on the need for income in constant rupees and current rupees. The need for income in current rupees arises from the investor's need to meet all or part of the living expenses. At the same time inflation may erode the purchasing power, the investor may like to offset the effect of the inflation and so, needs income in constant rupees.

#### Steps In Traditional Approach



#### (a) Need for current

**Income** The investor should establish the income which the portfolio should generate. The current income need depends upon the entire current financial plan of the investor. The expenditure required to maintain a certain level of standard of living and the other entire income generating source should be determined. Once this information is arrived at, it is possible to decide how much income must be provided for the portfolio of securities.

*(b) Need for Constant Income*

Inflation reduces the purchasing power of the money. Hence, the investor estimates the impact of inflation on his estimated stream of income and tries to build a portfolio which could offset the effect of inflation. Funds should be invested in such securities where income from them might increase at a rate that would offset the effect of inflation. The inflation or purchasing power risk must be recognized but this does not pose a serious constraint on portfolio if growth stocks are selected.

### **Liquidity**

Liquidity need of the investment is highly individualistic of the investor. If the investor prefers to have high liquidity then funds should be invested in high quality short term debt maturity issues such as money market funds, commercial papers and shares that are widely traded. Keeping the funds in shares that are poorly traded or stocks in closely held business and real estate lack liquidity. The investor should plan his cash drain and the need for net cash inflows during the investment period.

### **Safety of the Principal**

Another serious constraint to be considered by the investor is the safety of the principal value at the time of liquidation. Investing in bonds and debentures is safer than investing in the stocks. Even among the stocks, the money should be invested in regularly traded companies of longstanding. Investing money in the unregistered finance companies may not provide adequate safety

### **Time Horizon**

Time horizon is the investment-planning period of the individuals. This varies from individual to individual. Individual's risk and return preferences are often described in terms of his "life cycle". The stages of the life cycle determine the nature of investment. The first stage is the early career situation. At the career starting point assets are lesser than their liabilities. More goods are purchased on credit. His house might have been built with the help of housing loan scheme. His major asset may be the house he owns. His priority towards investments may be in the form of savings for liquidity purposes. He takes life insurance for protecting him from unforeseen events like death and accidents and then he thinks of the investments. The investor is young at this stage and has long horizon of life expectancy with possibilities of growth in income, he can invest in high-risk and growth oriented investments.

The other stage of the time horizon is the mid-career individual. At this stage, his assets are larger than his liabilities. Potential pension benefits are available to him. By this time he establishes his investment program. The time horizon before him is not as long as the earlier stage and he wants to protect his capital investment. He may wish to reduce the overall risk exposure of the portfolio but, he may continue to invest in high risk and high return securities.

The final stage is the late career or the retirement stage. Here, the time horizon of the investment is very much limited. He needs stable income and once he retires, the size of income he needs from investment also increases. In this stage, most of his loans are repaid by him and his assets far exceed the liabilities. His pension and life insurance programmes are completed by him. He shifts his investment to low return and low risk category investments, because safety of the principal is given priority. Mostly he likes to have lower risk with high interest or dividend paying component to be included in his portfolio. Thus, the time horizon puts restrictions on the investment decisions.

### **Tax Consideration**

Investors in the income tax paying group consider the tax concessions they could get from their investments. For all practical purpose, they would like to reduce the taxes. For income tax purpose, interests and dividends are taxed under the head "income from other sources". The capital appreciation is taxed under the head "capital gains" only when the investor sells the securities and realises the gain. The tax is then at a concessional rate depending on the period for which the asset has been held before being sold. From the tax point of view, the form in which the income is received i. e. interest, dividend, short term capital gains and long term capital gains are important. If the investor cannot avoid taxes, he can delay the taxes. Investing in government bonds and NSC can avoid taxation. This constraint makes the investor to include the items which will reduce the tax.

### **Temperament**

The temperament of the investor himself poses a constraint on framing his investment objectives. Some investors are risk lovers or takers who would like to take up higher risk even for low return while some investors are risk averse, who may not be willing to undertake higher level of risk even for higher level of return. The risk neutral investors match the return and the risk. For example, if a stock is highly volatile in nature then the stock may be selling in a range of ₹ 100 - 200 and returns may fluctuate. Investors who are risk averse would find it disturbing and do not have the temperament to invest in this stock. Hence, the temperament of the investor plays an important role in setting the objectives.

## Determination of Objectives

Portfolios have the common objective of financing present and future expenditures from a large pool of assets. The return that the investor requires and the degree of risk he is willing to take depend upon the constraints. The objectives of portfolio range from income to capital appreciation. The common objectives are stated below

- => Current income
- => Growth in income
- => Capital appreciation
- => Preservation of capital

The investor in general would like to achieve all the four objectives; nobody would like to lose his investment. But, it is not possible to achieve all the four objectives simultaneously. If the investor aims at capital appreciation, he should include risky securities where there is an equal likelihood of losing the capital. Thus, there is a conflict among the objectives.

## Selection of Portfolio

The selection of portfolio depends on the various objectives of the investor. The selections of portfolio under different objectives are dealt subsequently.

## Objectives and Asset Mix

If the main objective is getting adequate amount of current income, sixty per cent of the investment is made on debts and 40 per cent on equities. The proportions of investments on debt and equity differ according to the individual's preferences. Money is invested in short term debt and fixed income securities. Here the growth of income becomes the secondary objective and stability of principal amount may become the third. Even within the debt portfolio, the funds invested in short term bonds depends on the need for stability of principal amount in comparison with the stability of income. If the appreciation of capital is given third priority, instead of short term debt the investor opts for long term debt. The maturity period may not be a constraint.

## Growth and Income and Asset Mix

Here the investor requires a certain percentage of growth in the  $e$  received from his investment. The investor's portfolio may consist of 60 to 100 percent equities and 0 to

40 percent debt instrument. The debt portion of the portfolio may consist of concession regarding tax exemption. Appreciation of principal amount is given third priority. For example computer software, hardware and non-conventional energy producing company shares provide good possibility of growth in dividend.

### **Capital Appreciation and Asset Mix**

Capital appreciation and asset mix Capital appreciation means that the value of the original investment increases over the years. Investment in real estate's like land and house may provide a faster rate of capital appreciation but they lack liquidity. In the capital market, the values of the shares are much higher than their original issue prices. For example Satyam Computers, share value was ₹ 306 in April 1998 but in October 1999 the value was ₹ 1658. Likewise, several examples can be cited. The market capitalisation also has increased. Next to real assets, the stock markets provide best opportunity for capital appreciation. If the investor's objective is capital appreciation, 90 to 100 per cent of his portfolio may consist of equities and 0-10% of debts. The growth of income becomes the secondary objective.

### **Safety of Principal and Asset Mix**

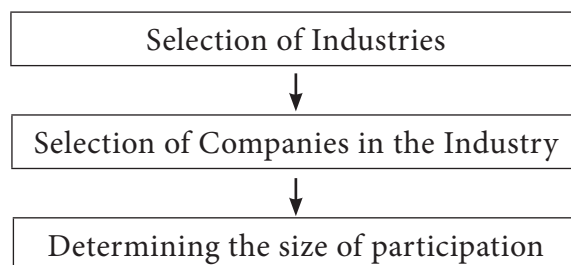
Usually, the risk averse investors are very particular about the stability of principal. According to the life cycle theory, people in the third stage of life also give more importance to the safety of the principal. All the investors have this objective in their mind. No one likes to lose his money invested in different assets. But, the degree may differ. The investor's portfolio may consist more of debt instruments and within the debt portfolio more would be on short term debts.

### **Risk and Return Analysis**

The traditional approach to portfolio building has some basic assumptions. First, the individual prefers larger to smaller returns from securities. To achieve this goal, the investor has to take more risk. The ability to achieve higher returns is dependent upon his ability to judge risk and his ability to take specific risks. The risks are namely interest rate risk, purchasing power risk, financial risk and market risk. The investor analyses the varying degrees of risk and constructs his portfolio. At first, he establishes the minimum income that he must have to avoid hardships under most adverse economic condition and then he decides risk of loss of income that can be tolerated. The investor makes a series of compromises on risk and non-risk factors like taxation and marketability after he has assessed the major risk categories, which he is trying to minimize.

## Diversification

Once the asset mix is determined and the risk and return are analysed, the final step is the diversification of portfolio. Financial risk can be minimized by commitments to top-quality bonds, but these securities offer poor resistance to inflation. Stocks provide better inflation protection than bonds but are more vulnerable to financial risks. Good quality convertibles may balance the financial risk and purchasing power risk. According to the investor's need for income and risk tolerance level portfolio is diversified. In the bond portfolio, the investor has to strike a balance between the short term and long term bonds. Short term fixed income securities offer more risk to income and long term fixed income securities offer more risk to principal. In the stock portfolio, he has to adopt the following steps which are shown in the following figure:



The investor has to select the industries appropriate to his investment objectives. Each industry corresponds to specific goals of the investor. The sales of some industries like two wheelers and steel tend to move in tandem with the business cycle, the housing industry sales move counter cyclically. If regular income is the criterion then industries, which resist the trade cycle should be selected. Likewise, the investor has to select one or two companies from each industry. The selection of the company depends upon its growth, yield, expected earnings, past earnings, expected price earning ratio, dividend and the amount spent on research and development. Selecting the best company is widely followed by all the investors but this depends upon the investors' knowledge and perceptions regarding the company. The final step in this process is to determine the number of shares of each stock to be purchased. This involves determining the number of different stocks that is required to give adequate diversification. Depending upon the size of the portfolio, equal amount is allocated to each stock. The investor has to purchase round lots to avoid transaction costs.

## Modern Approach

The traditional approach is a comprehensive financial plan for the individual. It takes into account the individual needs such as housing, life insurance and pension plans. But these types of financial planning approaches are not done in the Markowitz approach. Markowitz gives more attention to the process of selecting the portfolio. His planning can

be applied more in the selection of common stocks portfolio than the bond portfolio. The stocks are not selected on the basis of need for income or appreciation. But the selection is based on the risk and return analysis. Return includes the market return and dividend. The investor needs return and it may be either in the form of market return or dividend. They are assumed to be indifferent towards the form of return.

From the list of stocks quoted at the Bombay Stock Exchange or at any other regional stock exchange, the investor selects roughly some group of shares say of 10 or 15 stocks. For these stocks' expected return and risk would be calculated. The investor is assumed to have the objective of maximizing the expected return and minimising the risk. Further, it is assumed that investors would take up risk in a situation when adequately rewarded for it. This implies that individuals would prefer the portfolio of highest expected return for a given level of risk. In the modern approach, the final step is asset allocation process that is to choose the portfolio that meets the requirement of the investor. The risk taker i.e. who are willing to accept a higher probability of risk for getting the expected return would choose high risk portfolio. Investor with lower tolerance for risk would choose low level risk portfolio. The risk neutral investor would choose the medium level risk portfolio.

### Managing the Portfolio

After establishing the asset allocation, the investor has to decide how to manage the portfolio over time. He can adopt passive approach or active approach towards the management of the portfolio. In the passive approach the investor would maintain the percentage allocation for asset classes and keep the security holdings within its place over the established holding period. In the active approach the investor continuously assess the risk and return of the securities within the asset classes and changes them. He would be studying the risks (1) market related (2) group related and (3) security specific and changes the components of the portfolio to suit his objectives.

### Construction of the Optimal Portfolio

After determining the securities to be selected, the portfolio manager should find out how much should be invested in each security. The percentage of funds to be invested in each security can be estimated as follows:

$$X_i = \frac{Z_i}{\sum_{i=1}^{N_s} Z_i}$$

$$Z_i = \frac{\beta_i}{\sigma_{ei}^2} \left( \frac{R_i - R_f}{\beta_i} - C^* \right)$$

The first expression indicates the weights on each security and they sum up to one. The second shows the relative investment in each security. The residual variance or the unsystematic risk has a role in determining the amount to be invested in each security.

Taking up the previous example

$$Z_1 = 1/20 (14 - 8.29) = 0.285$$

$$Z_2 = 1.5/30 (12 - 8.29) = 0.186$$

$$Z_3 = 0.5/10 (12 - 8.29) = 0.086$$

$$Z_4 = 2/40 (10 - 8.29) = 0.086$$

$$\sum_{i=1}^n +0.285 + 0.186 + 0.186 + 0.086$$

$$= .743$$

$$X_1 = 0.285/0.743 = 0.38$$

$$X_2 = 0.186/0.743 = 0.25$$

$$X_3 = 0.186/0.743 = 0.25$$

$$X_4 = 0.086/0.743 = 0.12$$

Thus, the proportions to be invested in different securities are obtained. The largest investment should be made in security 1 and the smallest in security 4.

### Optimum Portfolio With Short Sales

The procedure used to calculate the optimal portfolio when short sales are allowed is, more or less similar to the procedure adopted for no short sales, except the cut-off point concept. At first, the stocks have to be ranked by excess return to beta.

Here, all the stocks are added to the portfolio. They are either held long or short. All the stocks affect the cut-off point. The Z value has to be calculated for each stock. If the Z value is positive, the stock will be held long and if negative, it will be sold short. Stocks which are having excess return to beta above  $C^*$  are held long as in the case of the portfolio without short sales. Stocks with an excess return to beta below  $C^*$  are sold short. In the case of previous example  $C^* = C = 7.9$ , if short sales are permitted, then

$$Z_i = \frac{\beta_i}{\sigma_{ei}^2} \left( \frac{R_i - R_f}{\beta_i} - C^* \right)$$

$$\begin{aligned}
 Z_1 &= 1/20(14 - 7.9) = 0.305 \\
 Z_2 &= 1.5/30(12 - 7.9) = 0.205 \\
 Z_3 &= 0.5/10(12 - 7.9) = 0.205 \\
 Z_4 &= 2/40(10 - 7.9) = 0.105 \\
 Z_5 &= 1/20(8 - 7.9) = 0.005 \\
 Z_6 &= 0.5/50(8 - 7.9) = 0.001 \\
 Z_7 &= 1.5/30(8 - 7.9) = -0.095
 \end{aligned}$$

The seventh stock will be sold short.

$$Z_i = \frac{\beta_i}{\sigma_{ei}^2} \left( \frac{R_i - R_f}{\beta_i} - C^* \right)$$

The proportion can be had using:

### Summary

- Markowitz developed algorithms to minimise portfolio risk. Diversification reduces the unsystematic risk component of the portfolio.
- The level of risk exposure is measured with the help of the standard deviation of the returns. The expected return is the weighted sum of the expected returns of the portfolio, the weights being the probabilities of their occurrence.
- If securities with less than perfect positive correlation between their price movements are combined risk can be reduced considerably. The risk would be nil or the standard deviation would be zero if two securities have perfect negative correlation. Risk cannot be reduced if the securities have perfect positive correlation.
- Many portfolios may be attainable. But some portfolios are attractive because they give more return for the same level of risk or same return with lesser level of risk. These portfolios form the efficient frontier.
- Utility curves of the investor decide the most efficient portfolio.
- In the levered portfolio investor is permitted to borrow and lend. Risk free assets are also added with risky assets and it would minimise risk.

## Solved Problems

1. Calculate the expected return and variance of a portfolio comprising two securities, assuming that the portfolio weights are 0.75 for security 1 and 0.25 for security 2. The expected return for security 1 is 18 per cent and its standard deviation is 12 per cent, while the expected return and standard deviation for security 2 are 22 per cent and 20 per cent respectively. The correlation between the two securities is 0.6.

### Solution

Calculation of expected return of portfolio:

$$\begin{aligned}
 r_p &= \sum_{i=1}^n x_i r_i \\
 &= (0.75 \times 18) + (0.25 \times 22) \\
 &= 13.5 + 5.5 = 19 \text{ per cent}
 \end{aligned}$$

Calculation of portfolio variance:

$$\begin{aligned}
 \sigma_p^2 &= x_1^2 \sigma_1^2 + x_2^2 \sigma_2^2 + 2x_1 x_2 (r_{12} \sigma_1 \sigma_2) \\
 &= (0.75)^2 (12)^2 + (0.25)^2 (20)^2 + 2 (0.75) (0.25) (0.6 \times 12 \times 20) \\
 &= 81 + 25 + 54 = 160 \text{ percent}
 \end{aligned}$$

2. Consider two securities, P and Q, with expected returns of 15 per cent and 24 per cent respectively, and standard deviation of 35 per cent and 52 per cent respectively. Calculate the standard deviation of a portfolio weighted equally between the two securities if their correlation is -0.9.

### Solution

Calculation of portfolio standard deviation:

$$\begin{aligned}
 \sigma_p^2 &= x_1^2 \sigma_1^2 + x_2^2 \sigma_2^2 + 2x_1 x_2 (r_{12} \sigma_1 \sigma_2) \\
 &= (0.5)^2 (35)^2 + (0.5)^2 (52)^2 + 2 (0.5) (0.5) (-0.9 \times 35 \times 52) \\
 &= 306.25 + 676 - 819 = 163.25 \\
 \sigma &= \sqrt{163.25} = 12.78 \text{ percent}
 \end{aligned}$$

3. The historical rates of return of two securities over the past ten years are given. Calculate the covariance and the correlation of the two securities.

| Years                       | 11  | 12  | 13  | 14  | 15  | 16  | 17  | 18  | 19  | 10  |
|-----------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Security 1 (return percent) | 112 | 18  | 17  | 114 | 116 | 115 | 118 | 220 | 116 | 222 |
| Security 2 (return percent) | 220 | 222 | 224 | 118 | 115 | 220 | 224 | 225 | 222 | 220 |

### Solution

#### Calculation of Covariance

| Year                                | $R_1$ | Deviation<br>( $R_1 - \bar{R}_1$ ) | $R_2$                             | Deviation<br>( $R_2 - \bar{R}_2$ ) | Product of<br>deviations |
|-------------------------------------|-------|------------------------------------|-----------------------------------|------------------------------------|--------------------------|
| 1                                   | 12    | -2.8                               | 20                                | -1                                 | 2.8                      |
| 2                                   | 8     | -6.8                               | 22                                | 1                                  | -6.8                     |
| 3                                   | 7     | -7.8                               | 24                                | 3                                  | -23.4                    |
| 4                                   | 14    | -0.8                               | 18                                | -3                                 | 2.4                      |
| 5                                   | 16    | 1.2                                | 15                                | -6                                 | -7.2                     |
| 6                                   | 15    | 0.2                                | 20                                | -1                                 | -0.2                     |
| 7                                   | 18    | 3.2                                | 24                                | 3                                  | 9.6                      |
| 8                                   | 20    | 5.2                                | 25                                | 4                                  | 20.8                     |
| 9                                   | 16    | 1.2                                | 22                                | 1                                  | 1.2                      |
| 10                                  | 22    | 7.2                                | 20                                | -1                                 | -7.2                     |
| $\bar{R}_1 = \frac{148}{10} = 14.8$ |       |                                    | $\bar{R}_2 = \frac{210}{10} = 21$ |                                    | -8.00                    |

$$\begin{aligned}\text{Covariance} &= \frac{\sum_{i=1}^N [R_i - \bar{R}_1][R_i - \bar{R}_2]}{N} \\ &= \frac{-8}{10} = -0.8\end{aligned}$$

For calculation of correlation, the standard deviation of the two securities are also required.

| Year | $R_1$ | $R_1^2$ | $R_2$ | $R_2^2$ |
|------|-------|---------|-------|---------|
| 1    | 12    | 144     | 20    | 400     |
| 2    | 8     | 64      | 22    | 484     |
| 3    | 7     | 49      | 24    | 576     |
| 4    | 14    | 196     | 18    | 324     |
| 5    | 16    | 256     | 15    | 225     |
| 6    | 15    | 225     | 20    | 400     |
| 7    | 18    | 324     | 24    | 576     |
| 8    | 20    | 400     | 25    | 625     |
| 9    | 16    | 256     | 22    | 484     |
| 10   | 22    | 484     | 20    | 400     |
|      | 148   | 2398    | 210   | 4494    |

Standard deviation of security 1

$$\begin{aligned}
 \sigma_1 &= \sqrt{\frac{N \sum R_1^2 - (\sum R_1)^2}{N^2}} \\
 &= \sqrt{\frac{(10 \times 2398) - (148)^2}{10 \times 10}} = \sqrt{\frac{23980 - 21904}{100}} \\
 &= \sqrt{20.76} = 4.56
 \end{aligned}$$

Standard deviation of security 2

$$\begin{aligned}
 \sigma_2 &= \sqrt{\frac{N \sum R_2^2 - (\sum R_2)^2}{N^2}} \\
 &= \sqrt{\frac{(10 \times 4494) - (210)^2}{10 \times 10}} \\
 &= \sqrt{20.76} = 28.98
 \end{aligned}$$

Correlation

$$\begin{aligned}
 r_{12} &= \frac{cov_{12}}{\sigma_1 \sigma_2} \\
 &= \frac{-0.8}{4.56 \times 28.98} = \frac{-0.8}{132.15} \\
 &= -0.0061
 \end{aligned}$$

4. A portfolio is constituted with four securities having the following characteristics:

| Security | Return (per cent) | Proportion of investment |
|----------|-------------------|--------------------------|
| P        | 17.5              | 0.15                     |
| Q        | 24.8              | 0.25                     |
| R        | 15.7              | 0.45                     |
| S        | 21.3              | 0.15                     |

Calculate the expected return of the portfolio.

### Solution

Expected return of the portfolio is calculated with the following formula:

$$\begin{aligned}
 r_p &= \sum_{i=1}^n x_i r_i \\
 &= (0.15 \times 17.5) + (0.25 \times 24.8) + (0.45 \times 15.7) + (0.15 \times 21.3) \\
 &= 2.625 + 6.200 + 7.065 + 3.195 \\
 &= 19.085 \text{ per cent}
 \end{aligned}$$

5. Given the following variance – covariance matrix for three securities, as well as the percentage of the portfolio that each security comprises, calculate the portfolio's standard deviation.

| Security | A            | B            | C            |
|----------|--------------|--------------|--------------|
| A        | 425          | -190         | 120          |
| B        | -190         | 320          | 205          |
| C        | 120          | 205          | 175          |
|          | $W_A = 0.35$ | $W_B = 0.25$ | $W_C = 0.40$ |

### Solution

The formula for the calculation of portfolio variance of a portfolio with more than two securities is as follows:

$$\sigma_p^2 = \sum_{i=1}^n \sum_{j=1}^n x_i x_j \sigma_{ij}$$

### Variance – Covariance Matrix

| Weight | Security | 0.35<br>A | 0.25<br>B | 0.40<br>C |
|--------|----------|-----------|-----------|-----------|
| 0.35   | A        | 425       | -190      | 120       |
| 0.25   | B        | -190      | 320       | 205       |
| 0.40   | C        | 120       | 205       | 175       |

$$\begin{aligned}
 \sigma_p^2 &= (0.35 \times 0.35 \times 425) + (0.35 \times 0.25 \times -190) + (0.35 \times 0.4 \times 120) \\
 &\quad + (0.25 \times 0.35 \times -190) + (0.25 \times 0.25 \times 320) + (0.25 \times 0.4 \times 205) \\
 &\quad + (0.4 \times 0.35 \times 120) + (0.4 \times 0.25 \times 205) + (0.4 \times 0.4 \times 175) \\
 &= 52.06 - 16.63 + 16.8 - 16.63 + 20 + 20.5 + 16.8 + 20.5 + 28 \\
 &= 141.40
 \end{aligned}$$

The portfolio standard deviation is

$$\sigma_p = \sqrt{141.40} = 11.89$$

6. The estimates of the standard deviations and correlation co-efficient for three stocks are given below:

| Stock | Standard deviation | Correlation with stock |       |      |
|-------|--------------------|------------------------|-------|------|
|       |                    | A                      | B     | C    |
| A     | 32                 | 1.00                   | -0.80 | 0.40 |
| B     | 26                 | -0.80                  | 1.00  | 0.65 |
| C     | 18                 | 0.40                   | 0.65  | 1.00 |

If a portfolio is constructed with 15 per cent of stock A, 50 per cent of stock B and 35 per cent of stock C, what is the portfolio's standard deviation?

### Solution

Here, the covariance's between securities are not given. However, the covariance between two securities may be expressed as the product of correlation coefficient between the two securities and standard deviations of the two securities that is,

$$\sigma_{ij} = r_{ij} \sigma_i \sigma_j$$

The variance – covariance matrix may therefore be set up as follows:

| Weight | Security | 0.15<br>A        | 0.50<br>B        | 0.35<br>C        |
|--------|----------|------------------|------------------|------------------|
| 0.15   | A        | (1 x 32 x 32)    | (-0.8 x 32 x 26) | (0.4 x 32 x 18)  |
| 0.50   | B        | (-0.8 x 26 x 32) | (1 x 26 x 26)    | (0.65 x 26 x 18) |
| 0.35   | C        | (0.4 x 18 x 32)  | (0.65 x 18 x 26) | (1 x 18 x 18)    |

The matrix may be simplified as follows:

| Weight | Security | 0.15<br>A | 0.50<br>B | 0.35<br>C |
|--------|----------|-----------|-----------|-----------|
| 0.15   | A        | 1024.0    | -665.6    | 230.4     |
| 0.50   | B        | -665.6    | 676.0     | 304.2     |
| 0.35   | C        | 230.4     | 304.2     | 324.0     |

$$\begin{aligned}
 \sigma_p^2 &= (0.15 \times 0.15 \times 1024.0) + (0.15 \times 0.5 \times -665.6) + (0.15 \times 0.35 \times 230.4) \\
 &\quad + (0.5 \times 0.15 \times -665.6) + (0.5 \times 0.5 \times 676.0) + (0.5 \times 0.35 \times 304.2) \\
 &\quad + (0.35 \times 0.15 \times 230.4) + (0.35 \times 0.5 \times 304.2) + (0.35 \times 0.35 \times 324.0) \\
 &= 23.04 - 49.92 + 12.10 - 49.92 + 169 + 53.24 + 12.10 + 53.24 + 36.69 \\
 &= 262.57
 \end{aligned}$$

The portfolio standard deviation is

$$\sigma_p = \sqrt{262.57} = 16.20$$

7. An investor owns a portfolio whose market model is estimated as:

$$R_p = 2.3 + 0.85 R_m + e_p$$

If the expected return on the market index is 17.5 per cent, what is the expected return on the investor's portfolio?

### Solution

Assuming that  $e_p = 0$

$$\begin{aligned} R_p &= 2.3 + 0.85 (17.5) \\ &= 2.3 + 14.875 \\ &= 17.175 \text{ per cent} \end{aligned}$$

8. An investor owns a portfolio composed of five securities with the following characteristics:

| Security | Beta | Random error term standard deviation (per cent) | Proportion |
|----------|------|-------------------------------------------------|------------|
| 1        | 1.35 | 5                                               | 0.10       |
| 2        | 1.05 | 9                                               | 0.20       |
| 3        | 0.80 | 4                                               | 0.15       |
| 4        | 1.50 | 12                                              | 0.30       |
| 5        | 1.12 | 8                                               | 0.25       |

If the standard deviation of the market index is 20 per cent, what is the total risk of the portfolio?

### Solution

The total portfolio risk may be expressed as:

$$\sigma_p^2 = \beta_p^2 \sigma_m^2 + \sum_{i=1}^n w_i^2 \sigma_{ei}^2$$

where

$\beta_p^2$  = Portfolio beta.

$\sigma_m^2$  = Variance of the market index.

$w_i^2$  = Proportion of investment in each security.

$\sigma_{ei}^2$  = Residual variance (random error) of individual securities.

$\beta_p$  or portfolio beta has to be calculated using the formula.

$$\begin{aligned}\beta_p &= \sum_{i=1}^n w_i \beta_i \\ &= (0.1)(1.35) + (0.2)(1.05) + (0.15)(0.80) + (0.3)(1.5) + (0.25)(1.12) \\ &= 1.195\end{aligned}$$

Portfolio residual variance ( $\sum_{i=1}^n w_i^2 \sigma_{ei}^2$ ) can be calculated as:

$$\begin{aligned}&= (0.1)^2(5)^2 + (0.2)^2(9)^2 + (0.15)^2(4)^2 + (0.30)^2(12)^2 + (0.25)^2(8)^2 \\ &= 20.81\end{aligned}$$

**Portfolio total risk can now be calculated as**

$$\begin{aligned}\sigma_p^2 &= \beta_p^2 \sigma_m^2 + \sum_{i=1}^n w_i^2 \sigma_{ei}^2 \\ &= (1.195)^2(20)^2 + 20.81 \\ &= 571.21 + 20.81 = 592.02\end{aligned}$$

9. Consider a portfolio composed of five securities. All the securities have a beta of 1.0 and unique or specific risk (standard deviation) of 25 per cent. The portfolio distributes weight equally among its component securities. If the standard deviation of the market index is 18 per cent, calculate the total risk of the portfolio.

### Solution

The input data may be arranged in the form of the following table

| Security | Beta | Specific risk<br>(Standard deviation) | Proportion |
|----------|------|---------------------------------------|------------|
| 1        | 1.0  | 25                                    | 0.2        |
| 2        | 1.0  | 25                                    | 0.2        |
| 3        | 1.0  | 25                                    | 0.2        |
| 4        | 1.0  | 25                                    | 0.2        |
| 5        | 1.0  | 25                                    | 0.2        |

Standard deviation of market index is 18 per cent.

$$\begin{aligned}\beta_p &= \sum_{i=1}^n w_i \beta_i \\ &= (0.2 \times 1.0) \times 5 = 1.0\end{aligned}$$

Portfolio residual variance =

$$= (0.2)^2(25)^2 \times 5 = 125$$

Portfolio total risk

$$\sigma_p^2 = \beta_p^2 \sigma_m^2 + \sum_{i=1}^n w_i^2 \sigma_{ei}^2$$

$$= (1.0)^2(18)^2 + 125$$

$$= 324 + 125 = 449$$

10. How many parameters must be estimated to analyse the risk- return profile of a 50-stock portfolio using (a) the original Markowitz model, and (b) the Sharpe single index model?

### Solution

In Markowitz model we require the following estimates:

N return estimates

N variance estimates

N (N-1)/2 covariance estimates

$$\begin{aligned} \text{Total estimates} &= 2N + [N(N-1)/2] \\ &= (2 \times 50) + [50(50-1)/2] \\ &= 100 + 1225 = 1325 \end{aligned}$$

In the Sharpe single index model we must have

N  $\alpha$  estimates

N  $\beta$  estimates

N residual variance estimates.

Market return,  $R_m$

Variance of market return,  $\sigma_m^2$

$$\begin{aligned} \text{Total estimates} &= 3N + 2 \\ &= (3 \times 50) + 2 = 152 \end{aligned}$$

11. Consider a portfolio of four securities with the following characteristics:

| Security | Weighting | $\alpha_i$ | $\beta_i$ | Residual variance ( $\sigma_{ei}^2$ ) |
|----------|-----------|------------|-----------|---------------------------------------|
| 1        | 0.2       | 2.0        | 1.2       | 320                                   |
| 2        | 0.3       | 1.7        | 0.8       | 450                                   |
| 3        | 0.1       | -0.8       | 1.6       | 270                                   |
| 4        | 0.4       | 1.2        | 1.3       | 180                                   |

Calculate the return and risk of the portfolio under single index model, if the return on market index is 16.4 per cent and the standard deviation of return on market index is 14 per cent.

### Solution

1. Portfolio return under single index model is calculated using the formula:  $R_p = \alpha_p + \beta_p R_m$

For applying this formula,  $\alpha_p$ , and  $\beta_p$  have to be calculated as:

$$\begin{aligned}\alpha_p &= \sum_{i=1}^n w_i \alpha_i \\ &= (0.2)(2.0) + (0.3)(1.7) + (0.1)(-0.8) + (0.4)(1.2) \\ &= 1.31\end{aligned}$$

$$\begin{aligned}\beta_p &= \sum_{i=1}^n w_i \beta_i \\ &= (0.2)(1.2) + (0.3)(0.8) + (0.1)(1.6) + (0.4)(1.3) \\ &= 1.16\end{aligned}$$

$$\begin{aligned}R_p &= \alpha_p + \beta_p R_m \\ &= 1.31 + (1.16)(16.4) \\ &= 1.31 + 19.024 \\ &= 20.334\end{aligned}$$

2. Portfolio risk under single index model is calculated as:

$$\sigma_p^2 = \beta_p^2 \sigma_m^2 + \sum_{i=1}^n w_i^2 \sigma_{ei}^2$$

For applying this, portfolio residual variance needs to be calculated as:

$$\sum_{i=1}^n w_i^2 \sigma_{ei}^2$$

Thus,

$$\begin{aligned}
 & (0.2)^2(320) + (0.3)^2(450) + (0.1)^2(270) + (0.4)^2(180) \\
 & = 12.8 + 40.5 + 2.7 + 28.8 \\
 & = 84.8
 \end{aligned}$$

Now,

$$\begin{aligned}
 \sigma_p^2 &= \beta_p^2 \sigma_m^2 + \sum_{i=1}^n w_i^2 \sigma_{ei}^2 \\
 &= (1.16)^2(14)^2 + 84.8 \\
 &= 263.74 + 84.8 = 348.54
 \end{aligned}$$

Hence,

$$\sigma_p = \sqrt{348.54} = 18.67$$

12. The data for three stocks are given. The data are obtained from correlating returns on these stocks with the returns on the market index.

| Stock | $\alpha_i$ | $\beta_i$ | Residual variance (percent) ( $\sigma_{ei}^2$ ) |
|-------|------------|-----------|-------------------------------------------------|
| 1     | -2.1       | 1.6       | 14                                              |
| 2     | 1.8        | 0.4       | 8                                               |
| 3     | 1.2        | 1.3       | 18                                              |

Which single stock would an investor prefer to own from a risk-return view point if the market index were expected to have a return of 15 per cent and a variance of return of 20 per cent?

### Solution

Here we have to calculate the expected return and risk of each security under the single index model.

$$\text{Expected return } R_i = \alpha_i + \beta_i R_m$$

$$\text{Security 1} = -2.1 + (1.6)(15) = -2.1 + 24 = 21.9$$

$$\text{Security 2} = 1.8 + (0.4)(15) = 1.8 + 6 = 7.8$$

$$\text{Security 3} = 1.2 + (1.3)(15) = 1.2 + 19.5 = 20.7$$

Security risk

$$\sigma_p^2 = \beta_p^2 \sigma_m^2 + \sigma_{ei}^2$$

$$\text{Security 1} = (1.6)^2(20) + 14 = 51.2 + 14 = 65.2$$

$$\text{Security 2} = (0.4)^2(20) + 8 = 3.2 + 8 = 11.2$$

$$\text{Security 3} = (1.3)^2(20) + 18 = 33.8 + 18 = 51.8$$

Now we can calculate the ratio of return to risk to assess the return per unit of risk.

$$\text{Security 1} = \frac{21.9}{65.2} = 0.34$$

$$\text{Security 2} = \frac{7.8}{11.2} = 0.70$$

$$\text{Security 3} = \frac{20.7}{51.8} = 0.40$$

The investor would prefer 'security 2' as it provides the highest return per unit of risk.

### Self Assessment Questions

1. Explain the concept and process of portfolio analysis?
2. Explain the significance of covariance in the estimation of the risk of a portfolio?
3. Define the Markowitz diversifications explain the statistical method used by Markowitz to obtain the risk reducing benefit?
4. How do the utility curves differ for risk loving neutral and averse investors?
5. What are the simple diversification (a) will it reduce total risk (b) will it reduce unsystematic risk?
6. Explain the Sharpe index model? How does it differ from the Markowitz model?
7. What are the steps in the traditional approach?
8. How do you arrive the optimum portfolio?
9. Explain the constraints in the formation of objectives?
10. What happens to the risk of a portfolio as more and more securities are added to the portfolio?

### CASE STUDY

Mr.X will retire at the end of 10 years. Upon retirement he is entitled to receive an annual end of year payment of ₹ 1,20,000 for 15 years. If he dies prior to the end of the 15 years period, his heirs would be entitled to the contractual payment.

His employers, Reliance Industries Ltd. Has to accumulate funds to provide a retirement annuity by making an equal annual year-end deposited into an accounting earning 7% interest. When the 15 year payment period begins the company would transfer the accumulated fund into an account earning a guaranteed 9% at the end of the company period, the account balance would be zero required.

- (a) How much would the company accumulate by the end of the year?
- (b) What should be the company's equal annual end-of-year deposit into the account be over the 10 years. Period to fund fully the retirement annually?

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## Unit – V

### Unit Structure

Lesson 5.1 - Capital Asset Pricing Theory

Lesson 5.2 - Arbitrage Pricing Theory

Lesson 5.3 - Portfolio Evaluation

Lesson 5.4 - Portfolio Revision

### Learning Objectives

*After reading this chapter, students should*

- Understand the concept of CAPM.
- Know about the APT various types of futures contracts like interest rate futures, foreign currency futures, stock index futures, bond index futures, etc.
- Understand the portfolio revision

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### Lesson 5.1 - Capital Asset Pricing Theory

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### Introduction

Investors are interested in knowing the systematic risk when they search for efficient portfolios. They would like to have assets with low beta co-efficient i.e. systematic risk. Investors would opt for high beta co-efficient only if they provide high rates of return. The risk averse nature of the investors is the underlying factor for this behavior. The capital asset pricing theory helps the investors to understand the risk and return relationship of the securities. It also explains how assets should be priced in the capital market.

## The CAPM Theory

Markowitz, William Sharpe, John Lintner and Jan Mossin provided the basic structure for the CAPM model. It is a model of linear general equilibrium return. In the CAPM theory, the required rate return of an asset is having a linear relationship with asset's beta value i.e. undiversifiable or systematic risk.

### Assumptions

1. An individual seller or buyer cannot affect the price of a stock. This assumption is the basic assumption of the perfectly competitive market.
2. Investors make their decisions only on the basis of the expected returns, standard deviations and co variances of all pairs of securities.
3. Investors are assumed to have homogenous expectations during the decision-making period.
4. The investor can lend or borrow any amount of funds at the riskless rate of interest. The riskless rate of interest is the rate of interest offered for the treasury bills or Government securities.
5. Assets are infinitely divisible. According to this assumption, investor could buy any quantity of share i.e. they can even buy ten rupees worth of Reliance Industry shares.
6. There is no transaction cost i.e. no cost involved in buying and selling of stocks.
7. There is no personal income tax. Hence, the investor is indifferent to the form of return either capital gain or dividend.
8. Unlimited quantum of short sales is allowed. Any amount of shares an individual can sell short.

### Lending and Borrowing

Here, it is assumed that the investor could borrow or lend any amount money at riskless rate of interest. When this opportunity is given to the investors, they can mix risk free assets with the risky assets in a portfolio to obtain a desired rate of risk-return combination.

$R_p$  = Portfolio return

$X_f$  = the proportion of funds invested in risk free assets

$1 - X_f$  = the proportion of funds invested in risky assets

$R_f$  = Risk free rate of return

$R_m$  = Return on risky assets

The expected return on the combination of risky and risk free combination is

$$R_p = R_f X_f + R_m (1 - X_f)$$

This formula can be used to calculate the expected returns for different situations, like mixing risk free assets with risky assets, investing only in the risky asset and mixing the borrowing with risky assets.

Now, let us assume that borrowing and lending rate to be 12.5% and the return from the risky assets to be 20%. There is a trade off between the expected return and risk. If an investor invests in risk free assets and risky assets, his risk may be less than what he invests in the risky asset alone. But if he borrows to invest in risky assets, his risk would increase more than he invests his own money in the risky assets. When he borrows to invest, we call it financial leverage. If he invests 50% in risk free assets and 50% in risky assets, his expected return of the portfolio would be

$$\begin{aligned} R_p &= R_f X_f + R_m (1 - X_f) \\ &= 12.5 \times .5 + 20(1 - .5) \\ &= 6.25 + 10 \\ &= 16.25\% \end{aligned}$$

If there is a zero investment in risk free asset and 100% in risky asset, the return is

$$\begin{aligned} R_p &= R_f X_f + R_m (1 - X_f) \\ &= 0 + 20\% \\ &= 20\% \end{aligned}$$

If -.5 in risk free asset and 1.5 in risky asset, the return is

$$\begin{aligned} R_p &= R_f X_f + R_m (1 - X_f) \\ &= (12.5 \times -.5) + 20 \times 1.5 \\ &= -6.25 + 30 \\ &= 23.75 \end{aligned}$$

The variance of the above mentioned portfolio can be calculated by using the equation.

$$\sigma_p^2 = \sigma_f^2 X_f^2 + \sigma_m^2 (1 - X_f)^2 + 2\text{Cov}_{fm} X_f (1 - X_f)$$

The previous example can be taken for the calculation of the variance. The variance of the risk free asset is in. The variance of the risky asset is assumed to be 15. Since the variance of the risky asset is zero, the 1,rtfolio risk solely depends on the portion of investment on risky asset.

| Proportion in risky asset (1-X <sub>f</sub> ) | Portfolio risk |
|-----------------------------------------------|----------------|
| 0.5                                           | 1.0            |
| 1.5                                           | 7.5            |
| 1.5                                           | 22.5           |

The risk is more in the borrowing portfolio being 22.5% and the return is also high among the three alternatives. In the lending portfolio, the risk is 7.5% and the return is also the lowest. The risk premium is proportional to risk, where the risk premium of a portfolio is defined as the difference between R<sub>p</sub> - R<sub>f</sub> i.e. the amount by which a risky rate of return exceeds the riskless rate of return.

### Risk - Return Trade Off

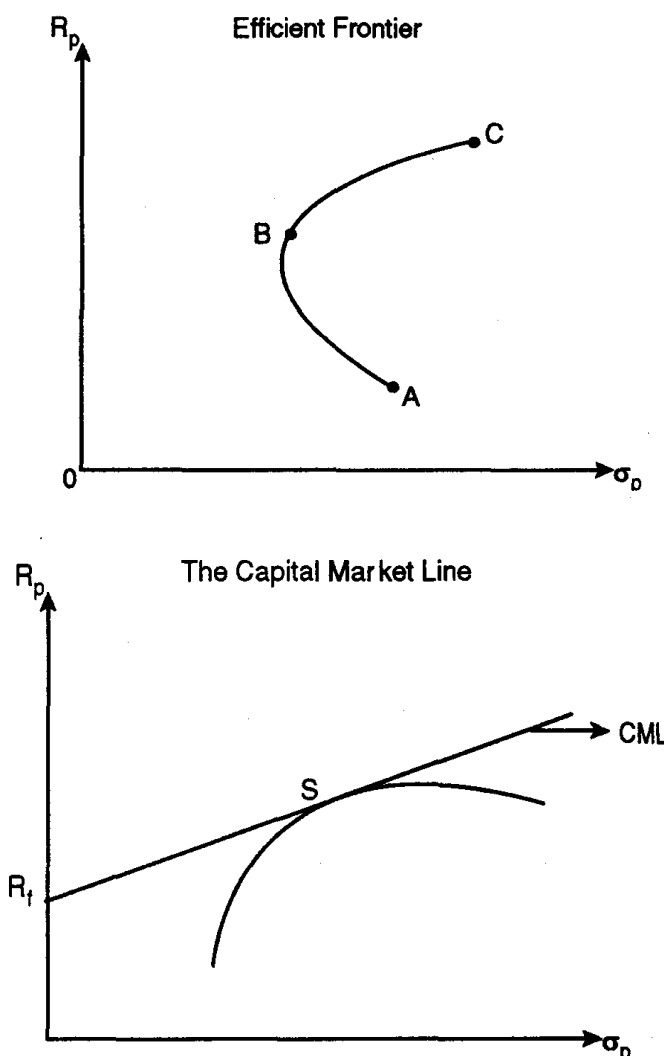
| Portfolio Return<br>R <sub>p</sub> | Risk-free Return<br>R <sub>f</sub> | Risk Premium<br>R <sub>p</sub> - R <sub>f</sub> | Portfolio Risk<br>σ | Factor of Proportionality<br>(R <sub>p</sub> - R <sub>f</sub> )/σ <sub>p</sub> |
|------------------------------------|------------------------------------|-------------------------------------------------|---------------------|--------------------------------------------------------------------------------|
| 16.25                              | 12.5                               | 3.75                                            | 7.5                 | 0.5                                                                            |
| 20.0                               | 12.5                               | 7.5                                             | 15.0                | 0.5                                                                            |
| 23.75                              | 12.5                               | 11.25                                           | 22.5                | 0.5                                                                            |

The risk-return proportionality ratio is a constant .5, indicating that one unit of risk premium is accompanied by 0.5 unit of risk.

### The Concept

According to CAPM, all investors hold only the market portfolio and riskless securities. The market portfolio is a portfolio comprised of all stocks in the market. Each asset is held in proportion to its market value to the total value of all risky assets. For example, if Reliance Industry share represents 20% of all risky assets, then the market

portfolio of the individual investor contains 20% of Reliance industry shares. At this stage, the investor has the ability to borrow or lend any amount of money at the riskiness rate of interest. The efficient frontier of the investor is given in figure.



The figure shows the efficient frontier of the investor. The investor prefers any point between B and C because, with the same level of risk they face on line BA, they are able to get superior profits. The ABC line shows the investor's, portfolio of risky assets. The investors can combine riskless asset either by lending or borrowing. This is shown in Figure.

The line  $R_fS$  represents all possible combination of riskless and risky asset. The 'S' portfolio does not represent any riskless asset but the line RS gives the combination of both. The portfolio along the path RS is called lending portfolio that is some money is invested in the riskless asset or may be deposited in the bank for a fixed rate of interest. If it crosses the point S, it becomes borrowing portfolio. Money is borrowed and invested in the risky asset. The straight line is called capital market line (CML). It gives the desirable set of investment opportunities between risk free and risky investments. The CML represents

linear relationship between the required rates of return for efficient portfolios and their standard deviations.

$E(R_p)$  = portfolio's expected rate of return

$R_m$  = expected return on market portfolio

$\sigma_m$  = standard deviation of market portfolio

$\sigma_p$  = standard deviation of the portfolio

For a portfolio on the capital market line, the expected rate of return in excess of the risk free rate is in proportion to the standard deviation of the market portfolio. The price of the risk is given by the slope of the line. The slope equals the premium for the market portfolio  $R_m - R_f$  divided by the risk or standard deviation of the market portfolio. Thus, the expected return of an efficient portfolio is

$$\text{Expected return} = \text{Price of time} + (\text{Price of risk} \cdot \text{Amount of risk})$$

Price of time is the risk free rate of return. Price of risk is the premium amount higher and above the risk free return.

### Security Market Line

The risk-return relationship of an efficient portfolio is measured by the capital market line. But, it does not show the risk-return trade off for other portfolios and individual securities. Inefficient portfolios lie below the capital market line and the risk-return relationship cannot be established with the help of the capital market line. Standard deviation includes the systematic and unsystematic risk. Unsystematic risk can be diversified and it is not related to the market. If the unsystematic risk is eliminated, then the matter of concern is systematic risk alone. This systematic risk could be measured by beta. The beta analysis is useful for individual securities and portfolios whether efficient or inefficient.

When an additional security is added to the market portfolio, an additional risk is also added to it. The variance of a portfolio is equal to the weighted sum of the co-variances of the individual securities in the portfolio.

If we add an additional security to the market portfolio, its marginal contribution to the variance of the market is the covariance between the security's return and market portfolio's return. If the security  $i$  is included, the covariance between the security and the market measures the risk. Covariance can be standardized by dividing it by standard

deviation of market portfolio  $\text{Cov } i_m / \sigma_m$ . This shows the systematic risk of the security. Then, the expected return of the security  $i$  is given by the equation:

$$R_i - R_f = (R_m - R_f / \sigma_m) \text{Cov } i_m / \sigma_m$$

This equation can be rewritten as follows

$$R_i - R_f = \text{Cov } i_m / \sigma_m^2 (R_m - R_f)$$

The first term of the equation is nothing but the beta coefficient of the stock. The beta coefficient of the equation of SML is same as the beta of the market (single index) model. In equilibrium, all efficient and inefficient portfolios lie along the security market line. The SML line helps to determine the expected return for a given security beta. In other words, when betas are given, we can generate expected returns for the given securities. This is explained in fig.

If we assume the expected market risk premium to be 8% and the risk free rate of return to be 7%, we can calculate expected return for A, B, C and D securities using the formula

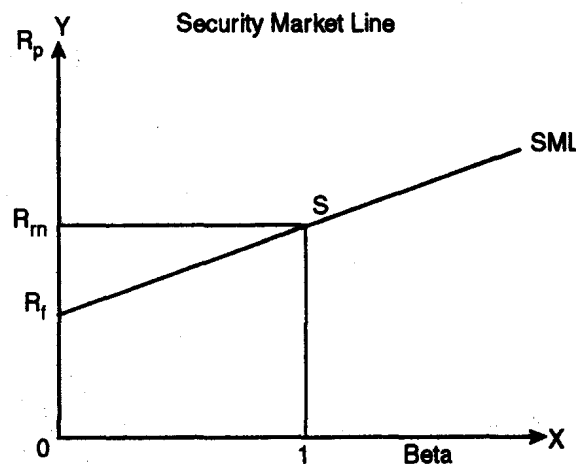
$$E(R_i) = R_f + \beta_i [E(R_m) - R_f]$$

If beta for  $\beta = 1$

If beta for  $\beta = 1$

$$= 7 + 1 (8)$$

$$= 15\%$$



Security A

Beta = 1.10

$$\begin{aligned} E(R) &= 7 + 1.10(8) \\ &= 15.8 \end{aligned}$$

Security B

$$\begin{aligned} \text{Beta} &= 1.20 \\ E(R) &= 7 + 1.20(8) \\ &= 16.8 = 16.6 \end{aligned}$$

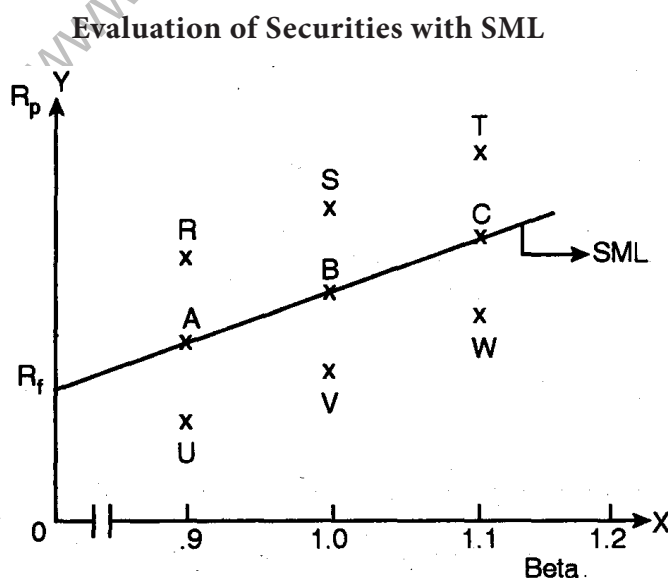
Security C

$$\begin{aligned} \text{Beta} &= .7 \\ E(R) &= 7 + .7(8) \\ &= 12.6 \end{aligned}$$

The same can be found out easily from the figure too. All we have to do is, to mark the beta on the horizontal axis and draw a vertical line from the relevant point to touch the SML line. Then from the point of intersection, draw another horizontal line to touch the Y axis. The expected return could be very easily read from the Y axis. The securities A and B are aggressive securities, because their beta values are greater than one. When beta values are less than one, they are known as defensive securities. In our example, security C has the beta value less than one.

### Evaluation of Securities

Relative attractiveness of the security can be found out with the help of security market line. Stocks with high risk factor are expected to yield more return and vice-versa. But the investor would be interested in knowing whether the security is offering return more or less proportional to its risk.



The figure provides an explanation for the evaluation. There are nine points in the diagram. A, B and C lie on the security market line, R, S and T above the SML and U, V and W below the SML. ARU have the same beta level of, 9. Likewise beta values of SBV = 1.00 and TCW = 1.10. The stocks above the SML yield higher returns for the same level of risk. They are underpriced compared to their beta value. With the simple rate of return formula, we can prove that they are undervalued.

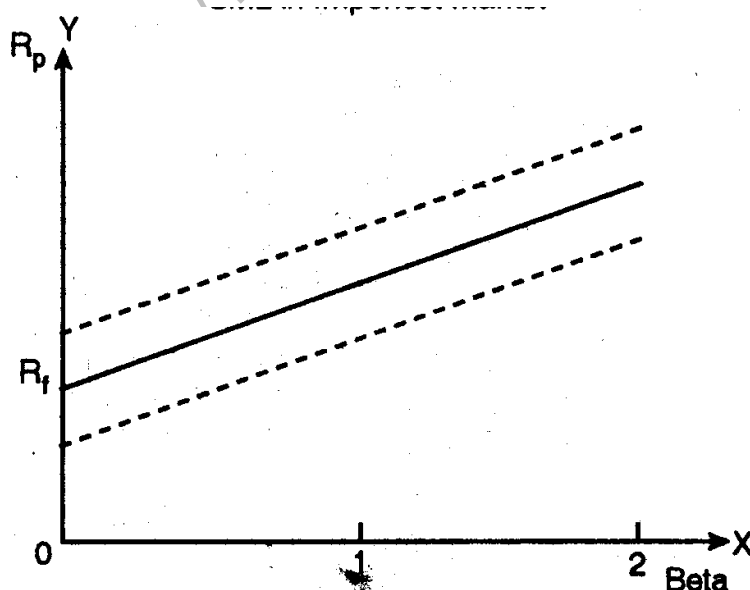
$P_i$  is the present price  $P_0$  - the purchase price and Div - Dividend. When the purchase price is low i.e. when the denominator value is low, the expected return could be high. Applying the same principle the stocks U, V and W can be classified as overvalued securities and are expected to yield lower returns than stocks of comparable risk. The denominator value may be high i.e. the purchase price may be high. The prices of these scripts may fall and lower the denominator. There by, they may increase the returns on securities.

The securities A, B and C are on the line. Therefore considered to be appropriately valued. They offer returns in proportion to their risk. They have average 40clc performance, since they are neither undervalued nor overvalued.

### Market Imperfection and SML

Information regarding the share price and market condition may not be immediately available to all investors. Imperfect information may affect the valuation of securities. In a market with perfect information, all securities should lie on SML. Market imperfections would lead to a band of SML rather than a single line. Market imperfections affect the width of the SML to a band. If imperfections are more, the width also would be larger. SML in imperfect market is given in figure.

### SML in Imperfect Market



## Empirical Tests of the CAPM

In the CAPM, beta is used to estimate the systematic risk of the security and reflects the future volatility of the stock in relation to the market. Future volatility of the stock is estimated only through historical data. Historical data are used to plot the regression line or the characteristic line and calculate beta. If historical betas are stable over a period of time, they would be good proxy for their ex-ante or expected risk.

Robert A. Levy, Marshall B. Blume and others have studied the question of beta stability in depth. I calculated betas for both Individual securities and portfolios. His study results have provided the following conclusions

- (1) The betas of individual stocks are unstable; hence the past betas for the individual securities are not good estimators of future risk.
- (2) The betas of portfolios of ten or more randomly selected stocks are reasonably stable, hence the portfolio betas are good estimators of future portfolio volatility. This is because of the errors in the estimates of individual securities' betas tend to offset one another in a portfolio.

Various researchers have attempted to find out the validity of the model by calculating beta and realized rate of return. They attempted to test (1) whether the intercept is equal to i.e. risk free rate of interest or the interest rate offered for treasury bills (2) whether the line is linear and pass through the beta = 1 being the required rate of return of the market. In general, the studies have showed the following results.

- (1) The studies generally showed a significant positive relationship between the expected return and the systematic risk. But the slope of the relationship is usually less than that of predicted by the CAPM.
- (2) The risk and return relationship appears to be linear. Empirical studies give no evidence of significant curvature in the risk/return relationship.
- (3) The attempts of the researchers to assess the relative importance of the market and company risk have yielded definite results. The CAPM theory implies that unsystematic risk is not relevant, but unsystematic and systematic risks are positively related to security returns. Higher returns are needed to compensate both the risks. Most of the observed relationship reflects statistical problems rather than the true nature of capital market.

- (4) According to Richard Roll, the ambiguity of the market portfolio leaves the CAPM untestable. The practice of using indices as proxies is loaded with problems. Different indices yield different betas for the same security.
- (5) If the CAPM were completely valid, it should apply to all financial assets including bonds. But, when bonds are introduced into the analysis, they do not fall on the security market line.

### **Present Validity of CAPM**

The CAPM is greatly appealing at an intellectual level, logical and rational. The basic assumptions on which the model is built raise some doubts in the minds of the investors. Yet, investment analysts have been more creative in adapting CAPM for their uses.

- (1) The CAPM focuses on the market risk, makes the investors to think about the riskiness of the assets in general. CAPM provides basic concepts which are truly of fundamental value.
- (2) The CAPM has been useful in the selection of securities and portfolios. Securities with higher returns are considered to be undervalued and attractive for buy. The below normal expected return yielding securities are considered to be overvalued and suitable for sale.
- (3) In the CAPM, it has been assumed that investors consider only the market risk. Given the estimate of the risk free rate, the beta of the firm, stock and the required market rate of return, one can find out the expected returns for a firm's security. This expected return can be used as an estimate of the cost of retained earnings.
- (4) Even though CAPM has been regarded as a useful tool to financial analysts, it has its own critics too. They point out, when the model is ex-ante, the inputs also should be ex-ante, i.e. based on the expectations of the future. Empirical tests and analyses have used ex-post i.e. past data only.
- (5) The historical data regarding the market return, risk free rate of return and betas vary differently for different periods. The various methods used to estimate these inputs also affect the beta value. Since the inputs cannot be estimated precisely, the expected return found out through the CAPM model is also subjected to criticism 4

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## Lesson 5.2 - Arbitrage Pricing Theory

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Arbitrage pricing theory is one of the tools used by the investors and portfolio managers. The capital asset pricing theory explains the return of the securities on the basis of their respective betas. According to the previous models, the investor chooses the investment on the basis of expected return and variance. The alternative model developed in asset pricing by Stephen Ross is known as Arbitrage Pricing Theory. The APT theory explains the nature of equilibrium in the asset pricing in a less complicated manner with fewer assumptions compared to CAPM.

### Arbitrage

Arbitrage is a process of earning profit by taking advantage of differential pricing for the same asset. The process generates riskless profit. In the security market, it is of selling security at a high price and the simultaneous purchase of the same security at a relatively lower price.

Since the profit earned through arbitrage is riskless, the investors have the incentive to undertake this whenever an opportunity arises. In general, some investors indulge more in this type of activities than others. However, the buying and selling activities of the arbitrageur reduce and eliminate the profit margin, bringing the market price to the equilibrium level.

### The Assumptions

1. The investors have homogenous expectations.
2. The investors are risk averse and utility maximisers.
3. Perfect competition prevails in the market and there is no transaction cost.

The APT theory does not assume (1) single period investment horizon, (2) no taxes (3) investors can borrow and lend at risk free rate of interest and (4) the selection of the portfolio is based on the mean and variance analysis. These assumptions are present in the CAPM theory.

## Arbitrage Portfolio

According to the APT theory an investor tries to find out the possibility to increase returns from his portfolio without increasing the funds in the portfolio. He also likes to keep the risk at the same level. For example, the investor holds A, B and C securities and he wants to change the proportion of the securities without any additional financial commitment. Now the change in proportion of securities can be denoted by  $X_A$ ,  $X_B$ , and  $X_C$ . The increase in the investment in security A could be carried out only if he reduces the proportion of investment either in B or C because it has already stated that the investor tries to earn more income without increasing his financial commitment. Thus, the changes in different securities will add up to zero. This is the basic requirement of an arbitrage portfolio. If  $X$  indicates the change in proportion,

$$\Delta X_A + \Delta X_B + \Delta X_C = 0$$

The factor sensitivity indicates the responsiveness of a security's return to a particular factor. The sensitiveness of the securities to any factor is the weighted average of the sensitivities of the securities, weights being the changes made in the proportion. For example  $b_A$ ,  $b_B$  and  $b_C$  are the sensitivities, in an arbitrage portfolio the sensitivities become zero.

$$h_A \Delta X_A + b_B \Delta X_B + b_C \Delta X_C = 0$$

The investor holds the A, B and C stocks with the following returns and sensitivity to changes in the industrial production. The total amount invested is ₹ 1,50,000.

| I       | R   | b    | Original weights |
|---------|-----|------|------------------|
| Stock A | 20% | .45  | .33              |
| Stock B | 15% | 1.35 | .33              |
| Stock C | 12% | .55  | .34              |

Now the proportions are changed.

The changes are

$$\Delta X_A = .02$$

$$\Delta X_B = .025$$

$$\Delta X_C = -.225$$

For an arbitrage portfolio

$$\Delta X_A + \Delta X_B + \Delta X_C = 0$$

$$.2 + .025 - .225 = 0$$

The sensitivities also become zero

$$\Delta X_A b_A + \Delta X_B b_B + \Delta X_C b_C = 0$$

$$.2 \times .45 + .025 \times 1.35 - .225 \times .55 = 0$$

In an arbitrage portfolio, the expected return should be greater than zero.

$$\Delta X_A R_A + \Delta X_B R_B + \Delta X_C R_C > 0$$

$$.2 \times 20 + .025 \times 15 - .225 \times 12$$

$$4.375 - 2.7 > 0$$

i.e. 1675%

The investor would increase his investment in stock A and B by selling C. The new compositions of weights are

$$X_A = 0.53$$

$$X_B = 0.355$$

$$X_C = 0.115$$

The portfolio allocation on stocks A, B and C is as follows

$$= 1,50,000 \times .53 + 1,50,000 \times .355 + 1,50,000 \times .115$$

$$= ₹ 79,500 + 53,250 + 17,250$$

The sensitivity of the new portfolio will be

$$= .45 \times .53 + 1.35 \times .355 + .55 \times .115$$

$$= .239 + .479 + .063 = .781$$

This is same as the old portfolio sensitivity

$$\text{i.e. } .45 \times .33 + 1.35 \times .33 + .55 \times .34 = .781$$

The return of the new portfolio is higher than the old portfolio.

Old portfolio return

$$\begin{aligned} &= 20 \times .33 + 15 \times .33 + 12 \times .34 \\ &= 6.6 + 4.95 + 4.08 \\ &= 15.63\% \end{aligned}$$

The new portfolio return

$$\begin{aligned} &= 20 \times .53 + 15 \times .355 + 12 \times .115 \\ &= 10.6 + 5.325 + 1.38 \\ &= 17.305\% \end{aligned}$$

This is equivalent to the old portfolio return plus the return that occurred due to the change in portfolio

$$= 15.63\% + 1.675\% = 17.305\%$$

The variance of the new portfolio's change is only due to the changes in its non-factor risk. Hence, the change in the risk factor is negligible. From the analysis it can be concluded that

1. The return in the arbitrage portfolio is higher than the old portfolio.
2. The arbitrage and old portfolio sensitivity remains the same.
3. The non-factor risk is small enough to be ignored in an arbitrage portfolio.

### Effect on Price

To buy stock A and B the investor has to sell stock C. The buying pressure on stock A and B would lead to increase in their prices. Conversely selling of stock C will result in fall in the price of the stock C. With the low price there would be rise in the expected return of stock C. For example, if the stock "C" at price ₹ 100 per share have earned 12 percent return, at ₹ 80 per share the return would be  $12/80 \times 100 = 15\%$ .

At the same time, return rates would be declining in stock A and B with the rise in price. This buying and selling activity will continue until all arbitrage possibilities are eliminated. At this juncture, there exists an approximate linear relationship between expected returns and sensitivities.

## The APT Model

According to Stephen Ross, returns of the securities are influenced by a number of macro economic factors. The macro economic factors are growth rate of industrial production, rate of inflation, spread between long term and short term interest rates and spread between low-grade and high grade bonds. The arbitrage theory is represented by the equation:

$$R_i = \lambda_0 + \lambda_1 b_{i1} + \lambda_2 b_{i2} + \dots + \lambda_j b_{ij}$$

$R_i$  = average expected return

$\lambda_1$  = sensitivity of return to  $b_{i1}$

$b_{i1}$  = the beta co-efficient relevant to the particular factor.

The equation is derived from the model

$$R_i = \alpha_i + b_{i1} I_1 + b_{i2} I_2 + \dots + b_{ij} I_j + e_i$$

Let us take the two factor model

$$R_i = \lambda_0 + \lambda_1 b_{i1} + \lambda_2 b_{i2} + b_2$$

If the portfolio is a well diversified one, unsystematic risk tends to be zero and systematic risk is represented by  $b_{i1}$  and  $b_{i2}$  in the equation.

Let us assume the existence of three well diversified portfolios as shown in the table.

| Portfolio | Expected return | $b_{i1}$ | $b_{i2}$ |
|-----------|-----------------|----------|----------|
| A         | 12.0            | 1        | 0.5      |
| B         | 13.4            | 3        | 0.2      |
| C         | 12              | 3        | -0.5     |

The equation  $R_i = \lambda_0 + \lambda_1 b_{i1} + \lambda_2 b_{i2} + b_2$  can be determined with the help of the above mentioned details. By solving the following equations

$$12 = \lambda_0 + 1\lambda_1 + 0.5\lambda_2$$

$$13.4 = \lambda_0 + 3\lambda_1 + 0.2\lambda_2$$

$$12 = \lambda_0 + 3\lambda_1 - 0.5\lambda_2$$

We can get

$$R_i = 10 + 1b_{i1} + 2b_{i2}$$

The expected return is

$$R_p = \sum_{i=1}^N X_i R_i$$

The risk is indicated by the sensitivities of the factors

$$b_{p1} = \sum_{i=1}^N X_i b_{i1}; b_{p2} = \sum_{i=1}^N X_i b_{i2}$$

All the portfolios constructed from portfolios A, B and C lie on the plane described A, B and C. Assume there exists a portfolio D with an expected return 14%,  $b_{i1} = 2.3$  and  $b_{i2} = .066$ . This portfolio can be compared with the portfolio E having equal portion of A, B and C portfolios. Every portfolio would have a share of 33%. The portfolio b are

$$b_{p1} = 1/3 \times 1 + 1/3 \times 3 + 1/3 \times 3 = 2.33$$

$$b_{p2} = 0.5 \times 1/3 + 0.2 \times 1/3 + (-0.5 \times 1/3) = 0.066$$

The risk for portfolio E is identical to the risk on portfolio D. The expected return for portfolio B is

$$\begin{aligned} & 1/3(12) + 1/3(13.4) + 1/3(12) \\ & = 12.46 \end{aligned}$$

Since the portfolio B lies on the plane described above, the return could be obtained from the equation of the plane.

$$\begin{aligned} R &= 10 + 1(2.33) + 2(.066) \\ &= 12.46 \end{aligned}$$

The portfolio D and B have the same risk but different returns. In this juncture, the arbitrageur enters in and buy portfolio D t selling portfolio B short. Thus buying of portfolio D through the funds generated from selling B would provide riskless profit with no investment and no risk. Let us assume that the investor sells Rsr1000 with of portfolio E and buys Rs1000 worth of portfolio D. The cash flow is as shown in the following table.

|                     | Initial cash flow | End of period | $b_{i1}$ | $b_{i2}$ |
|---------------------|-------------------|---------------|----------|----------|
| Portfolio D         | 1000              | + 1140.0      | + 2.33   | + .06    |
| Portfolio E         | 1000              | - 1124.6      | - 2.33   | - .06    |
| Arbitrage Portfolio | 0                 | 15.4          | - 0      | 0        |

The arbitrage portfolio involves zero investment, has no systematic risk ( $b_{i1}$  and  $b_{i2}$ ) and earns ₹ 15.4. Arbitrage would continue until portfolio D lies on the same plane.

### Arbitrage Pricing Equation

In a single factor model, the linear relationship between the return and sensitivity  $b$  can be given in the following form.

$$R_i = \lambda_0 + \lambda_1 b_i$$

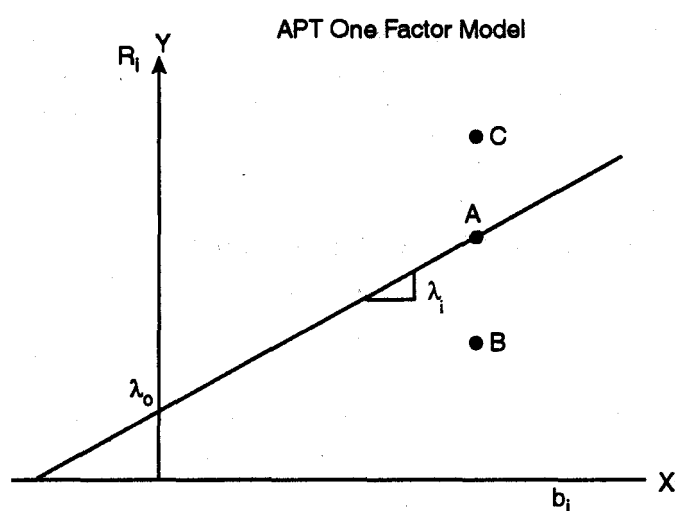
$R_i$  = return from stock A

$\lambda_0$  = riskless rate of return

$b_i$  = the sensitivity related to the factor

$\lambda_1$  = slope of the arbitrage pricing line

The above model is known as single factor model since only one factor is considered. Here, the industrial production alone is considered. The APT one factor model is given in figure.



The risk is measured along the horizontal axis and the return on the vertical axis. The A, B and C stocks are considered to be in the same risk class. The arbitrage pricing line

intersects the Y axis on which represents riskless rate of interest i.e. the interest offered for the treasury bills. Here, the investments involve zero risk and it is appealing to the investors who are highly risk averse. It stands for the slope of the arbitrage pricing line. It indicates the market price of risk and measures the risk-return trade-off in the security markets. It is the sensitivity coefficient or factor beta that shows the sensitivity of the asset or stock A to the respective risk factor.

### The Constants of the APT Equation

The existence of the risk-free asset yields a risk-free rate of return that is a constant. The asset does not have sensitivity to the factor. For example, the industrial production.

$$\text{If } b_i = 0$$

$$R_i = \lambda_0 + \lambda_i \cdot 0$$

$$R_i = \lambda_0$$

In other words,  $\lambda_0$  is equal to the risk-free rate of return. If the single factor portfolio's sensitivity is equal to one i.e.  $b_i = 1$  then

$$R_i = \lambda_0 + \lambda_i \cdot 1$$

This can be rewritten as

$$R_i = \lambda_0 + \lambda_i$$

$$R_i - \lambda_0 = \lambda_i$$

Thus  $\lambda_i$  is the expected excess return over the risk-free rate of return for a portfolio with unit sensitivity to the factor. The excess return is known as risk premium.

### Factors Affecting the Return

The specification of the factors is carried out by many financial analysts. Chen, Roll, and Ross have taken four macro-economic variables and tested them. According to them, the factors are inflation, the term structure of interest rates, risk premium, and industrial production. Inflation affects the discount rate or the required rate of return and the size of the future cash flows. The short-term inflation is measured by monthly percentage changes in the consumer price index. The interest rates on long-term bonds and short-term bonds differ. This difference affects the value of payments in the future relative to short-term

payments. The difference between the return on the high grade bonds and low grade (more risky) bonds indicates the market's reaction to risk. The industrial production represents the business cycle. Changes in the industrial production have an impact on the expectations and opportunities of the investor. The real value of the cash flow is also affected by it.

Burmeister and McElroy have estimated the sensitivities with some other factors. They are given below

- Default risk
- Time premium
- Deflation
- Change in expected sales
- The market returns not due to the first four variables.

The default risk is measured by the difference between the return on long term government bonds and the return on long terms bonds issued by corporate plus one-half of one per cent. Lime premium is measured by the return on long term government bonds minus one month Treasury bill rate one month ahead.

Deflation is measured by expected inflation at the beginning of the month minus actual inflation during the month. According to them, the first four factors accounted 25% of the variation in the Standard and 1or Composite Index and all the four co-efficient were significant.

Salomon Brothers identified five factors in their fundamental factor model. Inflation is the only common factor identified by others. The other factors are given below

- Growth rate in gross national product
- Rate of interest
- Rate of change in oil prices
- Rate of change in defence spending

All the three sets of factors have some common characteristics. They all affect the macro economic activities. Inflation and interest rate are identified as common factors. Thus, the stock price is related to aggregate economic activity and the discount rate of future cash flow

## APT and CAPM

The simplest form of APT model is consistent with the simple form of the CAPM model. When only one factor is taken into consideration, the APT can be stated as:

$$R_i = \lambda_0 + b_i \lambda_i$$

It is similar to the capital market line equation

$$R = R_f + \beta (R_m - R_f)$$

Which is similar to the CAPM model?

APT is more general and less restrictive than CAPM. In APT, the investor has no need to hold the market portfolio because it does not make use of the market portfolio concept. The portfolios are constructed on the basis of the factors to eliminate arbitrage profits. APT is based on the law of one price to hold for all possible portfolio combinations.

The APT model takes into account of the impact of numerous factors on the security. The macro economic factors are taken into consideration and it is closer to reality than CAPM.

The market portfolio is well defined conceptually. In APT model, factors are not well specified. Hence the investor finds it difficult to establish equilibrium relationship. The well defined market portfolio is a significant advantage of the CAPM leading to the wide usage of the model in the stock market.

The factors that have impact on one group of securities may not affect another group of securities. There is a lack of consistency in the measurements of the APT model.

Further, the influences of the factors are not independent of each other. It may be difficult to identify the influence that corresponds exactly to each factor. Apart from this, not all variables that exert influence on a factor are measurable.

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### Lesson 5.3 - Portfolio Evaluation

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Portfolio manager evaluates his portfolio performance and identifies the sources of strength and weakness. The evaluation of the portfolio provides a feed back about the performance to evolve better management strategy. Even though evaluation of portfolio performance is considered to be the last stage of investment process, it is a continuous process. The managed portfolios are commonly known as mutual funds. Various managed portfolios are prevalent in the capital market. Their relative merits of return and risk criteria have to be evaluated.

#### Mutual Fund

Mutual fund is an investment vehicle that pools together funds from investors to purchase stocks, bonds or other securities. An investor can participate in the mutual fund by buying the units of the fund. Each unit is backed by a diversified pool of assets, where the funds have been invested. A closed-end fund has a fixed number of units outstanding. It is open for a specific period. During that period investors can buy it. The initial offer period is terminated at the end of the pre-determined period. The closed-end schemes are listed in the stock exchanges. The investor can trade the units in the stock markets just like other securities. The prices may be either quoted at a premium or discount.

In the open-end schemes, units are sold and bought continuously. The investors can directly approach the fund managers to buy or sell the units. The price of the unit is based on the net asset value of the particular scheme. The net asset value of the fund is the value of the underlying securities of the scheme. The net asset value is calculated on a daily or weekly basis.

The gain or loss made by the mutual fund is passed on to the investors after deducting the administrative expenses and investment management fees. The gains are distributed to the unit holder in the form of dividend or reinvested by the fund to generate further gains.

The mutual fund may be with or without a load factor. A commission or charge paid by the investors while purchasing or selling the mutual fund is known as load factor. Front-end load is charged when units are sold by the funds and back-end load is charged when the units are repurchased by the funds. The front-end load factor reduces the units when

the investor buys it and the back-end load reduces the investor's proceeds when he sells the units. Generally, the load factor ranges between 1 and 6 per cent of the net asset value. Sometimes, the fund may not charge both the loads.

### **Advantages of Mutual Funds**

The Association of Mutual Funds in India (AMFI), a non-profit organization serving the cause of mutual funds, has listed the following advantages to the investors in mutual funds.

#### **1. Professional Management**

Experienced fund managers supported by a research team, select appropriate securities to the fund. The forecasting of the market is done effectively.

#### **2. Diversification**

Mutual funds invest in a diverse range of securities and over many industries. Hence, all the eggs are not placed in one basket. Normally an investor has to have large sum of money to achieve this objective, if he invests directly in the stock market. Through mutual funds, he can achieve diversification of portfolio at a fraction of the cost.

#### **3. Convenient Administration**

For the investors there is reduction in paper work and saving in time. It is also very convenient. Mutual funds help in overcoming the problems relating to bad deliveries, delayed payments and the like.

#### **4. Return Potential**

Medium and the long term mutual funds have the potential to provide high returns.

#### **5. Low Costs**

The funds handle the investments of a large number of people, they are in a position to pass on relatively low brokerage and other costs. This is because the funds can take advantage of the economies of scale.

## 6. Liquidity

Mutual funds' provide liquidity in t ways. In open-end schemes, the investor can get back his money at any time by selling back the units to the fund at NAV related prices. In closed-end fund, he has the option to sell the units through the stock exchange.

## 7. Transparency

Mutual funds provide information on each scheme about the specific investments made there under and so on.

## 8. Flexibility

Currently most funds have regular investment plans, regular withdrawal plans and dividend reinvestment schemes. A great deal of flexibility is assured in the process.

## 9. Choice of Scheme

Mutual funds offer a variety of schemes to suit varying needs of the investors.

## 10. Well — Regulated

The funds are registered with the Securities and Exchange Board of India and their operations are continuously monitored.

## Sharpe's Performance Index

Sharpe's performance index gives a single value to be used for the performance ranking of various funds or portfolios. Sharpe index measures the risk premium of the portfolio relative to the total amount of risk in the portfolio. This risk premium is the difference between the portfolio's average rate of return and the riskless rate of return. The standard deviation of the portfolio indicates the risk. The index assigns the highest values to assets that have best risk-adjusted average rate of return

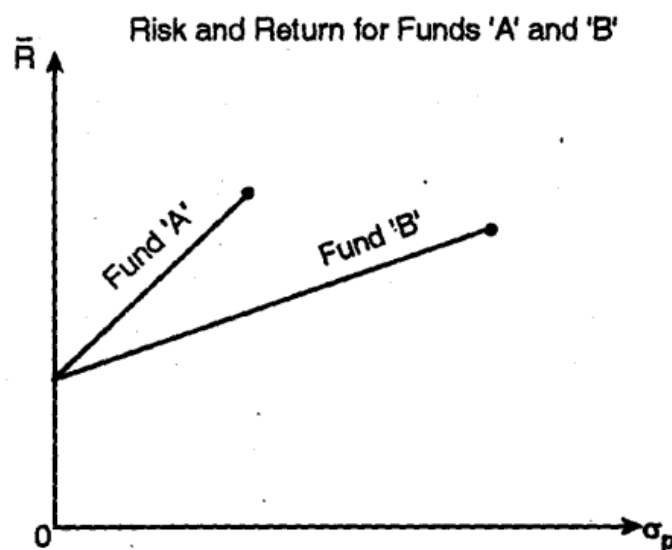
$$St = \frac{R_p - R_f}{\sigma_p}$$

$$\text{Sharp Index} = \frac{\text{Portfolio average return} - \text{Risk free rate of interest}}{\text{Standard deviation of the portfolio return}}$$

The details of two hypothetical funds A and B are given below

**Risk and Return for Funds A and B**

| Fund | Average Annual Return | Riskless Rate of Interest | Standard Deviation | $S_t$                                       |
|------|-----------------------|---------------------------|--------------------|---------------------------------------------|
| A    | 0.0879                | 0.05                      | 0.0829             | $\frac{0.0879 - 0.05}{0.0829}$<br>$= 0.457$ |
| B    | 0.1347                | 0.05                      | 0.1982             | $\frac{0.1347 - 0.05}{0.1982}$<br>$= 0.427$ |

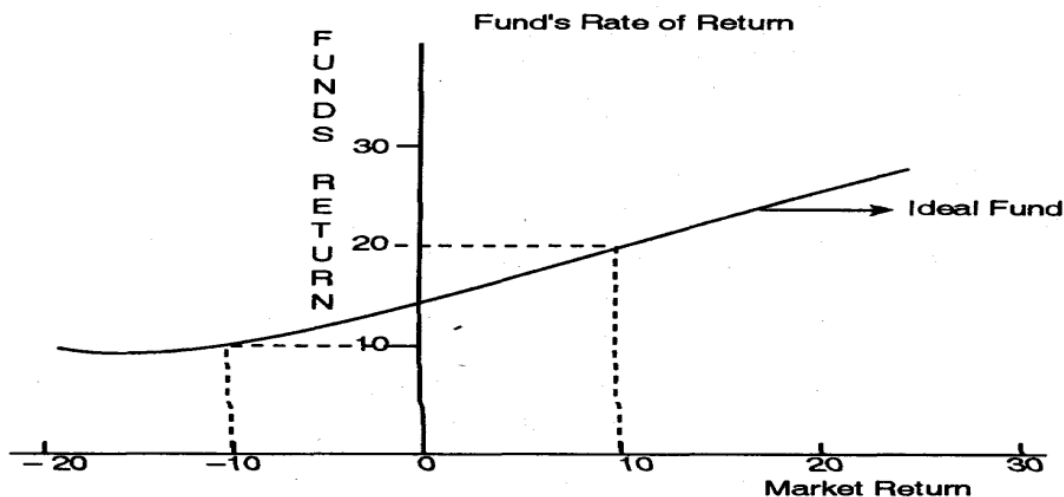


The larger the  $S_t$ , better the fund has performed. Thus, A ranked as better fund because its index  $.457 > .427$  even though the portfolio B had a higher return of 13.47 per cent. It is shown in Figure. The reason is that the fund 'B's managers took such a great risk to earn the higher returns and its risk adjusted return was not the most desirable. Sharpe index can be used to rank the desirability of funds or portfolios, but not the individual assets. The individual asset contains its diversifiable risk.

### Treynor's Performance Index

To understand the Treynor index, an investor should know the concept of characteristic line. The relationship between a given market return and the fund's return is given by the characteristic line. The fund's performance is measured in relation to the

market performance. The ideal fund's return rises at a faster rate than the general market performance when the market is moving upwards and its rate of return declines slowly than the market return, in the decline. The ideal fund may place its fund in the treasury bills or short sell the stock during the decline and earn positive return. The relationship between the ideal fund's rate of return and the market's rate of return is given by the figure



The market return is given on the horizontal axis and the fund's rate of return on the vertical axis. When the market rate of return increases, the fund's rate of return increases more than proportional and vice-versa. In the figure the fund's rate of return is 20 per cent when the market's rate of return is 10 per cent, and when the market return is -10, the fund's return is 10 per cent. The relationship between the market return and fund's return is assumed to be linear.

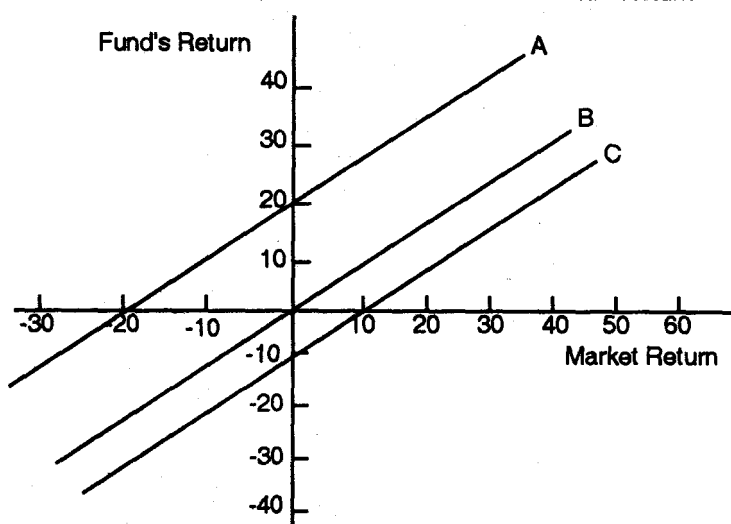
This linear relationship is shown by the characteristic line. Each fund establishes a performance relationship with the market. The characteristic line can be drawn by plotting the fund's rate of return for a given period against the market's return for the same period. The slope of the line reflects the volatility of the fund's return.

A steep slope would indicate that the fund is very sensitive to the market performance. If the fund is not so sensitive then the slope would be a slope of less inclination.

All the funds have the same slope indicating same level of risk. The investor would prefer A fund, because it offers superior return than funds C and B for the same level of risk exposure. This is shown in (Figure)

With the help of the characteristic line Treynor measures the performance of the fund. The slope of the line is estimated by

- $R_p = a + \beta R_m + e_p$   
 $R_p$  = Portfolio return  
 $R_m$  = The market return or index return  
 $e_p$  = The error term of the residual  
 $a, \beta$  = Co-efficients to be estimate



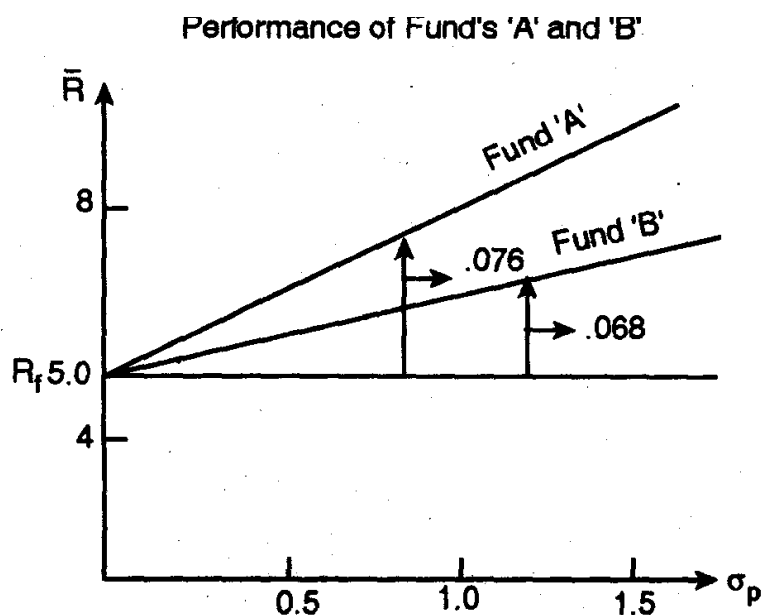
Beta co-efficient is treated as a measure of undiversifiable systematic risk

$$T_n = \frac{\text{Portfolio average return} - \text{Risk free rate of interest}}{\text{Standard deviation of the portfolio return}}$$

$$T_n = \frac{R_p - R_f}{\beta_p}$$

Treynor's risk premium of the portfolio is the difference between the average return and the riskless rate of return. The risk premium depends on the systematic risk assumed in a portfolio. Let us analyse to hypothetical funds.

| Fund | Average Return | Beta   | Risk Premium | $R_f$ | $T_n$                                        |
|------|----------------|--------|--------------|-------|----------------------------------------------|
| A    | 0.0879         | 0.499  | .0379        | .05   | $\frac{0.0879 - 0.05}{0.499}$<br>$= 0.076$   |
| B    | 0.1347         | 1.2493 | 0.0847       | .05   | $\frac{0.1347 - 0.05}{1.2493}$<br>$= 0.0678$ |



### Jensen's Performance Index

The absolute risk adjusted return measure was developed by Michael Jensen and commonly known as Jensen's measure. It is mentioned as a measure of absolute performance because a definite standard is set and against that the performance is measured. The standard is based on the manager's predictive ability. Successful prediction of security price would enable the manager to earn higher returns than the ordinary investor expects to earn in a given level of risk.

The basic model of Jensen is given below

$$R_p = \alpha + \beta (R_m - R_f)$$

$R_p$  = average return of portfolio

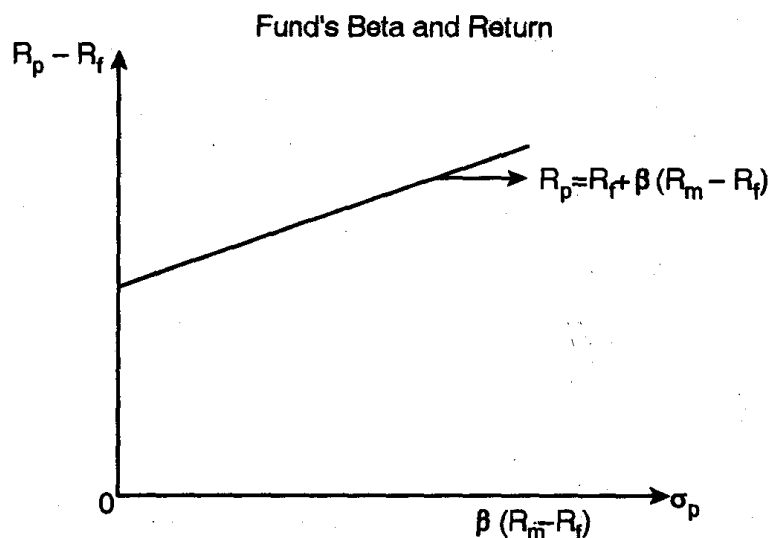
$R_f$  = riskless rate of interest

$\alpha$  = the intercept

$\beta$  = a measure of systematic risk

$R_m$  = average market return

The return of the portfolio varies in the same proportion of 13 to the difference between the market return and riskless rate of interest. Beta is assumed to reflect the systematic risk. The fund's portfolio beta would be equal to one if it takes a portfolio of all market securities. The 13 would be greater than one if the fund's portfolio consists of securities that are riskier than a portfolio of all market securities. The figure shows the relationship between beta and fund's return.



Any professional manager would be expected to earn average portfolio return of  $R = R_f + \beta (R_m - R_f)$ . If his predictive ability is superior, he should earn more than other funds at each level of risk. If the fund manager has consistently performed better than average  $R_p$ , there would be some constant factor that would make the actual return higher than average  $R$ . The constant may be that represents the forecasting ability of the manager. Then the equation becomes

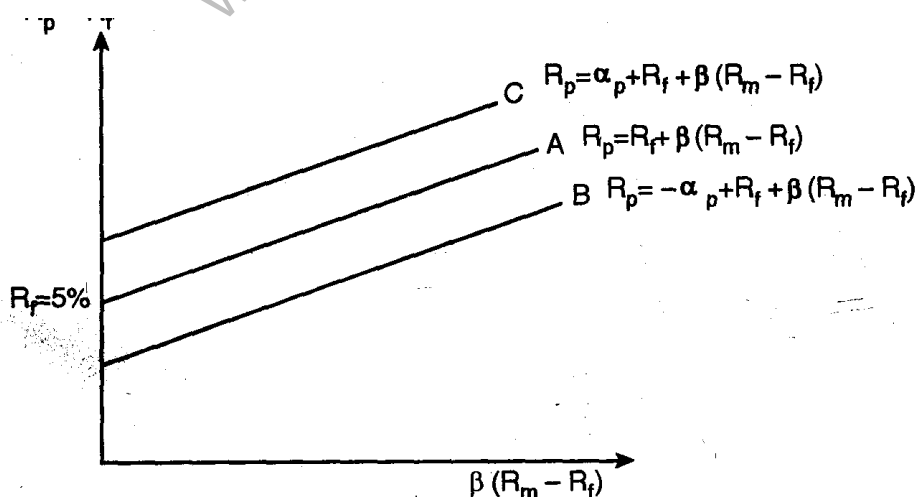
$$R_p - R_f = \alpha_p + \beta (R_m - R_f)$$

Or

$$R_p = \alpha_p + R_f + \beta (R_m - R_f)$$

By estimating this equation with regression technique, Jensen claimed a the constant, reflected the professional management's ability to forecast the price movements. A comparative analysis of three hypothetical funds A, B and C are given in the figure.

#### Jensen's Measure of Management Ability



Fund A's  $\alpha$  is equal to the risk free rate of return. If no risk is undertaken, the portfolio is expected to earn at least  $R_f$ . It is hypothesized that it takes no particular professional managerial ability to increase the return  $R_p$  by increasing  $(R_m - R_f)$ . In the fund C, the manager's predictive ability has made him earn more than  $R_f$ . The fund manager 'would be consistently performing better than the fund A. At the same time if the professional management has not improved, it 'would result in a negative  $\alpha$ . This is shown by the line B. Here the is even below the riskless rate of interest. Jensen in his study of 115 funds, he found out that only 39 funds possessed positive  $\alpha$  and employing professional management has improved the expected return. On an average, fund's performance is worse than expected, without professional management and if any investor is to purchase fund's shares, he must be very selective in his evaluation of management. Thus, Jensen's evaluation of portfolio performance involves two steps.

1. Using the equation the expected return should be calculated.
2. With the help of 3,  $R_m$  and  $R_f$ , he has to compare the actual return with the expected return. If the actual return is greater than the expected return, then the portfolio is considered to be functioning in a better manner. The following table gives the portfolio return and the market return. Rank the performance.

**Portfolio Return and Market Return**

| Portfolio    | $R_p$ | $\beta$ | $R_f$ |
|--------------|-------|---------|-------|
| A            | 15    | 1.2     | 5%    |
| B            | 12    | 0.8     | 5%    |
| C            | 15    | 1.5     | 5%    |
| Market Index | 12    | 1.0     | 5%    |

The return can be calculated with the given information using the formula:

$$R_p = R_f + \beta (R_m - R_f)$$

$$\text{Portfolio A} = 5 + 1.2 (12 - 5) = 13.4$$

$$\text{Portfolio B} = 5 + 0.8 (12 - 5) = 10.6$$

$$\text{Portfolio C} = 5 + 1.5 (12 - 5) = 15.5$$

The difference between the actual and expected return is compared.

$$\text{Portfolio A} = 15 - 13.4 = 1.6$$

$$\text{Portfolio B} = 12 - 10.6 = 1.4$$

$$\text{Portfolio C} = 15 - 15.5 = -0.5$$

Among the risk adjusted performance and of the three portfolios, A is the best, B - the second best and the last is the C portfolio.

### Example

Mr. X has owned units from three different mutual funds namely R, S, and T. The following particulars are available to him. He wants to dispose any one of the mutual fund for his personal expenditure. Which fund should he dispose?

| Funds  | Excess Average Return | Beta |
|--------|-----------------------|------|
| R      | 7.7                   | 1.02 |
| S      | 11.3                  | 0.99 |
| T      | 11.6                  | 1.07 |
| Market | 7.8                   | 1.00 |

Ans: The performance can be evaluated by finding out the differential return.  $R - R = \alpha + (R - R_f)$  (or)

$$R_p - R_f = \alpha_p + \beta (R_m - R_f) \quad \text{Or}$$

$$R_p = \alpha_p + R_f + \beta (R_m - R_f)$$

Portfolio R

$$\begin{aligned} \alpha_p &= (R_p - R_f) - \beta_p (R_m - R_f) \\ &= 7.7 - 1.02 \times 7.8 = -.256. \end{aligned}$$

Portfolio S

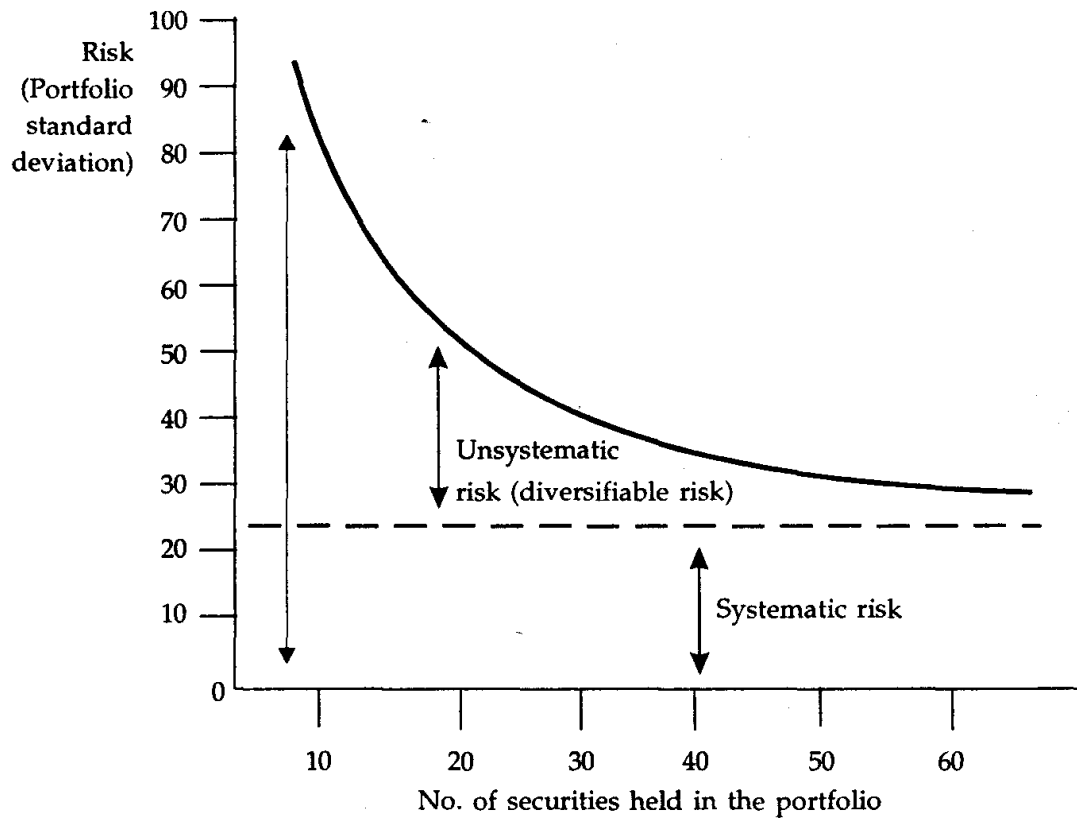
$$\begin{aligned} \alpha_p &= 11.3 - .99 \times 7.8 \\ &= 3.578 \end{aligned}$$

Portfolio C

$$\begin{aligned} \alpha_p &= 11.6 - 1.07(7.8) \\ &= 3.254 \end{aligned}$$

Since the Portfolio R has a negative alpha value Mr. X can sell th portfolio R and keep the other

For ranking purpose, Jensen measure should be properly adjusted. Each asset's alpha value should be divided by its beta co-efficient.



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### Lesson 5.4 - Portfolio Revision

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The care taken in the construction of the portfolio should be extended to the review and revision of the portfolio. Fluctuations that occur in the equity prices cause substantial gain or loss to the investors. The investor should have competence and skill in the revision of the portfolio. Normally the average investor dislikes to sell in the bull market with the anticipation of further rise. Likewise, he is reluctant to buy in the bear market with the anticipation of further fall.

The portfolio management process needs frequent changes in the composition of stocks and bonds. In securities, the type of securities to be held should be revised according to the portfolio policy. If the policy of investor shifts from earnings to capital appreciation, the stocks should be revised accordingly. An investor can sell his shares if the price of shares reaches the historic high prices. Likewise, if the security does not fulfill the investor's expectation regarding return and growth, it is better to get rid of it. The investor should also consider the factors like risk, quality and tax concessions. If another stock offers a competitive edge over the present stock, investment should be shifted to the other stock. Many investors find themselves inadequate in their ability to trade and earn profit. Mechanical methods are adopted to earn better profit through proper timing. Such types of mechanical methods are Formula Plans and Swaps.

#### Passive Management

Passive management is a process of holding a well diversified portfolio for a long term with the buy and hold approach. Passive management refers to the investor's attempt to construct a portfolio that resembles the overall market returns. The simplest form of passive management is holding the Index fund that is designed to replicate a good and well defined index of the common stock such as BSE-Sensex or NSE-Nifty. The fund manager buys every stock in the index in exact proportion of the stock in that index. If Reliance Industry's stock constitutes 5% of the index, the fund also invests 5% of its money in Reliance Industry stock.

The problem in the index fund is the transaction cost. If it is NSE-Nifty, the manager has to buy all the 50 stocks in market proportion and cannot leave the stocks with smallest weights to save the transaction costs. Further, the reinvestment of the dividends also poses

a problem. Here, the alternative is to keep the cash in hand or to invest the money in stocks incurring transaction cost. Keeping away the stock of smallest weights and the money in hand fail to replicate the index fund in the proper manner. The commonly used approaches in constructing an index fund are as follows:

1. Keeping each stock in proportion to its representation in the index
2. Holding a specified number of stocks for example 20, which historically track the index in the best manner.
3. Holding a smaller set of stocks to match the index in a pre-specified set of characteristics. This may be in terms of sector, industry and the market capitalisation.

### **Active Management**

Active Management is holding securities based on the forecast about the future. The portfolio managers who pursue active strategy with respect to market components are called 'market timers'. The portfolio managers vary their cash position or beta of the equity portion of the portfolio based on the market forecast. The managers may indulge in 'group rotation's. Here, the group rotation means changing the investment in different industries' stocks depending on the assessed expectations regarding their future performance.

Stocks that seem to be best bets or attractive are given more weights in the portfolio than their weights in the index. For example, Information Technology or Fast Moving Consumer Goods industry stocks may be given more weights than their respective weights in the NSE-50. At the same time, stocks that are considered to be less attractive are given lower weights compared to their weights in the index.

Here, the portfolio manager may either remain passive with respect to market and group components but active in the stock selection process or he may be active in the market, group and stock selection process.

### **The Formula Plans**

The formula plans provide the basic rules and regulations for the purchase and sale of securities. The amount to be spent on the different types of securities is fixed. The amount may be fixed either in constant or variable ratio. This depends on the investor's attitude towards risk and return. The commonly used formula plans are rupee cost averaging, constant rupee value, the constant ratio and the variable ratio plans. The formula plans help to divide the investible fund between the aggressive and conservative portfolios.

The aggressive portfolio consists more of common stocks which yield high return with high risk. The aggressive portfolio's return is volatile because the share prices generally fluctuate. The conservative portfolio consists of more bonds that have fixed rate of returns. It is called conservative portfolio because the return is certain and the risk is less. The conservative portfolio serves as a cushion for the volatility of the aggressive portfolio. The capital appreciation in the conservative portfolio is rather slow and the fall in price of the bond or debenture is also alike.

### **Assumptions of the Formula Plan**

1. The first assumption is that certain percentage of the investor's fund is allocated to fixed income securities and common stocks. The proportion of money invested in each component depends on the prevailing market condition. If the stock market is in the boom condition lesser funds are allotted to stocks. Perhaps it may be a ratio of 80 per cent to bonds and 20 per cent to stocks in the portfolio. If the market is low, the proportion may reverse. In a balanced fund, 50 per cent of the fund is invested in stocks and 50 per cent in bonds.
2. The second assumption is that if the market moves higher, the proportion of stocks in the portfolio may either decline or remain constant. The portfolio is more aggressive in the low market and defensive when the market is on the rise.
3. The third assumption is that the stocks are bought and sold whenever there is a significant change in the price. The changes in the level of market could be measured with the help of indices like BSE-Sensitive Index and NSE-Nifty.
4. The fourth assumption requires that the investor should strictly follow the formula plan once he chooses it. He should not abandon the plan but continue to act on the plan.
5. The investors should select good stocks that move along with the market. They should reflect the risk and return features of the market. The stock price movement should be closely correlated with the market movement and the beta value should be around 1.0. The stocks of the fundamentally strong companies have to be included in the portfolio.

### **Advantages of the Formula Plan**

- Basic rules and regulations for the purchase and sale of securities are provided.
- The rules and regulations are rigid and help to overcome human emotion.
- The investor can earn higher profits by adopting the plans.

- A course of action is formulated according to the investor's objectives.
- It controls the buying and selling of securities by the investor.
- It is useful for taking decisions on the timing of investments.

### Disadvantages

- The formula plan does not help the selection of the security. The selection of the security has to be done either on the basis of the fundamental or technical analysis.
- It is strict and not flexible with the inherent problem of adjustment.
- The formula plan should be applied for long periods, otherwise the transaction cost may be high.
- Even if the investor adopts the formula plan, he needs forecasting. Market forecasting helps him to identify the best stocks.

### Rupee Cost Averaging

The simplest and most effective formula plan is rupee cost averaging. First, stocks with good fundamentals and long term growth prospects should be selected. Such stocks' prices tend to be volatile in the market and provide maximum benefit from rupee cost averaging. Secondly, the investor should make a regular commitment of buying shares at regular intervals. Once he makes a commitment, he should purchase the shares regardless of the stock's price, the company's short term performance and the economic factors affecting the stock market.

In the rupee cost averaging plan, the investor buys varying number of shares at various points of the stock market cycle. In a way, it can be called time diversification. Let us assume that an investor decides to buy Rs11000 worth of particular shares for four quarters in one particular year, ignoring the transaction costs. The details are given in table

**Rupee Cost Averaging (in ₹)**

| Quarter | Market Price | Shares Purchased | Cumulative Investment | Market value (in ₹) | Unrealised Profit or Loss | Average Cost per share | Average Market Price per share |
|---------|--------------|------------------|-----------------------|---------------------|---------------------------|------------------------|--------------------------------|
| 1       | 100          | 10               | 1,000                 | 1,000               | 0                         | 100                    | 100                            |
| 2       | 90           | 11               | 1,990                 | 1,890               | (100)                     | 94.76                  | 95                             |
| 3       | 100          | 10               | 2,990                 | 3,100               | 110                       | 96.45                  | 96.67                          |
| 4       | 110          | 9                | 3,980                 | 4,400               | 420                       | 99.50                  | 100                            |

In the above example, the stock price fell in the second quarter but recovered in the third quarter. The investor was able to buy more stocks in the second quarter than in the first quarter. The benefits of this policy can be viewed by comparing the last two columns. In the second quarter, the average cost per share is lower than the average market price per share. This is the benefit derived from rupee cost averaging.

The rupee cost averaging for the Hero Honda stock is given in table. The process of investment is assumed to commence in January 1996 and end in 1998, covering 12 quarters.

### **Advantages**

The advantages of the rupee cost averaging plan are

1. Reduces the average cost per share and improves the possibility of gain over a long period.
2. Takes away the pressure of timing the stock purchase from investors
3. Makes the investors to plan the investment programme thoroughly on the commitment of funds that has to be done periodically
4. Applicable to both falling and rising market, although it works best if the stocks are acquired in a declining market.

In a nut shell, the investor must decide in advance the sum and periodic intervals at which he has to invest. Once it is decided, the implementation is mechanical.

### **Limitations**

1. Extra transaction costs are involved with small and frequent purchase of shares
2. The plan does not indicate when to sell. It is strictly a strategy for buying
3. It does not eliminate the necessity for selecting the individual stocks that are to be purchased
4. There is no indication of the appropriate interval between purchases
5. The averaging advantage does not yield profit if the stock price is in a downward trend
6. The plan seems to work better when stock prices have cyclical patterns.

The rupee cost averaging plan yields better results when applied to no load mutual funds. The problems of high transaction costs and stock selection are eliminated. The broad

based index fund experiences profit if the once is volatile, allowing the averaging effect to result in cost reduction. The investor has only to decide on the size of the fund and the length of the interval between the purchases.

| Quarters | Price  | Shares Bought | Total No. of Shares | Investment (₹) | Cumulative Investment (₹) | Market value (₹) | Unrealised Profits (₹) | Average Cost (₹) | Average Price (₹) |
|----------|--------|---------------|---------------------|----------------|---------------------------|------------------|------------------------|------------------|-------------------|
| 1        | 2      | 3             | 4                   | 5              | 6                         | 7                | 8                      | 9                | 10                |
| 15.1.96  | 112.00 | 90            | 90                  | 10080          | 10080                     | 10080            |                        | 112              | 112               |
| 15.4.96  | 142.50 | 70            | 160                 | 9975           | 20055                     | 22800            | 2745                   | 125              | 127               |
| 15.7.96  | 162.00 | 62            | 222                 | 10044          | 30099                     | 35964            | 5865                   | 136              | 139               |
| 15.10.96 | 130.00 | 77            | 299                 | 10010          | 40109                     | 38870            | (1239)                 | 134              | 137               |
| 15.1.97  | 152.00 | 66            | 365                 | 10032          | 50141                     | 55480            | 5339                   | 137              | 140               |
| 7.4.97   | 156.50 | 64            | 429                 | 10016          | 60157                     | 67139            | 6982                   | 140              | 143               |
| 15.7.97  | 301.75 | 33            | 462                 | 9958           | 70115                     | 139409           | 69294                  | 152              | 165               |
| 15.10.97 | 381.88 | 26            | 488                 | 9929           | 80044                     | 186357           | 106313                 | 164              | 192               |
| 15.1.98  | 390.75 | 26            | 514                 | 10160          | 90204                     | 200846           | 110642                 | 176              | 214               |
| 15.4.98  | 606.25 | 16            | 530                 | 9700           | 99904                     | 321313           | 221409                 | 189              | 254               |
| 15.7.98  | 443.50 | 23            | 553                 | 10201          | 110105                    | 245256           | 135151                 | 199              | 271               |
| 15.10.98 | 571.00 | 17            | 570                 | 9707           | 119812                    | 325470           | 205658                 | 210              | 296               |

Col 7 = Col 2 x Col 4

Col 8 = Col 7 x Col 6

Col 9 = Col 6 ÷ Col 4

Col 10 = I Qr Price + II Qr Price ÷ 2 and so on.

### Constant Rupees Plan

Constant rupee, constant ratio and variable ratio plans are considered to be true formula timing plans. These plans force the investor to sell when the prices rise and purchase as prices fall. Forecasts are not required to guide buying and selling. The actions suggested by the formula timing plan automatically help the investor to reap the benefits of the fluctuations in the stock prices.

The essential feature of this plan is that the portfolio is divided into two parts, which consists of aggressive and defensive or conservative portfolios. The portfolio mix facilitates the automatic selling and buying of bonds and stocks.

**The plan** The constant rupee plan enables the shift of investment from bonds to stocks and vice-versa by maintaining a constant amount invested in the stock portion of the portfolio. The constant rupee plan starts with a fixed amount of money invested in selected stocks and bonds. When the price of the stocks increases, the investor sells sufficient amount of stocks to return to the original amount of the investment in stocks. By keeping the value of aggressive portfolio constant, remainder is invested in the conservative portfolio.

The investor must choose action points or revaluation points. The action points are the times at which the investor has to readjust the values of the stocks in the portfolio. Stocks' values cannot be continuously the same and the investor has to be watchful of the market price movements. Stocks' value in the portfolio can be allowed to fluctuate to a certain extent. Percentage change in price like 5%, 10% or 20% can be fixed by the investor. Allowing only small percentage change would result in a lot of transaction cost and would not be beneficial to the investor. If the action points are too large, the investor may not be able to get full benefit out of the price fluctuations. The table shows the constant rupee plan. The transaction costs are not considered.

#### Constant Rupee Plan

| Period           | Market Price ₹ | Number of Shares | Value of Stock Portfolio (₹) | Value of Defensive Portfolio (₹) | Total (₹) |
|------------------|----------------|------------------|------------------------------|----------------------------------|-----------|
| 1                | 50             | 200              | 10,000                       | 10,000                           | 20,000    |
| 2                | 44             | 200              | 8,800                        | 10,000                           | 18,800    |
| 3                | 40             | 200              | 8,000                        | 10,000                           | 18,000    |
| 4                | 40             | 250              | 10,000                       | 8,000                            | 18,000    |
| Bought 50 Shares |                |                  |                              |                                  |           |
| 5                | 44             | 250              | 11,000                       | 8,000                            | 19,000    |
| 6                | 50             | 250              | 12,500                       | 8,000                            | 20,500    |
| 7                | 50             | 200              | 10,000                       | 10,500                           | 20,500    |
| Sold 50 Shares   |                |                  |                              |                                  |           |

According to the Table, the investor has ₹ 20,000 to invest and he divides it equally between stocks and bonds 50:50 that is 10,000:10,000. He makes quarterly adjustment if the stock portion falls or rises by 20%. In the third quarter, the stock prices fell by 20% initiating the action. He shifted ₹ 2,000 from the bonds' portion and bought 50 shares. This lifted the value of stock portion again to ₹ 10,000.

In the fifth quarter, the stock price has increased from ₹ 40 to ₹ 50, a 20 per cent increase. In this action point the investor disposes off the shares and shifts the money to the bond portion. By this the stock amount in the portfolio has remained constant but the total portfolio value has increased. The investor stands to gain by the total portfolio value appreciation.

The major advantage of this plan is that purchase and sales are determined automatically. This facilitates the investor to earn capital gain by selling the stocks when the price increases and buying it at a relatively lower price. To make the plan operate effectively, at the starting point, stocks should not be purchased either at high prices or at too low prices. If the investor starts the purchase at the extreme price level, the stock fund may be either too small or too large.

### Constant Ratio Plan

Constant ratio plan attempts to maintain a constant ratio between the aggressive and conservative portfolios. The ratio is fixed by the investor. The investor's attitude towards risk and return plays a major role in fixing the ratio. The conservative investor may like to have more of bond and the aggressive investor, more of stocks. Once the ratio is fixed, it is maintained as the market moves up and down. As usual, action points may be fixed by the investor. It may vary from investor to investor. As in the previous example, when the stock price moves up or down by 10 to 20 per cent action would be taken. Here, 10 per cent is taken as action point. The table shows the constant ratio plan.

**Constant Ratio Plan**

| Market Price                                                        | Number of Shares in Stock Portion | Value of Stock (₹) | Value of Defensive Portfolio (₹) | Total Portfolio Value (₹) | Ration of Stock Portion to Defensive Portion |
|---------------------------------------------------------------------|-----------------------------------|--------------------|----------------------------------|---------------------------|----------------------------------------------|
| 50                                                                  | 100                               | 5000               | 5000                             | 10,000                    | 1.00                                         |
| 48                                                                  | 100                               | 4800               | 5000                             | 9,800                     | 0.96                                         |
| 45                                                                  | 100                               | 4500               | 5000                             | 9,500                     | 0.90                                         |
| ₹ 248 transferred from bond portion and 5.5 shares purchased.       |                                   |                    |                                  |                           |                                              |
| 45                                                                  | 105.5                             | 4748               | 4752                             | 9,500                     | 1.00                                         |
| 40.5                                                                | 105.5                             | 4273               | 4752                             | 9,025                     | 0.90                                         |
| Bought 5.9 shares by transferring ₹ 239 from bond portion           |                                   |                    |                                  |                           |                                              |
| 40.5                                                                | 111.4                             | 4512               | 4511                             | 9,023                     | 1.00                                         |
| 44.5                                                                | 111.4                             | 4957               | 4511                             | 9,468                     | 1.10                                         |
| 5 shares are sold and invested in bonds to make the ratio equal 1:1 |                                   |                    |                                  |                           |                                              |

The advantage of constant ratio plan is the automatism with which it forces the manager to counter adjust his portfolio cyclically. But this approach does not eliminate the necessity of selecting individual security.

The limitation of the plan is that the money is shifted from the stock portion to bond portion. Bond is also a capital market instrument and responds to market pressures. Bond and share prices may both rise and fall at the same time. In the downtrend both prices may decline and then gain.

### Variable Ratio Plan

According to this plan, at varying levels of market price, the proportions of the stocks and bonds change. Whenever the price of the stock increases, the stocks are sold and new ratio is adopted by increasing the proportion of defensive or conservative portfolio. To adopt this plan, the investor is required to estimate a long term trend in the price of the stocks. Forecasting is very essential to this plan. When there is a wide fluctuation variable ratio plan is useful. The table explains the variable ratio plan.

#### Variable Ratio Plan

| Share price (₹) | Value of Stock portion (₹) | Value of Defensive (₹) | Total Portfolio value (₹) | Stock as a Percentage of Portfolio (₹) | Portfolio Adjustment | Shares in Stock Portion (₹) |
|-----------------|----------------------------|------------------------|---------------------------|----------------------------------------|----------------------|-----------------------------|
| 100             | 10,000                     | 10,000                 | 20,000                    | 50.00                                  | -                    | 100                         |
| 90              | 9,000                      | 10,000                 | 19,000                    | 47.37                                  | -                    | 100                         |
| 80              | 8,000                      | 10,000                 | 18,000                    | 44.4                                   | -                    | 100                         |
| 80              | 12,640                     | 5,400                  | 18,040                    | 70.06                                  | Bought 58 shares     | 158                         |
| 90              | 14,220                     | 5,400                  | 19,620                    | 72.48                                  | -                    | 158                         |
| 100             | 15,800                     | 5,400                  | 21,200                    | 74.53                                  | Sold 50 shares       | 158                         |
| 100             | 10,800                     | 10,800                 | 21,600                    | 50.00                                  | -                    | 108                         |

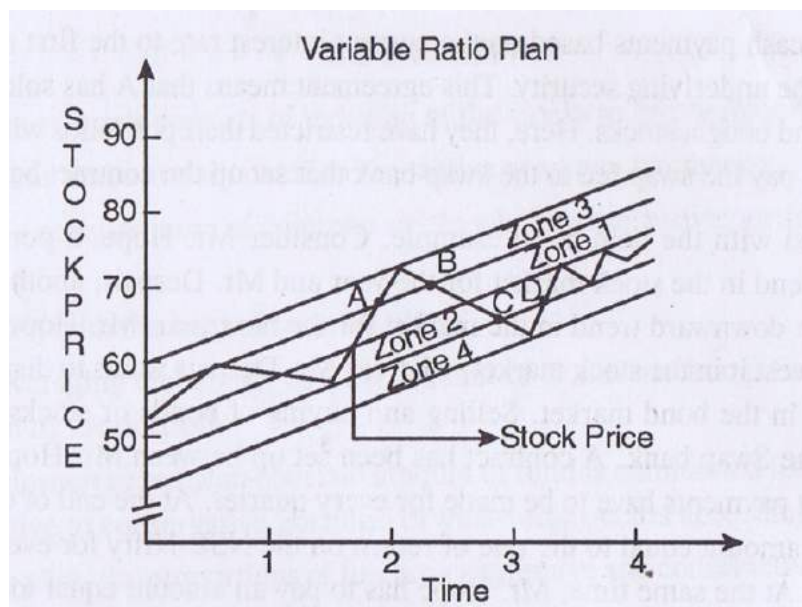
In the above example, the portfolio is adjusted for every 20 per cent change in the stock price. This adjustment criterion may be different for different investors depending upon their attitude towards risk and return. The portfolio is divided into two equal portions as in the case of other plans, with R,10,000 in each. Let us assume that there is a fall in the price of the stock, then, the percentage of stock in the portfolio declines. As the market price for the stock reaches a 20 per cent decline, that is to Rs,80, the adjustment action takes

place. The purchase of 58 shares raises the stock portion to 72.48 per cent. Once again, when there is a 20 per cent change, the adjustment action is triggered. When the prices have increased to ₹ 100, the investor sells 50 shares and the stock portion in the portfolio is reduced back to 50 per cent.

The figure explains the variable ratio plan.

The middle line is the trend line that represents the investor's expectation about of future course of prices. Zone 1 and 3 represent respectively of 10 and 20 per cent deviations above the expected trend, and zones 2 and 4 represent respectively 10 and 20 per cent deviations below the expected trend. Starting at ₹ 50, the portfolio's bonds and stocks ratio is 50:50.

At point A, the portfolio is adjusted to the next proportion, in this case 60 per cent bonds and 40 per cent stocks. At B, again it is 50:50. Below point C there would be more stocks than bonds. Because of the decline in stock price, more stocks are purchased. Above the point D, it is again 50:50. The line moves closer to the trend line



### Advantages

Automatically, the investor tends to correct his portfolio portions according to the price changes. The investor is not emotionally affected by the price changes in the market. With accurate forecast the variable ratio plan takes greater advantage of price fluctuations than the constant ratio plan.

## Limitations

1. The investor has to construct the appropriate zones and trend for alterations of the proportions
2. The selection of security has to be done by the investor by analysing the merits of the stock. The plan does not help in the selection of scrips.
3. If the zones are too small frequent changes have to be done and it would limit portfolio performance.

## Revision and the Cost

With the passage of time the stocks which were attractive once may turn out to be less attractive in terms of return. The investor's attitude towards risk and return also may change and the forecast regarding the market also may undergo change. In this context, the necessary revision is thought of by the portfolio manager. In revision of traded volumes the portfolio manager has to incur brokerage commission, price impact and bid-ask spread. Price impact means the effects on the price of stock. In simple terms, if the size of the trade is heavy on the buying side, the prices of the stock may increase. The bid-ask spread is the difference between the price that the market maker is willing to buy and sell the stock. These costs may be higher in small size stocks and the benefits of revision may be nullified by it. Usually revision is done with the view of either increasing the expected return of the portfolio or to reduce the risk (standard deviation) of the portfolio.

## SWAPS

Swap is a contract between two parties to exchange a set of cash flows over a pre-determined period of time. The two parties are known as counter parties. In an equity swap one counter party, say 'A', agrees to pay cash based on the rate of return of an agreed stock market index to the second counter party 'B'. Since the payments are based on the market index, they vary according to index movements. The second counter party B agrees to pay the fixed amount of cash payments based on the current interest rate to the first counterparty A. Thus, the payment depends upon the underlying security. This agreement means that A has sold stocks and bought bonds while B has sold bonds and bought stocks. Here, they have restricted their portfolios without the transaction costs, even though they have to pay the swap fee to the swap bank that set up the contract between the two parties.

This can be explained with the help of an example. Consider Mr. Hope, a portfolio manager having an expectation of upward trend in the stock market for the year and Mr.

Despair, another portfolio manager who feels that there would be downward trend in the market for the next year. Mr. Hope wants to sell ₹ 10 lakhs worth of bonds and to invest it in the stock market, whereas Mr. Despair wants to dispose off ₹ 10 lakhs worth of stocks to be invested in the bond market. Selling and buying of bonds or stocks involve transaction cost. Hence, they approach the Swap bank. A contract has been set up between Mr. Hope and Mr. Despair by the swap bank. The contract payments have to be made for every quarter. At the end of each quarter, Mr. Despair has to pay Mr. Hope an amount equal to the rate of return on the NSE-Nifty for every quarter in terms of the basic principal amount. At the same time, Mr. Hope has to pay an amount equal to 3% of the principal. The agreed notional principal amount is ₹ 10 lakhs. The contract lasts for an year. They pay fees to the swap bank.

Let us assume that the rates of return of NSE-Nifty are 5%, - 2%, 3% and 6% for the four quarters. Mr. Hope has to pay ₹ 30,000 to Mr. Despair each quarter, the payments Mr. Despair has to make to the Mr. Hope are as follows:

| Quarter | NSE-Nifty Return | Mr. Hope's Cashflows     |                        |                  | Mr. Despair Cashflows. |                     |                  |
|---------|------------------|--------------------------|------------------------|------------------|------------------------|---------------------|------------------|
|         |                  | Payment From Despair (₹) | Payment to Despair (₹) | Net outflows (₹) | Payment From Hope (₹)  | Payment to Hope (₹) | Net outflows (₹) |
| First   | 5%               | 50,000                   | 30,000                 | -20,000          | 30,000                 | 50,000              | 20,000           |
| Second  | -2%              | -20,000                  | 30,000                 | 50,000           | 30,000                 | -20,000             | -50,000          |
| Third   | 3%               | 30,000                   | 30,000                 | 00,000           | 30,000                 | 30,000              | 00,000           |
| Fourth  | 6%               | 60,000                   | 30,000                 | -30,000          | 30,000                 | 60,000              | 30,000           |

The results can be summarised

First Quarter Mr. Despair pays ₹ 20,000 to Mr. Hope

Second Quarter: Mr. Hope pays ₹ 50,000 to Mr. Despair

Third Quarter: There is no payment

Fourth Quarter: Mr. Despair pays ₹ 30,000 to Mr. Hope

The amount paid by Mr. Despair shows what would have transacted if Mr. Despair had sold stocks and bought bonds. Likewise the payments made by Mr. Hope indicates what would have happened if he had sold bonds and bought stocks. The equity swaps could be modified based upon the index and the prevailing interest rates.

## Summary

- The CAPM model is based on specific assumptions. The investor could borrow or lend any amount of money at riskless rate of interest.
- All investors hold only the market portfolio and the riskless securities.
- Market portfolio consists of the investments in all securities of the market. The proportion invested in each security is equal to the percentage of the total market capitalisation represented by the security.
- The capital market line represents the relationship between the expected return and standard deviation of the portfolio.
- The risk of the security is indicated by its covariance with the market portfolio.
- Security market line shows the linear relationship between the expected returns and betas of the securities.
- The objective of the asset pricing model is to identify the equilibrium asset price for expected return and risk. If the asset prices are not equal, there is a scope for arbitrage.
- An arbitrage portfolio is constructed without any additional financial commitment.
- Investors indulge in arbitrage, moving the price upwards if securities are held long and driving down the price of securities if held in short position, till the elimination of the arbitrage possibilities.
- The factor sensitivity in arbitrage model indicates the responsiveness of a security's return to a particular factor.
- Portfolio evaluation is carried out to assess the risk and return of the different portfolios.
- Mutual funds pool together the funds from investors by selling units and invest them in different types of securities.
- Closed-end funds are open for a specific period for subscription. The open-ended funds units are available continuously.
- Sharpe index is a measure of risk premium related to the total risk.
- Treynor index measures the fund's performance in relation to the market performance.

- Jensen index compares the actual or realised return of the portfolio with the calculated or predicted return. Better performance of the fund depends on the predictive ability of the managerial personnel of the fund.
- Passive management of funds consists of indexing of the stocks to be purchased. In active management funds are allocated to buy active stocks in the market.
- Aggressive portfolio consists more of common stocks while conservative portfolio consists more of bonds or debentures.
- Portfolios are revised with the help of formula plans.
- In the rupee cost averaging technique, varying amount of shares are bought at regular intervals. This is time diversification of the portfolio.
- According to the constant rupee plan constant amount of fund is maintained for the shares. The shifting of funds from aggressive to conservative portfolio or vice-versa occurs according to the price fluctuations.
- In the variable ratio plan, the proportions of funds on aggressive and conservative portfolios change according to the varying levels of security market prices.
- In an equity swap two parties agree to make payments to each other based on the stock market price and interest rate.

### Solved Problems

1. Security J has a beta of 0.75 while security K has a beta of 1.45. Calculate the expected return for these securities, assuming that the risk free rate is 5 per cent and the expected return of the market is 14 per cent.

### Solution

The expected return can be calculated using CAPM

$$R_i = R_f + \beta_i (R_m - R_f)$$

For Security J

$$\begin{aligned} R_i &= 5 + 0.75 (14 - 5) \\ &= 5 + 6.75 = 11.75 \text{ per cent} \end{aligned}$$

For Security K

$$\begin{aligned}
 R_i &= 5 + 1.45 (14 - 5) \\
 &= 5 + 13.05 = 18.05 \text{ per cent}
 \end{aligned}$$

2. A security pays a dividend of ₹ 3.85 and sells currently at ₹ 83. The security is expected to sell at ₹ 90 at the end of the year. The security has a beta of 1.15. The risk free rate is 5 per cent and the expected return on market index is 12 per cent. Assess whether the security is correctly priced.

### Solution

To assess whether a security is correctly priced, we need to calculate (a) the expected return as per CAPM formula, (b) the estimated return on the security based on the dividend and increase in price over the holding period.

### Expected return

$$\begin{aligned}
 R_i &= R_f + \beta_i (R_m - R_f) \\
 &= 5 + 1.15 (12 - 5) \\
 &= 5 + 8.05 = 13.05 \text{ per cent}
 \end{aligned}$$

### Estimated return

$$\begin{aligned}
 R_i &= \frac{(P_1 - P_0) + D_1}{P_0} \\
 &= \frac{(90 - 83) + 3.85}{83} \\
 &= \frac{7 + 3.85}{83} = \frac{10.85}{83} = 0.1307 = 13.07 \text{ per cent}
 \end{aligned}$$

As the estimated return on the security is more or less equal to the expected return, the security can be assessed as fairly priced.

3. The following data are available to you as portfolio manager:

| Security | Estimated return (per cent) | Beta | Standard deviation (per cent) |
|----------|-----------------------------|------|-------------------------------|
| A        | 30                          | 2.0  | 50                            |
| B        | 25                          | 1.5  | 40                            |

|                |      |     |    |
|----------------|------|-----|----|
| C              | 20   | 1.0 | 30 |
| D              | 11.5 | 0.8 | 25 |
| E              | 10.0 | 0.5 | 20 |
| Market index   | 15   | 1.0 | 18 |
| Govt. security | 7    | 0   | 0  |

- (a) In terms of the security market line, which of the securities listed above are underpriced?
- (b) Assuming that a portfolio is constructed using equal proportions of the five securities listed above, calculate the expected return and risk of such a portfolio.

### Solution

- (a) We can use CAPM to determine which of the securities listed are underpriced. For this we have to calculate the expected return on each security using CAPM equation:

$$R_i = R_f + \beta_i (R_m - R_f)$$

Given that  $R_f$  (Govt. security return rate) = 7 and  $R_m$  = 15

The equation becomes

$$R_i = 7 + \beta_i (15 - 7)$$

Now,

$$\text{Security A} = 7 + 2.0 (15 - 7) = 7 + 16 = 23 \text{ per cent}$$

$$\text{Security B} = 7 + 1.5 (15 - 7) = 7 + 12 = 19 \text{ per cent}$$

$$\text{Security C} = 7 + 1.0 (15 - 7) = 7 + 8 = 15 \text{ per cent}$$

$$\text{Security D} = 7 + 0.8 (15 - 7) = 7 + 6.4 = 13.4 \text{ per cent}$$

$$\text{Security E} = 7 + 0.5 (15 - 7) = 7 + 4 = 11 \text{ per cent}$$

The expected return as per CAPM formula and the estimated return of each security can be tabulated.

| Security | Expected return (per cent) | Estimated return (per cent) |
|----------|----------------------------|-----------------------------|
| A        | 23.0                       | 30.0                        |

|   |      |      |
|---|------|------|
| B | 19.0 | 25.0 |
| C | 15.0 | 20.0 |
| D | 13.4 | 11.5 |
| E | 11.0 | 10.0 |

A security whose estimated return is greater than the expected return is assumed to be underpriced because it offers a higher return than that expected from securities with the same risk.

**Accordingly, securities A, B and C are underpriced.**

(b) To calculate the expected return and risk  $R_p$  and  $\beta_p$  we need to calculate  $\beta_{pr}$  first

$$\beta_p^2 = \sum_{i=1}^n \omega_i^2 \beta_i$$

As the proportion of investment in each security is equal,  $\omega_i = 0.20$

$$\begin{aligned} \beta_p &= (0.2) (2.0) + (0.2) (1.5) + (0.2) (1.0) + (0.2) (0.8) + (0.2) (0.5) \\ &= (0.2) (2.0 + 1.5 + 1.0 + 0.8 + 0.5) \\ &= (0.2) (5.8) = 1.16 \text{ Expected return of portfolio} \end{aligned}$$

$$\begin{aligned} R_p &= R_f + \beta_p (R_m - R_f) \\ &= 7 + 1.16 (15 - 7) \\ &= 7 + 9.28 = 16.28 \text{ per cent} \end{aligned}$$

Systematic risk of the portfolio  $\beta_p = 1.16$

4. An investor owns a portfolio that over the last five years has produced 16.8 per cent annual return. During that time the portfolio produced a 1.10 beta. Further, the risk free return and the market return averaged 7.4 per cent and 15.2 per cent per year respectively. How would you evaluate the performance of the portfolio?

### Solution

The Treynor ratio can be used to evaluate the performance of the portfolio in this case.

$$\text{Treynor ration (TR) for the portfolio} = \frac{r_p - r_f}{\beta_p}$$

$$= \frac{16.8 + 7.4}{1.10} = \frac{9.4}{1.1} = 8.55$$

$$\text{Treynor ratio (TR) for market index} = \frac{15.2 + 7.4}{1.10} = \frac{7.8}{1.1} = 7.8$$

The ratio for the market index can be taken as the benchmark for evaluation.

The portfolio has a reward to volatility ratio higher than that of the market index. Hence, the performance of the portfolio can be considered superior.

5. You are given the following historical performance information on the capital market and a mutual fund:

| Year | Mutual fund beta | Mutual fund return (per cent) | Return on market index (per cent) | Return on Govt. securities (per cent) |
|------|------------------|-------------------------------|-----------------------------------|---------------------------------------|
| 1    | 0.90             | -3.00                         | -8.50                             | 6.50                                  |
| 2    | 0.95             | 1.50                          | 4.00                              | 6.50                                  |
| 3    | 0.95             | 18.00                         | 14.00                             | 6.00                                  |
| 4    | 1.00             | 22.00                         | 18.50                             | 6.00                                  |
| 5    | 1.00             | 10.00                         | 5.70                              | 5.75                                  |
| 6    | 0.90             | 7.00                          | 1.20                              | 5.75                                  |
| 7    | 0.80             | 18.00                         | 16.00                             | 6.00                                  |
| 8    | 0.75             | 24.00                         | 18.00                             | 5.50                                  |
| 9    | 0.75             | 15.00                         | 10.00                             | 5.50                                  |
| 10   | 0.70             | -2.00                         | 8.00                              | 6.00                                  |

Calculate the following risk adjusted return measures for the mutual fund:

- Reward-to-variability ratio
- Reward-to-volatility ratio

Comment on the mutual fund's performance.

### Solution

As the first step in calculation, the average values of the four variables may be calculated.

The averages are as follows:

Mutual fund beta = 0.87

Mutual fund return = 11.05 per cent

Return on market index = 8.69 per cent

Return on govt. securities = 5.95 per cent

(a) Reward to variability ratio or Sharpe ratio

$$SR = \frac{r_p - r_f}{\sigma_p}$$

For the calculation of this ratio,  $\sigma_{pr}$  or mutual fund's standard deviation of returns, is required.

#### Calculation of Standard deviation

| Year  | Mutual fund returns | X <sup>2</sup> |
|-------|---------------------|----------------|
| 1     | -3.00               | 9.00           |
| 2     | 1.50                | 2.25           |
| 3     | 18.00               | 324.00         |
| 4     | 22.00               | 484.00         |
| 5     | 10.00               | 100.00         |
| 6     | 7.00                | 49.00          |
| 7     | 18.00               | 324.00         |
| 8     | 24.00               | 576.00         |
| 9     | 15.00               | 225.00         |
| 10    | -2.00               | 4.00           |
| Total | 110.50              | 2097.25        |

$$\begin{aligned}
 \sigma_p &= \sqrt{\frac{N\sum X^2 - (\sum X)^2}{N^2}} \\
 &= \sqrt{\frac{(10 \times 2097.25) - (110.5)^2}{10 \times 10}} \\
 &= \sqrt{\frac{20972.50 - 12210.25}{100}} \\
 &= \sqrt{87.62} = 9.36 \text{ per cent}
 \end{aligned}$$

$$SR = \frac{11.05 - 5.95}{9.36} = 0.545$$

(b) Reward to volatility ratio or Treynor ratio

$$\begin{aligned}
 TR &= \frac{r_p - r_f}{\beta_p} \\
 &= \frac{11.05 - 9.36}{0.87} = 5.86
 \end{aligned}$$

Mutual Fund performance

For evaluating the mutual fund performance we have to calculate the Sharpe and Treynor ratios for the market index to be used as the benchmark.

For calculating the Sharpe ratio for the market index, the standard deviation of returns on the market index has to be calculated.

#### Calculation of Standard deviation

| Year  | Mutual fund returns | X2      |
|-------|---------------------|---------|
| 1     | -8.50               | 72.25   |
| 2     | 4.00                | 16.00   |
| 3     | 14.00               | 196.00  |
| 4     | 18.50               | 342.25  |
| 5     | 5.70                | 32.49   |
| 6     | 1.20                | 1.44    |
| 7     | 16.00               | 256.00  |
| 8     | 18.00               | 324.00  |
| 9     | 10.00               | 100.00  |
| 10    | 8.00                | 67.00   |
| Total | 86.90               | 1404.43 |

$$\begin{aligned}
 \sigma_m &= \sqrt{\frac{N\sum X^2 - (\sum X)^2}{N^2}} \\
 &= \sqrt{\frac{(10 \times 1404.43) - (86.90)^2}{10 \times 10}} \\
 &= \sqrt{\frac{14044.30 - 7551.61}{100}} \\
 &= \sqrt{64.93} = 8.06 \text{ per cent}
 \end{aligned}$$

Sharpe and Treynor ratios for the market index:

$$\begin{aligned}\text{Sharpe ratio} &= \frac{r_p - r_f}{\sigma_p} \\ &= \frac{8.69 + 5.95}{8.06} = \frac{2.74}{8.06} = 0.34\end{aligned}$$

$$\begin{aligned}\text{Treynor ratio} &= \frac{r_m - r_f}{\beta_m} \\ &= \frac{8.69 + 5.95}{1.00} = \frac{2.74}{1.00} = 2.74\end{aligned}$$

Ratios of the mutual fund and the market index may be tabulated as:

| Ratio         | Mutual fund | Market index |
|---------------|-------------|--------------|
| Sharpe ratio  | 0.545       | 0.34         |
| Treynor ratio | 5.86        | 2.74         |

Mutual fund has performed better than the market.

6. Information regarding two mutual funds and a market index are given below:

| Fund         | Return per cent | Standard deviation (per cent) | Beta |
|--------------|-----------------|-------------------------------|------|
| Gold         | 7               | 15                            | 0.72 |
| Platinum     | 16              | 35                            | 1.33 |
| Market index | 10              | 24                            | 1.0  |

Assuming the risk – free return as 5 per cent, calculate the differential return for the two funds.

### Solution

Differential return, as per Jensen ratio, is calculated as:

$$\alpha_p = R_p - E(R_p)$$

The expected return of the portfolio,  $E(R_p)$ , can be calculated using the CAPM formula.

$$E(R_p) = R_f + \beta_p(R_m - R_f)$$

$$\begin{aligned}\text{Gold fund: } E(R_p) &= 5 + 0.72 (10 - 5) \\ &= 5 + 3.6 = 8.6 \text{ per cent}\end{aligned}$$

$$\begin{aligned}\text{Platinum fund: } E(R_p) &= 5 + 1.33 (10 - 5) \\ &= 5 + 6.65 = 11.65 \text{ per cent}\end{aligned}$$

Differential return

$$\begin{aligned}\text{Gold fund: } \alpha_p &= 7 - 8.6 = -1.6 \text{ per cent} \\ \text{Platinum fund } \alpha_p &= 16 - 11.65 = 4.35 \text{ per cent}\end{aligned}$$

7. From the information given in example 3, calculate net selectivity measure for the platinum fund using Fama's framework of performance components.

### Solution

We have the following information:

$$\begin{aligned}R_p &= 16 \text{ per cent} & \sigma_p &= 35 \text{ per cent} \\ R_M &= 10 \text{ per cent} & \sigma_M &= 24 \text{ per cent} \\ R_f &= 5 \text{ per cent} & \beta_p &= 1.33\end{aligned}$$

Fama's decomposition may be stated as:

$$R_p = R_f + R_1 + R_2 + R_3$$

$$R_f = 5 \text{ per cent}$$

$$\begin{aligned}R_1 &= \beta_p (R_m - R_f) \\ &= 1.33 (10 - 5) = 6.65 \text{ per cent}\end{aligned}$$

$$\begin{aligned}R_2 &= [(\sigma_p / \sigma_m) - \beta_p] (R_m - R_f) \\ &= [(35/24) - 1.33] (10 - 5) \\ &= (1.46 - 1.33) (5) \\ &= 0.65 \text{ per cent}\end{aligned}$$

$$R_3 = 16 - (5 + 6.65 + 0.65) = 16 - 12.3 = 3.70 \text{ per cent}$$

Thus,

$$R_p = 5 + 6.65 + 0.65 + 3.70 = 16 \text{ per cent}$$

Alternatively, Fama's net selectively can be directly calculate as follows:

Fama's net selectively

$$\begin{aligned} R_p &= [R_f + (\sigma_p / \sigma_m) (R_m - R_f)] \\ &= 16 - [5 + (35/24) (10 - 5)] \\ &= 16 - (5 + 7.3) \\ &= 16 - 12.30 = 3.70 \text{ per cent.} \end{aligned}$$

### Input Data

| Security        | Weightage<br>( $\omega_i$ ) | Alpha<br>( $\alpha_i$ ) | Beta<br>( $\beta_i$ ) | Residual variance ( $\sigma_{ei}^2$ ) |
|-----------------|-----------------------------|-------------------------|-----------------------|---------------------------------------|
| A               | 0.2                         | 2.0                     | 1.7                   | 370                                   |
| B               | 0.1                         | 3.5                     | 0.5                   | 240                                   |
| C               | 0.4                         | 1.5                     | 0.7                   | 410                                   |
| D               | 0.3                         | 0.75                    | 1.3                   | 285                                   |
| Portfolio value | 1.0                         | 1.575                   | 1.06                  | 108.45                                |

The values of the portfolio alpha, portfolio beta, and portfolio residual variance can be calculated as the first step.

$$\begin{aligned} \alpha_p &= \sum_{i=1}^n \omega_i \alpha_i \\ &= (0.2)(2) + (0.1)(3.5) + (0.4)(1.5) + (0.3)(0.75) \\ &= 1.575 \end{aligned}$$

$$\begin{aligned} \beta_p &= \sum_{i=1}^n \omega_i \beta_i \\ &= (0.2)(1.7) + (0.1)(0.5) + (0.4)(0.7) + (0.3)(1.3) \\ &= 1.06 \end{aligned}$$

$$\begin{aligned} \text{Portfolio residual variance} &= \sum_{i=1}^n \omega_i^2 \sigma_{ei}^2 \\ &= (0.2)^2(370) + (0.1)^2(240) + (0.4)^2(410) + (0.3)^2(285) \\ &= 108.45 \end{aligned}$$

These values are noted in the last row of the table. Using these values, we can calculate the expected portfolio return for any value of projected market return. For a market return of 15 per cent, the expected portfolio return would be:

$$R_p = \alpha_p + \beta_p R_m = 1.575 + (1.06)(15) = 17.475$$

For calculating the portfolio variance we need the variance of the market returns. Assuming a market return variance of 320, the portfolio variance can be calculated as:

$$\sigma_p^2 = \beta_p^2 \sigma_m^2 + \sum_{i=1}^n \omega_i^2 \sigma_{ei}^2 = (1.06)^2 (320) + 108.45 = 468.002$$

### Self Assessment Questions

1. What are the basic assumptions of CAPM? What are the advantage of adopting CAPM model in the portfolio management?
2. What is meant by levered portfolio? How it is constructed?
3. Explain the CAPM theory and its validity in the stock market?
4. Describe the basic arbitrage pricing theory model of two factors?
5. What are the advantages of APT over CAPM? Explain in detail.?
6. What is meant by mutual funds? What are the advantage of professionally of managed portfolio?
7. Distinguish between the open –end and closed-end mutual funds.
8. Given an account of the various types of mutual funds available in the capital market?
9. State the reason for the treynor and sharpe giving conflicting performance ranking?
10. Distinguish between the security market line and capital market line?

### CASE STUDY

You are young derivatives trader. This is your first month on a corporate desk. A long time client with substantial exports to Australia calls up. The client is expecting an inflow of AUD 200 million in six months time.

During the discussion, it transpires that there are no direct options contracts for the dates the client is looking for. The client has burnt his fingers in earlier options contracts, when the market moved against and an American Put got exercised.

You suggest that the client can hedge this by a forward sale, purchase of a put option or by a strategy known as covered call writing. After the days trading is over you meet the chief trader and discuss this deal. The chief trader is not amused. Why? Compare the possibilities and explain using options algebra.

You succeed in convincing our client to take a suitable option on AUD 100 million and a 6-month forward on remaining AUD 100 million through USD. You are able to make a neat sum through this deal for your company. Once again your chief trader is not happy with you. He is asking what if the portfolio of the client sees large movements. You say you have tested it for delta neutrality. Convince the chief trader.

It seems that the chief trader is out to test your knowledge. Now, you are asked to report the impact of cross currency movement on all the Greeks of this client's portfolio.

### Questions

- (a) What information do you need? What analysis will you carry out?
- (b) How will you communicate with client and chief trader?

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