## COURSE OBJECTIVES:

Enables student to
$>$ Understand the nuances of stock market operations.
$>$ Understand the techniques involved in deciding upon purchase or sale of securities.

## UNIT-I INVESTMENT SETTING

Financial and economic meaning of Investment- Characteristics and objectives of Investment-Investment process - Types of Investment - Investment alternatives - Choice and Evaluation -Risk and return conceptsValuation of bonds and stock.

## UNIT-II FUNDAMENTAL ANALYSIS

Economic Analysis - Economic forecasting and stock Investment Decisions - Forecasting techniques. Industry Analysis : Industry classification, Industry life cycle - Company Analysis Measuring Earnings - Forecasting Earnings - Applied Valuation Techniques - Graham and Dodds investor ratios.

## UNIT-III TECHNICAL ANALYSIS

Fundamental Analysis Vs Technical Analysis-Dow theory- Charting methods-Chart Patterns Trend - Trend reversals - Market Indicators-Moving Average - Exponential moving Average Oscillators-RSI-ROC-MACD. Efficient Market theory - Forms of market efficiency -weak, semi-strong, strong form - Empirical tests of market efficiency-its application.

## UNIT-IV PORTFOLIO CONSTRUCTION AND SELECTION

Portfolio analysis - Reduction of portfolio risk through diversification - Portfolio risk - Portfolio Selection- Feasible set of portfolios - Efficient set - Markowitz model - Single index model -Construction of optimum portfolio-Multiindex model.

## UNIT-V

Capital Asset Pricing model - Lending and borrowing - CML - SML - Pricing with CAPM -Arbitrage pricing theory-Portfolio Evaluation-Sharpe's index Treynor's index, Jensen's index—Mutual Funds -Portfolio Revision.

## TOTAL: 45 PERIODS

## COURSE OUTCOMES:

1. Understand the concept of investment and identify the investment alternatives to investors
2. Learn the nuances of fundamental analyses and technical analyses
3. Analyse and evaluate the value of securities
4. Explain how to construct an efficient portfolio
5. Explore the various methods through which portfolio evaluation could be done

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## SECURITY ANALYSIS AND PORTFOLIO MANAGEMENT

UNIT I

## DEFINITIONS FOR INVESTMENT

"Investment may be defined as the purchase by an individual or institutional investor of a financial or real asset that produces a return proportional to the risk assumed over some future investment period." - F. Amling
"Investment defined as commitment of funds made in the expectation of some positive rate of return. If the investment is properly undertaken, the return will equal with the risk the investor assumes."

- Fisher \& Jordan


## FINANCIAL INVESTMENT

Financial investment involves of funds in various assets, such as stock, Bond, Real Estate, Mortgages etc. Investment is the employment of funds with the aim of achieving additional income or growth in value. It involves the commitment of resources which have been saved or put away from current consumption in the hope some benefits will accrue in future. Investment involves long term commitment of funds and waiting for a reward in the future.

The point of view people who invest their finds, they are the supplier of 'Capital' and in their view investment is a commitment of a person's funds to derive future income in the form of interest, dividend, rent, premiums, pension benefits or the appreciation of the value of their principle capital. To the financial investor it is not important whether money is invested for a productive use or for the purchase of secondhand instruments such as existing shares and stocks listed on the stock exchange. Most investments are considered to be transfers of financial assets from one person to another.
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ECONOMIC INVESTMENT
Economic investment means the net additions to the capital stock of the society which consists of goods and services that are used in the production of other goods and services. Addition to the capital stock means an increase in building, plants, equipment and inventories over the amount of goods and services that existed.

## CHARACTERISTICS OF INVESTMENT

Certain features characterize all investments. The following are the main characteristics of

## investments

1. 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 \& 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.
2. Risk: Risk is inherent in any investment. The risk may relate to loss of capital, delay in repayment of capital, nonpayment of interest, or variability of returns. While some investments like government securities \& bank deposits are almost risk less, others are more risky. The risk of an investment depends on the following factors.
3. Safety: The safety of an investment implies the certainty of return of capital without loss of money or time. Safety is another features which an investors desire for his investments. Every investor expects to get back his capital on maturity without loss \& without delay.
4. Liquidity: An investment, which is easily saleable, or marketable without loss of money \& without loss of time. Some investments like company deposits, bank deposits, P.O. deposits, NSC, NSS etc. are not marketable. Some investment instrument like preference shares \& debentures are marketable, but there are no buyers in many cases \& hence their liquidity is negligible.



## OBJECTIVES OF INVESTMENT

An investment is made because it serves some objective for an investor. Every investor invests with a specific objective in mind, and each investment has its own unique set of benefits and risks. There are three main objectives of investment: safety, growth and income.

1. Safety: While no investment option is completely safe, there are products that are preferred by investors who are risk averse. Some individuals invest with an objective of keeping their money safe, irrespective of the rate of return they receive on their capital. Such near-safe products include fixed deposits, savings accounts, government bonds, etc.
2. Growth: While safety is an important objective for many investors, a majority of them invests to receive capital gains, which means that they want the invested amount to grow. There are several options in the market that offer this benefit. These include stocks, mutual funds, gold, property, commodities, etc.
3. Income: Some individuals invest with the objective of generating a second source of income. Consequently, they invest in products that offer returns regularly like bank fixed deposits, corporate and government bonds, etc.

## Other objectives

While the aforementioned objectives are the most common ones among investors today, some other objectives include:

1. Tax exemption: Some people invest their money in various financial products solely for reducing their tax liability. Some products offer tax exemptions while many offer tax benefits on long-term profits.
2. Liquidity: Many investment options are not liquid. This means they cannot be sold and converted into cash instantly. However, some people prefer investing in options that can be used during emergencies. Such liquid instruments include stock, money market instruments and exchange-traded funds, to name a few.
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In simple terms, Investment refers to purchase of financial assets. While investment Goods are those goods, which are used for further production. Investment is a conscious act of an individual or any entity that involves deployment of money (cash) in securities or assets issued by any financial institution with a view to obtain the target returns over a specified period of time.

## Target returns on an investment include:

$>$ Increase in the value of the securities or asset, and/or
> Regular income must be available from the securities or asset.

## TYPES OF INVESTMENT

Different types or kinds of investment are discussed in the following points.

1. Autonomous Investment: Investment which does not change with the changes in income level is called as Autonomous or Government Investment.

Autonomous Investment remains constant irrespective of income level. Which means even if the income is low, the autonomous, Investment remains the same. It refers to the investment made on houses, roads, public buildings and other parts of Infrastructure. The Government normally makes such a type of investment.
2. Induced Investment: Investment which changes with the changes in the income level is called as Induced Investment.

Induced Investment is positively related to the income level. That is, at high levels of income entrepreneurs are induced to invest more and vice-versa. At a high level of income, Consumption expenditure increases this leads to an increase in investment of capital goods, in order to produce more consumer goods.
3. Financial Investment: Investment made in buying financial instruments such as new shares, bonds, securities, etc. is considered as a Financial Investment.


However, the money used for purchasing existing financial instruments such as old bonds, old shares, etc., cannot be considered as financial investment. It is a mere transfer of a financial asset from one individual to another. In financial investment, money invested for buying of new shares and bonds as well as debentures have a positive impact on employment level, production and economic growth.
4. Real Investment: Investment made in new plant and equipment, construction of public utilities like schools, roads and railways, etc., is considered as Real Investment.

Real Investment in new machine tools, plant and equipments purchased factory buildings, etc. increases employment, production and economic growth of the nation. Thus real investment has a direct impact on employment generation, economic growth, etc.
5. Planned Investment: Investment made with a plan in several sectors of the economy with specific objectives is called as Planned or Intended Investment.

Planned Investment can also be called as Intended Investment because an investor while making investment makes a concrete plan of his investment.
6. Unplanned Investment: Investment done without any planning is called as an Unplanned or

## Unintended Investment.

In unplanned type of investment, investors make investment randomly without making any concrete plans. Hence it can also be called as Unintended Investment. Under this type of investment, the investor may not consider the specific objectives while making an investment decision.
7. Gross Investment: Gross Investment means the total amount of money spent for creation of new capital assets like Plant and Machinery, Factory Building, etc.

It is the total expenditure made on new capital assets in a period.
8. Net Investment: Net Investment is Gross Investment less (minus) Capital Consumption (Depreciation) during a period of time, usually a year.

It must be noted that a part of the investment is meant for depreciation of the capital asset or for replacing a worn-out capital asset. Hence it must be deducted to arrive at net investment.
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## DEFINITIONS OF INVESTMENT RISK

Investment risk can be defined as the probability or likelihood of occurrence of losses relative to the expected return on any particular investment. Stating simply, it is a measure of the level of uncertainty of achieving the returns as per the expectations of the investor. It is the extent of unexpected results to be realized.

## ELEMENTS OF RISK

The total variability in returns of a security represents the total risk of that security. Systematic risk and unsystematic risk are the two components of total risk. Thus,

Total risk $=$ Systematic risk + Unsystematic risk

## Systematic Risk

These are risks associated with the economic, political, sociological and other macro level changes. They affect the entire market as a whole and cannot be controlled or eliminated merely by diversifying one's portfolio.

1. Interest Rate Risk: it is a type of systematic risk that particularly affects debt securities like bonds and debentures. A bond or debenture normally has a fixed coupon rate of interest.
2. Market Risk: it is a type of systematic risk that affects shares. Market prices of shares move up or down consistently for some time periods. A general rise in share price is referred to as a bullish trend, whereas a general fall in share prices is referred to as a bearish trend.
3. Purchasing Power Risk: it refers to the variation in investor returns caused by inflation. Inflation results lowering of the purchasing power of money. When an investor purchases a security, he foregoes the opportunity to buy some goods or services.
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## Unsystematic Risk

These are risks that are unique to a firm or industry. Factors such as management capability, consumer preferences, labour, etc. contribute to unsystematic risks. Unsystematic risks are controllable by nature and can be considerably reduced by sufficiently diversifying one's portfolio.
> Business Risk: every company operates within a particular operating environment. This operating environment comprises both internal environment within the firm and external environment outside the firm.

Financial Risk: Financial risk is a function of financial leverage which is the use of debt in the capital structure. The fixed payments in the form of interest which is a compulsory payment to be made whether the company makes profit or loss.

The Risk associated with investments are

1. Inflation risk: Due to inflation, the purchasing power of money gets reduced.
2. Interest rate risk: due to an economic situation prevailing in the country, the interest rate may change.
3. Default risk: the risk of not getting investment back, that's the principal amount invested and/ or interest.
4. Business risk: the risk of depression and other uncertainties of business.
5. Socio-political risk: the risk of changes in government, government policies, social attitude etc,.

The simple rule of investment management is that

1. The higher the risk, the greater will be the returns.
2. Similarly, lesser the risk, the lower will be the returns.

## The above showing risk and return indicates that

1. Low risk instruments such as small savings and bank bring low returns
2. Medium risk instruments such as company deposits \& non-convertible debentures will earn medium returns.
3. High risk instruments like equity shares, convertible debentures will earn high returns.
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Unit I
Two Mark Questions
4. Define Investment?
5. What are the objectives of Investment?
6. What is systematic risk?
7. What is the difference between investment and speculation?
8. Give the relationship between risk and return?
9. Explain non financial form of investment?
10. Explain the concept of Investment?
11. Define Risk?
12. What is systematic risk?
13. What are the equity shares?
14. Define Return?
15. Define Speculation?
16. What is Gambling?
17. What is capital appreciation?

## Big Questions

1. Define Investment. Explain the objectives and characteristics of investment?
2. What are the types of investments available for an aggressive investor?
3. Define Risk? Explain the various types of risks involved in investment?
4. Explain the process of investment undertaken by the investor.
5. Difference between the investment, speculators and gambling?

## FINANCIAL MARKET

A financial market is a market in which people and entities can trade financial securities, commodities, and other fungible items of value at low transaction costs and at prices that reflect supply and demand. Securities include stocks and bonds, and commodities include precious metals or agricultural goods.

## Types of Financial Market

The financial market may be classified as primary market and secondary market depending on whether the securities traded are newly issued securities or securities already outstanding and owned by investors.

Primary Market: The primary market is that part of the capital markets that deals with the issuance of new securities. Companies, governments or public sector institutions can obtain funding through the sale of a new stock or bond issue. This is typically done through a syndicate of securities dealers. The process of selling new issues to investors is called underwriting. In the case of a new stock issue, this sale is an initial public offering (IPO).

Secondary Market: The secondary market, also known as the aftermarket, is the financial market where previously issued securities and financial instruments such as stock, bonds, options, and futures are bought and sold. The term "secondary market" is also used to refer to the market for any used goods or assets, or an alternative use for an existing product or asset where the customer base is the second market.

## PARTICIPATE IN THE FINANCIAL MARKET

A financial is essentially a system by which financial securities are exchanged. This system is composed of participants, 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.


## 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 designed regulatory authorities. In India, the Ministry of Finance, the Reserve Bank of India securities and exchange board of India (SEBI), etc.

## NEW ISSUES MARKET

The main function of a new issue market is to facilitate transfer of resources from savers to the users. The savers are individuals, commercial banks, insurance companies etc. The users are public limited companies and the government. It is not only a platform for raising finance to establish new enterprises but also for expansion/ diversification/ modernization of existing units.

The main functions of a new issue market can be divided into a triple service functions:

1. Origination: It refers to the work of investigation, analysis and processing of new project proposals. It starts before an issue is actually floated in the market. This function is done by merchant bankers who may be commercial banks, all India financial institutions or private firms. At present, financial institutions and private firms also perform this service. Though this service is highly important, the success of the issue depends, to a large extent, on the efficiency of the market.
2. Underwriting: It is an agreement whereby the underwriter promises to subscribe to a specified number of shares or debentures or a specified amount of stock in the event of public not subscribing to the issue. If the issue is fully subscribed, then there is no liability for the underwriter. If a part of share issues remains unsold, the underwriter will buy the shares. Thus, underwriting is a guarantee for marketability of shares. There are two types of underwriters in India - Institutional (LIC, UTI, IDBI, and ICICI) and Non-institutional are brokers.
3. Distribution: It is the function of sale of securities to ultimate investors. This service is performed by brokers and agents who maintain a regular and direct contact with the ultimate investors.

## METHODS OF FLOATING NEW ISSUE

The various methods which are used in the flotation of securities in the new issue market are:

1. Public issues
2. Offer for sale
3. Placement
4. Rights issues
5. Public Issues: Under this method, this issuing company directly offers to the general public / institutions a fixed number of shares at a stated price through a document called prospectus. This is the most common method followed by joint stock companies to raise capital through the issue of securities. The prospectus must state the following: Name of the company, Address of the registered office, Existing and proposed activities, Location of the industry, Names of Directors, Minimum subscription and Names of brokers/ underwriters/ bankers/ managers and registrars to the issue.
6. Offer for Sale: This method of offer of sale consists in outright sale of securities through the intermediary of Issue Houses or share-brokers. In other words, the shares are not offered to the public directly. This method consists of two stages: The first stage is a direct sale by the issuing company to the issue house and brokers at an agreed price. In the second stage, the intermediaries resell the above securities to the ultimate investors. The issue houses or stock brokers purchase the securities at a negotiated price and resell at a higher price. The difference in the purchase and sale price is called spread. It is otherwise called Bought out deals (BOD).
7. Private Placement: Under this method, the issue houses or brokers buy the securities outright with the intention of placing them with their clients afterwards. Here the brokers act as almost wholesalers selling them in retail to the public. The brokers would make profit in the process of reselling to the public.
8. Rights Issue: It is a method of raising funds in the market by an existing company. A right means an option to buy certain securities at a certain privileged price within a certain specified period. Shares, so offered to the existing shareholders are called rights shares. Rights shares are offered to the existing shareholders in a particular proportion to their existing share ownership. The ratio in which the new shares or debentures are offered to the existing share capital would depend upon the requirement of capital.

## BOOK BUILDING

It is refers to the process of generating, capturing, and recording investor demand for shares during an Initial Public Offering (IPO), or other securities during their issuance process, in order to support efficient price discovery. Usually, the issuer appoints a major investment bank to act as a major securities underwriter or book runner.

When a company wants to raise money it plans on offering its stock to the public. This is typically takes place through either an IPO or an FPO (follow-on public offers). The book building process helps determine the value of the security. Once a company determines it wants to have an IPO, it will then contact a book runner or a lead manager. The book runner will determine the price range it is willing to sell the stock. The book runner will then send out the draft prospectus to potential investors. Generally, the issue stays open for five days. At the end of the five days, the book runner determines the demand of the stock for its given price range. Once the cost of the stock has been determined, then the issuing company can decide how to divide its stock at the determined price to its bidders.

## STOCK EXCHANGES

A stock exchange is a form of exchange which provides services for stock brokers and traders to buy or sell stocks, bonds, and other securities. Stock exchanges also provide facilities for issue and redemption of securities and other financial instruments, and capital events including the payment of income and dividends.

Securities traded on a stock exchange include stock issued by listed companies, unit trusts, derivatives, pooled investment products and bonds. Stock exchanges often function as "continuous auction" markets, with buyers and sellers consummating transactions at a central location, such as the floor of the exchange.

To be able to trade a security on a certain stock exchange, it must be listed there. Usually, there is a central location at least for record keeping, but trade is increasingly less linked to such a physical place, as modern markets are electronic networks, which gives those advantages of increased speed and reduced cost of transactions. Trade on an exchange is by members only.

The initial public offering of stocks and bonds to investors is by definition done in the primary market and subsequent trading is done in the secondary market. A stock exchange is often the most important component of a stock market. Supply and demand in stock markets are driven by various factors that, as in all free markets, affect the price of stocks (see stock valuation).

There is usually no compulsion to issue stock via the stock exchange itself, nor must stock be subsequently traded on the exchange. Such trading is said to be off exchange or over-the-counter. This is the usual way that derivatives and bonds are traded. Increasingly, stock exchanges are part of a global market for securities.

In recent years, various other trading venues, such as electronic communication networks, alternative trading systems and "dark pools" have taken much of the trading activity away from traditional stock exchanges

## STOCK MARKET IN INDIA (BSE AND NSE)

Most of the trading in the Indian stock market takes place on its two stock exchanges: the Bombay Stock Exchange (BSE) and the National Stock Exchange (NSE). The BSE has been in existence since 1875. The NSE, on the other hand, was founded in 1992 and started trading in 1994. However, both exchanges follow the same trading mechanism, trading hours, settlement process, etc. At the last count, the


BSE had about 4,700 listed firms, whereas the rival NSE had about 1,200 . Out of all the listed firms on the BSE, only about 500 firms constitute more than $90 \%$ of its market capitalization; the rest of the crowd consists of highly illiquid shares.

Almost all the significant firms of India are listed on both the exchanges. NSE enjoys a dominant share in spot trading, with about $70 \%$ of the market share, as of 2009 , and almost a complete monopoly in derivatives trading, with about a $98 \%$ share in this market, also as of 2009. Both exchanges compete for the order flow that leads to reduced costs, market efficiency and innovation. The presence of arbitrageurs keeps the prices on the two stock exchanges within a very tight range.

## MARKET INDEXES

The two prominent Indian market indexes are Sensex and Nifty. Sensex is the oldest market index for equities; it includes shares of 30 firms listed on the BSE, which represent about $45 \%$ of the index's free-float market capitalization. It was created in 1986 and provides time series data from April 1979, onward.

Another index is the S\&P CNX Nifty; it includes 50 shares listed on the NSE, which represent about $62 \%$ of its free-float market capitalization. It was created in 1996 and provides time series data from July 1990, onward.

## OTC EXCHANGE OF INDIA (OTCEI)

The OTC Exchange of India (OTCEI), also known as the Over-the-Counter Exchange of India, is based in Mumbai, Maharashtra. It is India's first exchange for small companies, as well as the first screen-based nationwide stock exchange in India. OTCEI was set up to access high-technology enterprising promoters in raising finance for new product development in a cost-effective manner and to provide a transparent and efficient trading system to investors.


OTCEI is promoted by the Unit Trust of India, the Industrial Credit and Investment Corporation of India, the Industrial Development Bank of India, the Industrial Finance Corporation of India, and other institutions, and is a recognized stock exchange under the SCR Act.

## INTER-CONNECTED STOCK EXCHANGE LTD. (ISE)

Inter-connected Stock Exchange Ltd. (ISE) started its operation in 1998 in Vashi, Mumbai. It is national-level stock exchange, providing trading, clearing settlement, risk management and surveillance support to its trading members. It has 841 trading members, who are located in 18 cities. These intermediaries are administratively supported through the regional offices at Delhi, Kolkata, Patna, Ahmadabad, Coimbatore and Nagpur, besides Mumbai.

The ISE is promoted by 12 regional stock exchanges namely at Bangalore, Bhubaneshwar, Chennai, Cochin, Coimbatore, Guwahati, Indore, Jaipur, Kanpur, Mangalore, Magadh and Vadodara. The participating exchanges of ISE have 4,500 members and listed securities. It is a stock exchange of stock exchanges, members of the stock exchanges being traders on the ISE.

## TRADING MECHANISM

Trading at both the exchanges takes place through an open electronic limit order book, in which order matching is done by the trading computer. There are no market or specialists and the entire process is order-driven, which means that market orders placed by investors are automatically matched with the best limit orders. As a result, buyers and sellers remain anonymous. The advantage of an order driven market is that it brings more transparency, by displaying all buy and sell orders in the trading system.

All orders in the trading system need to be placed through brokers, many of which provide online trading facility to retail customers. Institutional investors can also take advantage of the direct market access (DMA) option, in which they use trading terminals provided by brokers for placing orders directly into the stock market trading system. (For more, read Brokers and Online Trading: Accounts and Orders.)


## Types of Orders

A market order is an order to buy or sell a security immediately. This type of order guarantees that the order will be executed, but does not guarantee the execution price. A market order generally will execute at or near the current bid (for a sell order) or ask (for a buy order) price. However, it is important for investors to remember that the last-traded price is not necessarily the price at which a market order will be executed.

A limit order is an order to buy or sell a security at a specific price or better. A buy limit order can only be executed at the limit price or lower, and a sell limit order can only be executed at the limit price or higher. Example: An investor wants to purchase shares of ABC stock for no more than $\$ 10$. The investor could submit a limit order for this amount and this order will only execute if the price of ABC stock is $\$ 10$ or lower.

A stop order, also referred to as a stop-loss order is an order to buy or sell a stock once the price of the stock reaches the specified price, known as the stop price. When the stop price is reached, a stop order becomes a market order.

A buy stop order is entered at a stop price above the current market price. Investors generally use a buy stop order to limit a loss or protect a profit on a stock that they have sold short. A sell stop order is entered at a stop price below the current market price. Investors generally use a sell stop order to limit a loss or protect a profit on a stock they own.

Day Order: An order to buy or sell a security that automatically expires if not executed on the day the order was placed. A day order is an order that is good for that day only. If it is not filled it will be canceled, and it will not be filled if the limit or stop order price was not met during the trading session. It is one of several different order duration types that determine how long the order will be in the market before it is canceled.



## Settlement Cycle and Trading Hours

Equity spot markets follow a $\mathrm{T}+2$ rolling settlement. This means that any trade taking place on Monday gets settled by Wednesday. All trading on stock exchanges takes place between 9:55 am and 3:30 pm, Indian Standard Time (+ 5.5 hours GMT), Monday through Friday. Delivery of shares must be made in dematerialized form, and each exchange has its own clearing house, which assumes all settlement risk, by serving as a central counterparty.

## Speculation

The act of trading in an asset, or conducting a financial transaction, that has a significant risk of losing most or all of the initial outlay, in expectation of a substantial gain. With speculation, the risk of loss is more than offset by the possibility of a huge gain; otherwise, there would be very little motivation to speculate. While it is often confused with gambling, the key difference is that speculation is generally tantamount to taking a calculated risk and is not dependent on pure chance, whereas gambling depends on totally random outcomes or chance.

Types of Speculators
There are four types of speculator who are active on stock exchange in India

1. Bull: A bull is an operator who expects a rise in the prices of securities in the future.
2. Bear: A bear is a speculator who expects prices to fall in future and sells securities at present with a view to purchase them at lower prices in future.
3. Stag: A stag is a cautious speculator in the stock exchange.
4. Lame Duck: When a bear finds it difficult to fulfill his commitment, he is called Struggling like a Lame Duck
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Unit I
Two Mark Questions
5. List the functions of foreign exchange market?
6. Explain the concept of primary market?
7. Explain the concept of primary market?
8. Who is an underwriter or underwriting?
9. Define IPO?
10. What is OTCEI?
11. What is trading on Margin?
12. How reverse book building works?
13. Distinguish between primary and secondary market
14. Explain stock exchange?
15. Define NSE and BSE? Or define Nifty and SENSEX?
16. What is New issue market
17. State objectives of ISE.

## Big Questions

1. Discuss about the types of participants present in the primary and secondary market.
2. Explain the functions of SEBI and the role in evolving the Indian capital market.
3. Describe the methods of floating new issues.
4. Discuss the steps involved in the process of Book Building?
5. What are NSE and BSE? Discuss their features and advantages
6. Explain the detail about IPO.

## UNIT III

## FUNDAMENTAL ANALYSIS

Fundamental Analysis helps the investor to identify the right investment outlet and the right entry and exit timings and thus it helps in enhancing the return and reduces the risk of investing. The fundamental analysis mainly focuses on the analysis of economy, industry and the company performance. The general economic conditions affect the performance of companies and resultantly influence the returns available for the equity investors. Therefore analyzing economy becomes pertinent before investing in shares and securities. A study on the economic conditions would certainly give an idea about the future earning prospectus of companies and the dividends, capital gain and interest available for investors.

## 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.

Let us look at some of the key economic variables that an investor must as part of his fundamental analysis.

1) Population of the country: Analyzing the population of the country gives a complete picture about the kind of labour force. Increase in population results in increase in demand for many goods and services and at the same time the availability of manpower also increases. If the population explosion is strategically used by the country certainly it is an asset.
2) Research and Development facilities: The economic growth mainly depends on the emphasis given on research and development and the infrastructure development. The investor should select
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the industry based on the above issue. For example the Government is focusing on the development of infrastructure, telecommunication and power sector. These sectors future growth rate in very high.
3) Capital Formation: The capital formation in the country influences the growth of various industries. Mobilization of scattered savings and passing the same to the needy industries require efficient financial system.
4) Resources: Natural resources are very much important for the economic growth of the country. Water, oil, mines resources are the backbone of any economy. Technological discoveries in recycling of materials, nuclear and solar energy and new synthetics offers lot of potential for growth of economy.
5) Gross Domestic Product (GDP): The GDP indicates the growth rate of the economy and it represents the total value economy and it represents the total value of goods and services produced in the country. The growth of GDP reflects the growth of various sectors, companies and per capital income. If the GDP growth rate increases certainly the return available for investors also will increase.
6) Savings and Investments: The savings made by the large number of people and various sectors determine the growth of economy. If the people save a part of their earnings and make investments in various shares and securities then corporate can easily make investments in expansion and modernization programmes and this will fuel their earning capacity.
7) Rate of Inflation: The rate of inflation prevailing in the country determines the real economic growth. If money supply increases without increase in production of goods and services then inflation rises. During inflationary conditions more money chasing few goods. The returns available from stock market investments will be declining.
8) Budget Proposals: The annual budget proposals submitted by the State and Central Governments affects the economic growth. When budget deficit increases the economic growth will slow down and inflation starts rising.
9) The taxation policy: The various taxes imposed by the Central and State Government on individuals and corporate affects their purchasing ability. High corporate tax leaves the companies with fewer surpluses which will be inadequate to pay dividend to shareholders and to meet business development expenditures.
10) Balance of Payment of Currency value: The balance of payment position determines the currency value against overseas currencies and in turn the currency value determines the profitability of exports and importers. When the currency value appreciates against overseas currencies then it benefit the importers but affect the exporters.
11) Monsoon and Agriculture: In India around $79 \%$ of the people lives in rural areas and engaged in agriculture and allied activities. The agriculture mainly depends on monsoon. Moreover many sectors get raw materials from agriculture. Therefore the monsoon and agricultural output influences the stock market.

## ECONOMIC FORECASTING

## Meaning

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. 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.

## FORECASTING TECHNIQUES

Economic forecasting may be carried out for short-term periods, intermediate term periods and long term periods. An investor is more concerned about short-term economic forecasts for periods ranging
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from a quarter to three years.
Some of the techniques of short-term economic forecasting are discussed below:
Anticipatory Surveys: 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 as may also include the future plans of consumers with regard to their spending on durables and non-durables.

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 ate those time series data that reach their high points or their low in advance of the high points and low points of total economic activity. The coincidental indicators reach their peaks and low 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.

Econometric Model Building: This is the most precise and scientific of the different forecasting techniques. This technique makes use of Econometric, which is a discipline that applies mathematical and statistical techniques to economic theory. In applying this technique, the analyst is forced to define clearly and exactly the interrelationship between the economic variable. The precise relationship between the dependent and independent variables are specified in a formal mathematical manner in the form of equations.

Opportunistic Model Building: This is one of the most widely used forecasting techniques. It is also known as GNP model building or sectoral analysis. 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.
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THE MEANING OF INDUSTRY

An industry means a group of company doing similar business. The companies in a particular industry are almost using similar materials, technology manpower skill and distribution system. They target the same customer segment. Following are the examples of Industries;

It's like Banking Industry, Software Industry, Automobile Industry, Cement Industry, Steel Industry, Paper Industry, Aluminum Industry, Textiles Industry, Rubber Industry, Leather Industry, Chemical Industry and Pharmaceutical Industry.

## CLASSIFICATION OF INDUSTRY

a) Growth Industry: The industry which is growing at faster rate is termed as growth industry. This industry is growing at high rate when compared to other industry and to certain extent independent of the economy life cycle. In other words the growth industry growth rate is high when compared to the growth rate of economy and other sectors. For instance the Indian Software and Information technology enabled services industry and Infrastructure industry is considered as growth industry.
b) Cyclical Industry: The Cyclical Industries' growth depends on the growth of economy. For example the consumer goods industry such as consumer white goods industry (color television, washing machine, fridge etc.,) growth rate depends on the growth of general economic conditions.
c) Defensive Industry: The Defensive industry to certain extend is independent from the ups and downs of the other sectors. For example the growth of industry which is producing consumer essential goods such as food, cloth and basic requirements of the consumer are steady always.
d) Cyclical Growth Industry: The industry is basically cyclical and at the same time it is growing. For example the demand for passengers cars increases when the economy is in sound shape and facing down trend when they economy started facing trouble. The technological innovation and effective marketing strategy results in growth of the demand at high rate. However, when there is a slowdown in economical conditions, the growth rate of cyclical growth industry comes down.

## INDUSTRY LIFE CYCLE



Every industry has to undergo various stages due to changes in technology, consumer behaviour and innovations. The length of each and every stage may be different from industry to industry. The cost, profitability and demand are influenced mainly by the stages of the industry life cycle.

Pioneering Stage: This is the first stage of the industry life cycle and at this stage a new product is introduced and the demand is created by educating the consumers about the product. The number of players at the stage is less and the sales are also less. No company can operate at its full capacity. The cost of production, marketing and distribution are very high.

Expansion or Growth Stage: Under growth stage the companies in the industry are seeing growth rate of sales and profits. To meet increased demand the companies expand their capacity. Thus the companies enjoy the economics of large scale activities. The companies are achieving strong growth in sales and profit. By seeing the profitability many companies jump in to the industry and make it more competitive. The demand for the products will increase at very high rate. The profitability of all companies is very high. Introduction of new technologies, research and development and various collaborations enhances quality of the product and customer satisfactions.

Stagnation Stage: The next stage is called Stagnation stage. At this stage the market is stabilizing and the growth rate is very less. The transaction of the industry from the expansion stage to the stagnation stage is often very low. Two important reasons for this transition ate change in social habits and development of improved technology.

Decay Stage: This is last life cycle of the industry and at this stage the demand for the product starts declining. Thus causes of declining stage may be changes in raw material, technology, consumer behavior or Government policy. Under declining stage the companies' production is declining whereas the cost is high and above all the profitability is severely affected and ultimately it results in loss. Declines are almost inevitable in an industry.

## COMPANY ANALYSIS

Company analysis is the final stage of fundamental analysis. The economy analysis provides the
investors a broad outline of the prospects of growth in the economy. The industry analysis helps the investor to select the industry in which investment would be rewarding. Now he has to decide the company in which he should invest his money. Company analysis provides the answer to this question.

The company analysis is the major part in fundamental analysis. For taking prudent investment decision, the investor has to analyze economic conditions and select the most promising industry. However it doesn't mean that all the companies in the selected industry will be really growth oriented. Therefore it becomes necessary to identify the best company from the selected industry for investment. For this purpose the investor has to carefully analyze various important fundamental factors which influence the valuation and growth prospects of the company.

## MEASURING EARNINGS

The investor has to go through the financial statements and analyze the profitability and financial position of the company. The various accounting policies and accounting standards adopted by the company for preparation of the financial statement should be understood so that the real financial health of the company is known. In this regards the following areas should be carefully analyzed.

## Analysis of Financial Statement

The Trading, Profit and Loss account and Balance sheet are the basic financial statement of a company. The Trading, Profit and Loss account shows the results of one year business operation that is loss profit or loss. The Balance sheet shows the financial position of the company.

## Following are the techniques of financial statement analysis

a) Comparative Financial Statement: The figures of financial statement for more than one period are presented in a table for analysis. The increase or decrease of various items such as expenses, income, liabilities and assets over two years period are calculated and shown in terms of actual amounts and percentage. Such analysis helps the investor which items is increasing or decreasing and the percentage of increase or decrease.

b) Trend Analysis: The Trend analysis considers more than two years figures. For example a company's five years balance sheet can be shown in the form of table by taking the first year figure as base data. The base data is taken as hundred and the subsequent years figures are converted as a percentage of the based data. This Trend Analysis helps to understand the movement of the trend of the profitability and the financial position of the company.
c) Funds Flow and Cash Flow Analysis: The funds flow and cash flow analysis shows the various sources of funds and applications of funds of a company. It shows changes in the financial condition of the company over two years period. This statement also shows funds earned from core business or funds lost in the core business. The Cash flow statement shows the root causes of changes in cash position over two years period.
d) Ratio Analysis: Ratio is a relationship between two accounting figures expressed mathematically. Calculating ratio and analyzing the same will give a better picture about the turn over efficiency, profitability and financial position of a company. There are many ratios but the ratios under the following classifications will be immense useful to the investor (i) Liquidity ratios, (ii) Profitability ratios, Leverage ratios, (iv) Activity or efficiency ratios.

Liquidity Ratios: These measure the company's ability to fulfill its short-term obligations and reflect its short-term financial strength or liquidity. The commonly used liquidity ratios are:

1. Current ratio $=$ Current Assts $/$ Current Liabilities
2. Quick ratio $=$ liquidity Assets $/$ liquidity Liabilities

A higher current ratio would a enable a company to meet its short-term obligations even if the value of current assets declines. The quick ratio represents the ratio between quick assets and current liabilities. It is a more rigorous measure of liquidity. However, both these ratios are to be used together to analyze the liquidity of a company.

Leverage Ratios: These ratios are also known as capital structure ratio. They measure the company's ability to meet its long-term debt obligations. They light on the long-term solvency of a





company. The commonly used leverage ratios are the following:

1. Debt-equity ratio $=$ Long - Term Debt $/$ Shareholders Fund or Equity
2. Total debt ratio $=$ Total Debt $/$ Total Assets
3. Proprietary ratio $=$ Shareholders Fund $/$ Total Assets
4. Interest coverage ratio $=$ Earnings before interest and Taxes $($ EBIT $) /$ Interest

The first three ratios indicate the relative contribution of covers and creditors in financing the assets of the company. These ratios reflect the safety margin available to the long-term creditors. The coverage ratio measures the ability of the company to meet its interest payments arising from the debt.

Profitability Ratios: The profitability of a company can be measured by the profitability ratios. These ratios are calculated by relating the profits either to sales, or to investments, or to the equity shares. Thus, we have three groups of profitability ratios. These are listed below:

## 1. Profitability related to sales

a. Gross profit ratio $=$ Gross Profit $($ Sales - Cost of Goods sold $) /$ Net Sales
b. Operating profit ratio $=$ Operating Profit $/$ Net Sales $* 100$
c. Net profit ratio $=$ Net Profit $/$ Net Sales $* 100$

## 2. Profitability related to Investment

a. Return on assets $=$ Earnings After Tax $/$ Total Assets
b. Return on capital employed $=$ EBIT $/$ Total Capital Employed
c. Return on equity $=$ EAT / Shareholders Fund

## 3. Profitability related to equity shares

a. Earnings per share $=$ Net Profit after Interest, Tax and Dividend $/$ No. of Equity Share
b. Earnings yield $=$ EPS / Market Price Per Share
c. Dividend yield $=$ DPS (Dividend Per Share) / Market Price Per Share
d. Dividend payout ratio $=D P S / E P S$
e. Price earnings ratio $(P / E$ ratio $)=$ Market Price Per Share $/ E P S$

## 4. Overall profitability

Return on investment $($ ROI $)=$ EAT/ Sales * Sales / Total Assets

The overall profitability is measured by the return on investment, which is the product of net profit ratio and investment turnover. It is a central measure of the earnings power or operating efficiency of a company.

Activity or Efficiency Ratios: These are also known as turnover ratios. These ratios measure the efficiency in asset management. They express the relationship between sales and the different types of assets, showing the speed with which these assets generate sales. Important activity ratios are enumerated below:
a) Current assets turnover $=$ Sales $/$ Currents Assets
b) Fixed assets turnover $=$ Sales $/$ Fixed Assets
c) Total assets turnover $=$ Sales $/$ Average Inventory

## FORECASTING EARNINGS

It's all about earnings. When you come to the bottom line, that's what investors want to know. How much money is the company making and how much is it going to make in the future. Earnings are profits. It may be complicated to calculate, but that's what buying a company is about. Increasing earnings generally leads to a higher stock price and, in some cases, a regular dividend. When earnings fall short, the market may hammer the stock.

Every quarter, companies report earnings. Analysts follow major companies closely and if they fall short of projected earnings, sound the alarm. While earnings are important, by themselves they don't tell you anything about how the market values the stock. To begin building a picture of how the stock is valued you need to use some fundamental analysis tools.

The investor has to predict the future earnings of the company, so as to know the returns on his investment. The cost structure changes in sale and provisions etc., will influence the profitability. To predict earnings in the following factors should be carefully analyzed
a) The cost and sales: The cost structure that is the proposition of variable cost and fixed cost and

the pattern of sales affects the profitability of the company. When the fixed cost proportion is very high the company can earn more profit by increasing volume. Therefore growth in sale under the circumstances will yield maximum benefit to the company.
b) Depreciation: The provision for depreciation and other reserve determine the profitability of the company. If the company follows a conservative approach then the amount of depreciation and other reserve will be very high and leaves share holders with very less cash dividend. From such companies the shareholders can get only less immediate return. However the book value of the share may increase and in turn the market value of the equity shares gets increased. If the company changes the method depreciation it will have an impact on the profitability.
c) Depletion of resources: If the company is in oil, mining, gas and forest based business the depletion of such natural resources will pull down the profitability of the company. Therefore the resources available and the rate of depletion will give a hint about the future profitability of the company.
d) Employee cost: If the company is in manpower intensive industry and if the manpower cost is increasing then the future profitability of the business is doubtful. For example there is a consistent increasing employees cost in Indian IT Sectors and the profit margin is affected.
e) Currency Value: If the company is in export or import business the currency value against overseas currencies determine the profitability. For instance for the last one year the Indian currency appreciate against U.S $\$$ benefiting the importers and affecting the exporters. Therefore the trends of currency value can give better idea about the future profit margin of the companies.
f) Capital Structure: The capital structure that is the source of long term capital employed by a company influences the ultimate profit available for the equity share holders. By employing debt capital the company can reduce the cost of capital since the payment of interest is made before payment of corporate tax and results in tax savings. Above all the company promises to pay interest to the debenture holders irrespective of the profitability of the company Thus the debenture holders are on safer side and they expects only a reasonable interest. Thus the after tax cost of debt capital is always less.
g) Efficiency of management: If the board of directors consists of highly experienced, efficient and dedicated people then the company can be really successful. The efficiency of the management will be reflected in terms of; introduction of new products, financial discipline, good corporate governance and taking strategic decision.

## APPLIED VALUATION TECHNIQUES

Fundamentalists, make a careful analysis of shares. According to them, there should be a preliminary screening of investment, the economic and industrial analysis and analysis of the company to find out its profitability and efficiency and a study of the different kinds of company's management. Future projections of investments also form a major role in the study of investments. The fundamental school of thought has developed certain valuation models to show the effect of business decisions based on the market value of a firm. The fundamental valuation models were first laid by Timbergen and William. They were further developed by Graham Dodd Bodenhorn, Ezra Solomon and Modgiliani Miller.

## GRAHAM AND DODDS INVESTOR RATIOS

In their book on Security Analysis (1934) Benjamin Graham, and David Dodd, argued that future earnings power was the most important determinant of the value of stock. The original approach of identifying the undervalued stock is to find out the present value of forecasted dividends, and if the current market price is lower, it is undervalued. Alternatively, the analyst could determine the discount rate that makes the present value of the forecasted dividends equal to the current market price of the stock. If that rate (I.R.R. or discount rate) is more than the required rate for stocks of similar risks, then the stock is under priced.

Graham and Dodd had argued that each dollar of dividends is worth four times as much as one dollar of retained earnings (in their original Book); but subsequent studies of data showed no justification for this. Graham and Rea have given some questions on Rewards and risks for financial data analysts to answer yes or no and on the basis of these study to answer questions, they decided to locate undervalued
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stocks to buy and overvalued stocks to sell.

## Unit III

## Two Mark Questions

1. What is fundamental analysis?
2. What is Industry Analysis?
3. Describe concept of industry life cycle
4. Define GNP?
5. What is economic analysis?
6. What is company analysis?
7. What are uses of ratio analysis?
8. Define economic forecasting?

## Big Questions

1. Explain the techniques used for performing industry analysis.
2. What are the types of economic forecasting? Explain the forecasting techniques
3. What do you mean by Company Analysis? What financial statements are helpful in underwriting the company's prospects?
4. Explain The Applied Valuation Techniques And Graham And Dodds Investor Ratios?

## Unit IV

## TECHNICAL ANALYSIS

## MEANING OF TECHNICAL ANALYSIS

In finance, technical analysis is a security analysis methodology for forecasting the direction of prices through the study of past market data, primarily price and volume. Behavioral economics and quantitative analysis use many of the same tools of technical analysis, which, being an aspect of active management, stands in contradiction to much of modern portfolio theory. The efficacy of both technical and fundamental analysis is disputed by the efficient-market hypothesis which states that stock market prices are essentially unpredictable.

## DOW THEORY

The Dow Theory on stock price movement is a form of technical analysis that includes some aspects of sector rotation. The theory was derived from 255 Wall Street Journal editorials written by Charles H. Dow (1851-1902), journalist, founder and first editor of The Wall Street Journal and co-founder of Dow Jones and Company. Following Dow's death, William Peter Hamilton, Robert Rhea and E. George Schaefer organized and collectively represented Dow theory, based on Dow's editorials. Dow himself never used the term Dow Theory nor presented it as a trading system.

The six basic tenets of Dow Theory as summarized by Hamilton, Rhea, and Schaefer are described below

## 1. The market has three movements

(1) The "main movement", primary movement or major trend may last from less than a year to several years. It can be bullish or bearish. (2) The "medium swing", secondary reaction or intermediate reaction may last from ten days to three months and generally retraces from $33 \%$ to
$66 \%$ of the primary price change since the previous medium swing or start of the main movement.
(3) The "short swing" or minor movement varies with opinion from hours to a month or more. The three movements may be simultaneous, for instance, a daily minor movement in a bearish secondary reaction in a bullish primary movement.

## 2. Market trends have three phases

Dow Theory asserts that major market trends are composed of three phases: an accumulation phase, a public participation (or absorption) phase, and a distribution phase. The accumulation phase (phase 1) is a period when investors "in the know" are actively buying (selling) stock against the general opinion of the market. During this phase, the stock price does not change much because these investors are in the minority demanding (absorbing) stock that the market at large is supplying (releasing). .

## 3. The stock market discounts all news

Stock prices quickly incorporate new information as soon as it becomes available. Once news is released, stock prices will change to reflect this new information. On this point, Dow Theory agrees with one of the premises of the efficient-market hypothesis.

## 4. Stock market averages must confirm each other

In Dow's time, the US was a growing industrial power. The US had population centers but factories were scattered throughout the country. Factories had to ship their goods to market, usually by rail. Dow's first stock averages were an index of industrial (manufacturing) companies and rail companies. To Dow, a bull market in industrials could not occur unless the railway average rallied as well, usually first.

## 5. Trends are confirmed by volume

Dow believed that volume confirmed price trends. When prices move on low volume, there could be many different explanations. An overly aggressive seller could be present for example. But when price movements are accompanied by high volume, Dow believed this represented the "true"
market view. If many participants are active in a particular security, and the price moves significantly in one direction, Dow maintained that this was the direction in which the market anticipated continued movement.

## 6. Trends exist until definitive signals prove that they have ended

Dow believed that trends existed despite "market noise". Markets might temporarily move in the direction opposite to the trend, but they will soon resume the prior move. The trend should be given the benefit of the doubt during these reversals. Determining whether a reversal is the start of a new trend or a temporary movement in the current trend is not easy.


Primary trend and Secondary reactions

## BULLISH TREND

Bullish Trend' is an upward trend in the prices of an industry's stocks or the overall rise in broad market indices.

Definition: A 'trend' in financial markets can be defined as a direction in which the market moves. 'Bullish Trend' is an upward trend in the prices of an industry's stocks or the overall rise in broad market indices, characterized by high investor confidence.



Three phases of a bull market

## BEARISH TREND

Bearish Trend' in financial markets can be defined as a downward trend in the prices of an industry's stocks or overall fall in market indices.

A market condition in which the prices of securities are falling, and widespread pessimism causes the negative sentiment to be self-sustaining. As investors anticipate losses in a bear market and selling continues, pessimism only grows. Although figures can vary, for many, a downturn of $20 \backslash \%$ or more in multiple broad market indexes, such as the Dow Jones Industrial Average (DJIA) or Standard \& Poor's 500 Index (S\&P 500), over at least a two-month period, is considered an entry into a bear market.


## Three phases of a bear market

## PRICE CHART

A horizontal histogram plotted on the chart of a security, which corresponds to the volume of shares traded at a specific price level. Price by volume histograms are found on the Y -axis and are used by technical traders to predict areas of support and resistance.


## BAR CHART

A style of chart used by some technical analysts, on whom, as illustrated below, the top of the vertical line indicates the highest price a security traded at during the day, and the bottom represents the lowest price. The closing price is displayed on the right side of the bar, and the opening price is shown on the left side of the bar. A single bar like the one below represents one day of trading.


## JAPANESE CANDLESTICK

A chart that displays the high, low, opening and closing prices for a security for a single day. The wide part of the candlestick is called the "real body" and tells investors whether the closing price was higher or lower than the opening price (black/red if the stock closed lower, white/green if the stock closed higher). The candlestick's shadows show the day's high and lows and how they compare to the open and close. A candlestick's shape varies based on the relationship between the day's high, low, opening and

closing prices.


## CHART PATTERNS

When the price bar charts of several days are drawn close together, certain patterns emerge. These patterns are used by the technical analyst to identify trend reversal and predict the future movement of prices. The chart patterns may be classified as support and resistance patterns, reversal patterns and continuation patterns.

Support and Resistance: Support and resistance are price levels at which the downtrend or uptrend in price movements is reversed. Support occurs when price is falling but bounces back or reverses direction every time it reaches a particular level. When all these low paints are connected by a horizontal line, it forms the support line.


Reversal Patterns: Price movement's exhibit uptrend and downtrends. The trends reverse direction after a period of time. These reversals can be identified with the help of certain chart formations that typically occur during these trend reversals. Thus, reversal patters are chart formulations that tend to
signal a change in direction of the earlier trend.
The most popular reversal patterns
 are the head and shoulder formation and universe head and shoulder formation. The head and shoulder formation usually occurs at the end of a bull phase and is indicative of a reversal of trend. After
breaking the neckline, the price is expected to decline sharply.


Inverse head and shoulder
The inverse head and shoulder formation is also a reversal pattern indicative of an oncoming bullish phase. In the formation of this pattern a large increase in volume becomes necessary.

Continuation Patterns: A technical analysis pattern that suggests a trend is exhibiting a
temporary diversion in behavior, and will eventually continue on its existing trend. The symmetrical triangle charts displayed below are both exhibiting a continuation pattern. Notice how the chart extends above (below) its existing pattern.


## ELLIOTT WAVE THEORY

According to the Elliott Wave Theory, stock prices tend to move in a predetermined number of waves consistent with the Fibonacci series. Specifically, Elliott believed the market moved in five distinct waves on the upside and three distinct on the downside:


Waves one, three and five represent the 'impulse', or minor up waves in a major bull move. Waves two and four represent the 'corrective,' or minor down waves in the major bull move. The waves lettered A and C represents the minor down waves in a major bear move, while B represents the one up wave in a minor bear wave.

## MATHEMATICAL INDICATORS

Share prices do not rise or fall in straight lines. The movements are erratic. This makes it difficult

for the day analyst to gauge the underlying trend. He can use the mathematical tool of moving averages to smoothen out the apparent erratic movements of share prices and highlight the underlying trend

## Moving Averages

It is mathematical indicators of the underlying trend of the price movement. Two types of moving average are commonly used by analysts the simple moving average and exponential moving average.

Simple moving average: A simple moving average is formed by computing the average price of a security over a specific number of periods. Most moving averages are based on closing prices. A 5-day simple moving average is the five day sum of closing prices divided by five. As its name implies, a moving average is an average that moves. Old data is dropped as new data comes available. This causes the average to move along the time scale.

## Calculation of Five - day simple MA

| Days (1) | Closing Prices (2) | Total of prices of 5 days (3) | Three days MA (4) |
| :---: | :---: | :---: | :---: |
| 1 | 33 | - | - |
| 2 | 35 | - | - |
| 3 | 37.5 | - | - |
| 4 | 36 | - | - |
| 5 | 39 | 180.5 | 36.1 |
| 6 | 40 | 187.5 | 37.5 |
| 7 | 40.5 | 194 | 38.6 |
| 8 | 38.5 |  | 39.6 |

The first total of 180.5 in column 3 is obtained by adding the prices of the first five days, that's $(33+35+37.5+36+39)$. The second total of 187.5 in column 3 is obtained by adding the price of the $6^{\text {th }}$ day and deleting the price of the first day from the first total, that is, $(180.5+40-33)$. This process is continued. The moving average in column 4 is obtained by dividing the total figure in column 3 by the number of days, namely 5 .

Exponential Moving Average Calculation: Exponential moving averages reduce the lag by applying more weight to recent prices. The weighting applied to the most recent price depends on the number of periods in the moving average. There are three steps to calculating an exponential moving average. First, calculate the simple moving average. An exponential moving average (EMA) has to start somewhere so a simple moving average is used as the previous period's EMA in the first calculation. Second, calculate the weighting multiplier. Third, calculate the exponential moving average. The formula below is for a 5-day EMA.

EMA $=($ Current closing price - Previous EMA $) *$ Factor + Previous EMA
Where,

$$
\text { Factor }=2 / n+1
$$

And $\mathrm{n}=$ number of days for which the average is to be calculated.
Calculation of five-day EMA

| Days | Closing Price | EMA |
| :---: | :---: | :---: |
| 1 | 33 | 33 |
| 2 | 35 | 33.66 |
| 3 | 37.5 | 34.93 |
| 4 | 36 | 35.28 |
| 5 | 39 | 36.51 |
| 6 | 40 | 37.66 |

Here,

$$
\text { Factor }=2 / n+1=2 / 5+1=2 / 6=0.33
$$

The EMA for the first day is taken as the closing price of that day itself. The EMA for the second day is calculated as shown below.

$$
\begin{aligned}
\text { EMA } & =(\text { Current closing price }- \text { Previous EMA }) * \text { Factor }+ \text { Previous EMA } \\
& =(35-33) * 0.33+33=33.66
\end{aligned}
$$

EMA for the third day $=(37.5-33.66) * 0.33+33.66=34.93$.


## OSCILLATORS

Oscillators are mathematical indicators calculated with the help of the closing price data. They help to indentify overbought and oversold conditions and also the possibility of trend reversals. These indicators are called oscillators because they move across a reference point

Rate of Change Indicators (ROC): It is a very pupular oscillator which the rate of change of the current price as compared to the price a certain number of days or weeks back. To calculate a 7 days rate of change, each days price is divident by the price which prevailed 7 days ago and then 1 is substraced from this price ratio. $\quad$ ROC $=$ Current Price / Price ' $n$ ' period age -1

The calculation of ROC is illustrated below:

## Calculation of 7 days ROC

| Days | Closing Price | Closing 7 days ago | Price Ratio | ROC=Ratio - 1 |
| :---: | :---: | :---: | :---: | :---: |
| 1 | 70 | - | - | - |
| 2 | 72 | - | - | - |
| 3 | 73 | - | - | - |
| 4 | 70 | - | - | - |
| 5 | 74 | - | - | - |
| 6 | 76 | 70 | 1.07 | - |
| 7 | 77 | 72 | 1.08 | 0.07 |
| 9 | 78 | 73 | 1.10 | 0.08 |
| 10 | 80 | 70 | 1.13 | 0.10 |
| 11 | 79 | 74 | 1.05 | 0.13 |

The ROC values may be positive, negative or zero.
Relative Strength Index (RSI): This is a powerful indicator that signals buying and selling opportunities ahead of the market. RSI for a share is calculated by using the following formula.


Where,

$$
\mathrm{RS}=\text { Average gain per day / Average loss per day }
$$

The most commonly used time period for the calculation of RSI is 10 days. For the calculation a 10 day RSI, the gain per day or loss per day is arrived at by comparing the closing price of a day with that of the previous day for a period of 10 days.

The calculation of RSI is illustrated below:

## Calculation of 14 Days RSI

| Day | Closing Price | Change over previous day |  |
| :---: | :---: | :---: | :---: |
|  |  | Gain | Loss |
| 1 | 130 | - | - |
| 2 | 132 | 2 | - |
| 3 | 130 | - | 2 |
| 4 | 135 | 5 | - |
| 5 | 137 | 2 | - |
| 7 | 134 | 2 | - |
| 7 | 136 | 4 | - |
| 9 | 140 | - | - |
| 10 | 140 | 2 | - |

10 days average $17 / 10=1.7 \quad 5 / 10=0.5$

$$
\begin{aligned}
& \mathrm{RS}=1.7 / 0.5=3.4 \\
& \begin{aligned}
\mathrm{RSI}= & 100-[100 /(1+3.4)] \\
& =100-(100 / 4.4)
\end{aligned}
\end{aligned}
$$

$$
=100-22.73=77.27
$$

## MARKET INDICATORS

Technical analysis focuses its attention not only on individual stock price behaviour, but also on the general trend of the market. Indicators used by technical analysis to study the trend of the market as a whole are known as market indicators. Some of these indicators are discussed below.

Breadth of the Market: By comparing the number of shares which advanced and the numbers of shares that dividend during a period, the trend of the market can be ascertained. Comparison of advanced and declines is a means of measuring the dispersion or breadth of a general price rise or decline. The difference between the advances and declines is called the breadth of the market.

## Calculation of the Breadth

| Day | Advances | Declines | Daily Difference | Breadth Cumulative Difference |
| :--- | :---: | :---: | :---: | :---: |
| Monday | 620 | 350 | +270 | +270 |
| \ | 470 | 510 | -40 | +230 |
| Tuesday |  |  |  |  |
| Wednesday | 360 | 610 | -250 | -20 |
| Thursday | 585 | 380 | +205 | +185 |
| Friday | 705 | 270 | +435 | +620 |

Short Interest: A speculators often to short selling which is selling a share that is not owned by the person. This is done when the speculators feels that the price of the stock will fall in future. He hopes to purchases the share at a later date (cover his short position) the monthly shortly selling price and reap a profit.

Odd-lot Index: Small investors are presented to buy smaller number of shares than the normal trading lot of 100 shares. These are known as odd lots and the buyers and sellers of odd lots are called odd lotters..


## EFFICIENT MARKET HYPOTHESIS

The concept of an efficient capital market has been one of the dominate themes in academic literature since, the 1960. According to Elton and Grubar "When someone refers to efficient capital markets, the mean that security prices fully reflect all available information".

## FORMS OF MARKET EFFICIENCY

The capital market is considered to be efficient in three different forms: the weak form, semistrong form and strong form. Thus, the efficient market hypothesis has been sub-dividend into three forms, each dealing with a different type of information. the weak form deals with the information the past sequence of security price movements the semi-strong form deals with the publicly available information..

## Empirical Tests of Weak Form Efficiency

Serial Correlation

Run Test
Filter Tests
Distribution Pattern
Empirical Tests of Semi-strong Form Efficiency
Tests of Strong Form Efficiency

## Unit IV

## Two Mark Questions

1. Define Breath of the market?
2. Define Oscillators?
3. List down any two indicators?
4. What is moving average
5. Explain the three types of trends in stock prices
6. What is technical analysis?
7. Define RSI and its usage.
8. What are the two major market indicators considered as a barometer of Indian capital market?
9. What do you mean by security market line? Define "Efficient frontier"?
10. Explain Random Walk Hypothesis. What are the various levels of market Efficiency?
11. What patterns helps us identify the trend reversal?
12. What do you mean by support level?
13. What do you mean by resistance level?
14. What is odd lot trading?

## Big Questions

1. Describe the Dow Theory and its 3 components. Which component is most important?
2. Explain the different types of charts used in technical analysis and its uses.
3. Discuss the assumptions and implications of efficient market theory.
4. Explain Chart format in details with examples
5. Discuss about Mathematical indicator and give examples
6. What are the premises of technical analysis? What are the differences between technical and fundamental analysis?

## UNIT V

## PORTFOLIO REVISION

## 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. 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.

When Security Returns are Perfectly Positively Correlated: When security returns are perfectly positively correlated the correlation coefficient between the two securities will be +1 . The returns are two securities then move up or down together.

The portfolio variance is calculated using the formula

$$
\sigma_{p}^{2}=x_{1}^{2} \sigma_{1}^{2}+x_{2}^{2} \sigma_{2}^{2}+2 x_{1} x_{2} r_{12} \sigma_{1} \sigma_{2}
$$

Since, $\mathrm{r}_{12}=1$, this may be rewritten as:

$$
\sigma_{p}^{2}=x_{1}^{2} \sigma_{1}^{2}+x_{2}^{2} \sigma_{2}^{2}+2 x_{1} x_{2} \sigma_{1} \sigma_{2}
$$

The right hand side of the equation as the same form as the expansion of the identity $(a+b)^{2}$, namely $a^{2}+b^{2}+2 a b$. Hence, it may reduced as

The standard deviation then becomes

$$
\sigma_{p}=\left(x_{1} \sigma_{1}+x_{2} \sigma_{2}^{2}\right)
$$

This is simply the weighted average of the standard deviation of the individual securities. Taking the same example that we considered earlier for calculating portfolio variance, we shall calculated portfolio standard deviation when correlation co-efficient is +1 .

When Security Returns are Perfectly Negatively Correlated: When security returns are perfectly negatively correlated the correlation coefficient between the two securities will be -1 . The returns are two securities then move in exactly opposite directions.

The portfolio variance is calculated using the formula

$$
\sigma_{p}^{2}=x_{1}^{2} \sigma_{1}^{2}+x_{2}^{2} \sigma_{2}^{2}+2 x_{1} x_{2} r_{12} \sigma_{1} \sigma_{2}
$$

Since, $r_{12}=-1$, this may be rewritten as:

$$
\sigma_{p}^{2}=x_{1}^{2} \sigma_{1}^{2}+x_{2}^{2} \sigma_{2}^{2}-2 x_{1} x_{2} \sigma_{1} \sigma_{2}
$$

The right hand side of the equation as the same form as the expansion of the identity $(a-b)^{2}$, namely $a^{2}+b^{2}-2 a b$. Hence, it may reduced as

$$
\sigma_{p}^{2}=\left(x_{1} \sigma_{1}-x_{2} \sigma_{2}^{2}\right)^{2}
$$

The standard deviation then becomes

$$
\sigma_{p}=\left(x_{1} \sigma_{1}-x_{2} \sigma_{2}^{2}\right)
$$

This is simply the weighted average of the standard deviation of the individual securities. Taking the same example that we considered earlier for calculating portfolio variance, we shall calculated portfolio standard deviation when correlation co-efficient is -1 .

When Returns Uncorrelated: When the returns of two securities entirely uncorrelated, the correlation coefficient would be zero.

The formula for portfolio variance is:

$$
\sigma_{p}^{2}=x_{1}^{2} \sigma_{1}^{2}+x_{2}^{2} \sigma_{2}^{2}+2 x_{1} x_{2} r_{12} \sigma_{1} \sigma_{2}
$$

Since, $\mathrm{r}_{12}=0$, the last term in the equation becomes zero; the formula may be rewritten as:

$$
\sigma_{p}^{2}=x_{1}^{2} \sigma_{1}^{2}+x_{2}^{2} \sigma_{2}^{2}
$$

The standard deviation then becomes:

$$
\sigma_{p}=\sqrt{x_{1}^{2} \sigma_{1}^{2}+x_{2}^{2} \sigma_{2}^{2}}
$$

## PORTFOLIO REVISION

## MEANING OF PORTFOLIO REVISION

A portfolio a mix of securities selected from a vast universe of securities. Two variables determine the composition of a portfolio; the first is the securities included in the portfolio and the second is the proportion of total funds invested in each security.

## STEPS IN PORTFOLIO REVISION

1. Analysis of Investment Constraints: First the investment constraints such as the investor's expectation over income, liquidity holding period, safety and tax benefits are to be carefully analyzed.
i. Income Needs: The income needs of the investor are determined by the inflation and the level of his disposable income. If the investor needs current income to maintain his living standards and face inflation then the portfolio should be developed in such a way that it offers a periodical return consistently. If the inflation is raising then the portfolio should be developed in such a way that it offset the pressure of inflation by selecting securities with high growth return potential.
ii. Liquidity Needs: While developing the portfolio the investor should carefully analyze his expectation over liquidity. When the investor requires high liquidity (i.e. the desire to encase his investment with in very short period) he has to select securities with very short period of maturity and wider marketability. For example the money market instruments and shares of leading companies can be easily bought and sold.

iii. Preference over safety of the principal: The investor's risk attitude is the major parameter in deciding the securities for the portfolio. If the investor is risk taker he can develop a portfolio with growth oriented equity shares. If the investor is risk averter, then he has to select securities, bonds and debentures. On the other hand if the investor is having balanced attitude over risk, he can construct a portfolio with combination of growth oriented equity stocks and debt instruments.
iv. Preference over investment holding period: Another important constraint to be analyzed is decision over investment holding period. How long the investor would like to hold his investment is the holding period. The investment holding period is influenced by many factors such as the desired risk level, life cycle of the investor.
v. Tax benefits: The tax burden of the investor is another important constraint to be analyzed for constructing the portfolio. If the investor's tax obligation is very high then he would like select securities which give tax benefits. Otherwise if the tax obligation is very less than the investor would select securities by emphasizing other investment aspects.

## 2. Determination of Investment Objectives

The objectives of investment are to be clearly defined and ranked. In fact many investors would have multiple objectives of investment. The objectives may be income, capital gain, future provision etc.,

## 3. Risk and return analysis

The next important step in traditional approach to portfolio construction is the analysis of risk and return. To get more return the investor has to take higher degree of risk. Risk is the deviation of actual return from the expected return. There are various risks such as interest rate risk, purchasing power risk, financial risk and market risk. The investor has to analyze the various risk factors before constructing the portfolio.

## 4. Diversification of the portfolio

The last and important step in traditional portfolio is the diversification of the portfolio. The securities

are selected based on the investment constraints and investment objectives. The investor has to ensure the diversification so as to minimize the risk and enhance return. He has to select various types of securities from various sectors.

## FORMULA PLANS

Formula plans is a mechanical revision techniques or procedures have been developed to enable the investors to benefit from price fluctuations in the market by buying stocks when prices are low and selling them when prices are high. These techniques are referred to as formula plans.

## TYPES OF FORMULA PLAN

a) Rupee Cost Averaging: Under the Rupee cost averaging the fundamentally growth oriented stocks are identified first. Then the investor has to buy the selected stock at various price intervals instead of buying a large number of shares at single point. This is called time diversification. The rupee cost averaging reduces the average cost of purchase.
b) Constant Rupee Plan: The constant Rupee plan suggests that the investor should sell when the prices rise and start buy when the prices starts decline. The investor has to select the action points. The action points are the times at which the investor has to readjust the values of the stocks in the portfolio. The main advantage of this method is that the buying and selling of securities 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.
c) Constant Ratio Plan: Constant 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.
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 -vKD)


d) 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.

## PORTFOLIO EVALUATION

## Meaning of Portfolio Evaluation

Portfolio evaluation is the last step in the process of portfolio management. Portfolio analysis, selection and revision are undertaken with the objective of maximizing returns and minimizing risk.

## Need for Evaluation

a) Self evaluation
b) Evaluation of Portfolio Managers
c) Evaluation of Mutual Funds

## Evaluation Perspective

a) Transaction View
b) Security View
c) Portfolio View

## MEANING OF PORTFOLIO EVALUATION

Portfolio evaluation is the last step in the process of portfolio management. Portfolio analysis, selection and revision are undertaken with the objective of maximizing returns and minimizing risk. Performance evaluation, on the other hand, addresses such issues as whether the performance was superior or inferior, whether the performance was due to skill or luck, etc.
a) Measuring Portfolio Return
b) Risk Adjusted Returns
i. Sharp Ratio
ii. Treynor Ratio

## CAPITAL ASSET PRICING MODEL

William Sharpe (1964) published the capital asset pricing model (CAPM). Parallel work was also performed by Treynor (1961) and Lintner (1965). CAPM extended Harry Markowitz portfolio theory to introduce the notions of systematic and specific risk. For his work on CAPM, Sharpe shared the 1990 Nobel Prize in Economics with Harry Markowitz and Merton Miller.

CAPM considers a simplified world where:
> There are no taxes or transaction costs.

All investors have identical investment horizons.
$>$ All investors have identical opinions about expected returns, volatilities and correlations of available investments.

In such a simple world, Tobin's (1958) super-efficient portfolio must be the market portfolio. All investors will hold the market portfolio, leveraging or de-leveraging it with positions in the risk-free asset in order to achieve a desired level of risk.

According to CAPM, the marketplace compensates investors for taking systematic risk but not for taking specific risk. This is because specific risk can be diversified away. When an investor holds the market portfolio, each individual asset in that portfolio entails specific risk, but through diversification, the investor's net exposure is just the systematic risk of the market portfolio.

## Unit V

## Two Mark Questions

1. Difference between the SML and CML
2. Define optimal portfolio.
3. Define Efficient Market?
4. State the meaning of portfolio revision?
5. What is portfolio construction?
6. What is trend reversal?
7. What do you mean by Efficient Market Hypothesis?
8. Define CAPM?
9. What is an index fund?
10. What you mean by AMC?
11. Explain the concept of Formation of Plan?
12. Define NAV. What are formula plans?
13. What do you mean by risk aversion?
14. What is a open ended fund and closed ended fund?
15. What is portfolio selection?

## Big Questions

1. Explain the steps in portfolio constructions as per traditional approaches?
2. Explain the difference stages in portfolio management?
3. What are the basic assumptions of CAPM? What are the advantages of adopting CAPM model in the portfolio management?
4. What is portfolio theory? Explain the assumptions and principles underwriting the portfolio theory?
5. Should you care about how well a mutual fund is diversified? Why or Why not?
6. Discuss the growth of the mutual funds in India.
7. Distinguish between CAPM and Arbitrage pricing theory.
8. Explain about portfolio revision.

Rijs, and Return (Unit 5)
$\bar{R}=$ Expected return on investment in a security or asset
$R_{i}=$ Outcome of i
$\mathrm{n}=$ Total number of outcomes
example 7: An investor holds a security for one year. The probability distribution of possible returns of the
investment is given here. Calculate the expected and Repurn alset porl
Probability of Occurrence retern for the investment.

| Probability of Occurrence | Possible Rate of Return (\%) |
| :---: | :---: |
| 0.04 | 0.10 |
| 0.05 | 0.02 |
| 0.10 | 0.08 |
| 0.25 | 0.12 |
| 0.30 | 0.15 |
| 0.26 | 0.20 |

$$
\begin{aligned}
& =(0.10 \times 0.04)+(0.02 \times 0.05)+(0.08 \times 0.10)+(0.12 \times 0.25)+(0.15 \times 0.30)+(0.20 \times 0.26) \\
& =0.14 \text { or } 14 \text { per cent }
\end{aligned}
$$

The standard deviation of the returns $(\sigma)$, a measure of risk of a security, can be calculated as follows:

$$
\sigma=\sqrt{\sum_{i=1}^{n}\left(R_{i}-\bar{R}\right)^{2} P_{i}} \quad \rightarrow 1 \text { an et }
$$

$$
\begin{aligned}
& \text { Using the data given in example above, the standard deviation can be calculated as: } \\
& \begin{aligned}
& \sigma=\sqrt{(0.10-0.14)^{2} 0.04+(0.02-0.14)^{2} 0.05+(0.08-0.14)^{2} 0.10} \\
&+(0.12-0.14)^{2} 0.25+(0.15-0.14)^{2} 0.30+(0.20-0.14)^{2} 0.26
\end{aligned} \\
& \\
&
\end{aligned}=\sqrt{\begin{array}{l}
(0.0016 \times 0.04)+(0.0144 \times 0.05)+(0.0036 \times 0.10) \\
+(0.0004 \times 0.25)+(0.0001 \times 0.30)+(0.0036 \times 0.26)
\end{array}}
$$

### 5.2.4.4. Risk and Return on 2 Asset Portfolio

The formula of Two-Asset case are as follows:

$$
\sigma_{\mathrm{P}}=\sqrt{\mathrm{W}_{\mathrm{A}}^{2} \sigma_{\mathrm{A}}^{2}+\mathrm{W}_{\mathrm{B}}^{2} \sigma_{\mathrm{B}}^{2}+2 \cdot \mathrm{~W}_{\mathrm{A}} \cdot \mathrm{~W}_{\mathrm{B}} \cdot \mathrm{r}_{\mathrm{AB}} \cdot \sigma_{\mathrm{A}} \cdot \sigma_{\mathrm{B}}}
$$

where,
$\mathrm{W}_{\mathrm{A}} \quad=\quad$ Weightage/proportion of Asset A in the Total portfolio,
$\mathrm{W}_{\mathrm{B}}=$ Proportion of investment in Asset B,
$\sigma_{\mathrm{A}}, \sigma_{\mathrm{B}}=$ Standard deviations of Stock A and Stock B,
$\mathrm{r}_{\mathrm{AB}}=$ Correlation coefficient between the returns of Two Stocks.
Example 8: A portfolio of two securities 1 and 2. The following information is available:
$\mathrm{w}_{1}=0.6, \mathrm{w}_{2}=0.4, \sigma_{1}=0.1, \sigma_{2}=0.16, \mathrm{r}_{12}=0.5$
What is the standard deviation of portfolio return?
Solution: The standard deviation of portfolio returns:
$\sigma_{p}=\sqrt{[0.62 \times 0.102+0.42 \times 0.162+2 \times 0.6 \times 0.4 \times 0.5 \times 0.10 \times 0.16]}$
$\sigma_{p}=10.7 \%$

Example 9: Calculate the portfolio standard deviation for a two-asset portfolio comprised of the following two assets if the correlation of their returns is 0.5 .

| Particulars | Asset A | Asset B |
| :--- | :--- | :--- |
| Expected return | $10 \%$ | $20 \%$ |
| Standard deviation of expected returns | $5 \%$ | $20 \%$ |
| Amount invested | $₹ 20,000$ | $₹ 30,000$ |

Solution: $\sigma_{P}=\sqrt{W_{A}^{2} \sigma_{A}^{2}+W_{B}^{2} \sigma_{B}^{2}+2 \cdot W_{A} \cdot W_{B} \cdot r_{A B} \cdot \sigma_{A} \cdot \sigma_{B}}$

$$
\begin{aligned}
& \sigma_{p}=\sqrt{\left(0.4^{2}\right)\left(0.05^{2}\right)+\left(0.6^{2}\right)\left(0.2^{2}\right)+2(0.4)(0.6)(0.5)(0.05)(0.2)} \\
& \sigma_{p}=\sqrt{((0.16)(0.0025))+((0.36)(0.04))+((2)(0.0012))} \\
& \sigma_{p}=\sqrt{0.0004+0.0144+0.0024} \\
& \sigma_{p}=\sqrt{0.0172}=0.13114 \text { or } 13 \%
\end{aligned}
$$



Example 10: P and Q two securities, with expected returns of $15 \%$ and $24 \%$ respectively, and standard deviation of $35 \%$ and $52 \%$ 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:

$$
\begin{aligned}
& \sigma_{P}=\sqrt{W_{A}^{2} \sigma_{A}^{2}+W_{B}^{2} \sigma_{B}^{2}+2 \cdot W_{A} \cdot W_{B} \cdot r_{A B} \cdot \sigma_{A} \cdot \sigma_{B}} \\
& \sigma_{P}=\sqrt{(0.5)^{2}(0.35)^{2}+(0.5)^{2}(0.52)^{2}+2(0.5)(0.5)(-0.9 \times 0.35 \times 0.52)} \\
& \sigma_{P}=\sqrt{0.030625+0.0676-0.0819} \\
& \sigma=\sqrt{0.0163}=0.127 \text { or } 12.78 \%
\end{aligned}
$$

Example 11: Oliver's portfolio holds security A, which returned $12.0 \%$ and security B, which returned $15.0 \%$. At the beginning of the year $70 \%$ was invested in security A and the remaining $30 \%$ was invested in security B. Given a standard deviation of $10 \%$ security A, $20 \%$ for security B and a correlation coefficient of $0.5 \%$ between the two securities, calculate the portfolio variance.

Solution: $\sigma_{P}=\sqrt{\mathrm{W}_{\mathrm{A}}^{2} \sigma_{\mathrm{A}}^{2}+\mathrm{W}_{\mathrm{B}}^{2} \sigma_{\mathrm{B}}^{2}+2 \cdot \mathrm{~W}_{\mathrm{A}} \cdot \mathrm{W}_{\mathrm{B}} \cdot \mathrm{r}_{\mathrm{AB}} \cdot \sigma_{\mathrm{A}} \cdot \sigma_{\mathrm{B}}}$
Portfolio Variance $=\sigma_{\mathrm{P}}=\sqrt{\left(0.7^{2} \times 0.10^{2}\right)+\left(0.3^{2} \times 0.20^{2}\right)+(2 \times 0.7 \times 0.3 \times 0.5 \times 0.10 \times 0.20)}$

$$
\sigma_{p}=\sqrt{0.0127}
$$

Portfolio standard deviation is the square root of the portfolio variance.

$$
\sigma_{p}=\sqrt{0.0127}=11.27 \%
$$

Portfolio Standard Deviation $=(127)^{0.5}=11.27 \%$
Example 12: The following are the different state of economy, the probability of occurrence of that state and the expected rate of return from security A and B in these different states:

| State | Probability | Rate of Return |  |
| :--- | :---: | :---: | :---: |
|  |  | Security A | Security B |
| Recession | 0.20 | -0.15 | 0.20 |
| Normal | 0.50 | 0.20 | 0.30 |
| Boom | 0.30 | 0.60 | 0.40 | $₹ 20,000$ to invest. He invests $₹ 15,000$ in security A and balance in security B what will be the expected return Solution:

$$
\text { i) } \begin{aligned}
& \text { Expected Return }\left(\mathrm{R}_{\mathrm{P}}\right)=\mathrm{W}_{\mathrm{A}} \mathrm{R}_{\mathrm{A}}+\mathrm{W}_{\mathrm{B}} \mathrm{R}_{\mathrm{B}}+\ldots . \mathrm{W}_{\mathrm{n}} \mathrm{R}_{\mathrm{n}} \\
& \text { Security } \mathrm{A}=(0.20 \times-0.15)+(0.50 \times 0.20)+(0.30 \times 0.60) \\
&=-0.03+0.1+0.18 \\
&=0.25
\end{aligned}
$$

Security B $=(0.20 \times 0.20)+(0.50 \times 0.30)+(0.30 \times 0.40)$

$$
\begin{aligned}
& =0.04+0.15+0.12 \\
& =0.31
\end{aligned}
$$


ii) Standard Deviation $(\sigma)=\sqrt{\sum_{i=1}^{n}\left(R_{1}-\bar{R}\right)^{2} P_{i}}$

$$
\begin{aligned}
\text { Security } A & =\sqrt{\left[0.20(-0.15-0.25)^{2}+0.50(0.20-0.25)^{2}+0.30(0.60-0.25)^{2}\right]} \\
& =\sqrt{\left[0.20(-0.4)^{2}+0.50(-0.05)^{2}+0.30(0.35)^{2}\right]} \\
& =\sqrt{(0.20 \times 0.16)+(0.50 \times 0.0025)+(0.30 \times 0.1225)} \\
& =\sqrt{0.032+0.00125+0.03675}=\sqrt{0.07} \\
& =0.2646
\end{aligned}
$$

Security $B=\sqrt{\left[0.20(0.20-0.31)^{2}+0.50(0.30-0.31)^{2}+0.30(0.40-0.31)^{2}\right]}$

$$
\begin{aligned}
& =\sqrt{\left[0.20(-0.11)^{2}+0.50(-0.01)^{2}+0.30(0.09)^{2}\right]} \\
& =\sqrt{(0.20 \times 0.0121)+(0.50 \times 0.0001)+(0.30 \times 0.0081)} \\
& =\sqrt{0.00242+0.00005+0.00243}=\sqrt{0.0049} \\
& =0.07
\end{aligned}
$$

The expected return and standard deviation of the portfolio of the investor are:
Expected Return $=(0.75 \times 0.25)+(0.25 \times 0.31)=18.75+7.75=26.5$
Note: As the investor is investing ₹ 15,000 in Security A and $₹ 5,000$ in Security B, his portfolio will consist of 0.75 of A and 0.25 of B

Example 13: Stock TATA and BIRLA display the following returns over the past three years:

| Year | Return |  |
| :---: | :---: | :---: |
|  | TATA | BIRLA |
| $\mathbf{1 9 9 4}$ | 14 | 12 |
| 1995 | 16 | 18 |
| $\mathbf{1 9 9 6}$ | 20 | 15 |

## Answer following:

a) What is the expected return on portfolio made up of 40 per cent of TATA and 60 per cent of BIRLA?
b) What is the standard deviation of each stock?
c) Determine the correlation coefficient of stock TATA and BIRLA.
d) What is the portfolio risk of a portfolio made up of 40 per cent TATA and 60 per cent BIRLA?

## Solution:

a) Expected Rate of Return $=\frac{\sum R}{N}$
$\Sigma \mathrm{R}$ is the total of Returns, N is the number of observations

Returns of Stock TATA $=\frac{14+16+20}{3}=\frac{50}{3}=16.67$
Returns of Stock BIRLA $=\frac{12+18+15}{3}=\frac{45}{3}=15$
Portfolio Return $=\sum_{i=1}^{N} X_{1} R_{1}$
$\mathrm{X}_{1}$ being the proportion held by each security which includes $40 \%$ of TATA and $60 \%$ of BIRLA

$$
=(0.4 \times 16.67)+(0.6 \times 15)=6.67+9=15.67
$$

b) Standard Deviation of Each Stock

$$
\begin{aligned}
& \sigma= \sqrt{\frac{\sum\left(\mathrm{R}_{1}-\bar{R}_{1}\right)^{2}}{\mathrm{~N}}} \\
& \begin{aligned}
\sigma_{\text {TATA }} & =\sqrt{\frac{(14-16.67)^{2}+(16-16.67)^{2}+(20-16.67)^{2}}{3}} \\
& =\sqrt{\frac{(-2.67)^{2}+(-0.67)^{2}+(3.33)^{2}}{3}}=\sqrt{\frac{7.13+0.45+11.09}{3}}=\sqrt{\frac{18.67}{3}}=\sqrt{6.22} \\
\sigma_{\text {TATA }} & =2.49 \\
\sigma_{\text {BIRLA }} & =\sqrt{\frac{(12-15)^{2}+(18-15)^{2}+(15-15)^{2}}{3}}=\sqrt{\frac{(-3)^{2}+(3)^{2}+(0)^{2}}{3}} \\
& =\sqrt{\frac{9+9+0}{3}}=\sqrt{\frac{18}{3}}=\sqrt{6} \\
\sigma_{\text {BIRLA }} & =2.45
\end{aligned}
\end{aligned}
$$

c) Correlation Coefficient of Stock TATA and BIRLA

$$
\begin{aligned}
\mathrm{COV}_{\text {TATABIRLA }} & =\frac{\sum\left(\mathrm{R}_{1}-\overline{\mathrm{R}}_{1}\right)\left(\mathrm{R}_{2}-\overline{\mathrm{R}}_{2}\right)}{\mathrm{N}} \\
& =\frac{(14-16.67)(16-16.67)(20-16.67)+(12-15)(18-15)(15-15)}{3} \\
& =\frac{(-2.67 \times-0.67 \times 3.33)+(-3 \times 3 \times 0)}{3}=\frac{5.96+0}{3}=1.98
\end{aligned}
$$

$$
\mathrm{r}=\frac{\text { Covariance TATABIRLA }}{\sigma_{\mathrm{x}} \sigma_{\mathrm{y}}}=\frac{1.98}{2.49 \times 2.45}=\frac{1.98}{6}=0.33
$$

d) Portfolio Risk $\sigma_{\mathrm{P}}=\sqrt{\left(\mathrm{x}_{1}\right)^{2}\left(\sigma_{1}\right)^{2}+\left(\mathrm{x}_{2}\right)^{2}\left(\sigma_{2}\right)^{2}+2 \mathrm{X}_{1} \mathrm{X}_{2}\left(\mathrm{r}_{12} \sigma_{1} \sigma_{2}\right)}$

$$
\begin{aligned}
\mathrm{R}_{\mathrm{P}} & =\sqrt{\sigma_{\mathrm{P}}^{2}} \\
& =\sqrt{(0.4)^{2}(2.49)^{2}+(0.6)^{2}(2.45)^{2}+2 \times(0.4) \times(0.6) \times(0.33 \times 2.49 \times 2.45)} \\
& =\sqrt{(0.16)(6.1009)+(0.36)(6.0025)+2 \times(0.24) \times(2.0131)}=\sqrt{0.98+2.16+0.97} \\
& =\sqrt{4.11} \\
& =2.03
\end{aligned}
$$

### 5.2.4.5. Risk and Return on ' $\mathbf{n}$ ' Asset Portfolio

There is portfolio risk in n -asset model is used when the number of assets are more than two in a portfolio needs one to start with the calculation of covariance-variance matrix between all assets under considerati The presence of various computer software packages has helped the matrix calculation easier for a sam

Example 18: A portfolio of four

| Security securities with the following characteristics: |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
|  | Weighting |  | $\alpha_{i}$ | $\boldsymbol{\beta}_{\mathrm{i}}$ |
| Residual Variance |  |  |  |  |
| 1 |  |  |  | $\left(\boldsymbol{\sigma}_{\mathrm{ei}}^{2}\right)$ |
| 2 | 0.2 | 2.0 | 1.2 | 320 |
| 3 | 0.3 | 1.7 | 0.8 | 450 |
| 4 | 0.1 | -0.8 | 1.6 | 270 |

Calculate the return and risk of the cent and the standard deviation of return on market ingle index is model, if the 14 per cent.
Solution:

1) Portfolio return under single index model is calculated using the formula:

## 1) Portfolio return under single index model is calculated using the formula: $R_{p}=\alpha_{p}+\beta_{p} R_{m}$

$$
\begin{aligned}
& \text { For applying this formula, } \alpha_{p} \text { and } \beta_{p} \text { have to be calculated as: } \\
& \qquad \begin{aligned}
\alpha_{p} & =\sum_{i=1}^{n} w_{i} \alpha_{i} \\
& =(0.2)(2.0)+(0.3)(1.7)+(0.1)(-0.8)+(0.4)(1.2)=0.4+0.51+(-0.08)+0.48 \\
& =1.31
\end{aligned}
\end{aligned}
$$

$$
\beta_{p}=\sum_{i=1}^{n} w_{i} \beta_{i}
$$

$$
\begin{aligned}
& =(0.2)(1.2)+(0.3)(0.8)+(0.1)(1.6)+(0.4)(1.3)=0.24+0.24+0.16+0.52 \\
& =1.16
\end{aligned}
$$

$$
\begin{aligned}
\mathrm{R}_{\mathrm{p}} & =\alpha_{p}+\beta_{p} \mathrm{R}_{\mathrm{m}} \\
& =1.31+(1.16)(16.4)=1.31+19.024 \\
& =20.334
\end{aligned}
$$

2) Portfolio risk under single index model is calculated as:

$$
\sigma_{\mathrm{p}}^{2}=\beta_{\mathrm{p}}^{2} \sigma_{\mathrm{m}}^{2}+\sum_{\mathrm{i}=1}^{2} \mathrm{w}_{\mathrm{i}}^{2} \sigma_{\mathrm{ei}}^{2}
$$

For applying this, portfolio residual variance needs to be calculated as:

$$
\sum_{i=1}^{n} w_{i}^{2} \sigma_{\mathrm{ei}}^{2}
$$

Thus,

$$
\begin{aligned}
& \text { Is, } \\
& =(0.2)^{2}(320)+(0.3)^{2}(450)+(0.1)^{2}(270)+(0.4)^{2}(180) \\
& =(0.04 \times 320)+(0.09 \times 450)+(0.01 \times 270)+(0.16 \times 180)=12.8+40.5+2.7+28.8 \\
& =84.8
\end{aligned}
$$

Now,

$$
\begin{aligned}
\sigma_{\mathrm{p}}^{2} & =\beta_{\mathrm{p}}^{2} \sigma_{\mathrm{m}}^{2}+\sum_{\mathrm{i}=1}^{\mathrm{n}} \mathrm{w}_{\mathrm{i}}^{2} \sigma_{\mathrm{ci}}^{2} \\
& =(1.16)^{2}(14)^{2}+84.8=263.74+84.8=(1.3456 \times 196)+84.8 \\
& =348.54
\end{aligned}
$$

Hence, $\sigma_{p}=\sqrt{348.54}=18.67$

Example 19: A portfolio of six securities with the following characteristics:

| Security | Weighting | Alpha | Beta | Residual Variance (per cent) |
| :---: | :---: | :---: | :---: | :---: |
| 1 | 0.10 | -0.28 | 0.91 | 23 |
| 2 | 0.15 | 0.76 | 0.87 | 60 |
| 3 | 0.20 | 2.52 | 1.71 | 52 |
| 4 | 0.10 | -0.16 | 0.97 | 86 |
| 5 | 0.25 | 1.55 | 1.07 | 67 |
| 6 | 0.20 | 0.47 | 0.86 | 82 |

Assuming the return on market index to be 14.5 per cent and the standard deviation of return on market index to be 16 per cent, calculate the portfolio return and risk under single index model.

## Solution:

1) Calculation of Portfolio Return under Single Index Model

$$
\mathrm{R}_{\mathrm{P}}=\alpha_{\mathrm{P}}+\beta_{\mathrm{P}} \mathrm{R}_{\mathrm{M}}
$$

For applying this formula $\alpha_{p}$ and $\beta_{P}$ have to be calculated as,

$$
\begin{aligned}
\alpha_{p} & =\sum_{i=1}^{n} \omega_{i} \alpha_{i} \\
& =(0.10 \times-0.28)+(0.15 \times 0.76)+(0.20 \times 2.52)+(0.10 \times-0.16)+(0.25 \times 1.55)+(0.20 \times 0.47) \\
& =-0.028+0.114+0.504+(-0.016)+0.3875+0.094 \\
& =1.0555 \\
\beta_{P} & =\sum_{i=1}^{n} \omega_{i} \beta_{\mathrm{i}} \\
& =(0.10 \times 0.91)+(0.15 \times 0.87)+(0.20 \times 1.71)+(0.10 \times 0.97)+(0.25 \times 1.07)+(0.20 \times 0.86) \\
& =0.091+0.1305+0.342+0.097+0.2675+0.172 \\
& =1.1 \\
R_{P} & =\alpha_{P}+\beta_{\mathrm{P}} \mathrm{R}_{\mathrm{M}} \\
& =1.0555+(1.1 \times 14.5) \\
& =1.0555+15.95 \\
& =17.0055
\end{aligned}
$$

## 2) Calculation of Portfolio Risk under Single Index Model

$$
\sigma_{\mathrm{P}}^{2}=\beta_{\mathrm{P}}^{2} \sigma_{\mathrm{m}}^{2}+\sum_{\mathrm{i}=1}^{\mathrm{n}} \omega_{1}^{2} \sigma_{\mathrm{ci}}^{2}
$$

For applying this, portfolio residual variance need to be calculated as;

$$
\sum_{i=1}^{n} \omega_{1}^{2} \sigma_{\mathrm{ci}}^{2}
$$

- Thus,

$$
\begin{aligned}
& \left.=\left[(0.10)^{2} \times 23\right]+\left[(0.15)^{2} \times 60\right]+\left[(0.20)^{2} \times 52\right]+\left[(0.10)^{2} \times 86\right)\right]+\left[(0.25)^{2} \times 67\right]+\left[(0.20)^{2} \times 82\right] \\
& =(0.01 \times 23)+(0.0225 \times 60)+(0.04 \times 52)+(0.01 \times 86)+(0.0625 \times 67)+(0.04 \times 82) \\
& =0.23+1.35+2.08+0.86+4.1875+3.28 \\
& =11.9875
\end{aligned}
$$

## Now,

$$
\begin{aligned}
\sigma_{P}^{2} & =\beta_{p}^{2} \sigma_{\mathrm{m}}^{2}+\sum_{i=1}^{n} \omega_{i}^{2} \sigma_{\mathrm{ei}}^{2} \\
& =\left[(1.1)^{2} \times(16)^{2}\right]+11.9875 \\
& =(1.21 \times 256)+11.9875 \\
& =309.76+11.9875 \\
& =321.7475
\end{aligned}
$$

Hence, $\sigma_{P}=\sqrt{321.7475}=17.94$

### 53.7.5. Equation of CAPM

 the CAPM is the alternative method for the measurement of cost of capital. The model evaluate the relation between risk and return in the capital the measurement of cost of capital. The model evaluate the relation in the market and the expected rate of market. The CAPM works on the assumption that there is equilibrium Beta.The CAPM shows the linear relationship between the required rate of return of security and it can be in according to the market related and unavoided risk or Beta. The equation used in CAPM is: $E\left(R_{j}\right)=R_{f}+\beta\left[E\left(R_{m}\right)-R_{f}\right]$
where,
$E\left(R_{i}\right) \quad=$ expected return on security $j$
$\mathrm{R}_{\mathrm{f}}=$ risk-free return
$\beta \quad=$ beta of security $j$
$\mathrm{E}\left(\mathrm{R}_{\mathrm{m}}\right)=$ expected return on market portfolio
Example 20: Calculate the return on stock by the help of CAPM model when the expected rate of return of the market is $18 \%$, risk free interest is $10 \%$ and equity beta is 2.4 .

Solution: $\mathrm{E}\left(\mathrm{R}_{\mathrm{j}}\right)=\mathrm{R}_{\mathrm{f}}+\beta\left[\mathrm{E}\left(\mathrm{R}_{\mathrm{m}}\right)-\mathrm{R}_{\mathrm{f}}\right]$

$$
=10+2.4(18-10)
$$

$$
=10+19.2=29.20 \%
$$

Example 21: Mr. Arora is buying security of Reliance Industries. Mr. Arora requires to earn $15 \%$ in next year. Reliance Industries beta is $1.1, \mathrm{R}_{\mathrm{f}}$ is $5 \%$ and market return is $13 \%$. Comment whether Mr. Arora should buy security of Reliance Industries?

Solution: The equilibrium return according to CAPM

$$
\begin{aligned}
E\left(R_{j}\right) & =R_{f}+\beta\left[E\left(R_{m}\right)-R_{f}\right] \\
& =5+1.1(13-5)=5+8.8 \\
& =13.8 \%
\end{aligned}
$$

The actual return is less than the equilibrium return, i.e., $15.0<13.8$, he should not buy the stock. The stock is overvalued and its price may fall.

Example 22: The following data are available to you as portfolio manager:


| Securities | Estimated Return <br> $(\%)$ | Beta | Standard Deviation <br> $(\%)$ |
| :---: | :---: | :---: | :---: |
| 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 |

In terms of the security market line, which of the securities listed above are underpriced with (CAPM).
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:

1) 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:

$$
\bar{R}_{i}=R_{f}+\beta_{i}\left(\bar{R}_{m}-R_{f}\right)
$$

Given that $R_{f}$ (Government security return rate) $=7$ and $R_{m}=15$
The equation becomes $\overline{\mathrm{R}}_{\mathrm{i}}=7+\beta_{\mathrm{i}}(15-7)$
Now,
Security A $=7+2.0(15-7)=7+16=23 \%$
Security B $=7+1.5(15-7)=7+12=19 \%$
Security C $=7+1.0(15-7)=7+8=15 \%$
Security $\mathrm{D}=7+0.8(15-7)=7+6.4=13.4 \%$
Security $E=7+0.5(15-7)=7+4=11 \%$
The expected return as per CAPM formula and the estimated return of each security can be tabulated.

| Security | Expected Return <br> $(\%)$ | Estimated Return <br> $(\%)$ |
| :---: | :---: | :---: |
| 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 becausi it offers a higher return than that expected from securities with the same risk.
Accordingly, securities A, B, and C are underpriced.
2) To calculate the expected return and risk $\bar{R}_{p}$ and $\beta_{p^{\prime}}$, we need to calculate $\beta_{p^{\prime}}$ first

$$
\beta_{p}=\sum_{i=1}^{n} \omega_{i} \beta_{i}
$$

As the proportion of investment in each security is equal, $\omega_{\mathrm{i}}=0.20$
$\beta_{p}=(0.2)(2.0)+(0.2)(1.5)+(0.2)(1.0)+(0.2)(0.8)+(0.2)(0.5)$
$=0.4+0.3+0.2+0.16+0.1$
$=1.16$

Risk and Return (Unit 5)
Expected return of portfolio

$$
\begin{aligned}
\bar{R}_{p} & =R_{f}+\beta_{p}\left(\bar{R}_{m}-R_{f}\right) \\
& =7+1.16(15-7) \\
& =7+9.28 \\
& =16.28 \%
\end{aligned}
$$

Systematic risk of the portfolio $\beta_{p}=1.16$


It is also referred to as the Capital Asset Pricing Model (CAPM) which assumes that each security is referred to get a return which is same as the risk which is measured by Beta. CAPM shows the linear relationship between the systematic risk and expected return of all the assets. It is required for determining the price of assets.
Significance of Beta ( $\boldsymbol{\beta}$ ) for Valuation of Securities

1) The significance of beta in valuing securities is as follows:
2) The Beta helps the investors to analysis the price of the security and also checks volatility than in the market itself. If the security has the beta equal to one then it is less volatile and vice-versa.
3) Beta provides correct, quantifiable measure which makes it easy to work with. The changes depend on the market index, time-period measured, etc. This is needed for determining the costs of equity in which cash flow is discounted for the valuation method.

Example 23: Find the value of beta for security of ' $j$ ' from the following data:

| $\left(\mathrm{R}_{\mathrm{j}}\right.$ is the return on security ' j ' and $\mathrm{R}_{\mathrm{m}}$ is the return on market portfolio). |
| :--- |
| $\mathbf{R}_{\mathrm{m}}$ |

## Solution:

| N | Market Calculation of Beta ( $\boldsymbol{\beta}$ ) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | Return ( $\mathbf{R}_{\mathrm{m}}$ ) <br> (1) <br> 10 | Security Return $\left(R_{j}\right)$ <br> (2) | $\mathbf{R}_{\mathrm{j}}-\overline{\mathbf{R}}_{\mathrm{j}}$ (3) | $\mathbf{R}_{\mathrm{m}}-\overline{\mathbf{R}}_{\mathrm{m}}$ (4) | $\left(\mathbf{R}_{\mathrm{m}}-\overline{\mathbf{R}}_{\mathrm{m}}\right)^{2}$ (5) | $\begin{gathered} \left(\mathbf{R}_{\mathrm{m}}-\overline{\mathbf{R}}_{\mathrm{m}}\right)\left(\mathbf{R}_{\mathrm{j}}-\overline{\mathbf{R}}_{\mathrm{j}}\right) \\ (\mathbf{6})=(\mathbf{4}) \times(\mathbf{3}) \end{gathered}$ |
| 2 | $\begin{aligned} & 10 \\ & 7 \end{aligned}$ |  | -15.7 | 2.3 | 5.29 | $2.3 \times(-15.7)=-36.11$ |
| 3 | 8 | 7 | -0.7 | -0.7 | 0.49 | $(-0.7) \times(-0.7)=0.49$ |
| 4 | 16 | 14 | -1.7 | 0.3 | 0.09 | $0.3 \times(-1.7)=-0.51$ |
| 5 | -11 | $14$ | 6.3 | 8.3 | 68.89 | $8.3 \times 6.3=52.29$ |
| 6 | 12 | 15 | 7.3 | -18.7 | 349.69 | $-18.7 \times 7.3=-136.51$ |
| 7 | 12 | - 14 | 6.3 | 4.3 | 18.49 | $4.3 \times 6.3=27.09$ |
| 8 | 7 | -9 | -16.7 -3.7 | -6.7 | 44.89 | $-6.7 \times(-16.7)=111.89$ |
| 9 | 14 | 18 | -3.7 | -0.7 | 0.49 | $-0.7 \times(-3.7)=2.59$ |
| 10 | 13 | 16 |  | 6.3 | 39.69 | $6.3 \times 10.3=64.89$ |
|  | $\sum \mathbf{R}_{\mathrm{m}}=77$ | $\Sigma \mathbf{R}_{\mathrm{i}}=77$ | 8.3 | 5.3 | 28.09 | $5.3 \times 8.3=43.99$ |
|  |  |  |  |  | 556.1 | 130.1 |

$$
\begin{aligned}
& \bar{R}_{j}=\frac{\Sigma R_{j}}{N}=\frac{77}{10}=7.7, \bar{R}_{m}=\frac{\Sigma R_{m}}{N}=\frac{77}{10}=7.7 \\
& \beta=\frac{\Sigma\left(R_{j}-\bar{R}_{j}\right)\left(R_{m}-\bar{R}_{m}\right)}{\Sigma\left(R_{m}-\bar{R}_{m}\right)^{2}}=\frac{130.1}{556.1}=0.234
\end{aligned}
$$

Thus, the $\beta$ for security ' j ' $=0.234$ or 0.23

Example 24: The returns on security $j$ and the market portfolio for a 10-year period are given below:

| Year | Return on Security $\mathbf{j}$ | Return on Market Portfolio (\%) |
| :---: | :---: | :---: |
| 1 | 10 | 12 |
| 2 | 6 | 5 |
| 3 | 13 | 18 |
| 4 | -4 | -8 |
| 5 | 13 | 10 |
| 6 | 14 | 16 |
| 7 | 4 | 7 |
| 8 | 18 | 15 |
| 9 | 24 | 30 |
| 10 | 22 | 35 |

pisk and Return (Unit 5)
calculate Beta $(\beta)$ for security $j$.


$$
\bar{R}_{j}=\frac{\Sigma R_{j}}{N}=\frac{120}{10}=12, \bar{R}_{m}=\frac{\Sigma R_{m}}{N}=\frac{140}{10}=14
$$

Beta: $\beta_{j}=\frac{\operatorname{Cov}\left(R_{j}, R_{m}\right)}{\sigma_{m}^{2}}$ or $\beta=\frac{\Sigma\left(R_{j}-\bar{R}_{j}\right)\left(R_{m}-\bar{R}_{m}\right)}{\Sigma\left(R_{m}-\bar{R}_{m}\right)^{2}}=\frac{878}{1352}=0.649$ or 0.65

Alpha: $\alpha=\overline{R_{j}}-\beta_{j} \overline{\mathrm{R}}_{\mathrm{m}}$
$=12-(0.65)(14)=12-9.1=29 \%$

Example 26: Following information of two portfolios is as follows:

| Portfolio | Beta |
| :--- | :--- |
| $\mathbf{X}$ | 1.45 |
| $\mathbf{Y}$ | 0.75 |

Calculate the expected return for these securities, assuming that the risk-free rate is $5 \%$ and the expected return of the market is $14 \%$.

Solution: The expected return can be calculated using CAPM:

$$
\overline{\mathrm{R}}_{\mathrm{i}}=\mathrm{R}_{\mathrm{f}}+\beta_{i}\left(\overline{\mathrm{R}}_{\mathrm{m}}-\mathrm{R}_{\mathrm{f}}\right)
$$

For Portfolio X

$$
\overline{\mathrm{R}}_{\mathrm{i}}=5+1.45(14-5)=5+13.05=18.05 \%
$$

## For Portfolio Y

$$
\overline{\mathrm{R}}_{\mathrm{i}}=5+0.75(14-5)=5+6.75=11.75 \%
$$

Example 27: The following table gives an analyst's expected return on two stocks for particular market returns:

| Market <br> Return | Aggressive <br> Stock | Defensive <br> Stock |
| :---: | :---: | :---: |
| $12 \%$ | $4 \%$ | $16 \%$ |
| $40 \%$ | $60 \%$ | $32 \%$ |

The risk free rate is $14 \%$.

1) What are the betas of the aggressive and defensive stocks?
2) What are the alphas of the aggressive and defensive stocks?

## Solution:

1) Beta $=\frac{\text { Covariance }}{\text { Variance }}$

Calculation of Beta of Aggressive Stock
AggressiveStock $=\frac{60 \%-4 \%}{40 \%-12 \%}=\frac{56 \%}{28 \%}=2$

## Calculation of Beta of Defensive Stock

DefensiveStock $=\frac{32 \%-16 \%}{40 \%-12 \%}=\frac{16 \%}{28 \%}=0.571$
2) Alpha $=$ Actual Expected Return - Required Rate of Return Predicted by CAPM

## Calculation of Alpha of Aggressive Stock

where, Expected Return $E\left(R_{p}\right)=\sum_{i=1}^{n} W_{i} R_{i}$
Expected Return $=(0.5 \times 4 \%)+(0.5 \times 60 \%)=0.02+0.3$

$$
=0.32 \text { or } 32 \%
$$

Beta $=2$
Required Rate of Return $=$ Risk free rate of return $+(\beta \times$ Market Risk Premium $)$

$$
=14 \%+(2 \times 12 \%)=14 \%+24 \%=38 \%
$$

Alpha $=$ Expected Return of Aggressive Stock - Required Rate of Return of Aggressive Stock $=32 \%-38 \%=-6 \%$

Example 30: You are given the following information:

1) Risk-free rate of interest is $10 \%$.
2) Company's expected return for next year is $18 \%$ and its beta is 2 .

What is the market's expected return for next year?

## Solution:

$$
\begin{aligned}
& R_{p}=R_{f}+\beta\left(R_{m}-R_{f}\right) \\
& 18 \%=10 \%+2\left(R_{m}-10 \%\right) \\
& 18 \%-10 \%=2 R_{m}-20 \% \\
& R_{m}=\frac{8 \%+20 \%}{2} R_{m}=\frac{28 \%}{2} \\
& R_{m}=0.14 \text { or } 14 \%
\end{aligned}
$$

Example 31: The CAPM was estimated for some period in the market. The actual return of two portfolios is given below:

Portfolio A: Actual return $=14 \%$ Beta $=0.8$
Portfolio B: Actual return $=20 \%$ Beta $=1.2$
The equation of the CAPM is $\mathrm{Ri}=0.07+0.10 \mathrm{bi}$
What can be said about the portfolio's performance?

## Solution:

$$
\begin{aligned}
& \mathrm{R}_{\mathrm{i}}=\alpha+\beta \mathrm{R}_{\mathrm{m}} \\
& \mathrm{R}_{\mathrm{A}}=0.07+\beta 0.10 \\
& \text { Portfolio } \mathrm{R}_{\mathrm{A}}=0.07+(0.8 \times 0.10)=0.07+0.08=0.15 \\
&=0.15 \times 100=15 \% \\
& \text { Portfolio } \mathrm{R}_{\mathrm{B}}=0.07+(1.2 \times 0.10)=0.07+0.12=0.19 \\
& \quad=0.19 \times 100=19 \%
\end{aligned}
$$

Portfolio A's expected return is $15 \%$ but the actual return is $14 \%$. It is an underperformed portfolio. B's expected return is $19 \%$. But actual return is $20 \%$. The performance is higher than the expected return. Portfolio $B$ has performed well than the portfolio A.

## be analysis, three researcapital markel Evaluation

porfolio performance in the William theory, and recognizing the necessity to incorporate return and risk into evaluation. Risk-adjusted performance These measuack Treynor, and Michael Jensen- developed measures of management. ance were developed to compare the quality of investment Three widely-used risk-adjusted measures are:


### 5.5.7.1. Sharpe's Measure/Ratio

Sharpe's measure is called as the 'Reward to Variability' Ratio. The returns from a portfolio are initially
adjusted for risk-free return.
These excess returns attributable as reward for investing in risky assets are validated in terms of return per unit of risk. The figure $\mathbf{5 . 1 4}$ shows Sharpe's ratio: Sharpe's Ratio $(S R)=\left[\frac{\mathrm{R}_{\mathrm{p}}-\mathrm{R}_{\mathrm{F}}}{\sigma_{\mathrm{P}}}\right]$


Figure 5.14: Graphical Representation of the Sharpe Ratio
where, $\mathrm{R}_{\mathrm{P}}=$ Realized Return on a portfolio during a holding period $R_{F}=$ Risk-free rate of Return
$\sigma_{P}=$ Standard deviation of the Portfolio
Example 32: Calculate Sharpe's ratio from the following information of two portfolios.

| Portfolio | Return <br> $\left(\mathbf{R}_{\mathbf{P}}\right)$ | Risk Free <br> $\left(\mathbf{R}_{\mathbf{F}}\right)$ | Excess return <br> $\left(\mathbf{R}_{\mathbf{P}}-\mathbf{R}_{\mathbf{F}}\right)$ | Portfolio risk <br> $(\mathbf{S D})$ |
| :---: | :---: | :---: | :---: | :---: |
| A | 32 | 19 | 13 | 21 |
| B | 28 | 19 | 9 | 19 |

Solution: Sharpe's Ratio (SR) $=\left[\frac{\mathrm{R}_{\mathrm{P}}-\mathrm{R}_{\mathrm{F}}}{\sigma_{\mathrm{P}}}\right]$
Portfolio $\mathrm{A}=\frac{32-19}{21}=\frac{13}{21}=0.62$
Portfolio B $=\frac{28-19}{19}=\frac{9}{19}=0.47$
Reward per unit of risk in case of Portfolio A is relatively higher. Hence its performance is said to be good.

Example 33: Following data is provided for four portfolios:

| Portfolio | Expected Rate of Return | SD of Returns from Portfolios |
| :---: | :---: | :---: |
| A | $22 \%$ | 17 |
| B | $25 \%$ | 18 |
| C | $21 \%$ | 14 |
| D | $26 \%$ | 20 |

The expected return on market portfolio is 19.50 per cent with a SD of 14 . The RF is 16 per eent. On the basis of above data calculate Sharpe ratio and examine that which portfolio has performed the best?

## Solution:

| Calculation of Sharpe's Ratio |  |
| :---: | :---: |
| Portfolio | Sharpe's Ratio |
| A | $(22-16) / 17=0.35$ |
| B | $(25-16) / 18=0.50$ |
| C | $(21-16) / 14=0.36$ |
| D | $(26-16) / 20=0.50$ |
| Market Portfolio | $(19.50-16) / 14=0.25$ |

Hence, B and D is best performer.
Example 34: The following information is provided regarding the performance of the fund. Namely Birla Advantage, Sundaram Growth and F and C value for a period of a six months ending August 2012. The risk free rate of interest is assumed to be 9 . Rank them with the help of Sharpe index and discuss.

|  | $\mathbf{R}_{\mathbf{P}}^{\prime}$ | $\boldsymbol{\sigma}_{\mathbf{p}}$ | $\mathbf{B}$ |
| :--- | :---: | :---: | :---: |
| Birla Advantage | 25.38 | 4 | 0.23 |
| Sundaram Growth | 25.11 | 9.01 | 0.56 |
| Sun F and C value | 25.01 | 3.55 | 0.59 |

Solution: Sharpe Index or Ratio $=\left[\frac{R_{P}-R_{F}}{\sigma_{P}}\right]$

| Fund | Sharpe Index/Ratio | Ranking |
| :---: | :---: | :---: |
| Birla Advantage | $\frac{25.38-9}{4}=\frac{16.38}{4}=4.095$ | 2 |
| Sundaram Growth | $\frac{25.11-9}{9.01}=\frac{16.11}{9.01}=1.788$ | 3 |
| Sun F and C Value | $\frac{25.01-9}{3.55}=\frac{16.01}{3.55}=4.509$ | 1 |

By ranking through Sharpe index or Ratio, the fund "Sun F and C Value" is more aggressive than other two funds. Since, it has a high Sharpe Index and also the higher beta of 0.59 .

Thus, the fund "Sun F and C value" would be prefer because it is a diversified portfolio.

### 5.5.7.2 Treynor's Measure

Treynor's measure is called as 'Reward to Volatility' ratio. Treynor considers portfolio beta as a measure of risk. Portfolio beta is the average beta of individual assets in the given Portfolio.

This beta designates the market risk of the given portfolio. The Treynor's measure is shown in figure 5.15 .
Treynor's Measure (TR) $=\left[\frac{R_{P}-R_{F}}{\beta_{P}}\right]$


Figure 5.15: Graphical Representation of the Treynor Measure
Where, $\mathrm{R}_{\mathrm{P}}=$ Realized Return on a Portfolio
$R_{F}=$ Risk-free Rate of Return
$\beta_{\mathrm{P}}=$ Portfolio
Difference between Sharpe's and Treynor's Measure


Example 35: An administrator of a large pension fund (i.e., HDFC Life. Time Pension Funds) decides to renew his contracts with three money managers. He must measure how they have performed. Assume that the administrator have the following results for each individual's performance: Market return 36\%, Risk-free $30 \%$ and Beta 1.22.

| Investment Manager | Average Annual Rate of Return | Beta |
| :---: | :---: | :---: |
| Z | 0.34 | 1.12 |
| B | 0.38 | 1.27 |
| Y | 0.40 | 1.42 |

Solution: The T values for each investment manager can be calculated as:

$$
\begin{aligned}
& \mathrm{T}_{\mathrm{m}}(0.36-0.30) / 1.22=0.049 \\
& \mathrm{~T}_{\mathrm{Z}}(0.34-0.30) / 1.12=0.036 \\
& \mathrm{~T}_{\mathrm{B}}(0.38-0.30) / 1.27=0.063 \\
& \mathrm{~T}_{\mathrm{Y}}(0.40-0.30) / 1.42=0.070
\end{aligned}
$$

These results show that $Z$ did not even "beat-the-market." $Y$ had the best performance and both B and Y beat the market.

Example 36: On the basis of the results of four portfolio managers for a 5 -year period given below (RF 20\%, RM 26\%) calculate the Treynor Ratio and select the manager with best performance:

| Portfolio | Average Return (\%) | Beta |
| :---: | :---: | :---: |
| A | 24 | 0.90 |
| B | 27 | 1.15 |
| C | 27 | 1.35 |
| D | 25 | 1.00 |

Solution:

## Calculation of Treynor Ratio

| Portfolio | Treynor Ratio |
| :---: | :---: |
| A | $(24-20) / 0.90=4.4444$ |
| B | $(27-20) / 1.15=6.0869$ |
| C | $(27-20) / 1.35=5.1851$ |
| D | $(25-20) / 1.00=5.0000$ |

Thus, B is best performer.

### 5.5.7.3. Jensen's Measure

The Treynor's and Sharpe's Indexes provide measures for ranking the relative performances of various portfolios, on a risk-adjusted basis. Jensen attempts to construct a measure of absolute performance on a riskadjusted basis - i.e., a definite standard against which performances of various funds can be measured. This standard is based on measuring the "portfolio manager's predictive ability - i.e., his ability to earn returns through successful prediction of security prices which are higher than those which we would expect given the level of riskiness of his portfolio".

A simplified version of his basic model is given by:
$\overline{\mathrm{R}}_{\mathrm{JT}}-\mathrm{R}_{\mathrm{FT}}=\alpha_{1}+\beta_{\mathrm{J}}\left(\mathrm{R}_{\mathrm{MT}}-\mathrm{R}_{\mathrm{FT}}\right)$
where, $\bar{R}_{J T}=$ Average return on portfolio j for period t ,
$\mathrm{R}_{\mathrm{FT}}=$ Risk-free rate of interest for period t
$\alpha_{j}=$ Intercept that measures the forecasting ability of the portfolio manager
$\beta_{j}=$ Measure of systematic risk
$\overline{\mathrm{R}}_{\mathrm{MT}}=$ Average return of a market portfolio for period t

$$
\overline{\mathrm{R}}_{\mathrm{JT}}-\mathrm{R}_{\mathrm{FT}}
$$



Figure 5.16: Graphical Representations of Jensen's Measure of Management Ability

Example 37: Calculate the actual return and risk from the following information:

| Funds | $\mathbf{R}_{\mathrm{ft}}$ | $\mathbf{R}_{\mathrm{jt}}$ | $\mathbf{R}_{\mathrm{mt}}$ | Beta |
| :---: | :---: | :---: | :---: | :---: |
| Fund A | 8 | 15 | 18 | 0.2 |
| Fund B | 8 | 23 | 18 | 0.7 |
| Fund C | 8 | 17 | 18 | 1.06 |

Solution: Calculation of Return on the Portfolio:
$R_{j t}-R_{f t}=\alpha_{1}+\beta_{j}\left(R_{m t}-R_{f t}\right)$

$$
\left.\begin{array}{rl}
\alpha=15-10 & =5 \% \\
\text { nd } B: E\left(R_{3}\right) & =8+0.7(18-8)=10 \\
\alpha & =23-15
\end{array}\right)
$$

Fund B: $\mathrm{E}\left(\mathrm{R}_{\mathrm{J}}\right)=8+0.7(18-8)=15$

$$
\begin{aligned}
\alpha=23-15 & =8 \%(\text { Excess Positive Return })
\end{aligned}
$$

$$
\begin{aligned}
& \text { Fund C: } \mathrm{E}\left(\mathrm{R}_{\mathrm{J}}\right)=8+1.06(18-8)=18.6 \\
& \quad \alpha=17-18.6=-1.6 \%(\text { Negative Return) } \\
& \text { Examnle } 38 .
\end{aligned}
$$

Example 38: On the basis of the results of four portfolio managers for a 5 -year period given below ( $\mathrm{R}_{\mathrm{F}} 5 \%, \mathrm{R}_{\mathrm{M}}$ $11 \%$ ) calculate Jenson's Alpha and select the manager with best performance:

| Portfolio | Average Return (\%) | Beta |
| :---: | :---: | :---: |
| A | 9 | 0.30 |
| B | 12 | 0.55 |
| C | 12 | 0.75 |
| D | 10 | 0.40 |

## Solution:

Calculation of Jenson's Alpha

| Corculation of Jenson's Alpha |  |  |
| :---: | :---: | :---: |
| Portfolio | Jenson's Alpha |  |
| A | $9-[5+0.30(11-5)]=9-6.8=2.2$ |  |
| B | $12-[5+0.55(11-5)]=12-8.3=3.7$ |  |
| C | $17-[5+0.75(11-5)]=17-9.5=7.5$ |  |
| D | $10-[5+0.40(11-5)]=10-7.4=2.6$ |  |

C is best performer.
Jensen measure may also be viewed as excess return over the expected return, taking CAPM as the base. Accordingly, we compare the actual return of the stock with the expected returns as per CAPM and calculate excess return for each stock or portfolio. The stock or portfolio with the highest excess returns gets the highest ranking.

The following formula is used:
Excess return $=\mathbf{R}_{s}-\left[\mathbf{R}_{\mathrm{f}}+\boldsymbol{\beta}\left(\mathbf{R}_{\mathrm{m}}-\mathbf{R}_{\mathrm{f}}\right)\right]$
Where, $\mathrm{R}_{\mathrm{s}}=$ Return on the stock
$\mathrm{R}_{\mathrm{f}}=$ Risk-free rate
$B=$ Beta of the security or portfolio
$\mathrm{R}_{\mathrm{m}}=$ Market return
It should be noted that according to Jensen's measure, market's excess return is zero by default, as expected returns and actual returns are same, since $\beta=1$
Example 39: IDBI and UCO are two mutual funds. IDBI has a sample mean of success 0.15 and fund UCO has a sample mean of success 0.20 , with the riskier fund UCO having doubled the beta at 2.2 as fund IDBI. The respective standard deviations are $17 \%$ of UCO and $21 \%$ of IDBI. The mean return for market index is 0.14 ,
2) Compute the Treynor index for the funds. Interpret the results and compare it to the Jensen index.
3) Compute the Sharpe index for funds and the market.

## Solution:

1) Fund UCO shows the more positive effect than the Jensen index fund of IDBI:

Jensen Index: $\mathrm{R}_{\mathrm{P}}-\left[\mathrm{R}_{\mathrm{F}}+\beta_{\mathrm{P}}\left(\mathrm{R}_{\mathrm{M}}-\mathrm{R}_{\mathrm{F}}\right)\right]$ )
Fund IDBI $=15 \%-[10 \%+(14 \%-10 \%) 1.1]=15 \%-(10 \%+4.4 \%)=0.6$
Fund $\mathrm{UCO}=20 \%-[10 \%+(14 \%-10 \%) 2.2]=20 \%-(10 \%+8.8 \%)=1.2 \%$
2) The Treynor index shows that the fund are performing at the same level:

Treynor's Measure (TR) $=\left[\frac{\mathrm{R}_{\mathrm{P}}-\mathrm{R}_{\mathrm{F}}}{\beta_{\mathrm{P}}}\right]$
Fund $\mathrm{IDBI}=\frac{15 \%-10 \%}{1.1}=\frac{5 \%}{1.1}=4.545$
Fund $\mathrm{UCO}=\frac{20 \%-10 \%}{2.2}=\frac{10 \%}{2.2}=4.545$
3) The Sharpe index places fund UCO ahead of fund IDBI, but by a lesser margin than the Market Index:

Sharpe's Ratio $(S R)=\left[\frac{R_{P}-R_{F}}{\sigma_{P}}\right]$
Fund $\operatorname{IDBI}=\frac{15 \%-10 \%}{17 \%}=0.294$
Fund UCO $=\frac{20 \%-10 \%}{21 \%}=0.476$
Market: $\mathrm{Sp}=\frac{14 \%-10 \%}{10 \%}=0.400$

