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Dr. Babasaheb Ambedkar
Open University
(Established by Government of Gujarat)

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MBA
SEMESTER - 3
MBA03EF303

Security Analysis & Portfolio Management (SAPM)

Message for the Students

Dr. Babasaheb Ambedkar Open (University is the only state Open University, established by the Government of Gujarat by the Act No. 14 of 1994 passed by the Gujarat State Legislature; in the memory of the creator of Indian Constitution and Bharat Ratna Dr. Babasaheb Ambedkar. We Stand at the seventh position in terms of establishment of the Open Universities in the country. The University provides as many as 54 courses including various Certificate, Diploma, UG, PG as well as Doctoral to strengthen Higher Education across the state.

On the occasion of the birth anniversary of Babasaheb Ambedkar, the Gujarat government secured a quiet place with the latest convenience for University, and created a building with all the modern amenities named 'Jyotirmay' Parisar. The Board of Management of the University has greatly contributed to the making of the University and will continue to this by all the means.

Education is the perceived capital investment. Education can contribute more to improving the quality of the people. Here I remember the educational philosophy laid down by Shri Swami Vivekananda:

> ***"We want the education by which the character is formed, strength of mind is Increased, the intellect is expand and by which one can stand on one's own feet".***

In order to provide students with qualitative, skill and life oriented education at their threshold. Dr. Babaasaheb Ambedkar Open University is dedicated to this very manifestation of education. The university is incessantly working to provide higher education to the wider mass across the state of Gujarat and prepare them to face day to day challenges and lead their lives with all the capacity for the upliftment of the society in general and the nation in particular.

The university following the core motto 'स्वाध्यायः परमम् तपः' does believe in offering enriched curriculum to the student. The university has come up with lucid material for the better understanding of the students in their concerned subject. With this, the university has widened scope for those students who
are not able to continue with their education in regular/conventional mode. In every subject a dedicated term for Self Learning Material comprising of Programme advisory committee members, content writers and content and language reviewers has been formed to cater the needs of the students.

Matching with the pace of the digital world, the university has its own digital platform Omkar-e to provide education through ICT. Very soon, the University going to offer new online Certificate and Diploma programme on various subjects like Yoga, Naturopathy, and Indian Classical Dance etc. would be available as elective also.

With all these efforts, Dr. Babasaheb Ambedkar Open University is in the process of being core centre of Knowledge and Education and we invite you to join hands to this pious *Yajna* and bring the dreams of Dr. Babasaheb Ambedkar of Harmonious Society come true.

Prof. Ami Upadhyay
Vice Chancellor,
Dr. Babasaheb Ambedkar Open University,
Ahmedabad.

Dr. Babasaheb Ambedkar Open University

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SECURITY ANALYSIS & PORTFOLIO MANAGEMENT (SAPM)
MBA03EF303
SEMESTER-3

BLOCK-1

BLOCK-2

PART - 1

MBA
SEMESTER-3 FINANCE
SECURITY ANALYSIS & PORTFOLIO MANAGEMENT (SAPM)
BLOCK: 1

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UNIT – 1 INVESTMENT – A CONCEPTUAL FRAMEWORK

1.1 Introduction

Every Person wants to secure his future in financial aspects. For this, he tries to save some money from his current income by declining his current consumption and investing these savings in a productive form of investment. In this way, for investing, he is sacrificing the present consumption/needs for getting the return in the future. As the future is uncertain, there will be no surety in getting the desired return, which becomes the risk. Thus, risk and return play an important role in investment. Wide investment avenues are available to investors for investing. Selecting one of the most appropriate avenues as per the needs and objectives of investors is very important. In very simple words, Investment is a trade-off between present financial gain and potential future gain.

1.2 Meaning & Definition

- **Meaning of Investment:**
  In very simple terms, when an asset is acquired to generate income and capital appreciation, it is known as an investment. Here, capital appreciation means an increase in the value of assets over the period or a difference between the Purchasing price and Selling Price.

- **Definition of Investment:**

  Investment is a complex concept, and various authors have given different definitions based on their perspectives and fields of expertise. Here are some definitions of investment by notable authors:

  - **According to Oxford Dictionary,** "Investment is defined as the action or process of investment money for profit".
  - **According to Keynes**, "Investment is defined as the addition of the value of the capital equipment, which has resulted from the productive activity of the period".
  - **Benjamin Graham, a famous investor and author of "The Intelligent Investor,"** defined Investment as "an operation which, upon thorough analysis, promises safety of principal and an adequate return."

- **In their book "Fundamentals of Investing," Gitman and Joehnk defined Investment as** "the process of increasing wealth by acquiring assets that produce income and appreciate in value over time."
- **Peter Drucker, a Management Guru,** defined Investment as "the systematic allocation of resources to productive uses."

Time and Risk are the two key aspects of investment. In some investments, the time element is the domain attribute, for some, the risk element is the domain attribute and for some investments, both time and risk element are the domain attribute. Let us understand this with the help of examples. If investor is going to invest in government bonds, the time element is the dominant attribute. If the investment is made in stock options, the risk is the domain attribute, and if investor is investing in Equity shares, both time and risks are important domain attributes. It depends upon the options/alternatives that the investor is choosing for investing.

❖ **What is a Portfolio?**

In Finance & Investment, A Group of financial assets owned by an individual or organization is known as a Portfolio. Investors can frame the portfolio by combining various financial assets like Stocks, bonds, mutual funds, exchange-traded funds (ETFs), real estate, and other investing tools. The securities of the portfolio vary from investor to investor because every investor has their own investment objective, choices, and attitudes.

❖ **Definition of Investment Management:**
Investment Management is a complex field. Various authors try to define investment management in their way. Some of the definitions of Investment Management are as follows:

1. **Peter L. Bernstein:** "Investment Management is the professional asset management of various securities (shares, bonds, and other securities) and other assets (e.g., real estate), to meet specified investment goals for the benefit of investors."
2. **Frank J. Fabozzi:** "Investment Management involves the process of planning, organizing, and controlling an investor's financial assets to achieve the investment objectives of an individual or institution."
3. **Zvi Bodie, Alex Kane, and Alan J. Marcus (from "Investments" textbook):** "Investment Management refers to the professional management of various securities (such as stocks and bonds) and assets (like real estate) on behalf of investors. It involves making decisions about what to buy, hold, and sell to achieve an individual's or institution's financial goals."
4. **Lawrence Gitman and Michael Joehnk (from "Fundamentals of Investing" textbook):** "Investment Management encompasses the process of allocating, overseeing, and controlling an investor's assets in a manner that is consistent with the investor's financial goals, risk tolerance, and time horizon."
5. **Charles D. Ellis:** "Investment Management involves the careful selection of securities for investment and continuous portfolio monitoring to ensure that the investor's objectives are met while considering risk and return."

6. **Robert C. Pozen and Theresa Hamacher (from "The Fund Industry: How Your Money is Managed"):** "Investment Management is the process of selecting and monitoring a portfolio of assets in order to achieve specific investment objectives while managing risk effectively."

1.3 Investment, Speculation and Gambling

According to Benjamin Graham, "An investment operation is one which, upon thorough analysis, promises safety of principal and an adequate return. Operations not meeting these requirements are speculative."

❖ **Difference between Investor and Speculator**

Point	Investor	Speculator
Time period	The investor wants to invest his fund for a longer period. This period is at least one year.	The period for speculators is very short. It may be a few days or a few months.
Risk proportion	Generally, an investor is ready to take less risk or moderate risk.	Speculators are always ready to take high risk.
Rate of Return	An investor always seeks to moderate return from the investment due to the limited risk born by him. The return of investors is in the form of dividend income/ interest income and capital appreciation in the price of securities over the period.	Speculator always seeks to higher amount of return due to the high volume of risk. The return of the speculator is in the form of capital appreciation arising from short-term price variation in the securities.
Basis of Decision	An investor undertakes an in-depth review of the firm's prospects while giving greater importance to fundamental variables.	The hearsay, technical charts, and market psychology that speculators rely on more.
Transaction Cost	The transaction cost is generally high in investment as compared to speculation.	The transaction cost is generally very low in speculation.
Amount of Borrowing	An investor typically utilizes his own money for investment.	Mostly Speculator use amount of borrowing to trade.

❖ **Gambling:**

Gambling is different from Investment and Speculation in the following respects:

(1) The result of Gambling is known more quickly (speedy) as compared to speculation.
(2) Rationally people are entered into gambling for fun, not to generate income.
(3) It is a Zero-sum or win-lose game depending upon future event which is uncertain. Here, gain of the one party is the loss to the other party. Both parties

have the same expectation about the outcome of the contract but it is not certain who will be the gainer or loser when both parties are entering into the contract.

(4) Gambling increases risk without offering a corresponding financial reward.

1.4 Investment Objectives:

Every investor has an objective for investing. These objectives vary from person to person depending upon their choices and financial situation. Investment Objectives play an important role in the determination of portfolio. Some of the common investment objectives are as follows:

(1) To Maximize the Return:

By reducing the current expenditure from the income, investor saves some amount of money for the future. Thus, they are sacrificing the present needs/consumptions for future benefits. For this, they are expecting something, which in general is known as a return. Every investor depending upon their requirement saves their money in various investment alternatives that maximize the amount of return.

(2) To Minimize the Risk:

Maximization of income and Minimization of risk are the important objectives of investment. Every Investor wants to earn a good amount of return at the minimum risk level. An investor always wants a steady and good amount of return. But it may be possible that whatever return the investor is expecting may not be the same in actuality/reality. This situation represents the risk in investment management. Thus, the investor will select those alternatives for investments, which provide the minimum risk and maximum return to investors.

(3) For Tax Saving:

Some of the investment alternatives are tax free while some of the other alternatives reduce the tax liability of the investor. Thus, the investor needs to consider the amount of taxation at the time of making an investment. Thus, he/she can get the tax benefit. For example, Tax-free savings accounts, the National Pension Scheme, Life insurance policies, and Tax-saving mutual funds are popular in saving tax and earning good returns.

(4) To Maintain Liquidity:

One of the important objectives of investment management is liquidity. Liquidity refers to the ability of an investment instrument to easily convert into cash with minimum risk. However, all the investment options are not easily converted into cash. Thus, the majority of investors are investing their money in the form of investment, which can be easily converted into cash in an emergency.

(5) Safeguard from inflation:

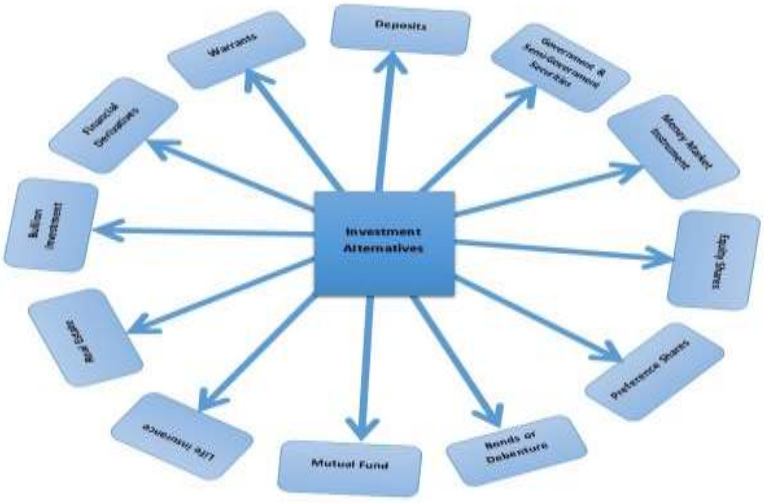
For safeguarding the investors, the rate of return should guarantee an inflation hedge means it should be higher or at least equal to the inflation rate of the economy.

(6) **Wealth Maximization**:

An investor wants not only a steady return from investment but also expects some capital appreciation from an investment, which is also known as capital growth or wealth maximization.

1.5 Investment Alternatives:

A wide range of investment alternatives are available for investing. From the viewpoint of individual investors, some of the alternatives are given below:



(1) Deposits:

Individuals hold significant portions of their financial assets in the form of deposits. Generally, people prefer to invest in Bank deposits, Post Office Deposits, and Company Fixed Deposits. This is the simplest form of investment for any investor.

(2) Government and Semi-Government Securities:

Anyone can invest in the shares/bonds issued by Government/ semi-government/statutory bodies. The risk proportion is very low in these kinds of security as the credibility of the Government and Government undertakings is high.

(3) Money Market Instruments:

Money Market Instruments have a maturity period of less than one year. This is a market for the short-term investment. The instruments of the Money Market are highly liquid and carry lower risk. The instruments of the money markets include Treasury Bills, Certificate of Deposits, Commercial Papers, Call Money, Notice Money, and Commercial Bills.

(4) Equity Shares:

In the company, there are mainly two types of funds. Owner's fund and Borrower's fund. Equity share capital represents the owner's fund. Equity shareholders are the real owners of the company. Those who are ready to take high risk can invest in Equity shares. By investing in equity shares, the investor

receives dividends and if the company is performing well and has the capability for future growth, the market price of the share moves high consequently and shareholders earn profit from that. Blue Chip Shares, Growth Shares, Income Shares, Cyclical Shares, and Speculative Shares are classified as various categories of Equity shares by stock market analysts.

(5) Preference Share:

Preference share is called a hybrid instrument because preference shares are having characteristics of both Equity shares and Debt. Preference shareholders are entitled to get a fixed rate of dividend. When the company goes into liquidation, preference shareholders have priority to get back their capital. The investor, who wants to earn a fixed return and safety of principal with moderate risk can go for preference share.

(6) Bonds or Debentures:

Bonds or Debentures are generally long-term instruments having a fixed amount of return to the investor. Those investors, who want to earn a steady return from the investment with the safety of the capital prefer to invest in Bonds or Debentures. Bonds are issued by Government agencies or Private Companies while Debentures are generally issued by Private Companies.

(7) Mutual Fund:

Mutual Fund is becoming the most popular form of investment nowadays. Investors can invest in various schemes of mutual funds instead of directly making investments in Equity shares or fixed income securities. As per the requirements of the investor, Mutual funds make investments in various types of schemes like Equity Schemes, Debt Schemes, and Balanced Schemes.

(8) Life Insurance:

Life Insurance policies offer risk protection as well as a means of investment. These products encourage saving and also offer insurance protection. Tax exemptions are also available for life insurance policies. Endowment Assurance policy, Money Back policy, Whole Life policy, and Term Assurance Policy are the important types of Life Insurance Policies in India.

(9) Real Estate:

Due to the high expected return, investing in Real Estate like commercial buildings and land is the most attractive. Investors are investing their money in Real Estate properties when the amounts of predicted profits are very attractive. But a huge amount of money is required for investing in Real Estate. Not only this, it is connected with the future development plans of the location.

(10) Bullion Investment:

Bullion Investment refers to the purchase of precious metals such as Gold, Silver, and other metals. The return offered by these metals is generally higher than inflation.

(11) Financial Derivatives:

An instrument whose value is derived from the value of an underlying asset is referred to as a Financial Derivative. Future and Options are the most important financial derivatives for investors.

(12) Warrant:

A Warrant refers to the right to purchase of Equity share within a stipulated period and at a specific price. Warrants are generally offered with preference shares and Debentures/Bonds to make them more attractive. A warrant holder will not be entitled to receive any dividends and voting rights until the exercise of his right. The warrant holder will buy shares/exercise his rights if the exercise price is lower than the market price of the share because it is profitable for him. In contrast, the warrant holder would prefer to liquidate the debt of the firm and will not exercise his right to buy shares if the exercise price is more than the market price.

1.6 Criteria For Evaluation of Investment:

For the evaluation of an investment, the following criteria should be considered.

(1) Convenience:

In general, convenience refers to how simple it is to make and maintain an investment. Every investment alternative has a different degree of convenience. Investor, who do not have in-depth knowledge of the market are generally going to invest in the form of investment, which require less effort means which is easy and convenient to him. For example, depositing money in savings account does not require any lengthy procedure. It is very easy but if you want to acquire any real estate assets, you need to follow procedural and legal formalities. Thus, it requires a lot of effort.

(2) Rate of Return:

An investment is made to earn a Return. Here, Return means regular income (Dividend/ Interest) and an increase in the value of investment (Capital Appreciation). The difference between the buying price and the selling price of the investment is known as Capital Appreciation.

With the help of the following formula, the Rate of return on investment can be found:

$$\text{Rate of Return} = \frac{Annual\ Income\ (Ending\ Price - Beginning\ Price)}{Beginning\ Price} \times 100$$

Let us understand the Rate of Return with the help of the following formula:

Price of Share A at the Beginning of the Year = Rs. 50

Dividend Paid during the year = Rs. 5

Price of Share A at the end of the year = Rs. 55

Now, the Rate of Return is calculated as follows:

$$\text{Rate of Return} = \frac{Annual\ Income\ (Ending\ Price - Beginning\ Price)}{Beginning\ Price} \times 100$$

$$\text{Rate of Return} = \frac{5\ (55-50)}{50} \times 100$$

$$= \frac{5 \times 5}{50} \times 100$$

$$= \frac{25}{50} \times 100$$

$$= 50\%$$

(3) Risk:

The variability in the rate of return of the security is known as the Risk. The deviation between Expected Outcomes and Real outcomes is also known as Risk. Risk and Return have a positive relationship. If the investment risk is higher in particular securities, then it will generate a higher amount of return and vice versa. Thus, ultimately return of the investor depends upon the risk ability of the investor. Various statistical measures like Range, Variance, Standard Deviation, and Beta (β) are used for ascertaining the Risk.

- ✓ **Range:** The difference between the Highest Value and Lowest Value.
- ✓ **Variance:** The Mean of the Squares of Deviations of individual returns around their average value
- ✓ **Standard Deviation:** The Square Root of Variance.
- ✓ **Beta (β):** Beta represents how volatile an investment's return is about market fluctuation.

(4) Safety:

Safety is one of the most important criteria that is considered by investors at the time of investing. Here, Safety means an investor wants the protection of both principal amount and future expected return. Every investor wants safety from an investment as the investor is sacrificing their present benefit for the uncertain future. An investor will easily agree to invest in that investment option which will provide the safety of the principal amount and steady rate of return. But, this kind of investment alternative provides a lower rate of return.

(5) Marketability:

An investment is said to be highly marketable if the following conditions are satisfied.

(i) It is quickly transacted (Quick transaction)
(ii) Low Transaction Cost
(iii) The Difference in price between the two subsequent transactions is negligible.

An investment having high marketability should be highly desirable and vice versa. Generally, the Equity shares of the listed public companies are highly marketable as compared to private companies.

(6) Liquidity:

If the investment is highly marketable then it will convert into cash easily. Liquidity is one of the most important characteristics of investment which is required by the investor because if the investment is liquid, they can easily modify their portfolio with changing market scenarios and as per their objectives.

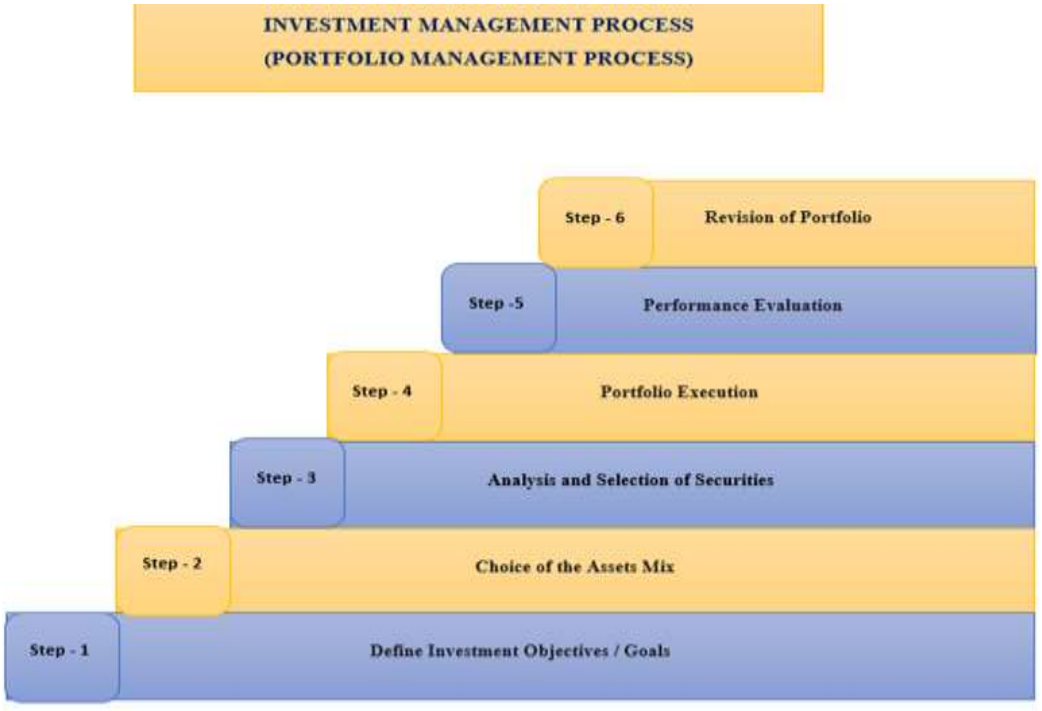
(7) Tax Liability:

Some of the investment alternatives are providing the Tax benefits while others do not. Generally, Tax benefits of the investment are categorized into three categories i.e. Initial Tax Benefit, Continuing Tax Benefit, and Terminal Tax Benefit.

- **Initial Tax Benefit:** It refers to the relief in Tax Benefits, which is generally enjoyed at the time of investing. At the time of depositing Public Provident Fund Account (PPF) getting a rebate under sec. 80C of the Income Tax Act is an example of an Initial Tax Benefit.
- **Continuing Tax Benefit**: It refers to the Tax Shield, which is received with recurring returns from the investment. Dividend income and income from certain other sources are exempted from tax up to a certain limit in the hands of the recipient is an example of Continuing Tax Benefit.
- **Terminal Tax Benefit:** It refers to relief from taxation when an investment is realized/ liquidated. For example, a withdrawal from a Public Provident Fund Account is not subject to tax.

1.7 Investment Management Process (Portfolio Management Process)

The Investment Management process is also known as a Portfolio Management Process. The process of Investment management is not simple. It is a complex activity. It is divided into the following stages:



(1) Define Investment Objectives / Goals:

Objectives for investing are differ from person to person. The common objective of any investor is regular income and capital appreciation with the safety of the principal. Before making any investment, the relative importance of these should be specified. At the same time, with the investments, certain constraints will arise like liquidity, time horizon, tax, etc. should be also identified.

(2) Choice of the Assets Mix:

The Choice of asset Mix is the most important stage in the entire process of Portfolio Management. The choice of Assets Mix is directly related to the proportion of different classes of assets in the portfolio such as Stocks, Bonds, Real Estate, and Cash Equivalents. Based on Investment Objectives and Risk tolerance, investors can determine the Optimal Mix of assets.

(3) Analysis and Selection of Securities:

Fundamental analysis and technical analysis help in the analysis of securities (For the stock options). It helps in finding of intrinsic value of securities as well as to know the future trends of securities. Thus, investors can identify whether the securities are underpriced or overpriced and make a decision whether to invest in such securities or not. On the other hand, Yield to Maturity, Credit Rating, Term to Maturity, Tax Shelter, and Liquidity are such factors that are considered for fixed-income securities (Debentures & Bonds). Thus, by analysis of securities, Investor can easily select the securities that can fulfill the objectives of investors.

(4) Portfolio Execution:

A portfolio is a collection of securities created to help investors achieve their main investment objectives of achieving maximum return and minimum risk. This stage is concerned with the implementation of a portfolio plan by combining selected securities into a well-balanced portfolio according to their chosen asset allocation and budget. Instead of holding a single security, the risk is less in a well-diversified portfolio.

(5) Performance Evaluation:

Periodical Performance Evaluation of the portfolio is necessary. This step is also known as Portfolio Appraisal. This step deals with the measurement of risk and return of security from time to time and comparing it with expected risk and return. It is helpful in the identification of Loss also. This kind of evaluation could offer valuable feedback that helps to continuously raise the caliber of the portfolio management procedure.

(6) Revision of Portfolio:

Whether to make revisions to the portfolio or not depends on the results of the Performance Evaluation of the portfolio. If the result of the performance evaluation of the portfolio is not in alignment with the investment objectives/Goals, the investor should design a new portfolio by selling certain underperforming securities and

buying others that can improve the return on the portfolio, which can satisfy the expectation of the investors.

From the above-mentioned process, we can say that the process of managing investments is ongoing and dynamic, requiring constant monitoring and adjustment to changing market conditions, individual circumstances, and financial objectives.

❖ Keywords:

- **Investment:** when an asset is acquired to generate income and capital appreciation, it is known as an investment.
- **Portfolio:** A Group of financial assets owned by an individual or organization is known as Portfolio.
- **Return:** Regular income (dividend/ Interest) and increase in the value of investment (Capital Appreciation).
- **Capital Appreciation:** The difference between the buying price and the selling price of the investment.
- **Risk:** The variability in the rate of return of the security is known as the Risk.
- **Liquidity:** Liquidity refers to the ability of investment instruments to easily convert into cash with minimum risk.

❖ Exercise:

❖ Write a detailed note on each of the following:

(1) Discuss Various Investment alternatives available for Investment.
(2) Explain the Criteria for Evaluation of Investment.
(3) Discuss the Investment/Portfolio Management Process.

❖ Write Short Notes on:

(1) Difference between Investments and Speculation.
(2) Difference between Investments and Gambling.
(3) Objectives of Investment.

❖ Briefly answer the following questions:

(1) Give the meaning of Investment.
(2) Define Investment Management.
(3) What do you mean by Return?
(4) Give the formula for measuring the Rate of Return.
(5) Give the names of various Types of Equity Shares.
(6) What are the different schemes of Mutual funds?
(7) Give the name of the Life Insurance Companies in India.
(8) What do you mean by Safety in Investment Management?
(9) When an investment is said to be highly marketable?
(10) What are Initial Tax Benefits?
(11) What are Continuing Tax Benefits?
(12) What is Terminal Tax Benefits?

(13) Explain Bullion Investment.

❖ **Multiple Choice Questions (MCQ):**

(1) What are the two key aspects of investment from the following:
(a) Risk
(b) Time
(c) None of Above
(d) (a) & (b) both

(2) Which of the following statistical measures are used to measure risk elements?
(a) Beta (**β)**
(b) Variance
(c) Standard Deviation
(d) All of the Above.

(3) One of the following is not a component of the investment management process:
(a) Choice of the Assets Mix
(b) Analysis and Selection of Securities
(c) Revision of Portfolio
(d) Scanning of Capital Project Decision

(4) Risk and Return have _____ relation:
(a) Positive
(b) Negative
(c) None of the Above
(d) (a) & (b) both

(5) _____ represents how volatile an investment's return is about market fluctuation.
(a) Beta (**β)**
(a) Standard Deviation
(b) Range
(c) Variance

Answers:

(1) **–** (d) (a) & (b) both
(2) – (d) All of the Above
(3) – (d) Scanning of Capital Project Decision
(4) – (a) Positive
(5) - (a) Beta

❖ **Fill in the Blanks in the following statements:**

(1) _____ & _____ are the two key aspects of investment (**Time, Risk**).
(2) In Finance & Investment, A Group of financial assets owned by an individual or organization is known as _____ (**Portfolio**).
(3) A _____ mainly relies on hearsay, technical charts, and market psychology that speculators rely on more (**Speculator**).

(4) Rationally, people are entered into _____ for fun, not to generate income (**Gambling**).
(5) _____is a Zero-sum or win-lose game depending upon a future event, which is uncertain (**Gambling)**.
(6) _____ is a market for the short-term investment (**Money Market**).
(7) _____ & _____ are the most important financial derivatives for the investors (**Future & Options)**.
(8) _____ refers to how simple it is to make and maintain an investment (**Convenience**).
(9) The deviation between Expected Outcomes and Real outcomes also represents the _____ (**Risk**).
(10) The decision of _____ is directly related to the proportion of different classes of assets in the portfolio such as Stocks, Bonds, Real Estate, and Cash Equivalents (**Assets Mix**).
(11) _____ & _____ are helping in the analysis of securities for the stock options (**Fundamental analysis, Technical Analysis**).
(12) Performance Evaluation of portfolio is also known as _____ (**Portfolio Appraisal**).

UNIT – 2 INVESTMENT ENVIRONMENT

2.1 Introduction

Investment: A Primer: Investment, in its essence, involves allocating resources, typically money, with the expectation of generating an income or profit. It can take various forms, including stocks, bonds, real estate, mutual funds, and more unconventional assets like crypto currencies. The core objective is to put money to work in one or more types of investment vehicles in the hopes of growing your money over time.

In the context of India, investment has a deep-rooted cultural significance, often associated with saving and financial security. Traditionally, physical assets like gold and real estate have been favoured, but there's a growing interest in financial assets, spurred by economic growth, rising incomes, and digitalization.

The Investment Environment in India

The investment environment encompasses all the economic, financial, regulatory, and market conditions that affect investment decisions and outcomes. It's a dynamic ecosystem influenced by a myriad of factors, from global economic trends and domestic policies to technological advancements and social shifts.

Economic Factors: India's economic landscape is characterized by its status as one of the fastest-growing major economies in the world. Despite challenges like inflation and fiscal deficits, India's vast market, demographic dividend, and structural reforms bode well for investors.

Financial Markets: India's financial markets have been evolving rapidly, with the Bombay Stock Exchange (BSE) and the National Stock Exchange (NSE) among the world's largest in terms of transactions. The growth of digital trading platforms has also democratized access to stock markets, mutual funds, and bonds, attracting a new generation of investors.

Regulatory Framework: The Securities and Exchange Board of India (SEBI) is the primary regulator, ensuring that markets operate in a fair and transparent manner. SEBI's initiatives, aimed at investor protection, market development, and regulation, have significantly enhanced the investment environment. Moreover, the Reserve Bank of India

(RBI) plays a crucial role in monetary policy and banking regulation, influencing investment through interest rate adjustments and liquidity management.

Technological Advancements: The fintech revolution has transformed India's investment landscape, making financial services more accessible and convenient. Innovations in digital payments, online trading platforms, and robot-advisory services have opened new avenues for investors.

Socio-Cultural Shifts: There's a noticeable shift towards financial literacy and investment in financial assets among the Indian population. This is complemented by government initiatives like the Pradhan Mantri Jan Dhan Yojana (PMJDY) aimed at increasing financial inclusion.

Global Factors: As an emerging market, India is sensitive to global economic trends, including interest rate decisions by major central banks, trade policies, and geopolitical events. These factors can influence foreign investment flows into Indian markets, impacting currency values and stock prices.

Conclusion

India's investment environment is marked by its dynamic and evolving nature, presenting both opportunities and challenges for investors. The combination of a strong regulatory framework, technological innovation, and a growing economy creates a fertile ground for investment. However, navigating this landscape requires an understanding of the myriad factors at play, from macroeconomic trends to regulatory policies and market dynamics. For investors, both domestic and international, the key to success lies in staying informed, diversifying investments, and aligning strategies with long-term financial goals.

2.2 Definition, Meaning, Importance

2.2.1 Definition

When considering the investment environment from an Indian perspective, it's important to reflect on the unique economic, financial, regulatory, and cultural factors that influence investment decisions and opportunities within India. Here are several definitions that capture various aspects of the investment environment in India:

Economic Growth and Stability Perspective: The investment environment in India is often characterized by its rapidly growing economy, making it an attractive destination for both domestic and foreign investors. Factors such as GDP growth rate, demographic dividend, and economic reforms play a significant role in defining the investment landscape. Investments are influenced by government policies aimed at stimulating growth, such as Make in India, Digital India, and liberalization of foreign direct investment (FDI) rules.

Financial Markets and Infrastructure Perspective: In this context, the investment environment in India includes the structure and performance of Indian stock exchanges like the Bombay Stock Exchange (BSE) and the National Stock Exchange (NSE), which are among the largest in the world. It also encompasses the development of digital payment systems, fintech innovations, and the expansion of financial services to

underserved segments of the population through initiatives like the Pradhan Mantri Jan Dhan Yojana (PMJDY).

Regulatory and Legal Framework Perspective: This definition focuses on the regulatory bodies such as the Securities and Exchange Board of India (SEBI), which oversees the securities market, and the Reserve Bank of India (RBI), which regulates the banking sector. The investment environment is shaped by regulations and policies designed to protect investors, ensure fair trading practices, and maintain financial stability.

Global Integration Perspective: From this angle, the investment environment in India is defined by its integration with the global economy, including its participation in international trade, its status as a major recipient of remittances, and its attractiveness as a destination for foreign investment. Policies and bilateral agreements that facilitate trade and investment, along with India's role in international organizations, contribute to its investment environment.

Socio-Cultural and Demographic Perspective: This perspective highlights the role of India's diverse and young population in shaping the investment environment. Consumer behaviour, increasing urbanization, and the rising middle class influence investment trends, particularly in sectors such as real estate, consumer goods, and technology services. Additionally, the cultural emphasis on saving and investing, particularly in gold and real estate, marks the investment preferences of the Indian population.

Sustainability and Social Responsibility Perspective: Reflecting a global trend, the investment environment in India increasingly considers environmental, social, and governance (ESG) factors. Investors and corporations are focusing on sustainable development and corporate social responsibility (CSR) initiatives, driven by both regulatory mandates and growing awareness among the public.

Technological Advancement Perspective: The investment environment in India is also defined by its rapid technological advancements and innovation ecosystem. The growth of the IT and services sector, along with startups in fintech, e-commerce, and healthcare, presents new investment opportunities. Government initiatives like Startup India aim to foster innovation and entrepreneurship, contributing to a vibrant investment landscape.

2.2.2 Meaning

The term "Investment Environment" broadly refers to the overall conditions and factors that affect the ability of individuals and entities to invest and earn returns on their investments. It encompasses a wide range of elements including, but not limited to, economic indicators, market conditions, regulatory frameworks, technological advancements, and geopolitical events. The investment environment determines how and where investors can allocate their resources to achieve their financial goals, influencing decisions on asset allocation, risk management, and investment strategy.

In more detail, the investment environment includes:

Economic Factors: These include indicators like inflation rates, interest rates, GDP growth, and unemployment rates that influence the overall economic health and impact investment returns.

Market Conditions: This involves the performance of various asset classes such as equities, bonds, real estate, and commodities, along with market liquidity and volatility. Market sentiment, driven by investor perceptions and behaviours, also plays a crucial role.

Regulatory Frameworks: Laws and regulations governing financial markets, investor protection measures, taxation policies, and the operation of different types of investment vehicles form an essential part of the investment environment. Regulatory bodies ensure fair trading practices and stability in the financial system.

Technological Advances: Innovations in technology that affect investments, such as financial technologies (fintech), blockchain, and digital currencies, alter the landscape for how investments are made and managed.

Geopolitical Events: Political stability, international relations, trade policies, and events like elections or conflicts can have significant impacts on the investment environment, influencing investor confidence and market dynamics.

Socio-Cultural Factors: Social trends, demographic changes, and cultural attitudes toward saving and investing can shape investment preferences and demand for various investment products.

Environmental, Social, and Governance (ESG) Factors: Increasingly, investors are considering the sustainability and ethical impact of their investments, looking at how corporations manage environmental challenges, social responsibilities, and governance practices.

The investment environment is dynamic, with conditions changing over time due to developments in any of these areas. Investors, both individual and institutional, must navigate this complex landscape to make informed decisions that align with their investment objectives, risk tolerance, and time horizon.

2.2.3 Importance

The investment environment plays a crucial role in shaping the decision-making process of investors and the overall performance of investments. Its importance can be understood from several key perspectives:

Determines Investment Opportunities: The investment environment defines the spectrum of available investment opportunities. Economic growth, technological advancements, and market conditions can create new investment avenues, such as emerging market equities, green bonds, or digital assets. Understanding the investment environment helps investors identify these opportunities.

Influences Risk and Return Profiles: Different components of the investment environment, such as interest rates, inflation, and geopolitical stability, significantly impact the risk and return profiles of various investment options. For instance, a rising

interest rate environment may make bonds more attractive relative to stocks, while economic stability can enhance the appeal of riskier asset classes like equities.

Guides Asset Allocation: The investment environment is critical for asset allocation decisions. Investors rely on an understanding of the current economic and financial market conditions to allocate their resources among different asset classes (stocks, bonds, real estate, etc.) in a way that matches their risk tolerance and investment goals.

Affects Market Sentiment: Investor sentiment, which can drive market trends and volatility, is influenced by the investment environment. Positive news about economic growth or successful trade negotiations can boost investor confidence, leading to bullish markets, whereas political instability or financial crises can trigger market sell-offs.

Impacts Regulatory Compliance: The regulatory aspect of the investment environment ensures that investments are made legally and ethically, protecting investors from fraud and market manipulation. It also influences the structure and governance of investment vehicles, affecting how investments are managed and operated.

Facilitates Strategic Planning: For both individual investors and institutional investors, understanding the investment environment is essential for strategic planning. It helps in setting investment objectives, selecting appropriate investment strategies, and managing risks effectively.

Promotes Financial Stability: A well-regulated and transparent investment environment contributes to the overall stability of the financial system. It helps in preventing financial crises by ensuring that financial markets operate efficiently and that financial institutions remain solvent.

Drives Economic Development: The investment environment can also have broader implications for economic development. By attracting foreign direct investment (FDI) and encouraging domestic investments, a favourable investment environment can lead to job creation, infrastructure development, and improved living standards.

Encourages Sustainable Investing: With the growing emphasis on environmental, social, and governance (ESG) factors, the investment environment plays a role in promoting sustainable investing. By aligning investments with ESG criteria, investors can contribute to positive social and environmental outcomes while seeking financial returns.

Overall, the investment environment is a foundational element that influences the functioning of global financial markets, the strategies of investors, and the economic prospects of societies. Its dynamics are essential for anyone involved in the investment process, from individual investors to financial institutions and policymakers.

2.3 The Factors Affecting Investment Environment

the factors affecting the investment environment involve examining the myriad elements that influence the dynamics of investment opportunities, risks, and returns. Below, these factors are categorized into economic factors, financial market factors, regulatory factors, geopolitical factors, technological factors, and socio-cultural factors.

Economic Factors

1. Interest Rates: Central banks' interest rate policies directly impact the cost of borrowing and the return on savings, influencing both consumption and investment decisions. Lower interest rates tend to encourage borrowing and investing in riskier assets, while higher rates may lead to increased savings.

2. Inflation: Inflation affects the real returns on investments. High inflation can erode purchasing power and reduce the attractiveness of fixed-income investments. Investors seek assets that can outpace inflation, often turning to equities or commodities.

3. Economic Growth: GDP growth rates provide insights into the economic health and potential profitability of investments. Strong growth can signal robust corporate earnings and attractive investment opportunities, particularly in equities.

4. Unemployment Rates: The level of unemployment in an economy can indicate its health and stability. High unemployment can signal economic distress, potentially leading to lower consumer spending and corporate earnings.

Financial Market Factors

1. Market Volatility: Volatility reflects the degree of variation in investment returns over a certain period. High volatility can indicate higher risk, which might deter conservative investors but attract those seeking higher returns through active trading.

2. Liquidity: Market liquidity, or the ability to quickly buy or sell assets without causing significant price movement, is crucial for investor confidence. Illiquid markets can pose risks, particularly in times of market stress.

3. Asset Valuations: The valuation of assets, measured through metrics like the price-to-earnings ratio for stocks or yield for bonds, affects investment decisions. Overvalued or undervalued assets can signal potential investment opportunities or risks.

Regulatory Factors

1. Regulatory Environment: Laws and regulations governing financial markets, taxation, and investor protection shape the investment environment. Stringent regulations can protect investors but may also limit investment opportunities or increase compliance costs.

2. Corporate Governance: Standards and practices that govern company management affect investor confidence. Good corporate governance can enhance investment attractiveness by ensuring transparency, accountability, and shareholder rights.

Geopolitical Factors

1. Political Stability: Stability and predictability in government policies are crucial for investment confidence. Political turmoil or uncertainty can deter investment, while stable regimes encourage it.

2. International Relations and Trade Policies: Trade agreements, tariffs, and international sanctions can influence market dynamics, affecting sectors differently. For instance, import tariffs might benefit domestic industries but harm international exporters.

Technological Factors

1. Technological Innovation: Advances in technology can create new investment sectors (e.g., renewable energy, biotechnology) and disrupt existing ones (e.g., traditional retail with e-commerce). Investors need to keep pace with technological trends.

2. Digitalization of Financial Markets: The rise of fintech, blockchain, and cryptocurrencies has transformed traditional investment channels, offering new assets and changing how transactions are conducted.

Socio-cultural Factors

1. Demographic Trends: Aging populations in developed countries and young populations in emerging markets affect investment preferences and economic growth patterns, influencing sectors like healthcare, real estate, and technology.

2. Social and Ethical Investing: Increasing interest in sustainable and responsible investing has led to the growth of ESG (Environmental, Social, Governance) criteria, affecting the flow of investments towards companies and projects that align with these values.

3. Consumer Behaviour: Shifts in consumer preferences, driven by trends or cultural changes, can impact industries and investment opportunities. For example, the growing emphasis on health and wellness has buoyed sectors like fitness and organic foods.

Conclusion

The investment environment is influenced by a complex interplay of factors across various dimensions. Understanding these factors is crucial for investors to navigate the market effectively, make informed decisions, and align their investment strategies with their financial goals and risk tolerance. Each factor, whether economic, market-based, regulatory, geopolitical, technological, or socio-cultural, has the potential to significantly impact the performance of investment portfolios and the broader financial landscape.

2.4 Elements of Investment Environment

the elements of the investment environment involve a detailed exploration of the various components that together create the backdrop against which investment decisions are made. These elements can be broadly categorized into the economic environment, financial markets, regulatory framework, technological landscape, geopolitical dynamics, and social and cultural influences. Below, we delve into each of these elements, highlighting their importance and impact on investment strategies and outcomes.

Economic Environment

1. Interest Rates: Set by central banks, interest rates are a primary economic tool influencing the investment environment. They affect borrowing costs, consumer spending, and the attractiveness of various asset classes.

2. Inflation: The rate at which the general level of prices for goods and services is rising. Inflation impacts the real returns on investments and can influence the choice between asset classes.

3. Gross Domestic Product (GDP): A measure of economic activity and growth. High GDP growth can signal a strong economy and attractive investment opportunities, particularly in equities and real estate.

4. Employment Levels: Employment data provide insights into economic health and consumer spending capacity. High employment levels support robust economic activity and investment returns.

Financial Markets

1. Stock Markets: Represent equities or shares of company ownership. Stock markets are a reflection of corporate health and economic trends, offering growth opportunities for investors.

2. Bond Markets: Consist of debt securities issued by governments and corporations. Bond markets are influenced by interest rates and credit risk, offering income and safety in diverse portfolios.

3. Commodities Markets: Include natural resources and agricultural products. Commodities can serve as a hedge against inflation and a diversification tool in investment portfolios.

4. Foreign Exchange Markets: Involve the trading of currencies. FX markets are affected by international trade, monetary policies, and global economic conditions.

Regulatory Framework

1. Financial Regulations: Laws and policies that govern financial transactions, aimed at protecting investors, ensuring fair markets, and preventing financial crises.

2. Regulatory Bodies: Institutions like the Securities and Exchange Commission (SEC) in the U.S. or the Financial Conduct Authority (FCA) in the UK oversee financial markets and enforce regulations.

3. Corporate Governance: Standards and practices that ensure companies are managed in the interests of shareholders and other stakeholders. Good governance can enhance investor confidence.

Technological Landscape

1. Financial Technologies (FinTech): Innovations in financial services, such as digital payments, robo-advisors, and blockchain, are transforming traditional investment models and operations.

2. Market Accessibility: Technology has made financial markets more accessible to a broader audience, enabling online trading and real-time information dissemination.

3. Cybersecurity: As investments increasingly move online, cybersecurity becomes a critical concern for protecting assets and sensitive financial information.

Geopolitical Dynamics

1. Political Stability: Stable political conditions are conducive to investment, as they reduce uncertainty. Political instability can deter investment and cause market volatility.

2. Trade Policies: Tariffs, trade agreements, and international sanctions can reshape investment landscapes by impacting industries and markets differently.

3**. Global Events:** Conflicts, elections, and diplomatic relations among countries can have immediate and profound effects on global financial markets.

Social and Cultural Influences

1. Demographic Shifts: Aging populations or growing middle classes in different regions can influence market demand and investment opportunities, particularly in sectors like healthcare and consumer goods.

2. Social Trends: Increasing awareness of social issues, such as climate change and social justice, has given rise to socially responsible and impact investing, focusing on environmental, social, and governance (ESG) factors.

3. Investor Behaviour: Psychological factors and investor sentiment can drive market trends and fluctuations, often studied in the field of behavioural finance.

Conclusion

The investment environment is a multifaceted and dynamic entity, shaped by a complex interplay of economic, financial, regulatory, technological, geopolitical, and social elements. Understanding these components is crucial for investors aiming to navigate the market effectively, make informed decisions, and achieve their financial goals. Each element presents both opportunities and challenges, requiring investors to stay informed and adapt their strategies to changing conditions.

2.5 A Key Aspect of The Investment Environment

Global Perspective:

Given the complex nature of the investment environment, focusing on "Regulatory Frameworks" offers a rich area for exploration, crucial to understanding how investments operate globally and domestically. This detailed note covers the significance,

components, impacts, challenges, and evolving nature of regulatory frameworks in the investment environment.

Regulatory Frameworks in the Investment Environment

Introduction

Regulatory frameworks comprise the rules, regulations, and standards set by governmental and non-governmental bodies to govern the operation of financial markets and protect investors. These frameworks are essential for ensuring transparency, fairness, accountability, and stability in the investment environment.

Significance of Regulatory Frameworks

1. **Investor Protection:** Regulations protect investors from fraudulent activities, misinformation, and unethical practices, building trust in financial markets.
2. **Market Integrity:** Regulatory frameworks ensure that markets operate efficiently, transparently, and fairly, facilitating effective price discovery and resource allocation.
3. **Financial Stability:** By overseeing financial institutions and market activities, regulations help prevent systemic risks that could lead to market crashes or financial crises.
1. **4. Economic Confidence:** A well-regulated investment environment encourages domestic and international investment, contributing to economic growth and development.**Components of Regulatory Frameworks**
1. **Securities and Exchange Commissions:** Bodies like the U.S. SEC and the UK's FCA oversee securities markets, enforcing laws related to trading, investment advice, and fraud prevention.
2. **Banking Regulations:** Central banks and banking regulatory authorities supervise banking institutions, ensuring liquidity, solvency, and risk management.
3. **Corporate Governance Codes:** Guidelines and standards promoting ethical management, accountability, and shareholder rights within corporations.
4. **International Regulatory Standards:** Global initiatives like the Basel Accords provide frameworks for banking supervision and risk management on an international scale.

Impacts of Regulatory Frameworks

1. **Enhancing Market Confidence:** Effective regulations build investor confidence in the fairness and resilience of financial markets.
2. **Promoting Innovation:** By providing clear rules, regulatory frameworks can encourage innovation within financial services, including fintech and sustainable investing.
3. **Limiting Market Participation:** Overly stringent regulations may limit market participation or innovation, potentially stifling economic growth.

Challenges in Regulatory Frameworks

1. **Keeping Pace with Innovation:** Rapid technological advancements in financial services pose a challenge for regulators to maintain relevant and effective oversight.
2. **Regulatory Arbitrage:** Differences in regulations across jurisdictions can lead to regulatory arbitrage, where entities exploit less stringent regulatory environments.
3. **Balancing Regulation and Growth:** Finding the right balance between stringent oversight and fostering market innovation and participation is a continual challenge.

The Evolving Nature of Regulatory Frameworks

1. **Global Coordination:** Increasing global financial integration has led to efforts at coordinating regulatory policies across jurisdictions, such as through the G20 and the Financial Stability Board (FSB).
2. **Adaptation to Technological Advances:** Regulators are increasingly focusing on regulating new technologies like blockchain, cryptocurrencies, and digital banking platforms.
3. **Focus on Sustainability:** There's a growing emphasis on incorporating environmental, social, and governance (ESG) factors into regulatory standards, reflecting broader societal concerns about sustainability and corporate responsibility.

Conclusion

Regulatory frameworks are a key aspect of the investment environment, playing a critical role in ensuring market integrity, protecting investors, and fostering confidence in financial systems. As the financial landscape evolves with technological innovations and changing societal values, regulatory frameworks must adapt to continue providing effective oversight and guidance. Understanding these frameworks is essential for anyone involved in the investment process, from individual investors to financial institutions and policymakers.

Indian Perspective:

In the context of Security Analysis and Portfolio Management (SAPM) in India, a critical aspect of the investment environment is the regulatory framework established by the Securities and Exchange Board of India (SEBI). SEBI plays a pivotal role in regulating the securities market, enhancing investor protection, and promoting fair and efficient markets. This detailed note covers SEBI's role, its regulatory mechanisms, and their impact on security analysis and portfolio management within the Indian investment environment.

The Regulatory Framework in India: SEBI's Role
Introduction

Established in 1992, the Securities and Exchange Board of India (SEBI) is the principal regulator for securities markets in India. It seeks to protect investors, develop the securities market, and regulate business practices to ensure fairness and transparency.

SEBI's Regulatory Mechanisms

1. Market Regulation: SEBI formulates rules and regulations for the operation of stock exchanges and other securities markets to ensure efficient and fair-trading practices.

2. Corporate Governance: It sets standards for corporate governance among listed companies, ensuring accountability, fairness, and transparency in their operations and management.

3. Investor Protection: SEBI establishes guidelines to protect investor interests, including regulations on disclosure requirements, insider trading, and fraudulent practices.

4. Mutual Fund Regulation: It oversees the operation of mutual funds in India, ensuring that they operate within the guidelines aimed at protecting the interests of investors.

5. Market Development: SEBI introduces measures to develop and regulate new market instruments such as derivatives, facilitating broader investment and hedging opportunities.

Impact on Security Analysis and Portfolio Management

1. Enhanced Market Integrity: By ensuring transparency and fairness in the securities market, SEBI's regulations help analysts and portfolio managers make informed investment decisions.

2. Improved Corporate Governance: The emphasis on corporate governance enhances the quality of financial reporting and disclosures, critical for effective security analysis.

3. Investor Confidence: Robust regulatory mechanisms foster investor confidence, which is vital for the stability and growth of the securities market. This, in turn, impacts portfolio investment flows and returns.

4. Diversification Opportunities: Regulatory developments in new financial instruments and markets offer portfolio managers a broader array of investment options for diversification.

5. Risk Management: SEBI's regulations on derivative markets enable better risk management tools for portfolio managers, allowing them to hedge against market volatility effectively.

Challenges and Considerations

1. Balancing Innovation and Regulation: While SEBI's regulations aim to protect investors and ensure market integrity, there's an ongoing challenge to balance these goals without stifling financial innovation.

2. Global Integration: As Indian markets become more integrated with the global financial system, SEBI faces the challenge of aligning its regulations with international standards while catering to domestic market needs.

3. Technological Advancements: The rapid advancement of fintech and digital trading platforms poses both opportunities and regulatory challenges, requiring continuous adaptation of regulatory frameworks.

The Evolving Role of SEBI

1. Adaptation to Global Standards: SEBI actively works on aligning its regulatory frameworks with global best practices, enhancing the attractiveness of India as an investment destination.

2. Focus on Fintech Regulation: It is increasingly focusing on regulating fintech innovations to ensure they contribute positively to the market without compromising investor protection.

3. Sustainability Initiatives: SEBI is incorporating sustainability and ESG factors into its regulatory agenda, reflecting the growing importance of sustainable investing in portfolio management.

Conclusion

SEBI's regulatory framework is a cornerstone of the investment environment in India, particularly in the context of Security Analysis and Portfolio Management. Its role in ensuring market integrity, protecting investors, and fostering an efficient and transparent market environment is indispensable for the health of India's securities market. As the financial landscape evolves, SEBI's adaptability and forward-looking regulatory approaches will continue to shape the investment environment, supporting the growth and development of India's financial markets.

2.6 Keywords

To explore the investment environment with a focus on Security Analysis and Portfolio Management (SAPM), we can derive a comprehensive list of keywords that touch upon critical concepts, instruments, methodologies, and regulatory aspects. These keywords encompass the broad spectrum of topics relevant to investors, analysts, and portfolio managers in understanding and navigating the investment landscape effectively.

1. Security Analysis: The practice of analysing financial securities to determine their investment value. This analysis can be fundamental, examining financial statements and market conditions, or technical, focusing on price movements and trends.
2. Portfolio Management: The art and science of making decisions about investment mix and policy, matching investments to objectives, asset allocation, and balancing risk against performance. It includes ongoing monitoring and adjustment to meet investment goals.
3. Asset Allocation: The process of dividing an investment portfolio among different asset categories, such as stocks, bonds, and cash. The goal is to minimize risk and maximize returns by investing in different areas that would each react differently to the same event.

4. Risk Assessment: Identifying and analysing potential issues that could negatively impact key business initiatives or projects. In investing, it focuses on the likelihood of losing money on an investment and ways to mitigate these risks.
5. Return Analysis: Evaluating the performance of an investment by measuring the gain or loss it generates over a certain period. This analysis helps investors understand how their investments are performing and whether they are meeting their financial goals.
6. Diversification Strategy: A risk management technique that mixes a wide variety of investments within a portfolio. The rationale behind this technique contends that a portfolio of different kinds of investments will, on average, yield higher returns and pose a lower risk than any individual investment found within the portfolio.
7. Fundamental Analysis: A method of measuring a security's intrinsic value by examining related economic and financial factors. Fundamental analysts study anything that can affect the security's value, from macroeconomic factors, such as the state of the economy, to microeconomic factors, like the company's management effectiveness.
8. Technical Analysis: A trading discipline employed to evaluate investments and identify trading opportunities by analysing statistical trends gathered from trading activity, such as price movement and volume.
9. Quantitative Analysis: The use of mathematical and statistical techniques to understand behaviour and evaluate financial instruments. It can help identify patterns and predict future movements in the financial markets.
10. Equity Valuation: The process of determining the value of a company's stock. This can be done using various methods, including dividend discount models, discounted cash flow models, and multiples like the P/E ratio.
11. Fixed Income Securities: These are debt instruments that pay a fixed amount of interest to investors until maturity. Upon maturity, investors are repaid the principal amount invested. Bonds are a common type of fixed-income security.
12. Bond Valuation: The process of determining the fair value of a bond. This involves calculating the present value of a bond's future interest payments, also known as its cash flows, and its value at maturity, or face value.
13. Yield Curve Analysis: The examination of the yield curve, which shows the relationship between interest rates and the maturity dates of debt securities. It is used to gauge economic sentiment and expectations.
14. Credit Analysis: An assessment of the creditworthiness of a borrower in general terms or to a particular debt or financial obligation. It often involves evaluating the borrower's ability to repay debt.
15. Derivatives: Financial instruments whose value is derived from the value of an underlying asset, index, or rate. They can be used for a variety of purposes, including hedging, increasing leverage, or speculating on the future price of an asset.
16. Options Strategies: Involve the buying and selling of options to profit from an expected move in the underlying asset. Options provide the right, but not the obligation, to buy (call) or sell (put) an asset at a specified price within a certain period.
17. Futures Contracts: Standardized legal agreements to buy or sell something (usually a commodity or financial instrument) at a predetermined price at a

specified time in the future. They are used for hedging against price changes or for speculation.

18. Hedging Techniques: Methods used to reduce or eliminate financial risk. This involves taking an offsetting position in a related security, such as using futures contracts to hedge against price fluctuations in the cash market.
19. Commodity Markets: Platforms where various commodities, including agricultural products, metals, and energy sources, are traded. These markets allow for the buying, selling, and trading of physical goods or derivative products.
20. Foreign Exchange Markets: Also known as Forex, these markets involve the trading of currencies. It is the largest financial market in the world, offering liquidity and 24-hour trading across different time zones.
21. Emerging Markets: Countries with social or business activities in the process of rapid growth and industrialization. Investments in these markets are considered higher risk due to their developing economies but offer the potential for high returns.
22. Market Efficiency: The extent to which stock prices and other securities prices reflect all available, relevant information. It's a core concept in financial economics that suggests prices of traded assets already reflect all publicly available information.
23. Behavioural Finance: A field of finance that proposes psychology-based theories to explain stock market anomalies and explores how emotions influence investors' decisions, potentially leading to irrational financial decisions and market inefficiencies.
24. Investment Theories: Frameworks that attempt to explain and predict the behaviour of financial markets and the dynamics of financial instruments. Examples include the Modern Portfolio Theory and the Efficient Market Hypothesis.
25. Modern Portfolio Theory (MPT): A theory on how risk-averse investors can construct portfolios to optimize or maximize expected return based on a given level of market risk, emphasizing that risk is an inherent part of higher reward.
26. Capital Asset Pricing Model (CAPM): A model that describes the relationship between systematic risk and expected return for assets, particularly stocks. It is used to estimate the cost of equity capital.
27. Arbitrage Pricing Theory (APT): A theory that provides a framework to derive the expected return of an asset based on the relationship between its return and many macroeconomic factors that affect the asset's risk.
28. Efficient Market Hypothesis (EMH): The theory that all existing information is already reflected in stock prices. According to EMH, stocks always trade at their fair value, making it impossible for investors to either purchase undervalued stocks or sell stocks for inflated prices.
29. Financial Leverage: The use of borrowed money (debt) to amplify returns from an investment or project. While it can increase profit potential, it also increases the risk of loss.
30. Portfolio Optimization: The process of choosing the proportions of various assets to be included in a portfolio in such a way as to make the portfolio better than any other according to some criterion.

31. Asset Pricing Models: Theoretical models used to determine the fair value of assets. These models consider various factors like cash flows, dividends, and risk levels associated with the asset to calculate its expected return.
32. Risk-Return Trade-off: A principle that holds that potential return rises with an increase in risk. Low levels of uncertainty (low risk) are associated with low potential returns, whereas high levels of uncertainty (high risk) are associated with high potential returns.
33. Securities and Exchange Board of India (SEBI): The regulatory authority for securities and commodity markets in India under the jurisdiction of the Ministry of Finance, Government of India. SEBI is tasked with protecting investors, promoting fair trading, and regulating securities markets.
34. Regulatory Frameworks: The set of laws, regulations, and guidelines established by governmental bodies that govern how financial markets and investments operate. These frameworks aim to maintain market integrity and protect investor rights.
35. Compliance and Governance: Refers to the processes and policies that ensure a company or organization adheres to legal and ethical standards, as well as the mechanisms for overseeing management practices.
36. Environmental, Social, and Governance (ESG) Investing: An investment strategy that evaluates companies based on their adherence to environmental protection, social responsibility, and governance practices alongside traditional financial analysis.
37. Sustainable and Responsible Investing (SRI): Investment strategies that consider both financial return and social/environmental good to bring about a positive change. It involves excluding or selecting investments based on ethical guidelines.
38. Corporate Social Responsibility (CSR): A business model in which companies integrate social and environmental concerns in their operations and interactions with stakeholders, going beyond the legal obligations.
39. Mutual Funds: Investment vehicles that pool money from many investors to purchase a diversified portfolio of stocks, bonds, or other securities, managed by professional fund managers.
40. Exchange-Traded Funds (ETFs): Similar to mutual funds, but are traded on stock exchanges like individual stocks. ETFs hold assets such as stocks, commodities, or bonds and generally operate with an arbitrage mechanism to keep trading close to its net asset value.
41. Hedge Funds: Private investment funds that employ a diverse range of strategies to earn active return, or alpha, for their investors. Hedge funds may be aggressively managed or make use of derivatives and leverage in both domestic and international markets.
42. Private Equity: A form of financing where funds are directly invested into private companies, or public companies are taken private, with the aim of gaining significant influence or control over the company's operations and profitability.
43. Venture Capital: A type of private equity focused on investing in startups and early-stage companies with high growth potential in exchange for equity, or an ownership stake.
44. Real Estate Investment Trusts (REITs): Companies that own, operate, or finance income-generating real estate across a range of property sectors. REITs offer

investors regular income streams, diversification, and long-term capital appreciation.

45. Asset Management Companies (AMCs): Firms that invest pooled funds from clients into a variety of securities and assets. AMCs make investment decisions with the goal of achieving the specified investment objectives for the benefit of their clients.
46. Portfolio Diversification: A risk management strategy that mixes a wide variety of investments within a portfolio. By spreading investments across different financial instruments, industries, and other categories, it aims to reduce the impact of any single asset's performance on the overall portfolio.
47. Market Volatility: Refers to the rate at which the price of securities increases or decreases for a given set of returns. Market volatility is a measure of the risk associated with a security or the market. High volatility means the value of the security can change dramatically over a short time period in either direction.
48. Liquidity Analysis: The assessment of an asset's ability to be sold quickly without causing a significant movement in its price and with minimum loss of value. Liquidity analysis is crucial for understanding how easily assets can be converted to cash, which affects investment decisions and risk assessment.
49. Macroeconomic Indicators: Statistics that reflect current economic conditions or economic forecasts. These indicators, such as GDP growth rates, inflation, and unemployment rates, influence financial markets and investment environments, guiding investors in making informed decisions.
50. Financial Statements Analysis: The process of analysing a company's financial statements (including the balance sheet, income statement, and cash flow statement) to understand its financial health and to make better economic decisions.
51. Investment Strategies: Plans designed to achieve specific financial goals. Investment strategies can vary greatly in their approach, from conservative strategies focusing on income and preservation of capital to aggressive strategies aiming for high growth.
52. Trading Strategies: Systems that are designed to create trading signals or execute trades based on predetermined criteria. These strategies can be based on technical analysis, fundamental analysis, or quantitative methods.
53. Portfolio Rebalancing: The process of realigning the weightings of a portfolio of assets. Rebalancing involves periodically buying or selling assets in a portfolio to maintain an original or desired level of asset allocation or risk.
54. Tax Efficiency in Investing: Strategies that are used to minimize tax liabilities within an investment portfolio. Tax-efficient investing involves planning so as to maximize after-tax returns on investments.
55. Dividend Investing: A strategy focused on buying stocks of companies that pay high dividends. Dividend investing aims at generating income from investments irrespective of market conditions.
56. Growth vs. Value Investing: A strategy that involves choosing stocks. Growth investing focuses on companies expected to grow at an above-average rate compared to their industry or the market. Value investing focuses on stocks that are undervalued in price based on fundamental characteristics.
57. Algorithmic Trading: The use of computer algorithms to automatically make trading decisions, submit orders, and manage those orders after submission.

Algorithmic trading is used to split trades into multiple orders to achieve better market prices.

58. Financial Modelling: The process of creating a summary of a company's expenses and earnings in the form of a spreadsheet that can be used to calculate the impact of a future event or decision.
59. Investment Banking: A specific division of banking related to the creation of capital for other companies, governments, or other entities. Investment bankers advise on acquisitions, mergers, and provide services like underwriting new debt and equity securities.
60. Fintech Innovations: Financial technologies that seek to improve and automate the delivery and use of financial services. Fintech, short for financial technology, is applied to help companies, business owners, and consumers better manage their financial operations and processes.

This comprehensive overview covers crucial concepts in the investment environment, particularly within Security Analysis and Portfolio Management, providing a broad understanding of the terms and strategies that define this field.

❖ **Exercise**

Multiple Choice Questions:

1. What is the primary goal of investment?
   A) To save for retirement
   B) To generate an income or profit
   C) To keep money safe
   D) To buy physical assets

Answer: B) To generate an income or profit

2. Which of the following is a traditional form of investment in India?
   A) Crypto-currencies
   B) Gold
   C) Mutual Funds
   D) Stock Options

Answer: B) Gold

3. What role does the Securities and Exchange Board of India (SEBI) play?
   A) It regulates the technology sector
   B) It is the primary regulator for securities markets in India
   C) It controls India's monetary policy
   D) It provides banking services to the Indian government

Answer: B) It is the primary regulator for securities markets in India

4. Which of the following is a key economic factor affecting investment decisions?
   A) Colour trends in fashion
   B) Weather patterns
   C) Inflation rates
   D) Celebrity endorsements

Answer: C) Inflation rates

5. The Bombay Stock Exchange (BSE) is known for being:
   A) The only stock exchange in India
   B) One of the oldest stock exchanges in Asia
   C) An exchange exclusively for trading commodities
   D) The world's largest stock exchange in terms of transactions

Answer: B) One of the oldest stock exchanges in Asia

6. Which initiative is aimed at increasing financial inclusion in India?
   A) Digital India
   B) Startup India
   C) Pradhan Mantri Jan Dhan Yojana (PMJDY)
   D) Make in India

Answer: C) Pradhan Mantri Jan Dhan Yojana (PMJDY)

7. What does RBI stand for, and what is its primary function?
   A) Reserve Bank of India; It regulates the technology sector
   B) Reserve Bank of India; It is the central banking institution of India controlling the monetary policy
   C) Regulatory Body of Investments; It regulates the stock market
   D) Rural Banking Institution; It provides loans to rural areas

Answer: B) Reserve Bank of India; It is the central banking institution of India controlling the monetary policy

8. Which of the following best describes 'Asset Allocation'?
   A) Investing all your money in a single asset
   B) Dividing investments among different asset classes
   C) Allocation of stocks in a portfolio
   D) Transferring assets to another person

Answer: B) Dividing investments among different asset classes

9. Fintech innovations in India have primarily contributed to:
   A) Decrease in digital transactions
   B) Increased accessibility to financial services
   C) Decline in startup culture
   D) Reduced investments in technology

Answer: B) Increased accessibility to financial services

10. Market Volatility refers to:
   A) The predictability of market trends
   B) The stability of government policies
   C) The rate at which prices increase or decrease
   D) The efficiency of market operations

Answer: C) The rate at which prices increase or decrease

11. Which is a derivative financial instrument?
   A) Stock
   B) Bond

C) Option
D) Gold

Answer: C) Option

12. Modern Portfolio Theory (MPT) emphasizes on:
A) Investing solely in stocks
B) The benefits of diversification
C) Avoiding risky investments
D) Focusing on short-term gains

Answer: B) The benefits of diversification

13. The Capital Asset Pricing Model (CAPM) is used to:
A) Calculate dividends
B) Estimate the cost of equity
C) Determine the exchange rate
D) Analyse market trends

Answer: B) Estimate the cost of equity

14. An example of a fixed-income security is:
A) A company share
B) A commodity future
C) A corporate bond
D) Real estate

Answer: C) A corporate bond

15. Which market allows the trading of currencies?
A) Commodity Market
B) Stock Market
C) Foreign Exchange Market
D) Bond Market

Answer: C) Foreign Exchange Market

16. 'Liquidity' in financial markets refers to:
A) The ability to convert assets into cash quickly
B) The level of interest rates
C) The stability of a financial institution
D) The depth of water in a market

Answer: A) The ability to convert assets into cash quickly

17. The Efficient Market Hypothesis (EMH) suggests that:
A) Markets are never efficient
B) Stock prices do not reflect all available information
C) It's impossible to beat the market consistently through stock selection
D) Insider trading is a viable strategy

Answer: C) It's impossible to beat the market consistently through stock selection

18. What does 'Financial Leverage' imply?
A) Reducing debt in a company
B) The use of debt to amplify investment returns

C) Decreasing the number of investments
D) Investing only in leveraged ETFs

Answer: B) The use of debt to amplify investment returns

19. A 'Mutual Fund' is best described as:
A) A private investment partnership
B) A single-stock investment
C) An investment vehicle pooling money from many investors
D) A government-led investment scheme

Answer: C) An investment vehicle pooling money from many investors

20. Which of the following is a focus of Environmental, Social, and Governance (ESG) Investing?
A) Financial performance only
B) Social responsibility
C) Short-term market trends
D) Celebrity endorsements

Answer: B) Social responsibility

21. What is the primary function of the Securities and Exchange Board of India (SEBI)?
A) Providing banking services
B) Regulating the securities market
C) Setting the prime interest rate
D) Printing currency

Answer: B) Regulating the securities market

22. Which of the following economic indicators is most directly relevant to the stock market?
A) Unemployment rate
B) Consumer Price Index (CPI)
C) Gross Domestic Product (GDP) growth rate
D) All of the above

Answer: D) All of the above

23. Market volatility is often measured by which of the following?
A) GDP growth rate
B) Consumer confidence index
C) Volatility Index (VIX)
D) Unemployment rate

Answer: C) Volatility Index (VIX)

24. In the context of investments, what does 'diversification' aim to achieve?
A) Focus all investments in a single sector to maximize returns
B) Spread investments across various assets to reduce risk
C) Increase investment in high-risk assets
D) Invest only in government securities

Answer: B) Spread investments across various assets to reduce risk

25. Which of the following is an example of a derivative product?

A) Corporate bond
B) Equity shares
C) Futures contract
D) Savings account

Answer: C) Futures contract

26. What does a bear market indicate?
A) Market prices are rising
B) Market prices are falling
C) The market is highly volatile
D) The market is stable with no price movement

Answer: B) Market prices are falling

27. An increase in interest rates by the central bank is likely to:
A) Decrease the cost of borrowing
B) Increase the cost of borrowing
C) Have no impact on the stock market
D) Decrease inflation immediately

Answer: B) Increase the cost of borrowing

28. Which of the following is considered a safe haven asset during market turmoil?
A) Crypto currencies
B) Gold
C) High-yield bonds
D) Real estate

Answer: B) Gold

29. What impact does high inflation typically have on the investment environment?
A) Increases the purchasing power of money
B) Decreases the real return on investments
C) Encourages savings over investment
D) Decreases the cost of borrowing

Answer: B) Decreases the real return on investments

30. The Efficient Market Hypothesis (EMH) suggests that:
A) It is easy to beat the market through stock selection and market timing
B) Only insiders can achieve superior investment returns
C) Stock prices reflect all available information
D) Stock prices do not reflect underlying economic fundamentals

Answer: C) Stock prices reflect all available information

31. What is the primary objective of asset allocation in portfolio management?
A) To invest solely in assets with the highest returns
B) To minimize risk by diversifying investments across various asset classes
C) To focus investment in a single asset class
D) To predict the future direction of the stock market

Answer: B) To minimize risk by diversifying investments across various asset classes

32. Which of the following best describes a 'bull market'?
A) A market in which prices are expected to fall
B) A market characterized by declining investor confidence
C) A market in which prices are rising or are expected to rise
D) A market with stagnant prices

Answer: C) A market in which prices are rising or are expected to rise

Short Questions:

1. What is the primary goal of investment?
2. Name two major stock exchanges in India.
3. What is the role of the Securities and Exchange Board of India (SEBI)?
4. Define market volatility.
5. What does diversification in an investment portfolio aim to achieve?
6. Give an example of a derivative financial instrument.
7. Explain the term 'bear market'.
8. How does an increase in interest rates affect the cost of borrowing?
9. Why is gold considered a safe haven asset?
10. What impact does high inflation typically have on the real return of investments?
11. What does the Efficient Market Hypothesis (EMH) suggest about stock prices?
12. What is the primary objective of asset allocation in portfolio management?
13. Describe a 'bull market'.
14. How does technological innovation impact the investment environment?
15. What is the significance of the Consumer Price Index (CPI) for investors?
16. What is a mutual fund?
17. Explain the concept of financial leverage.
18. What is the significance of environmental, social, and governance (ESG) factors in investing?
19. How do geopolitical events influence the investment environment?
20. What is the purpose of a portfolio rebalancing?

Long Questions:

1. Describe how the global investment environment influences individual investment decisions and outline the implications for investors when navigating international markets.
2. Provide a detailed definition of the investment environment, including its components and their interrelations. How do these components collectively influence investment outcomes?
3. Elaborate on the significance of having a thorough understanding of the investment environment for investors and financial analysts. Discuss how this knowledge impacts financial planning and investment strategy formulation.
4. Analyse the various economic, political, and social factors that affect the investment environment. How do changes in these factors impact investor sentiment and market performance?
5. Identify and describe the fundamental elements of the investment environment. Discuss the role of each element in shaping investment strategies and in the assessment of investment opportunities and risks.

6. Considering market volatility as a critical aspect of the investment environment, discuss its implications for portfolio management and investment decision-making. What strategies can be adopted to mitigate the effects of market volatility?
7. Discuss the concept of asset allocation and its importance within the investment environment. How does strategic asset allocation influence portfolio diversification and risk management?
8. Explore the principle of diversification and its role in minimizing investment risk. Provide examples to illustrate the effectiveness of diversification across various asset classes and geographical regions.
9. Analyse the impact of market volatility on the investment environment, focusing on its causes, measurement, and strategies for managing volatility. How do investors adapt their strategies in response to fluctuations in market volatility?
10. Evaluate the influence of regulatory frameworks on the investment environment. How do regulatory changes and compliance requirements affect investment strategies and market participation?
11. Discuss the impact of technological advancements on the investment landscape. How have innovations in financial technology transformed how investors access and interact with financial markets?
12. Examine the role of economic indicators in shaping the investment environment. How do indicators such as GDP growth, inflation rates, and unemployment figures influence investment decisions and market trends?
13. Explore the effects of globalization on the investment environment. How does the interconnectedness of global financial markets influence investment diversification and risk assessment strategies?

Explain the Following Keywords in the Context of the Investment Environment

1. Security Analysis
2. Portfolio Management
3. Asset Allocation
4. Risk Assessment
5. Return Analysis
6. Diversification Strategy
7. Fundamental Analysis
8. Technical Analysis
9. Quantitative Analysis
10. Equity Valuation
11. Fixed Income Securities
12. Bond Valuation
13. Yield Curve Analysis
14. Credit Analysis
15. Derivatives
16. Options Strategies
17. Futures Contracts
18. Hedging Techniques
19. Commodity Markets
20. Foreign Exchange Markets
21. Emerging Markets
22. Market Efficiency
23. Behavioural Finance
24. Investment Theories
25. Modern Portfolio Theory (MPT)
26. Capital Asset Pricing Model (CAPM)
27. Arbitrage Pricing Theory (APT)
28. Efficient Market Hypothesis (EMH)
29. Financial Leverage
30. Portfolio Optimization
31. Asset Pricing Models
32. Risk-Return Trade-off
33. Securities and Exchange Board of India (SEBI)
34. Regulatory Frameworks
35. Compliance and Governance
36. Environmental, Social, and Governance (ESG) Investing

37. Sustainable and Responsible Investing (SRI)
38. Corporate Social Responsibility (CSR)
39. Mutual Funds
40. Exchange-Traded Funds (ETFs)
41. Hedge Funds
42. Private Equity
43. Venture Capital
44. Real Estate Investment Trusts (REITs)
45. Asset Management Companies (AMCs)
46. Portfolio Diversification
47. Market Volatility
48. Liquidity Analysis
49. Macroeconomic Indicators
50. Financial Statements Analysis
51. Investment Strategies
52. Trading Strategies
53. Portfolio Rebalancing
54. Tax Efficiency in Investing
55. Dividend Investing
56. Growth vs. Value Investing
57. Algorithmic Trading
58. Financial Modelling
59. Investment Banking
60. Fintech Innovations

UNIT – 3 RISK AND RETURN

3.1 Introduction

Some investors invest to gain a sense of power or prestige. However, for most investors, the main purpose of investing is to earn a return on their money. Most investors place their money in investments in the hope of getting a return on their money, but there are other factors you should consider. However, simply selecting stocks based on return is not enough. Investors like returns, they don't like risk. When making investment decisions: (1) which securities to hold, and (2) how much money to allocate to each. These decisions are generally made in two steps. First, estimates are made of the expected return and risk associated with the securities available over the holding period. This step is known as security analysis. Second, it is necessary to compare the return-risk estimates to decide how to allocate the available funds between the securities on a consistent basis. This step involves portfolio analysis, selection and management. In fact, portfolio selection provides the necessary inputs for security analysis.

3.2 Concept of Risk

An investor expects to receive some return on their investment in the future. However, since the future is uncertain, the expected future return is also uncertain. The uncertainty associated with the return on investment that introduces risk into the project.

Expected return is the uncertain future return that a firm expects to earn from its project. Actual return, on the other hand, is the actual return that the firm actually receives.

The realized return from a project may not be the same as the expected return. This possibility of the actual return differing from the expected return is what is known as risk. Risk is the variability in the expected return from a project. In other words, it is the degree of deviation from the expected return.

Risk is associated with the probability that the realized return will be lower than the expected return. Therefore, when the realized return exactly matches the expectation, there is no risk.

3.3 Elements of Risk

Various factors can cause variations in expected return, which are known as elements of risk. There are two broad groups of these elements, classified as **systematic risk** and **unsystematic risk**.

3.3.1 Systematic Risk (Market Risk)

Business entities are a part of a dynamic society. Various changes take place in society, such as economic, political, and social system changes, which affect the performance of companies and hence their expected returns. These changes affect all entities to varying degrees. Therefore, the impact of these changes is system-wide, and the portion of the total variability in returns due to these factors is known as systematic risk. These risks are further divided into interest rate risk, market risk, and purchasing power risk.

Types of Systematic Risk:

- **Interest Rate Risk:** This risk arises from changes in interest rates. When interest rates rise, the value of existing bonds falls, and vice versa.
- **Market Risk:** This risk is also known as beta risk and is associated with fluctuations in the overall stock market. It is measured by the beta coefficient, which indicates the volatility of a stock relative to the market.
- **Purchasing Power Risk:** This risk arises from changes in the purchasing power of money due to inflation. Inflation erodes the value of future cash flows, which can impact the value of an investment.

Systematic risk is difficult to diversify away and is therefore considered to be a non-diversifiable risk. Investors can use various hedging strategies to mitigate systematic risk.

3.3.2 Unsystematic Risk (Specific Risk):

A company's return can change due to certain factors that affect only that company. Examples of such factors include shortages of raw materials, labour strikes, management inefficiency, etc. When variability in returns occurs due to such firm-specific factors, it is known as unsystematic risk. This risk is unique or specific to a particular entity and affects it in addition to systematic risk. These risks are further divided into business risk and financial risk.

Types of Unsystematic Risk:

- **Business Risk:** This risk arises from factors that are specific to a company's operations, such as competition, changes in technology, or product liability.

- **Financial Risk:** This risk arises from a company's financial structure, such as its debt load or dividend policy.

Unsystematic risk can be diversified away by investing in a variety of different companies and industries. This is because the factors that affect one company may not affect another company in the same way.

3.4 Measurement of Risk:

The amount of risk is known as the measurement of risk. Two approaches are followed in the measurement of risk:
(i) Mean-Variance Approach:
(ii) Correlation or Regression Approach:

(i) Mean-Variance Approach:

The mean-variance approach is used to measure total risk, which is the sum of systematic and unsystematic risks. Under this approach, variance and standard deviation, which measure the extent of deviation of possible returns from the expected return, are calculated as follows:

$$\sigma^2 = \sum_{i=1}^{n} [(X_i - \overline{X})^2 p(X_i)]$$

Where,

- Xi = Possible return
- P = Probability of return
- n = Number of possible returns

(ii) Correlation or Regression Approach:

The consistency or regression method is used to measure systematic risk. Systematic risk is expressed by β and calculated by the following formula:

$$\beta i = \frac{r_{im}\, \sigma_m\, \sigma_i}{\sigma^2_m}$$

rim = consistent coefficient between stock i and market index returns
σm = standard deviation of market index returns
σi = standard deviation of stock returns

3.5 Meaning of Return

Return can be defined as the actual income from a project as well as the appreciation in the value of the capital. Thus, there are two components involved - the basic component or cash flow from the investment over time, either in the form of interest or dividends; and the change in the price of the asset, which is commonly referred to as capital gain or loss.

The term yield is often used in reference with return, which refers to the income component relative to some value of the asset. The total return of an asset for a holding period is related to all the cash flows received by the investor during any given period of time from the amount of money invested in the asset.

It is measured as follows:

Total Return = Cash Payments Received + Change in Price of Asset During the Period / Purchase Price of Asset

In relation to return, we use two terms - realized return and expected or predicted return. Realized return is the return that was actually earned by the firm, so it is historical. Expected or predicted return is the return that the firm expects to earn from an asset over some future period of time.

3.6 Probability Distributions

Investors use probability distributions to expect the return on an asset like a stock over time and to hedge their risk.

The term "probability distribution" refers to any statistical function that describes all the possible outcomes of a random variable within a given range of values. One of the most common examples of a probability distribution is the normal distribution. However, there are other main categories of probability distributions - the Chi-square distribution, the binomial distribution, and the Poisson distribution.

Stock returns are often assumed to be normally distributed, but in reality, they exhibit kurtosis with large negative and positive returns that are more extreme than what the normal distribution would predict.

Probability distributions are often used in risk management and to evaluate the probability and magnitude of losses that an investment portfolio may experience based on the distribution of historical returns.

3.7 Expected returns

Expected return is the profit or loss that an investor expects on an investment that calls the rate of return or the expected rate. The expected returns are calculated by multiplying the possible outcomes by the odds and then by calculating the total of these outcomes. The average, expected return of the long-term weight of essentially historical results is not guaranteed. The expected return is calculated by the following formula:

$$E(R) = \Sigma X^* P(X)$$

where X = will represent different values of return,

P(X) = shows the probability of different returns

For example, if an investment has a 50% chance of gaining 20% and a 50% chance of losing 10%, find the expected return.

$$E(R) = \Sigma X^* P(X)$$

$$= (50\% \times 20\% + 50\% \times -10\%)$$

$$= 5\%$$

3.8 Standard Deviation

Standard deviation is a tool for evaluating the risks associated with a particular investment.

When investment analysts want to understand the risks associated with a mutual fund or a hedge fund, they first and foremost look at its standard deviation.

This measure of average variation has a leading place in many fields related to statistics, economics, accounting, and finance. For a given data set, the standard deviation measures how the numbers are spread out from the mean value.

By measuring the standard deviation of a portfolio's annual rate of return, analysts can see how consistent the return is over time.

Key points:

- Standard deviation can show the consistency of investment returns over time.
- A fund with a high standard deviation exhibits price volatility.
- A fund with a low standard deviation is more predictable.

Standard deviation is calculated by taking the square root of the variance, which is itself the average of the squared differences from the mean.

For example, suppose a mutual fund has the following annual returns over five years: 4%, 6%, 8.5%, 2%, and 4%.

Answer: The average value, or mean, is 4.9%. The standard deviation is calculated by taking the square root of the mean value so the standard deviation is 2.46%. This means that each individual annual value is on average 2.46% away from the mean.

3.9 Portfolio Expected Return

The portfolio expected return is the weighted average return expected from a portfolio.

It is calculated by considering the expected return of each individual asset in its weight (percentage) within the portfolio, and then summing up the expected returns of all constituents.

To calculate the portfolio expected return, an investor needs to know the expected return of each security in their portfolio, as well as the overall weight (weighting) of each security in the portfolio.

This means that investors need to add up the weighted average of the expected rates of return (RoR) of each security.

Investors base their estimates of a security's expected return on the assumption that what has been proven true in the past will continue to hold true in the future.

Investors don't use a market-based perspective when calculating expected return.
Instead, they can find the weight of each security in the portfolio by taking the value of each security and dividing it by the total value of the portfolio.

Expected return = WA × RA + WB × RB + WC × RC

Where:

- WA = Weight of security A
- RA = Expected return of security A
- WB = Weight of security B
- RB = Expected return of security B
- WC = Weight of security C
- RC = Expected return of security C

Since expected return is based on historical data, investors should consider the likelihood of each security repeating its historical performance in light of the current investment environment.

Some assets, like bonds, are more likely to match their historical returns, while others, like stocks, can fluctuate more widely year-to-year.

Example:

Consider an investment A that has a 20% chance of giving a 15% return on investment, a 50% chance of generating a 10% return, and a 30% chance of losing 5%. Find the portfolio expected return.

A's expected return = 0.2 (15%) + 0.5 (10%) + 0.3 (-5%)

= 3% + 5% - 1.5%

= 6.5%

Therefore, the potential long-term average return for investment A is 6.5%.

Note:

- The 20%, or 0.2, probability translates to a 15%, or 0.15, return.
- The 50%, or 0.5, probability translates to a 10%, or 0.1, return.
- The 30%, or 0.3, probability translates to a negative 5% return, or -0.05.

3.10 Portfolio Diversification

Diversification is a risk management strategy that involves mixing a variety of different kinds of investments in a portfolio.

A diversified portfolio contains a mix of different asset types and investment vehicles in an attempt to limit exposure to any one asset or risk.

The logic behind this technique is that a portfolio constructed of different types of assets will, on average, earn a long-term return and reduce the risk of any individual holding or security.

Diversification attempts to smooth out the occurrences of unsystematic risk in a portfolio, so that the positive performance of some investments off sets the negative impact of others.

The benefits of diversification are only achieved if the securities in the portfolio are not perfectly correlated - that is, they respond differently, often in opposite ways, to market influences.

Diversification by asset class:

Fund managers and investors often diversify their investments across asset classes and determine what percentage of the portfolio to allocate to each.
These can include classes such as:

1. Stocks: Shares or equity in publicly traded companies
2. Bonds: Government and corporate fixed-income debt instruments
3. Real estate: Land, buildings, natural resources, agriculture, livestock, and water and mineral deposits
4. Exchange-traded funds (ETFs): Marketable baskets of securities that track an index, commodity, or sector.
5. Commodities: Raw materials needed for the production of other goods or services.
6. Cash and short-term cash equivalents (CEEs): Treasury bills, certificates of deposit, money market vehicles, and other short-term, low-risk investments.

They will then diversify within asset class investments, such as by selecting stocks from different sectors, which have a low correlation of returns, or by selecting stocks with different market capitalizations.

In the case of bonds, investors can choose from investment-grade corporate bonds, U.S. Treasuries, state and municipal bonds, high-yield bonds and others.

3.11 Beta

Beta describes the volatility of a security's return in response to swings in the market.
A security's beta is calculated by dividing the product of the security's return volatility and the market return by the variance of the market return over a specified period.

The beta calculation is used by investors to understand whether a stock moves in the same direction as the rest of the market, and how volatile (risky) it is compared to the market.

Beta is used in the Capital Asset Pricing Model (CAPM), which is a measure of the volatility or systematic risk of a security or portfolio, relative to the entire market.
For example, a beta coefficient can measure the volatility of an individual stock compared to the volatility of the entire market.

Statistically, beta represents the line generated by a regression of data points from the individual stock's return against the market return.

Beta is used in the CAPM, which describes the relationship between systematic risk and the expected return of assets, particularly stocks.

CAPM is widely used in finance to price risky securities and to generate expected returns for assets, taking into account the risk of those assets and the cost of capital.

Beta coefficient (β) = Correlation (Re, Rm) / Variance (Rm)

Where:

- Re = Return on individual stock
- Rm = Return on the overall market
- Correlation = How changes in the stock's return are related to changes in the market return
- Variance = How far the data points of the market spread from their average value

3.12 Difference between Risk and Return

Issue	Risk	Return
Meaning	You can also define risk as the amount of volatility involved in the investment.	Returns are the money you expect on your investment.
Risk	Every investment has some 'risk', although the severity of the risk depends on the class of the investment.	On the other hand, 'returns' are what every investor is behind. It is the most sought after factor in the financial market.
Proportion	According to the trade-off between risk and return, the degree of risk determines the degree of return.	There is no difficulty in determining the degree.
Part	Systemic risk and unsystematic risk are a part of the risk	Expected returns are a part of the return

3.13 Difference between Market Risk and Unique Risk

Issue	Market Risk	Unique risk
meaning	Market risk refers to risk due to common market factors and affects the entire industry.	Unique (specific) risk is the risk to the company that arises due to the characteristics of the company.
Diversity	According to portfolio theory, this risk cannot be eliminated by diversification.	According to portfolio theory, this risk can be overcome by diversification.
Effect	Market risk affects a large number of asset classes	When a unique risk only affects the industry or a particular company
Applicable to whom	Applies to all industries.	The disastrous event of one industries does not apply to another industries.
Examples	Economic recession, security stress, inflation	Fire, production defects, dissatisfaction in the company's products, entry of a competitor.

3.14 Conclusion

The two fundamental determinants of investing in shares and bonds are risks and returns to add values to an investor's wealth. An asset can be considered as a risky asset when the chances of damage to an asset are high. Return is a step as a result of the total gain or loss experienced by the owner in respect of the asset (shares/bonds) during a specified period of time.

In investing, especially in portfolio management, risk and return are two crucial steps in investment decision making. This chapter attempts to provide a brief theoretical understanding with pictures of the return of shares and the risk associated with them, and the directions of the portfolio of shares. The diagrams in the tables and diagrams can contribute significantly to a reader's understanding of the portfolio management of risk and returns.

3.15 Keywords

1. **Beta:** A multiplier, it describes how the expected returns of a stock or portfolio are related to financial market returns.
2. **Portfolio:** A collection of investments held by an organization or private person.
3. **Systemic risks:** risk that cannot be reduced by diversity.
4. **Unsystematic risks:** A company or industry special risk that is inherent in every investment.The amount of temporary risk can be reduced by this proper diversification.
5. **Expected return:** Expected return is the profit or loss that an investor expects on an investment that calls the rate of return or the expected rate.
6. **Probability Distribution**: Investors use potential distributions to anticipate returns on assets such as stocks in a timely manner and to protect their risk.

❖ **Exercise**

Answer the following questions.

1) Describe the concept of risk.
2) Explain the elements of risk.
3) Explain the Measurement of risk.
4) State the meaning of Return.
5) What is probability distribution?
6) What is the expected return?
7) Explain the standard deviation.
8) Explain the portfolio expected return.
9) Explain portfolio diversification.
10) What is beta?
11) Explain the difference between risk and return.
12) Explain the difference between market risk and unique risk.

State whether the following statements are true or false:

1. The expected return of a portfolio is the arithmetic average of the expected returns of its securities.
2. Diversity can reduce the risk.
3. The risk is the possibility that the actual return of the investment will be different from what is expected.
4. Higher risk is equivalent to higher returns.
5. Unique (specific) risk is the risk to the company that arises due to the characteristics of the company.
6. Market risk refers to risk due to common market factors and affects the entire industry.

Answer: 1. False 2. True 3. True 4. False 5. True 6. True

Fill in the blanks:

1. The rate of return expected by investors includes _____ and _____.
2. Beta is useful for comparing the _____ of different stocks.
3. _____ is considered to be the most risky investment.
4. The international threat can include both _____ and _____.
5. Beta is a measure of systematic risk to safety that cannot be avoided by _____.
6. Risk _____ and risk _____ the two main objectives of portfolio management.
7. Every investment involves uncertainties that give future investments a _____ return.
8. Investors use _____ distributions to expect returns on assets such as stocks in a timely manner and to protect their risk.
9. _____ risk refers to risk due to common market factors and affects the entire industry.
10. ____ Risk is a risk to a company that arises due to the characteristics of the company.

Answers:

1. Yield, capital appreciation
2. Systematic risk
3. Equity shares
4. Country's risk, exchange rate risk
5. Diversity
6. To avoid, to reduce
7. Risky
8. Possible
9. Market
10. Unique

UNIT – 4 FUNDAMENTAL ANALYSIS -1 (ECONOMY & INDUSTRY)

4.1. Introduction

Fundamental Analysis (FA) is a comprehensive method of business analysis. It becomes very crucial to understand a firm from many different perspectives when an investor wants to engage in it for the long term. It is crucial for an investor to focus on the underlying company success rather than the daily, short-term disturbance in the stock prices. A corporation with solid fundamentals typically sees its stock price increase over time, generating wealth for its shareholders.

4.2. Meaning and Definition

Fundamental analysis (FA) is the process of determining the fundamental worth of a securities with the goal of profiting from trading in it. Fundamental analysis' main goal is to establish if an asset or stock is cheap or overpriced so that investors may decide whether to purchase, hold, or sell it in order to maximize their prospective profits. Thus, Fundamental analysis is a technique for determining an asset's inherent worth and researching the variables that can affect its price in the future. This type of study is founded on outside factors, financial statements, and market trends.
Here are some definitions of fundamental analysis given by different authors:

- **Investopedia:** Fundamental analysis is a method of evaluating a security's intrinsic value by examining related economic and financial factors. Intrinsic value is the value of an investment based on the issuing company's financial situation and current market and economic conditions.
- **John Burr Williams**: Fundamental analysis is the study of a company's financial statements and other factors to determine its intrinsic value.
- **Warren Buffett:** The essence of investing is the act of moving money from an area of lower expected return to an area of higher expected return. That's what we do at Berkshire Hathaway. And we do that by finding mispriced assets.
- **Benjamin Graham:** The intelligent investor is a realist who sells to optimists and buys from pessimists.

These definitions all emphasize the importance of intrinsic value in fundamental analysis. Intrinsic value is the value of an investment based on its underlying fundamentals, such as its financial statements, industry trends, and competitive landscape. Fundamental analysts believe that the stock market is not always efficient, and that there are opportunities to buy stocks that are trading below their intrinsic value.

Fundamental analysis is a complex and time-consuming process, but it can be a valuable tool for investors who are looking to make long-term investments. Fundamental analysts typically use a variety of ratios and metrics to evaluate a company's financial performance, such as price-to-earnings ratio, price-to-book ratio, return on equity, and debt-to-equity ratio. They also consider the company's management team, competitive landscape, and industry trends.

Once a fundamental analyst has evaluated a company, they will compare its current stock price to its intrinsic value. If the stock price is below the intrinsic value, the analyst may recommend buying the stock. If the stock price is above the intrinsic value, the analyst may recommend selling the stock.

Fundamental analysis is not a perfect science, and it is important to note that there is no guarantee that a stock will trade at its intrinsic value. However, fundamental analysis can be a valuable tool for investors who are looking to make long-term investments in companies that are well-managed and have strong financial prospects.

4.3. Importance of Fundamental Analysis

Fundamental analysis is crucial for several reasons, particularly for investors who take a long-term perspective on their investments. Here are some key reasons why fundamental analysis is important:

- **Intrinsic Value Assessment:** Fundamental analysis helps in determining the intrinsic value of a security or investment. Fundamental analysis is like figuring out how much a stock or investment is really worth. To do this, we look at things like how much money it's making, how much it could grow, and if it's financially healthy. This helps us know the actual value of the investment.
- **Long-Term Investment Decisions:** People who want to build wealth over a long time usually use fundamental analysis. This means they look at a company's basics to find stocks or other things that are likely to grow a lot and do well for a long time.
- **Risk Management:** Understanding the fundamental factors of an investment can aid in risk management. Knowing the basic things about an investment helps you handle risks better. When you check how well a company is doing financially, how much debt it has, and how stable it is overall, you can make smarter choices about whether investing in it has risks or not.
- **Identifying Quality Investments:** Analysing a company's basics helps investors find good investments. If a company has strong basics, a good management team, and competitive advantages, it's usually seen as a better choice for long-term investments.
- **Dividend Investing:** For people who want to earn money from their investments, it's important to look closely at a company's basic information. This helps to figure out if the company can regularly give out a share of its profits, known as dividends. Companies that consistently make money and have a solid financial foundation are more likely to keep giving dividends and may be even increase them in the future.
- **Market Trends and Economic Conditions**: "Looking at the big picture, fundamental analysis involves studying not just individual companies, but also overall economic trends and market situations. By understanding how the economy as a whole is doing, investors can predict changes in the market and make adjustments to their investment plans."

- **Valuation Assessment**: Fundamental analysis provides tools for assessing whether a security is overvalued or undervalued. Investors can use metrics like the price-to-earnings (P/E) ratio, price-to-book (P/B) ratio, and other valuation indicators to make informed decisions about the attractiveness of an investment.
- **Decision-Making During Volatility:** In times of market volatility, fundamental analysis can provide a steady framework for decision-making. Instead of reacting emotionally to short-term market fluctuations, investors can rely on an understanding of a company's fundamentals to guide their decisions.
- **Financial Health Assessment:** Fundamental analysis involves a thorough examination of a company's financial statements. This helps investors gauge a company's financial health, liquidity, and ability to weather economic downturns.
- **Long-Term Strategy Development:** Knowing the basics of an investment is important for planning how to invest for the long term. When investors grasp the key factors that affect an investment's value, they can create a collection of investments that match their money goals and how much risk they're comfortable with.

  While fundamental analysis is powerful, it's important to note that no single approach guarantees success in the complex and dynamic world of investing. Investors often combine fundamental analysis with other methods, such as technical analysis and market sentiment analysis, for a more comprehensive investment strategy.

4.4. Economic Analysis in Fundamental Analysis

Economic analysis is a study of the economy and its impact on businesses. It is one of the components of fundamental analysis, which is a method of evaluating a company's value by examining its financial performance and the economic environment in which it operates.

Economic analysis helps investors to understand whether the economic conditions are favourable for companies to grow and prosper. It involves examining a variety of economic factors, including GDP, government spending and borrowing, consumer spending, capital markets, savings rate, investment patterns, interest rates, inflation rates, tax rates, foreign direct investment, and money supply and demand.

By understanding these economic factors, investors can make better predictions about the future of share prices. For example, if the economy is growing and consumer spending is strong, this is likely to be positive for stock prices. On the other hand, if the economy is in a recession and consumer spending is weak, this is likely to be negative for stock prices.

In addition to helping investors to predict future stock prices, economic analysis can also be used to identify investment opportunities. For example, if an economic analyst believes that a particular sector or industry is poised for growth, they may recommend investing in companies in that sector or industry.

Overall, economic analysis is a valuable tool for investors who want to make informed investment decisions. By understanding the economic factors that can affect stock prices, investors can increase their chances of success in the stock market.

4.4.1. Tool of Economic Analysis

Economic analysis is a tool that investors use to understand the factors that can affect stock prices. Some of the most important economic factors include:

- **Gross Domestic Product (GDP):** GDP is the total value of all goods and services produced in a country in a given year. A growing GDP indicates a growing economy, which is generally good for stock prices.
- **Fiscal Policy:** Fiscal policy is the use of government spending and taxation to influence the economy. Government spending on infrastructure, education, and other programs can boost economic growth and benefit stock prices. On the other hand, tax increases can reduce corporate profits and stock prices.
- **Monetary Policy:** Monetary policy is the use of interest rates and other tools to control the money supply. The central bank sets interest rates, which affect the cost of borrowing for businesses and consumers. Lower interest rates can stimulate economic growth and stock prices, while higher interest rates can slow growth and hurt stock prices.
- **Savings Rate:** The savings rate is the percentage of disposable income that households save. A higher savings rate means more money available for investment, which can boost stock prices.
- **Trade Deficit**: A trade deficit occurs when a country imports more goods and services than it exports. This can hurt domestic producers and reduce corporate profits, which can lead to lower stock prices.
- **Exchange Rate:** The exchange rate is the price of one currency in terms of another. A weaker currency can make a country's exports more competitive, which can boost corporate profits and stock prices. On the other hand, a stronger currency can make exports less competitive, which can hurt corporate profits and stock prices.

Investors should consider all of these economic factors when making investment decisions. In addition to the above, here are some other economic factors that can affect stock prices:

- **Inflation:** Inflation is the rate at which prices for goods and services are rising. Higher inflation can erode the value of corporate profits and stock prices.
- **Unemployment:** Unemployment is the percentage of the labour force that is unemployed. Higher unemployment can lead to lower demand for goods and services, which can hurt corporate profits and stock prices.
- **Consumer confidence:** Consumer confidence is a measure of how optimistic consumers are about the future. Higher consumer confidence can lead to increased spending, which can boost economic growth and stock prices.
- **Business confidence**: Business confidence is a measure of how optimistic businesses are about the future. Higher business confidence can lead to increased investment and hiring, which can boost economic growth and stock prices.

Investors should monitor all of these economic factors and make investment decisions based on their own analysis.

4.5. Industry Analysis in Fundamental Analysis

Industry analysis is a study of the competitive landscape and trends in a particular industry. It is an important part of fundamental analysis, which is a method of evaluating a company's value by examining its financial performance and the economic environment in which it operates. Industry analysis is a crucial component of fundamental analysis, helping investors evaluate the prospects of a particular sector or industry. Understanding the dynamics of a specific industry provides valuable insights into the potential performance of companies operating within that sector.

Industry analysis helps investors to:

- Understand the competitive forces at play in an industry and how they are likely to impact a company's performance.
- Identify potential opportunities and threats in the industry.
- Assess a company's competitive position and its strengths and weaknesses relative to its peers.
- Make more informed investment decisions.

To conduct an industry analysis, investors typically consider the following factors:

- Industry structure: This includes the number of competitors in the industry, the level of competition, and the barriers to entry and exit.
- Industry trends: This includes growth trends, technological trends, and regulatory trends.
- Competitive landscape: This includes the strengths and weaknesses of the company's main competitors.
- Company's competitive position: This includes the company's market share, its brand strength, and its cost structure.

Investors can use the information gathered from industry analysis to make investment decisions, such as whether to buy, sell, or hold a company's stock. For example, if an investor believes that an industry is poised for growth and that a particular company has a strong competitive position, they may decide to buy the company's stock.
Here are some examples of how industry analysis can be used in fundamental analysis:

- An investor might be interested in investing in the technology sector because they believe that it is poised for growth due to the increasing adoption of new technologies.
- An investor might be interested in investing in a particular biotechnology company because they believe that the company has a strong competitive position due to its innovative drug pipeline.
- An investor might be interested in investing in a particular bank because they believe that the company has a strong competitive position due to its large branch network and its strong customer loyalty.

Overall, industry analysis is a valuable tool for investors who want to make informed investment decisions. By understanding the competitive landscape and trends in a particular industry, investors can increase their chances of success in the stock market.

- An investor might be interested in investing in a particular bank because they believe that the company has a strong competitive position due to its large branch network and its strong customer loyalty.

Overall, industry analysis is a valuable tool for investors who want to make informed investment decisions. By understanding the competitive landscape and trends in a particular industry, investors can increase their chances of success in the stock market.

4.6. Advantage of Fundamental Analysis

1. Fundamental analysis helps investors find stocks that may be priced lower than they're really worth. Analysts look at a company's true value to identify stocks that could be a good deal. This gives investors a chance to buy stocks at a lower price and make money over a long period.
2. It helps investors understand how a company works and its competition. By looking at financial statements and industry trends, analysts can figure out a company's operations and what might affect its future. This knowledge helps investors make smarter choices when investing.
3. Fundamental analysis lowers the risk for investors. By putting money into companies with strong financial basics, analysts help investors avoid big losses. Strong companies can better handle tough economic times and other challenges.
4. It guides investors in making long-term choices. Fundamental analysis looks at companies with strong basics and growth potential. This helps investors reach their financial goals over a long time.
5. It's a clear and fair process. Fundamental analysis relies on information available to the public, like financial statements. This makes it a fair and clear way to evaluate companies.
6. It works for different types of investments. Fundamental analysis can be used for stocks, bonds, and real estate. This flexibility lets investors create a varied investment mix.
7. It makes investors more aware of the economy and finance. By doing fundamental analysis, investors learn about different industries, companies, and economic factors. This makes them smarter investors overall.
8. It gives a deep understanding of companies. Analysts spend lots of time studying and analysing individual companies. This helps them really understand a company's model, competition, and money performance.
9. It identifies trends and opportunities. Analysts, by studying financial statements and industry trends, can find trends and opportunities that others might miss. This gives them an advantage in the market.
10. It tailors a portfolio to individual needs. Analysts use their knowledge to create a portfolio that fits individual needs and goals. This helps investors reach their financial aims.
11. It aims for consistent long-term returns. While it doesn't promise profits, fundamental analysis helps investors make consistent returns over time. Analysts focus on finding companies with strong basics and future growth potential.
12. It's a rewarding and interesting experience. Fundamental analysis is a challenging and interesting activity. It's fulfilling for investors who enjoy learning about different businesses and industries.

Overall, fundamental analysis is a valuable tool for investors who want to make informed investment decisions and achieve their long-term financial goals.

4.7. Disadvantages of fundamental analysis

1. Analysing companies and industries in fundamental analysis takes a lot of time, which can be tough for investors with limited time or resources.
2. Fundamental analysis is complicated, especially for new stock market investors. There are many factors to think about, and figuring out one particular matter as most important can be tricky.
3. Fundamental analysis relies on personal opinions. Different investors may see a company's value differently, even with the same data. This can lead to different investment choices, even if they use the same analysis method.
4. It's based on past and current data, but the future is uncertain. Predicting how a company will do in the future, even with a good track record, is challenging.
5. It doesn't promise success. Even with thorough analysis, there's no guarantee investors will make money. The stock market might not agree with their assessment of a company's value.
6. Data can be tricky. Financial statements used in fundamental analysis can be misleading. Companies might use practices to make their financial performance look better than it is.
7. The market isn't always logical. Stock prices can be influenced by various things, like investor feelings, news, and technical analysis. Even if a company is strong, its stock price might not show its true value.
8. Finding undervalued stocks is hard. In a competitive market, it's tough to find good deals because many investors use fundamental analysis to find undervalued stocks, driving up prices.
9. It can cost a lot. Fundamental analysis, especially with financial databases or professional analysts, can be expensive.
10. It needs technical knowledge. Investors must understand accounting and finance for fundamental analysis, which is a challenge for those without a background in these areas.
11. It can be biased. Fundamental analysts might favour certain companies or industries, leading to poor investment decisions.
12. Not for everyone. Fundamental analysis suits investors with time, resources, and research skills. New investors or those with limited time might prefer other investment strategies.

Overall, fundamental analysis is a valuable tool for investors, but it is important to be aware of its limitations. Fundamental analysis is time-consuming, complex, and subjective. It is also important to remember that there is no guarantee of success with fundamental analysis.

❖ **Exercise**

Fill in the blanks:

1. Fundamental analysis is a method used to evaluate the _____ of a security by analysing various financial, economic, and other qualitative factors.
2. In fundamental analysis, investors examine a company's financial statements, such as the income statement and balance sheet, to assess its _____ health.
3. The primary importance of fundamental analysis lies in helping investors make informed decisions about buying or selling securities based on a company's _____ and future potential.

4. Economic analysis in fundamental analysis involves studying macro-economic factors, such as GDP growth, inflation, and unemployment rates, to understand the overall _____ conditions.
5. In fundamental analysis, industry analysis is crucial as it helps investors assess the growth prospects and challenges faced by companies within a specific _____.
6. One advantage of fundamental analysis is that it provides a _____ perspective on a company's value, helping investors make long-term investment decisions.
7. One limitation of fundamental analysis is that it may not account for short-term market _____ or sudden changes in investor sentiment.

Answers:

1. Value
2. Financial
3. Current
4. Economic
5. Industry
6. Comprehensive
7. Volatility

Answer the following questions:

1. What is the primary focus of fundamental analysis?
2. Define fundamental analysis in your own words
3. Why is fundamental analysis important for investors?
4. How does economic analysis contribute to fundamental analysis?
5. In fundamental analysis, why is industry analysis considered crucial?
6. What is a key advantage of using fundamental analysis in investment decision-making?
7. Mention a potential drawback of relying solely on fundamental analysis.

Write Short Note on:

1. Importance of Fundamental Analysis
2. Economic Analysis in Fundamental Analysis
3. Industry Analysis in Fundamental analysis
4. Advantage of Fundamental Analysis
5. Disadvantages of fundamental analysis

UNIT – 5 FUNDAMENTAL ANALYSIS - II (COMPANY)

5.1 Introduction

Concept of Investment has emerged by dividing our surrounding people into two categories; one who have excess of savings and other who are in need of fund. In such a situation to regulate the free flow of funds in the economy, the concept of Investment has emerged in which funds are transferred from savings into funds attracting handsome return. There are various investment avenues, like, gold, fixed deposits, government bonds, real estate, securities, corporate bonds etc. From these avenues, now a day, and the curiosity to buy securities has increased.

Now the question is how to invest hard earned money in the securities to get maximum return? To answer this question, one of the methods, is fundamental analysis. It is a method which covers financial statements of the company, external influences, events and industry trend etc. factors to analyse the intrinsic value of the stock or securities which helps to investors as well as company to take future decisions regarding fund investment into the securities. It consists three main components, namely, economic analysis, industry analysis and company analysis.

In the previous unit you have learnt the basics and overview of the fundamental analysis. Let's discuss this topic further in this unit and learn the company's fundamental analysis in detail.

5.2 Classification/ Types of Fundamental Analysis

Fundamental analysis consists two types which are mentioned and explain below:

1. **Qualitative Analysis:** As the name suggests, qualitative analysis considers the qualitative factors of a company, such as goodwill, demand, consumer behaviour, company recognition in the broader market, competitive analysis, and brand value. It also aims to determine how the management is, the impact of their decisions on the market, and depicts their socio-economic position. Qualitative analysis is usually considered subjective.
2. **Quantitative Analysis:** Quantitative analysis is related to the measurable characteristics of a business. Hence, the biggest source of quantitative analysis is financial statements. Quantitative analysis is about statistics, reports, and data. It

considers statements, balance sheets, cash flows, debt, quarterly performance, and many financial ratios to understand the company's overall financial health and determine the share's price

5.3 Basics of Fundamental Analysis

Before conducting fundamental analysis of a stock and securities, following basics factors are considered. These factors are –

- **Company's structure and revenue:** To know overall structure and how it generates the revenue.
- **Company's profits over the years:** To analyse company's historical profit trends to understand its financial performance.
- **Revenue growth over the years:** To evaluate the consistency and growth of the company's revenue over the time.
- **Company's debt:** To examine the level of debt the company holds, as excessive debt can impact financial stability.
- **Corporate governance:** To assess the company's governance practice and the effectiveness of its leadership.
- **Rate of turnover:** To evaluate how efficiently the company manages its assets by considering the rate of turnover.

Normally, analysts look at these six factors while conducting a fundamental analysis of any security and determine its intrinsic value.

5.4 Qualitative factors affect to the Company & Industry

Fundamental analysis seeks to determine the intrinsic value of a company's stock. But since qualitative factors, by definition, represent aspects of a company's business that are difficult or impossible to quantify, incorporating that kind of information into a pricing evaluation can be quite difficult. Some qualitative factors are mentioned below which gives the idea about company's performance.

Business Model:

Even before an investor looks at a company's financial statements or does any research, one of the most important questions that should be asked is: What exactly does the company do? This is referred to as a company's business model – it's how a company makes money. You can get a good overview of a company's business model by checking out its website or reading the first part of its 10-K report (a comprehensive overview of the company's business and financial condition and includes audited financial statements. Sometimes business models are easy to understand. On the other hand, you'd be surprised how complicated it can get.

Competitive advantage:

Another business consideration for investors is competitive advantage. A company's long-term success is driven largely by its ability to maintain a competitive advantage - and keep it. When a company can achieve competitive advantage, its shareholders can be well rewarded for decades. Harvard Business School professor Michael Porter distinguishes between strategic positioning and operational effectiveness. Operational effectiveness means a company is better than rivals at similar activities while competitive advantage means a company is performing better than rivals by doing different activities or

performing similar activities in different ways. Investors should know that few companies are able to compete successfully for long if they are doing the same things as their competitors.

Management:

Just as an army needs a general to lead it to victory, a company relies upon management to steer it towards financial success. Some believe that management is the most important aspect for investing in a company. It makes sense - even the best business model is doomed if the leaders of the company fail to properly execute the plan.

Corporate Governance:

Corporate governance describes the policies in place within an organization denoting the relationships and responsibilities between management, directors and stakeholders. These policies are defined and determined in the company charter and its bylaws, along with corporate laws and regulations. The purpose of corporate governance policies is to ensure that proper checks and balances are in place, making it more difficult for anyone to conduct unethical and illegal activities. Good corporate governance is a situation in which a company complies with all of its governance policies and applicable government regulations in order to look out for the interests of the company's investors and other stakeholders. Financial and Information Transparency, Stakeholder Rights, Structure of the Board of Directors etc. are the various aspects which are to be analysed by the investors while investing into a company.

Business model, Management and Corporate Governance, these three areas are all important to consider when analysing qualitative factors of any company. Now move on to looking at qualitative factors in the environment in which the company operates i.e. qualitative factors of industry.

Customers:

Some companies serve only a handful of customers, while others serve millions. In general, it's a red flag (a negative) if a business relies on a small number of customers for a large portion of its sales because the loss of each customer could dramatically affect revenues. For example, think of a military supplier who has 100% of its sales with the Indian government. One change in government policy could potentially wipe out all of its sales. For this reason, companies will always disclose in their 10-K if any one customer accounts for a majority of revenues.

Market Share:

Understanding a company's present market share can tell volumes about the company's business. The fact that a company possesses an 85% market share tells you that it is the largest player in its market by far Furthermore, this could also suggest that the company possesses some sort of "economic moat," in other words, a competitive barrier serving to protect its current and future earnings, along with its market share. Market share is important because of economies of scale. When the firm is bigger than the rest of its rivals, it is in a better position to absorb the high fixed costs of a capital-intensive industry.

Industry Growth:
One way of examining a company's growth potential is to first examine whether the number of customers in the overall market will grow. This is crucial because without new customers, a company has to steal market share in order to grow.

In some markets, there is zero or negative growth, a factor demanding careful consideration. For example, a manufacturing company dedicated solely to creating audio compact cassettes might have been very successful in the '70s, '80s and early '90s. However, that same company would probably have a rough time now due to the advent of newer technologies, such as digital apps and online platform. The current market for audio compact cassettes is only a fraction of what it was during the peak of its popularity.

Competition:

Simply looking at the number of competitors goes a long way in understanding the competitive landscape for a company. Industries that have limited barriers to entry and a large number of competing firms create a difficult operating environment for firms. One of the biggest risks within a highly competitive industry is pricing power. This refers to the ability of a supplier to increase prices and pass those costs on to customers. Companies operating in industries with few alternatives have the ability to pass on costs to their customers.

Regulation:

Certain industries are heavily regulated due to the importance or severity of the industry's products and/or services. As important as some of these regulations are to the public, they can drastically affect the attractiveness of a company for investment purposes.
In industries where one or two companies represent the entire industry for a region (such as utility companies), governments usually specify how much profit each company can make. In these instances, while there is the potential for sizable profits, they are limited due to regulation. In other industries, regulation can play a less direct role in affecting industry pricing. For example, the drug industry is one of most regulated industries. And for good reason - no one wants an ineffective drug that causes deaths to reach the market.

5.5 Quantitative factors affect to the Company

The sheer volume of numbers in a company's financial statements can be surprising and intimidating to many investors. On the other hand, financial statements are a gold mine of information if you know how to analyse them.
Financial statements are the means by which a company discloses information regarding its financial performance. Followers of fundamental analysis use quantitative information obtained from financial statements to make investment decisions. There are basically three main statements in financial statements which are as follows:

- **Balance Sheet:** statement which shows the business position with company’s assets and liabilities.

  A balance sheet represents a record of a company's assets, liabilities, and equity at a specific point in time. A balance sheet is named by the fact that the financial structure of a business is balanced as follows:

Assets = Liabilities + Shareholders' Equity

Assets represent the resources that a business owns or controls at a given point in time. This includes items such as cash, inventory, machinery and buildings. The other side of the equation represents the total value of the financing the company used to acquire those assets.

Credit comes as a result of liabilities or equity. Liabilities represent debt (which of course must be paid back), while equity represents the total value of money that the owners have contributed to the business – including retained earnings, which are profits made in previous years.

- **Income Statement:** statement which shows the financial result of the business.
  While the balance sheet takes a snapshot approach to examining a business, the income statement measures a company's performance over a specific time frame. Technically, you may have a balance sheet for a month or even a day, but you will only see the quarterly and annual reports of public companies.
- **Cash Flow Statement:** statement shows the cash inflows and cash outflows during the year consisting operation, investing and financial activities. Cash flow statement is important because it is very difficult for a business to manipulate its cash situation. Aggressive accountants can do a lot to manipulate earnings, but counterfeiting cash in the bank is difficult. For this reason, some investors use the cash flow statement as a more conservative measure of company performance.

In India, the Securities and Exchange board of India (SEBI) requires all companies that are publicly traded on a major exchange to submit periodic filings detailing their financial activities, including the financial statements mentioned above.

5.6 Other factors

Financial statements aren't the only parts found in a business's annual and quarterly SEC filings. Here are some other notable sections:

Management Discussion and Analysis (MD&A):

As a preface to financial statements, a company's management will typically spend a few pages talking about the most recent year (or quarter) and providing a background of the company. This is known as Management Discussion and Analysis (MD&A). Apart from providing investors with a clear picture of what the company does, the MD&A also shows some key areas in which the company has performed well.

Don't expect the letter from management to delve into all the juicy details affecting the company's performance. The management's analysis is at their discretion, so understand they probably aren't going to be disclosing any negatives.

The Auditor's Report:
Auditors' job is to express an opinion on whether the financial statements are reasonably accurate and provide adequate disclosure. This is the purpose behind the auditor's report, sometimes called the "independent accountants' report".

By law, every public company that trades stocks or bonds on an exchange must have its annual reports audited by a certified public accountants' firm. An auditor's report is meant to scrutinize the company and identify anything that might undermine the integrity of the financial statements.

The Notes to the Financial Statements:

Just as the MD&A serves an introduction to the financial statements, the notes to the financial statements (sometimes called footnotes) tie up any loose ends and complete the overall picture. If the income statement, balance sheet and statement of cash flows are the heart of the financial statements, then the footnotes are the arteries that keep everything connected. Therefore, if you aren't reading the footnotes, you're missing out on a lot of information.

The footnotes list important information that could not be included in the actual ledgers. For example, they list relevant things like outstanding leases, the maturity dates of outstanding debt and details on compensation plans, such as stock options, etc.

5.7 Case Study

Fundamental Analysis of Tata Motors

❖ **INDUSTRY ANALYSIS: AUTOMOBILE INDUSTRY**

The Indian automobile industry has historically served as a reliable indicator of the country's economic performance, reflecting both macroeconomic expansion and technological advancements. The dominance of the two-wheeler segment in terms of volume can be attributed to the increasing middle-class population and the significant proportion of young people in India. Additionally, the sector has experienced growth due to companies' growing interest in exploring rural markets. The demand for commercial vehicles is being driven by the expanding logistics and passenger transportation industries.

The Indian market holds a strong position globally in the heavy vehicles sector, with the country being the largest producer of tractors, the second-largest manufacturer of buses, and the third-largest producer of heavy trucks. In the fiscal year 2021-2022, India produced 22.93 million vehicles, highlighting its substantial manufacturing capacity.

India's auto export industry is also noteworthy, with expectations of strong growth shortly. The Indian government has implemented several initiatives to further boost the industry, including the Automotive Mission Plan 2026, the scrappage policy, and the production-linked incentive scheme. These initiatives aim to position India as a global leader in the two-wheeler and four-wheeler markets by 2022.

Political factors:

The Indian automobile industry has attracted many investors. All these are pooled in three main regions despite the expansive size of the country. This is due to the fact that these areas are more developed as compared to other regions. The government has a hand in this because it has invested in the development of these regions. Politically speaking, the automobile industry has greatly benefited from the government of India. The government

has set up bodies that help the automobile industry in carrying out research and development. These bodies also maintain a monitoring system for the automobile industry.

Economic factors:

India has also been experiencing economic growth at an average of 6% and the automobile industry contributes 22% to the GDP of the country. This makes it a very important income-generating activity for the country. This growth has rippled its way to create consumers as there is a huge growing middle class in India. This class of people is increasingly purchasing automobiles and this is evident in the increased sales of certain vehicles in the past decade. Without economic growth, India would not be able to attract as many foreign investors in the automobile industry. It is thus important for the country to sustain this upward growth as it will affect all its manufacturing industries.

Social factors:

India is fast becoming an automobile industry hub because of its large population. This forms a bustling market for the manufacturers. The tastes of the population may vary but manufacturers always take note of the fast- selling automobiles and create appropriate designs. For instance, in the past three years, there has been a surge in two-wheeler vehicles because of their convenience in the country. Many automobile industries have created these vehicles for domestic consumers.

Technological factors:

The automobile industry has grown because there are several technological inventions. These are used not only in the manufacture of the vehicles but also to reduce expenses for the vehicle buyers. The government is also helping in research and development to ensure that both producers and consumers are happy and encouraged to invest in the automobile industry.

Environmental factors:

Environmental factors have influenced the automobile industry in India because more investors are opting to manufacture environmentally friendly vehicles. These include vehicles that consume less fuel and emit less fumes. There are also some investors who have chosen to manufacture electric vehicles in a bid to conserve energy and the environment.

Legal factors:

Legal factors have played a role in the recent expansion of the Indian automobile industry. This is because the industry is extremely incentivized with investors being given 100% foreign direct investment pass. There are also zero taxes for the investors who ship the cars to other countries from their manufacturing bases in India. By easing the legal rules affecting the industry, the government of India has encouraged varied automobile companies to set up shop in the country.

- **COMPANY ANALYSIS: TATA MOTORS**

HISTORY:

Tata Motors was founded in 1945, as a locomotive manufacturer. Tata Group entered the commercial vehicle sector in 1954 after forming a joint venture with Daimler-Benz of Germany in which Tata developed a manufacturing facility in Jamshedpur for Daimler lorries. By November of 1954 Tata and Daimler manufactured their first goods carrier chassis at their Jamshedpur plant with 90-100hp and a capacity of 3-5 tons. After years of dominating the commercial vehicle market in India, Tata Motors entered the passenger vehicle market in 1991 by launching the Tata Sierra, a sport utility vehicle based on the Tata Mobile platform. Tata subsequently launched the Tata Estate (1992; a station wagon design based on the earlier Tata Mobile), the Tata Sumo (1994, a 5-door SUV), and the Tata Safari (1998).

CURRENT STATUS:

Tata Motors Limited is an Indian multinational automotive manufacturing company, headquartered in Mumbai, India, which is part of the Tata Group. The company produces passenger cars, trucks, vans, coaches, and buses. Tata Motors has auto manufacturing and vehicle plants in Jamshedpur, Pant Nagar, Lucknow, Sanand, Dharwad, and Pune in India, as well as in Argentina, South Africa, the United Kingdom, and Thailand. It has research and development centres in Pune, Jamshedpur, Lucknow, Dharwad, India South Korea, the United Kingdom, and Spain. Tata Motors is listed on the BSE (Bombay Stock Exchange), where it is a constituent of the BSE SENSEX index, the National Stock Exchange of India, and the New York Stock Exchange. The company is ranked 265th on the Fortune Global 500 list of the world's biggest corporations as of 2019. Tata Motors' principal subsidiaries include British premium car maker Jaguar Land Rover (the maker of Jaguar and Land Rover cars) and the South Korean commercial vehicle manufacturer Tata Daewoo. Tata Motors has a construction-equipment manufacturing joint venture with Hitachi (Tata Hitachi Construction Machinery), and a joint venture with Stellates which manufactures automotive components and Fiat Chrysler and Tata branded vehicles. On 12 October 2021, private equity firm TPG invested $1 billion in Tata Motors' electric vehicle subsidiary.

SIZE OF THE COMPANY:

Formerly	Tata Engineering and Locomotive Company Ltd. (TELCO)
Total assets	₹336,081.38 crore (US$42 billion) (2023)
Total equity	₹45,321.80 crore (US$5.7 billion) (2023)
Number of employees	59,000+(2022)
Parent	Tata Group

VISION: By the year 2024, Tata Motors' Vision and mission going to become the most aspirational Indian auto brand, consistently winning, by
Delivering superior financial returns
Driving sustainable mobility solutions
Exceeding customer expectations, and
Creating a highly engaged workforce
Encompassing description

MISSION: We innovate mobility solutions with passion to enhance the quality of life

VALUE: We innovate mobility solutions with passion to enhance the quality of life.
Integrity
Teamwork
Accountability
Customer focus
Excellence
Speed

SWOT ANALYSIS:

A SWOT analysis is a valuable tool for strategic planning. It evaluates the Strengths, Weaknesses, Opportunities, and Threats of a business, project, or individual. By identifying internal and external factors that could impact success or failure, a SWOT analysis can inform a strategic plan. In this article, we will conduct a SWOT analysis of Tata Motors. A SWOT analysis is a valuable tool for strategic planning. It evaluates the Strengths, Weaknesses, Opportunities, and Threats of a business, project, or individual. By identifying internal and external factors that could impact success or failure, a SWOT analysis can inform a strategic plan. In this article, we will conduct a SWOT analysis of Tata Motors.

Strengths:

TATA Motors has a well-diversified portfolio of vehicles which includes right from economical passenger vehicles to luxury cars and the penetration of TATA Motors into the commercial vehicle segment is also very impressive. It creates a brand royalty for the company.

Weaknesses:

The revenue of Tata Motors is heavily dependent on the JLR (Jaguar land rover) segment, which can hit the business and profitability if a slowdown occurs in this segment. In 2019 such situations occurred for the company when there was a massive decline in demand for JLR in Chinese and European markets and the rest was fuelled by the pandemic in 2020.

Opportunities:

- With the advent of Electric Vehicles in India and other nations, TATA Motors can take advantage of its innovative legacy to increase its market share in the EV segment. Its sister companies like TATA Power can create the entire EV environment by installing more charging stations.

- With the economy coming on track and industries coming out of recession, the purchasing power of people is expected to increase which TATA Motors can use to increase their revenues and market share in the PV segment.

Threats

- The government's increasing concern for the environment has posed various threats to the company as various policies BS-VI (Bharat Stage Emission Standards 6 pertain to regulations that control the emission of pollutants by setting allowable levels for vehicles within the country) have been implemented in the past to reduce pollution which has caused an overall slowdown in the industry.
- International issues like Brexit, the Chinese Economy Slowdown, US import tariff, trade wars, and pandemics can severely affect the company in the future as it has also done in recent years.
- With the advent of foreign PV companies like MG, and Kia in India, the market share of existing companies will shrink severely and TATA Motors will be the one among them.

Tata Motors, as a significant player in the global automotive industry, possesses several strengths that have solidified its position in the market. This includes a diverse product portfolio, a strong domestic presence, and a growing focus on innovation and technology, such as electric and autonomous vehicles.

The SWOT analysis of Tata Motors paints a comprehensive picture of the company's strategic position in the automotive industry. It underscores the need for continued strategic planning and execution to maximize its strengths, address its weaknesses, seize opportunities, and mitigate the threats it faces in this dynamic industry.

5.8 Conclusion

Fundamental Analysis serves as robust tool for investors seeking a thorough understanding of a company's intrinsic value and long-term potential. By evaluating financial and non-financial factors, investors can make informed decisions aligned with stock's true worth. While fundamental analysis provides a comprehensive view, it contracts with technical analysis, which focuses on short-term price movements. Despite its time-consuming nature and susceptibility to emotional influences, fundamental analysis remains a cornerstone for investors adopting a strategic value-oriented approach to the market.

❖ Exercises

Answer the following questions:

1. Explain the types of fundamental analysis in detail.
1. Which basic factors are to be considered while fundamental analysis?
2. Explain in detail the qualitative factors affecting industry and company's fundamental analysis.
3. Explain in detail the quantitative factors affecting industry and company's fundamental analysis.
4. Explain in detail the other factors affecting (except qualitative and quantitative) industry and company's fundamental analysis.
5. Do the fundamental analysis of any company and industry in detail.

PART - 2

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SEMESTER-3 FINANCE
SECURITY ANALYSIS & PORTFOLIO MANAGEMENT (SAPM)
BLOCK: 2

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UNIT – 6 TECHNICAL ANALYSIS

6.1 Introduction

The share price movement is analysed broadly with two approaches, namely, the fundamental approach and the technical approach. The fundamental approach analyses the share prices on the basis of economic, industry and company statistics. If the price of the share is lower than its intrinsic value, the investor buys it. But if he finds the price of the share higher than the intrinsic value he sells and gets profit. The technical analyst mainly studies the stock price movement of the security market. If there is an uptrend in the price movement investors may purchase the scrip. With the onset of fall in price he may sell it and move from the scrip. Basically, technical analysts and fundamental analysts aim at a good return on investment. The technical analysis is based on the doctrine given by Charles H. Dow in 1884, in the Wall Street Journal. He wrote a series of articles in the Wall Street Journal. A.J. Nelson, a close friend of Charles Dow formalized the Dow Theory for economic forecasting. The analysts used charts of individual stocks and moving averages in the early 1920's. Later on, with the aid of calculators and computers, sophisticated techniques came into vogue

6.1.1 Technical Analysis

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

Assumptions

1) The market value of the scrip is determined by the interaction of supply and demand.
2) The market discounts everything. The price of the security quoted represents the hopes, fears and inside information received by the market players. Inside information regarding the issuing of bonus shares and right issues may support the prices. The loss of earnings and information regarding the forthcoming labour

problem may result in fall in price. These factors may cause a shift in demand and supply, changing the direction of trends.

3) The market always moves in trend. Except for minor deviations, the stock prices move in trends. The price may create definite patterns too. The trend may lie either increasing or decreasing. The trend continues for some time and then it reverses.
4) Any layman knows the fact that history repeats itself. It is true to the stock market also. In the rising market investors' psychology have tip beats and they purchase the shares in greater volumes, driving the prices higher. At the same time, in the downtrend they may be very eager to get out of the market by selling them and thus plunging the share price further. The market technicians assume that past prices predict the future.

6.2 The Dow Theory in technical analysis

Originally proposed in the late nineteenth century by Charles H. Dow, the editor of the Wall Street Journal, the Dow theory is perhaps the oldest and best-known theory of technical analysis.

Dow Theory expresses his ideas on price actions in the stock market. Charles Dow was also one of the founders of Dow Jones and Company, as well as the first editor of Wall Street Journal, where he published his ideas on the behaviour of the stock market.

Dow Theory served as an initial basis for further development of technical analysis, and nowadays it still plays an important role in the financial world.

Dow never managed to publish the complete theory on the market, and due to this, after Dow's death (1902) several followers William Peter Hamilton, Robert Rhea and E. George Schaefe collectively represented his theory, based on his reviews.
The Dow Theory is made up of six tenets, and all traders who decide to use technical analysis should know these 6 principles, as they will help them to better understand how the markets work.

1. The Averages Discount Everything

Every single factor, information that is likely to have influence on both demand and supply is reflected in the market price. For example, presidential elections in the United States or the introduction of a new product, etc.

2. The Market Has Three Trends

Dow has considered a trend to have three parts: primary, secondary, and minor.

Primary Trend

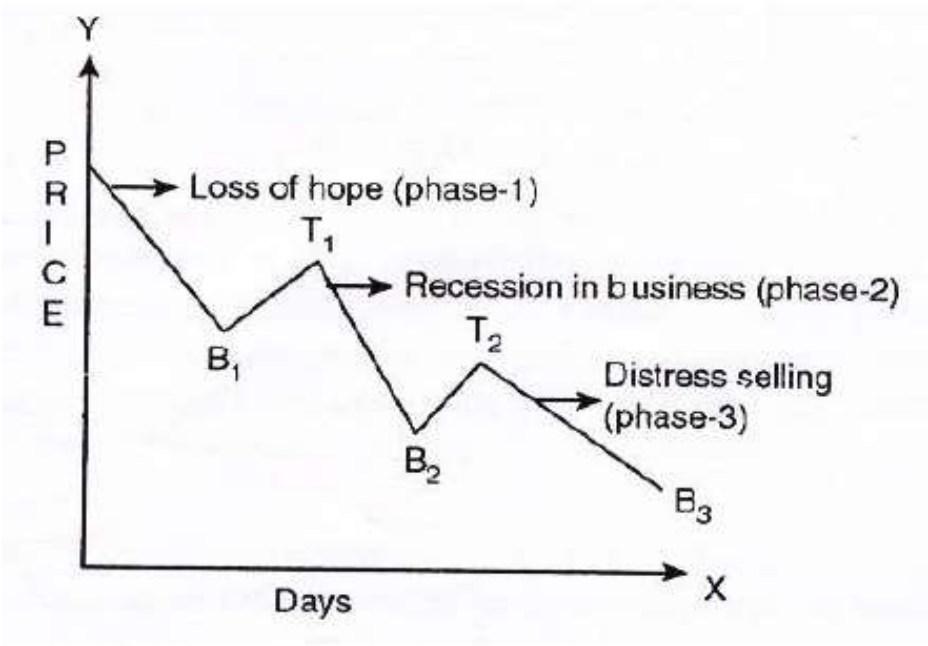
The security price trend may be either increasing or decreasing. When the market exhibits an increasing trend, it is called a bull market. The bull market shows three clear-cut peaks. Each peak is higher than the previous peak. The bottoms are also higher than the previous bottoms. The reactions following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

The phases leading to the three peaks are revival, improvement in corporate profit and speculation. The revival period encourages more and more investors to buy scrip their

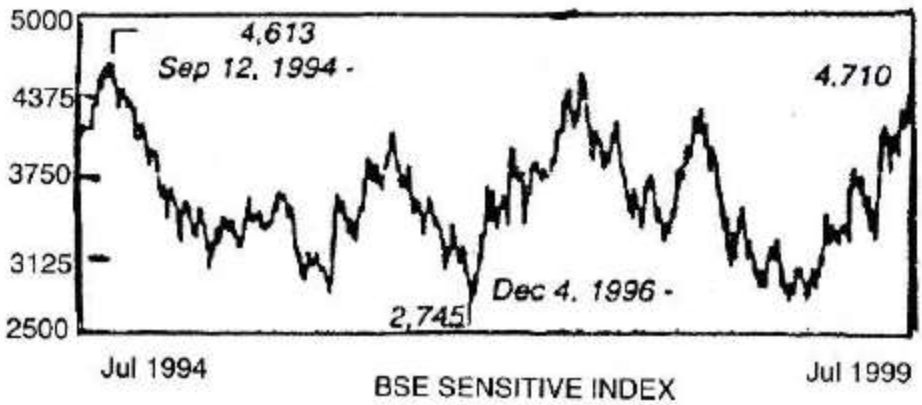
expectations about the future being high. In the second phase, increased profits of corporate would result in further price rise. In the third phase, prices advance due to inflation and speculation. The figure gives the three phases of the bull market.

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

The final phase is characterized 1' the distress sale of shares. During the bear phase of 1996, in the Bombay Stock Exchange more than 2/3 of stocks were inactive. Most of the scrip's were sold below their par values. The figure gives the bear market. Here the tops and bottoms are lower than the previous ones. The bull and bear phases of the Indian stock market are given in Figure.



Bear and Bull Markets



The Secondary Trend

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

upward and corrects the main trend. The correction wou1d be 33% to 66% of the earlier fall. Intermediate trend corrects the overbought and oversold conditions. It provides the space to the market. Compared to the time taken for the primary trend, the secondary trend is swift and quicker.

Minor Trends

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

3. Major Trends Have Three Phases

Dow states that there are three phases to every primary (major) trend, which is the most important trend to be paid attention to.

Accumulation phase – the first stage of informed investors to start entering the market with the belief that a turning point is inevitable.

Public participation phase – in this phase prices start rising rapidly and economic news improves becoming more optimistic.

Distribution phase – this phase takes place when economic conditions and news reach their peaks. Many investors become more encouraged and public participation increases, as media keeps on publishing bullish stories.

4. The Averages Must Confirm Each Other

Dow stated that for having a valid change of trend, the Industrial and Rail Averages must confirm each other. Both averages must exceed the previous peak to confirm the inception or continuation of a bull market. According to Dow, the signals did not have to occur simultaneously, but he believed that a shorter length of time between the two signals provided stronger confirmation.

5. Volume Must Confirm the Trend

Dow paid much attention to price action because he considered the main signals for buying and selling to be based on price movements. Dow recognized volume as a secondary indicator, which played an important role in confirming price signals. In other words, the volume should expand in the direction of the primary/ major trend.

6. A Trend Is Assumed to Be Continuous Until Definite Signals of Its Reversal

Dow believed that trends kept on existing regardless of the influencing factors known as "market noise." Markets might move in the direction opposite the trends for a short time, but they will soon return to prior move. According to the physical low of motion, an object in motion remains in the same direction until an external force causes it to change the direction. Dow in his turn believed that if the trend lasted longer, the probability of its change would be greater and, of course, there are reversal signals to look for.

6.3 Support and Resistance Level

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

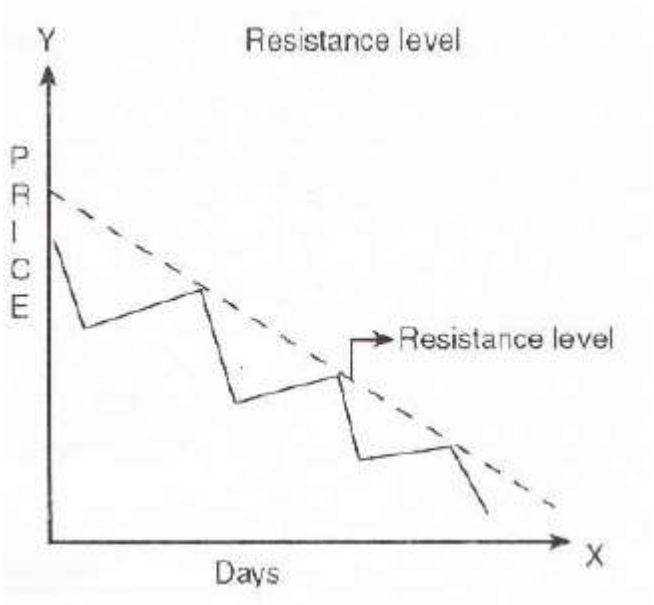
Support and resistance usually occur whenever the turnover of a large number of shares tends to be concentrated at several price levels. When the stock touches a certain level and then drops, this is called resistance and if the stock reaches down to certain level and then rises there exists a support.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

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

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

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

The support and the resistance level need not be formed only on tops or bottoms. They can be on the trend lines or gaps of the chart. Gaps are defined as those points or price levels where the scrip has not changed hands. In the rising or falling price level gaps are formed. If the prices are in the upward move and the high of any day is lower than the next day's low, the gap is said to have occurred.
For example, if the high price of the Instant Company's scrip on March 1st is 200 and on March 2nd low is 225, a gap is said to have occurred on the bar chart. This indicates that the stock is not traded between the level 200 and 225. This gap indicates further rise in price level. Likewise in a falling price, a gap is formed if the low price on day 1 is higher than the high price of day 2. Suppose the low price on Monday is 150 and the high price on the Tuesday is 130, a gap is said to have occurred and indicates that there was no transaction between the level of 150 and 130.



6.4 Charting Techniques and Technical Indicators

The role of technical analysis is quite essential in forecasting the market; that is why it is very important to understand how to conduct an accurate analysis. The two main tools that help traders and investors to make technical analysis easy are **technical indicators** and **chart patterns.**

6.4.1 Chart patterns

A chart pattern is another important and inseparable part of technical analysis. Chart patterns are intended to predict market trends. The proper usage of chart patterns helps traders and investors to decide when is the right time for them to enter and exit a particular trade. With the help of chart patterns, it has already become possible to forecast whether the price is going to continue its direction or reverse. Accordingly, there are two types of chart patterns: **Trend continuation patterns and Trend Reversal Patterns.**
Trend continuation patterns are formed during a pause in the trend, and they are quite easily recognized on the charts. Continuation patterns are usually shorter in their duration than the reversal patterns, and in contrast to reversal patterns, continuation patterns indicate trend consolidations, and continuations and not trend reversals.

Trend reversal patterns indicate the end of a previous trend and show that the market is ready to begin a new trend. The most well-known reversal patterns are the following:

- Head and Shoulders
- Inverse Head and Shoulders
- Double Top
- Double Bottom

6.4.1.1 Bar chart and Line chart

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

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

6.4.1.2 Head and Shoulders

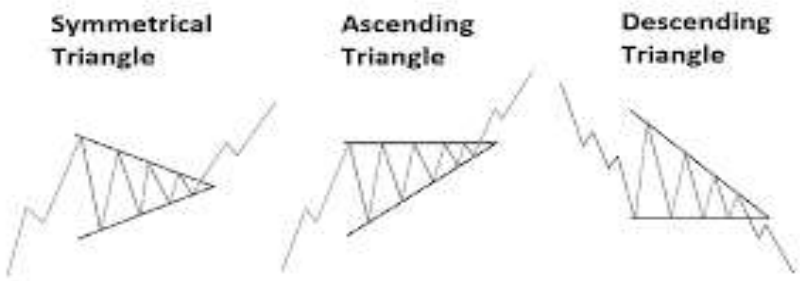
This pattern is easy to identify and the signal generated by this pattern is considered to be reliable. In the head and shoulder pattern, there are three rallies resembling the left shoulder, a head, and a right shoulder A neckline is drawn connecting the lows of the tops. When the stock price cuts the neckline from above, it signals the bear market.
The upward movement of the price for some duration creates the left shoulder. At the top of the left shoulder people who bought during the uptrend begin to sell resulting in a dip.
Near the bottom, there would be a reaction, and people who have not bought in the first uptrend start buying at relatively low prices thus pushing the price upward. The alternating forces of demand and supply create new ups and downs. The following figures explain the head and shoulders pattern.

6.4.1.3 Inverse Head and Shoulders

Here the reverse of the previous pattern holds true. The price of stock falls and rises which makes an inverted right shoulder. As the process of fall and rise in price continues the head and left shoulders are created. Connecting the tops of the inverted head and shoulders gives the neckline. When the price rises above the neckline, a price rise is expected. It indicates the end of the bear market and the beginning of the bull market. These patterns have to be confirmed with the volume and trend of the market.

6.4.1.4 Triangles

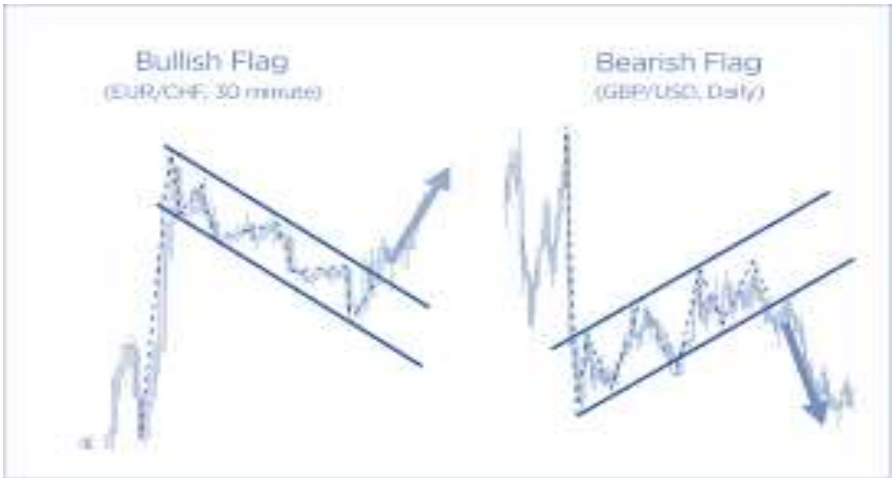
The triangle formation is easy to identify and popular in technical analysis. The triangles are of symmetrical, ascending, descending and inverted. Hence it is difficult to predict which way the price will break out.



6.4.1.5 Flags

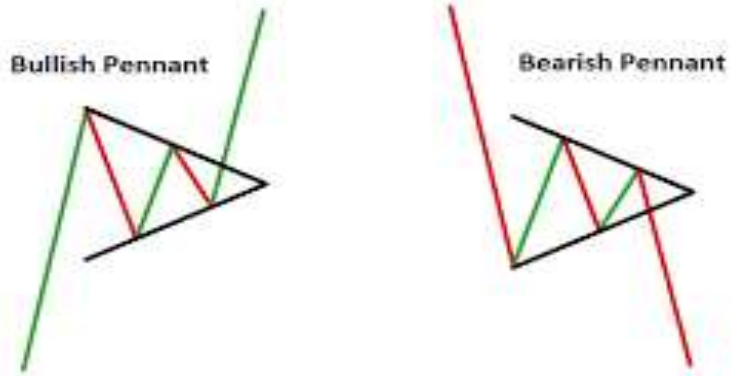
The flag pattern is commonly seen on the price charts. These patterns emerge either before a fall or rise in the value of the scrip These patterns show the market corrections of the over-bought or oversold situations. The time taken to form these

patterns is quick. Each rally and setback may last only three to four days. If the pattern is wider, it may take three weeks to complete the pattern.
A bullish flag is formed by two trend lines that move downwards. The break-out would occur on the upper side of the trend line. In a bearish flag both the trend lines would be moving upwards. The breakout occurs in the downward trend line.



6.4.1.6 Pennant

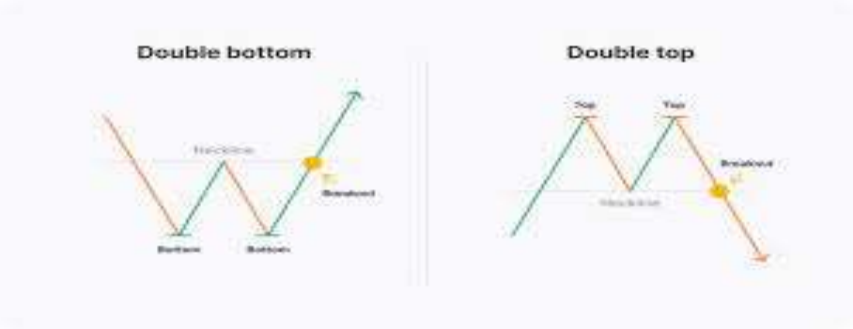
The pennant looks like a symmetrical triangle. Here there is bullish and bearish pennant. In the bullish pennant, the lower tops form the upper trend line. The lower trend line connects the rising bottoms. The bullish trend occurs when the value of scrip moves above the upward trend line. Likewise in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



6.4.1.7 *Double Top and Bottom*

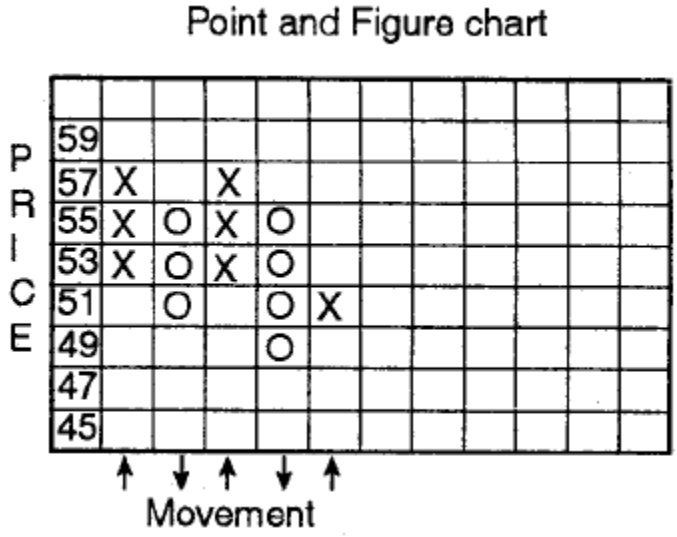
This type of formation signals the end of one trend and the beginning of another. If the double top is formed when a stock price rises to a certain level, falls rapidly, again rises to the same height or more, and turns down. Its pattern resembles the letter ‘M’. The double top may indicate the onset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

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



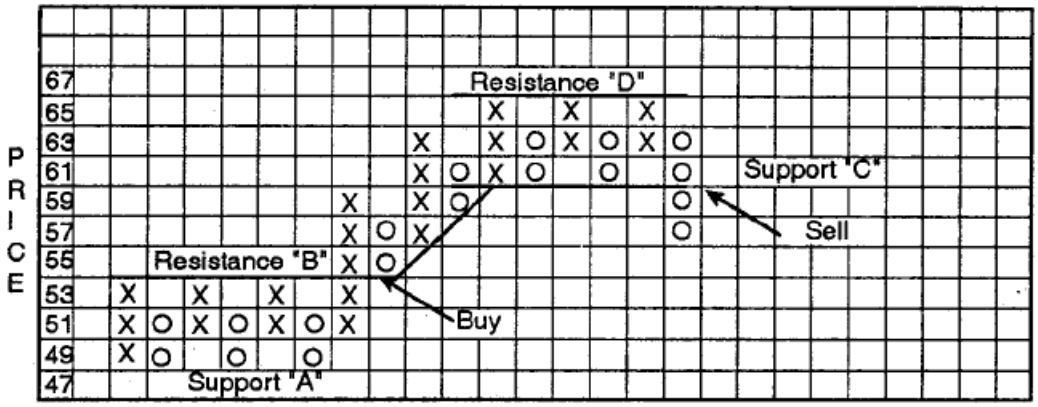
6.4.1.8 Point and Figure Charts

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



The prices are given on the left of the figure as shown. The numbers represent the price of the stock at 2-point intervals. The interval of price changes can be 1,2,3,5 or 10 points. It depends on the analyst's preference further; it depends upon the stock price movement. Higher points are chosen for high-priced stocks and vice versa. Only whole number prices are entered. In the figure, the initial price 53 was entered in column 1 a X. The next mark X will be made only if the stock moves up to 55. As long as the price moves up, the Xs a drawn in the vertical column. Here the stock price has moved to 57. When the stock price declines by two points or more the chartist records the change by placing the 'o' in the next column. Then the movements are interpreted. The trend reversals can be spotted easily. The figure shows the trend reversals in the point and figure chart.

Point and Figure chart



As long as the price moves between points A and B, there is little indication of a price rise. As the price raise is at level 4, it generates a buy signal. The market may turn out to be bullish. Likewise, when the price pierces the down the support level C indicates that the stock should be sold and the market may turn out to be bearish.
In spite of the simplicity of thawing the PF charts, they have some inherent disadvantages also.

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

6.4.1.9 Moving Average Analysis

The market indices do not rise or fall in a straight line. The upward and downward movements are interrupted by counter moves. The underlying trend can be studied by smoothening of the data. To smooth the data moving average technique is used. The word moving means that the body of data moves ahead to include the recent observation. If it is five day moving average, on the sixth day the body of data moves to include the sixth day observation eliminating the first day's observation. Likewise, it continues. In the moving average calculation, the closing price of the stock is used.

A 5-day moving average of daily closing prices is calculated as follows:

Trading day	*Closing price*	*Sum of five most recent closing prices*	*Moving average*
1	*25.0*		
2	26.0		
3	25.5		
4	24.5		
5	26.0	127.0	25.4
6	26.0	128.0	25.6
7	26.5	128.5	25.7
8	26.5	129.5	29.9
9	26.0	131.0	26.2
10	27.0	132.0	26.4

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

6.4.1.10 MACD

A variation in the moving average is the moving average convergence divergence or MACD. It involves comparing a short-term moving average, say a 50-day moving average, with a long-term moving average, say a 200-day moving average. If the short-term moving average is consistently higher than the long-term moving average, it is a bullish signal; if the short-term moving average is consistently lower than the long-term moving average, it is a bearish signal.

6.4.1.11 Relative Strength Index (RSI)

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

$$RSI = 100 - \frac{100}{1 + ₹}$$

$$₹ = \frac{Average\ gain\ per\ day}{Average\ loss\ per\ day}$$

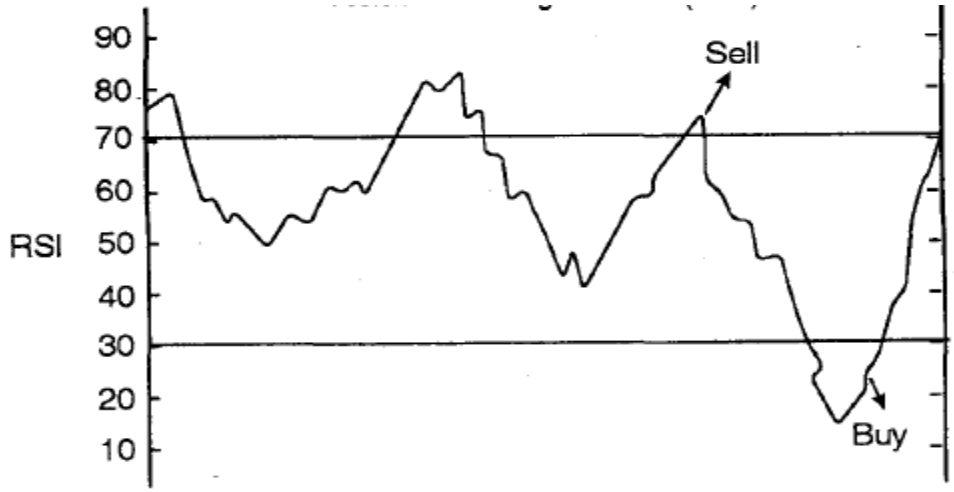
The RSI can be calculated for any number of days depending on the wish of the technical analyst and the tune frame of trading adopted in a particular stock market. RSI is calculated for 5, 7, 9 and 14 days. If the time I period taken for calculation is more, the possibility of getting wrong signals is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

Calculation of Day RSI for ACC

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

$$RSI = 100 - \frac{100}{I + 8.627}$$
$$= 100 - 10.387 = 89.613$$

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



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

6.4.2 Technical indicator

A technical indicator is considered to be an inseparable part of technical analysis. Technical indicators are tools used by traders and investors for forecasting future market movements; it is done by analysing the moves of the price trends in the past. There is a great variety of technical indicators, like indicators based on breath and sentiment, and traders are free to study and use the one that is the best for them.

6.4.2.1 Breadth indicators

- ***The advance-decline line***

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

The net difference between the number of stocks that advanced and declined during the same period is the breadth of the market. A cumulative index of net differences measures the market breadth. More specifically, if the market average is moving upwards, whereas the breadth of the market is moving downwards, it indicates that the market is likely to turn bearish. Likewise, if the market average is moving downwards but the breadth of the market is moving upwards it signals that the market may turn bullish.

The following table gives the breadth of the market.

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

- **New highs and lows**

Technical analysts consider the market as bullish when a significant number of stocks hit the 52-week high each day.

- **Volume of Trade**

Dow gave special emphasis on volume. Volume expands along with the bull market and narrows down in the bear market. Large volume with rise in price indicates bull market and the large volume with fall in price indicates bear market. If the volumes decline for five consecutive days, then it will continue for another four days and the same is true in increasing volume.

6.4.2.2 Sentiment indicators

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

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

- **Put/ call ratio:**

  The put-call ratio is a measurement that is widely used by investors to gauge the overall mood of a market. A "put" or put option is a right to sell an asset at a predetermined price. A "call" or call option is a right to buy an asset at a predetermined price. If traders are buying more puts than calls, it signals a rise in bearish sentiment. If they are buying more calls than puts, it suggests that they see a bull market ahead.

  The put-call ratio is calculated by dividing the number of traded put options by the number of traded call options. A ratio of 0.70 means that only 7 puts are purchased for every 10 calls purchased. A put-call ratio of 1 indicates that the number of buyers of calls is the same as the number of buyers for puts. However, a ratio of 1 is not an accurate starting point to measure sentiment in the market because there are normally more investors buying calls than buying puts. So, an average put-call ratio of 0.7 for equities is considered a good basis for evaluating sentiment. So, investors use it as a technical indicator to define whether it is a buy or sell signal.

A rise in the put/call ratio means that speculators are pessimistic. For the technical nalyst, however, it is a buy signal while a fall in the put/call ratio is a sell signal.

6.5 Technical Analysis and Fundamental Analysis

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

4. Compared to fundamental analysts, technical analysts mainly predict the short-term price movement rather than long-term movement. They are not committed to buy and hold policy.
5. Fundamentalists are of the opinion that supply and demand for stocks depend on the underlying factors. The forecasts of supply and demand depend on various factors. Technicians opine that they can forecast supply and demand by studying the prices and volume of trading.
6. In both the approaches supply and demand factors are considered to be critical. Business, economic, social, and political concern affects the supply and demand for securities. These underlying factors in the form of supply and demand come together in the securities market to determine security prices.

6.6 Summary

- The Technical analysts study the behaviour of the price of the stock to determine the future price of the stock.
- According to Charles H. Dow, stock price movements are divided into three: the primary movement, the secondary movement, and the daily fluctuations.
- A primary trend may be a bull market moving in a steady upward direction, or a bear market steadily dropping.
- A secondary trend or secondary reaction is the movement of the market contrary to the primary trend.
- Support level is the barrier for further decline. It provides a base for an up move. The resistance level is the level in which advances are temporarily stopped and the sellers overcome the demand.
- Volume of the trade confirms the trend. A fall of volume with the rise in price indicates trend reversal and vice-versa.
- Breadth of the market is the net number of stocks advancing versus, those declining in the market. If the Al D line slopes downward while the Sensex is rising, it gives a bearish signal and vice-versa.
- Moving averages are used as a technical indicator. It smoothens out the short-term fluctuations, helpful in comparing the stock price movement with the index movement and discovering the trend.
- Charts are the major analytical tools used in technical analysis. A point and figure chart is a one-dimensional chart drawn to predict the extent and direction of the price movement. Ordinary bar charts generate numerous patterns. These patterns indicate the trend and the trend reversals.

6.7 Keywords

- **Advances & declines:** a comparison of the number of stocks advancing and the number of stocks declining. See also the Cumulative Advance/Decline Line and Ratio.
- **Bar charts:** The open, high, low and close of the day are represented in chart form. Also used to determine strength of price movement over the time period in question. The tick on the left side of the bar represents the open and that on the right the close. Some bars do not have an opening tick.
- **Bearish Resistance Line:** (point & figure technique) a downtrend drawn at 45 degrees from the top right corner of a rising column of Xs, usually a significant top.

- **Charting:** The study of historical price patterns / action in order to determine likely future movements.
- **Double Bottom / Double Top:** Is formed when a market makes a high / low then retreats from it only to test it once more. If support of resistance holds at the high / low level, a turning point may be in prospect. The formation is only completed when the intervening minor low / high is broken on a closing price basis.
- **Head and Shoulders:** Three-pronged chart formation resembling a head and two shoulders, where the second peak marks the extreme of the trend. The third peak fails to extend beyond the second. The pattern is completed by a break of the "neckline", signalling a trend reversal. Also "Inverse Head and Shoulders" at market bottoms.
- **Line Chart:** Simplest form of chart connecting end of day / time period closes.
- **Moving Average:** The average price of a stock / market over any given (rolling) period of time. Used primarily as an indication of trend, less useful in rangebound markets. Usually plotted at the end of the time period covered but can be centred or shifted as required.
- **Support:** Psychological, fundamental or technical level that limits selling in a stock / market. Often described as a point where there are more buyers than sellers. Can appear as sideways support (bases or ranging markets) or uptrend support (rising markets).
- **Point & Figure:** Charting technique where price falls are marked by a 'O' and price gains are marked by a 'X'. The chart is plotted without the time element and can be used as a 'noise reduction' system. For more information see the "guide to point and figure" in the Investors Intelligence University.

❖ **Exercise**

- **Short and long Questions:**

1. Explain in detail the Dow Theory and how is it used to determine the direction of the stock market.
2. Can stock prices have a support level and resistance level? If so, explain.
3. 'Moving averages not only smoothen the data, but also predict the market'. Comment.
4. How do the volume and breadth of the market indicate the trend of the market?
5. How are short sales index used to determine the direction of the market?
6. What is a point and figure chart, and how is it used?
7. 'Chart patterns are helpful in predicting the stock price movement' Comment.

- **Multiple Choice Questions**

1. The two primary tools of a technical analyst are:
   A. Level of the market index and volume
   B. Economic factors and level of market index
   C. Price and volume
   D. Price and technical factors

2. Technical analysts reflect the idea that stock prices:
   A. Move upward over time
   B. Move inversely over time
   C. **Move in trends**
   D. Move randomly
3. Volume and specific Calander time are not considered important in a:
   A. Pie chart
   B. **Point and figure chart**
   C. Bar chart
   D. Histogram
4. A principal weakness of Dow theory is:
   A. It's use of averages instead of indexes
   B. Its attention to general market movements.
   C. That it pays too much attention to primary trends
   D. **The many versions that are available.**
5. A support level is a price range:
   A. At which a significant increase in the supply of stock is expected.
   B. **At which a significant increase in demand for a stock price is expected.**
   C. Below which a stock price cannot go.
   D. Above which a stock price cannot go.
6. _____analysis focuses on economic and Political factors which are external to the market itself.
   A. Technical
   B. **Fundamenta**l
   C. Industry
   D. Economic
7. All of the following are assumptions made by technical analysts except:
   A. Changes in trend are caused by shifts in the supply and demand relationship.
   B. **Stock price movements are independent**
   C. Security prices tend to move in trends.
   D. Supply and demand of securities are determined by various factors.
8. _____analysis focuses on timing and on the short run.
   A. **Technical**
   B. Fundamental
   C. Industry
   D. Economic
9. _____ theory provided three trends in the market.
   A. Random walk hypothesis
   B. Efficient market hypothesis
   C. **Dow theory**
   D. Efficient frontier theory
10. Technical analysis differs from fundamental analysis in that technical analysis
   A. Is aimed at the market. While fundamental analysis is aimed at individual stocks.
   B. **Is based on published market data and focuses on internal factors.**
   C. Focuses on the long-term trends of production.
   D. Does not consider price and volume.

UNIT – 7 MARKOWITZ PORTFOLIO SELECTION MODEL

7.1 Introduction

The Markowitz model is an investment technique. It is used to create a portfolio that would yield maximized returns. In 1952, Harry Markowitz published his model in the Journal of Finance. Markowitz is an American Economist. He is considered the creator of the modern portfolio theory. The theory is also known as the Markowitz Mean Variance Model.

Prior to the development of Markowitz Portfolio Theory (MPT), investing processes were centred on individual stocks; investors would look through available assets and find "sure bets" assets that would produce decent returns without subjecting the investor to too much risk. Expected net present value (NPV) was used to distinguish these "sure bet" stocks, while securities were valued by discounting their future cash flows. Stocks that could generate more money at a quicker rate were given great value.

Markowitz disagreed with this thinking. The "present value" theory had shortcomings; selecting the "best" portfolio under this logic meant selecting a single stock with the highest expected NPV. That approach was risky by nature, and while economic experts believed a good portfolio was a diversified one, there was no methodology available for investors to achieve this diversity.

Markowitz looked to probability and statistics to further his insights; if one believed a stock's price changed randomly, statistical tools including mean and variance could be used to form more diverse portfolios. In the instance of two or more stocks, an investor could consider correlation.

7.1.1 Assumptions of Markowitz Portfolio Theory (MPT)

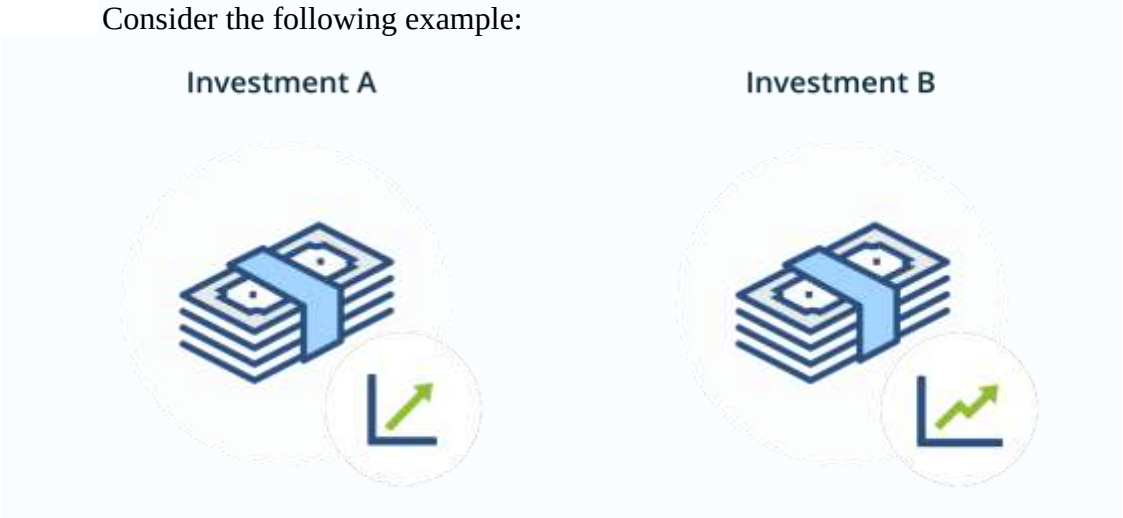
Markowitz created a formula that allows an investor to mathematically trade off risk tolerance and reward expectations, resulting in the ideal portfolio.

This theory was based on two main concepts:

1. Every investor's goal is to maximize return for any level of risk.
2. Risk can be reduced by diversifying a portfolio through individual, unrelated securities. MPT works under the assumption that investors are risk-averse, preferring a portfolio with less risk for a given level of return. Under this assumption, investors will only take on high-risk investments if they can expect a larger reward.

Markowitz's assumptions are as follows:

- The model assumes that investors are rational and will always behave in a certain manner.
- The model assumes that there are only two different types of assets low returns and high returns.
- Harry Markowitz argues that markets will always work in a certain direction and will always be efficient. But this is not always the case.
- Diversification is important. But the theory assumes diversification is the only way to minimize investment risks.
- The Markowitz model of portfolio assumes that every investor has unlimited access to information about market changes. In reality, investors often lack the time and expertise to gather relevant data.
- Markowitz assumes that all investors are risk-averse, but that is not universally true.
- The model mentions a bracket of bearable loss but not all real-world investors can afford that.
  Consider the following example:



- A "rational investor" is asked to choose between two investments: Investment A and Investment B. Both are expected to increase in value by six percent each year. However, Investment B is considered twice as volatile as Investment A, meaning its value fluctuates at twice the magnitude of Investment A's value fluctuations.
- MPT suggests that a rational investor will always choose the less volatile asset, in this case Investment A, so long as both options provide an equivalent expected return.

- A portfolio's overall risk is computed through a function of the variances of each asset, along with the correlations between each pair of assets. Asset correlations affect the total portfolio risk, formulating a smaller standard deviation than would be found by a weighted sum.
- With these insights, Markowitz worked to create a management system that would transform the landscape of modern investing processes and published his new theory in The Journal of Finance in 1952.
- Under MPT—or mean-variance analysis an investor can hold a high-risk asset, mutual fund, or security, so long as this high-risk investment is minimized by all underlying assets. The portfolio itself is balanced in a way that its overall risk is lower than some of its underlying investments. Risk is defined as the range by which an asset's price will vary on average, but Markowitz split risk into two subsequent categories.

7.1.2 Two Components of Risk

According to MPT, there are two components of risk for individual stock returns.
In a truly diversified combination of assets or portfolio the risk of each asset itself contributes very little to overall portfolio risk. Rather, the covariances among the individual assets determine more of the overall portfolio risk. Therefore, investors can reduce individual asset risk by combining a diversified portfolio of assets.

1. Systematic Risk

This refers to market risks that cannot be reduced through diversification, or the possibility that the entire market and economy will show losses that negatively affect investments. It's important to note that MPT does not claim to be able to moderate this type of risk, as it is inherent to an entire market or market segment.

2. Unsystematic Risk

Also called specific risk, unsystematic risk is specific to individual stocks, meaning it can be diversified as you increase the number of stocks in your portfolio.

7.2 Portfolio Return and Risk

7.2.1 Portfolio Expected Return

The expected return on a portfolio is simply the weighted average of the expected returns on the individual securities in the portfolio.

$$E(RP) = \sum_{i=1}^{n} wi\ E(Ri)$$

where E(RP) = Expected portfolio return

wi = weight assigned to security i

E(Ri) = expected return on security i

n = number of securities in the portfolio

7.2.2 Portfolio Risk

In symbols

$$E(Rp) = \sum wi\ E(Ri)$$

But

$$\sigma p2 \neq \sum wi\ 2\sigma i\ 2$$

As the inequality shown in Eq., investors can achieve the benefit of risk reduction through diversification.

Although the expected return on a portfolio is the weighted average of the expected returns on the individual securities in the portfolio, portfolio risk is not the weighted average of the risks of the individual securities in the portfolio.

7.2.2.1 Measurement of Co-movements in Security Returns

To develop the equation for calculating portfolio risk. We need information on weighted individual security risks and weighted co movements between the returns of securities included in the portfolio. Co movements between the returns of securities are measured by covariance (an absolute measure) and coefficient of correlation (a relative measure).

Covariance

Covariance reflects the degree to which the returns of the two securities vary or change together. A positive covariance means that the returns of the two securities move in the same direction whereas a negative covariance implies that the returns of the two securities move in opposite direction.

$$COV(Ri, Rj) = P_1 [R_{i1} - E(R_i)] [R_{j1} - E(R_j)] + P_2 [R_{i2} - E(R_j)] [R_{j2} - E(R_j)]$$

$$+ \ldots\ldots + P_n [R_{in} - E(R_i)] [R_{jn} - E(R_j)]$$

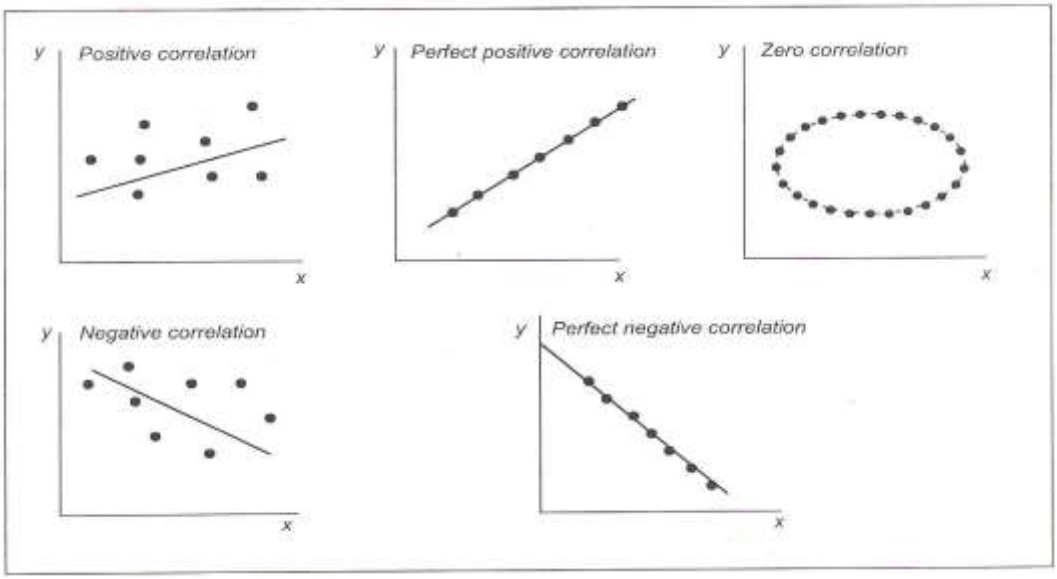
Where Ri = Return on security i

E(Ri)= Expected return on security i

Pn= probability for security n

Coefficient of correlation

Correlation is showing co-movement between two variables. The correlation coefficient can vary from -1.0 to +1.0, A value of -1.0 means perfect negative correlation, a value of 0 means no correlation and a value of +1.0 means perfect positive correlation.



$$Cor(R_i, R_j) or\ \rho_{ij} = \frac{\sigma ij}{\sigma i \sigma j}$$

where ρij = correlation coefficient between the returns on securities i and j

σij = covariance between the returns on securities i and j

σi , σj = standard deviation of the returns on securities i and j

Portfolio Risk: 2 – Security Case

$$\sigma p = \sqrt{w1^2\ \sigma 1^2 + w2^2\ \sigma 2^2 + 2w1w2\ \rho 12\ \sigma 1\ \sigma 2}$$

Where, W1= weight assigned to security 1

W2= weight assigned to security 2

σp= Portfolio Risk

7.3 Efficient Frontier

The efficient frontier theory was introduced by Nobel Laureate Harry Markowitz in 1952 and is a cornerstone of Modern Portfolio Theory (MPT). The efficient frontier rates portfolios (investments) on a scale of return (y-axis) versus risk (x-axis). The efficient frontier, also known as the portfolio frontier, is a set of ideal or optimal portfolios expected to give the highest return for a minimal return. It manifests the risk-and return trade-off of a portfolio. This frontier is formed by plotting the expected return on the y-axis and the standard deviation as a measure of risk on the x-axis. For building the frontier, there are three important factors to be taken into consideration:

- Expected return,
- Variance/ Standard Deviation as a measure of the variability of returns, also known as risk and
- The covariance of one asset's return to that of another asset.

Key Takeaways

- The efficient frontier, or the portfolio frontier, describes the ideal portfolios predicted to produce the highest return with the lowest risk. It depicts the link between risk and returns for a portfolio, with expected return on the y-axis and standard deviation as a risk measurement on the x-axis.
- It is vital to consider three key factors: expected return, risk (measured by variance or standard deviation), and the correlation between the returns of different assets.

Example of the Efficient Frontier

Let us understand the construction of the efficient frontier with the help of a numerical example:
Assume two assets, A and B, are in a particular portfolio. Calculate the risks and returns for the two assets whose expected return and standard deviation are as follows:

Particulars	A	B
Expected Return	10%	20%
Standard Deviation	15%	30%
Correlation Coefficient	-0.05	

Let us now give weights to the assets, i.e., a few portfolio possibilities of investing in such assets as given below:

Portfolio	Weight (in %)	
	A	B
1	100	0
2	75	25
3	50	50
4	25	75
5	0	100

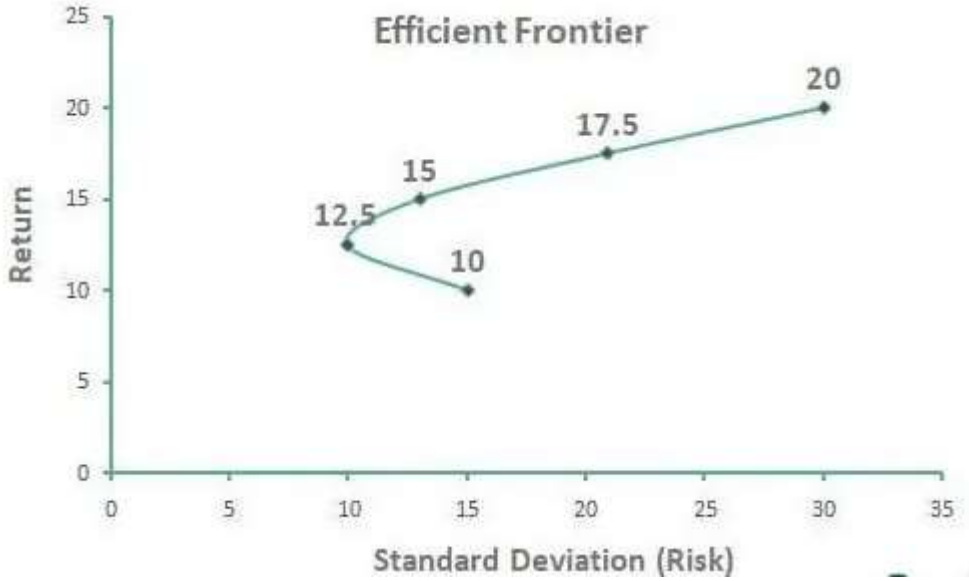
Using the formula for Expected Return and Portfolio Risk i.e.

Expected Return = (Weight of A * Return of A) + (Weight of B* Return of B)
Portfolio Risk = √ [(Weight of A^2 * Standard Deviation of A^2) + (Weight of B^2 * Standard Deviation of B^2) + (2 X Correlation Coefficient * Standard Deviation of A * Standard Deviation of B)],

We can arrive at the portfolio risks and returns as below.

Portfolio	Risk	Return
1	15	10
2	9.92	12.5
3	12.99	15
4	20.88	17.5
5	30	20

Using the above table, if we plot the risk on the X-axis and the Return on Y-axis, we get a graph that looks as follows and is called the efficient frontier, sometimes referred to as the **Markowitz bullet**.



- In this illustration, we have assumed that the portfolio consists of only two assets A and B, for simplicity and easy understanding. We can, in a similar fashion, construct a portfolio for multiple assets and plot it to attain the frontier. In the above graph, any points outside the frontier are inferior to the portfolio on the efficient frontier because they offer the same return with higher risk or lesser return with the same amount of risk as those on the frontier. Portfolio 2 represents MVP (minimum variance portfolio) or minimum standard deviation portfolio. By choosing an appropriate mix between two securities, the investor can achieve any point on the curved line. No investor will choose portfolio 1. Because after portfolio 1 expected return is increasing still standard deviation is still decreasing.

From the above graphical representation of the efficient frontier, we can arrive at two logical conclusions:

- It is where the optimal portfolios are.
- The efficient frontier is not a straight line. It is curved. It is concave to the Y-axis.

However, the efficient frontier would be a straight line if we are constructing it for a complete risk-free portfolio.

7.3.1 Assumptions of the Efficient Frontier Model

- Investors are rational and know all the facts about the markets. This assumption implies that all the investors are vigilant enough to understand the stock movements, predict returns, and invest accordingly. That also means that this model assumes all investors are on the same page regarding knowledge of the markets.
- All investors have a common goal: avoid the risk because they are risk-averse and maximize the return as far as possible and practicable.
- There are not many investors who would affect the market price.
- Investors have unlimited borrowing power.
- Investors lend and borrow money at a risk-free interest rate.
- The markets are efficient.
- The assets follow a normal distribution.
- Markets absorb information quickly and accordingly base the actions.
- The investors' decisions are always based on expected return and standard deviation as a measure of risk.

7.3.2 Merits of the Efficient Frontier Model

- This theory portrayed the importance of diversification.
- This efficient frontier graph helps investors choose the portfolio combinations with the highest and least possible returns.
- It represents all the dominant portfolios in the risk-return space.

7.3.3 Drawbacks/Demerits of the Efficient Frontier Model

- The assumption that all investors are rational and make sound investment decisions may not always be true because not all investors would have enough knowledge about the markets.
- The theory can be applied, or the frontier can be constructed only when a concept of diversification is involved. If there is no diversification, the theory would certainly fail.
- Also, the assumption that investors have unlimited borrowing and lending capacity is faulty.
- The assumption that the assets follow a normal distribution pattern might not always stand true. In reality, securities may have to experience returns far from the respective standard deviations, sometimes like three standard deviations away from the mean.
- The real costs, like taxes, brokerage, fees, etc., are not considered while constructing the frontier.

7.4 Portfolios of Assets

Typically, the answer to the investment problem is not the selection of one asset above all others, but the construction of a portfolio of assets, i.e. diversification across a number of different securities. The key to diversification is the correlation across

securities. Recall from data analysis and statistics that the correlation coefficient is a value between -1 and 1, and measures the degree of co-movement between two random variables, in this case stock returns.

Consider two securities, A and B. Security A has a mean of 10% and an S.D. of 15%. Security B has a mean of 20% and an S.D. of 30%. We can calculate the standard deviation of a *portfolio* composed of different mixtures of A & B using this equation:

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

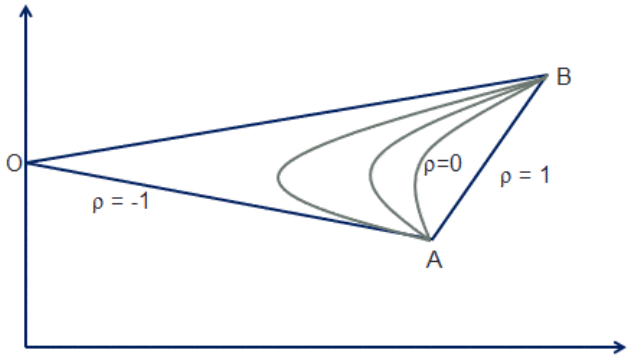
Notice that a portfolio will typically have a weight of one, so usually, $W_A + W_B = 1$
What if the correlation of A&B = 0 ? Notice that a portfolio of 80% A and 20% B has a standard deviation of sq. rt. $(.8^2*.15^2+.2^2*.3^2+2*0*.8*.2*.15*.3)$ = 13.4 % In other words, a mixture of 20% of the MORE RISKY SECURITY actually decreases the volatility of the portfolio! This is a remarkable result. It means you can reduce risk and increase return by diversifying across assets.

What if the correlation of A&B = 1 ? In this case, the perfect correlation between the two assets means there is no diversification. The portfolio std of the 80/20 mix is 18%. this is equal to a linear combination of the standard deviations:
(.8)(.15)+(.2)(.30) = 18%.

What if the correlation of A&B = -1 ? This is an unusual case, because it means that when A moves up, B always moves down. Take a mixture of .665 A and (1-.665) B. sq. rt. $(.665^2*.15^2+(1-.665)^2.3^2+2*0*(.665)*(1-.665)*.15*.3)$ = .075%, Which is very close to zero. In other words, A is nearly a perfect hedge for B. One of the few real-life negative correlations you will find is a short position in a stock offsetting the long position. In this case, since the mean returns are also the same, the expected return will be zero. These extremes of correlation values allow us to describe an envelope within which all combinations of two assets will lie, regardless of their correlations.

If ρAB =-1,

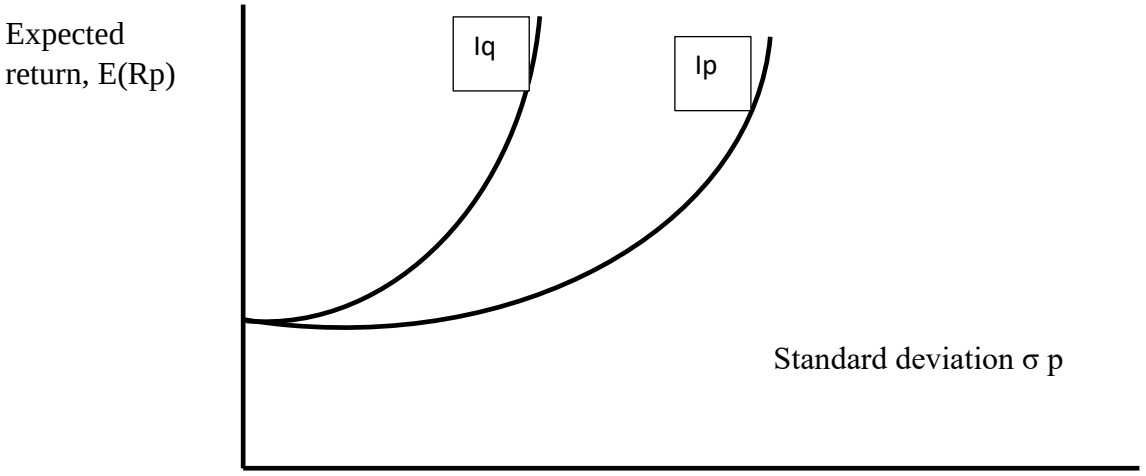
WA= σB / (σA+ σB)



7.5 Investor's Utility Curves or Indifference Curves

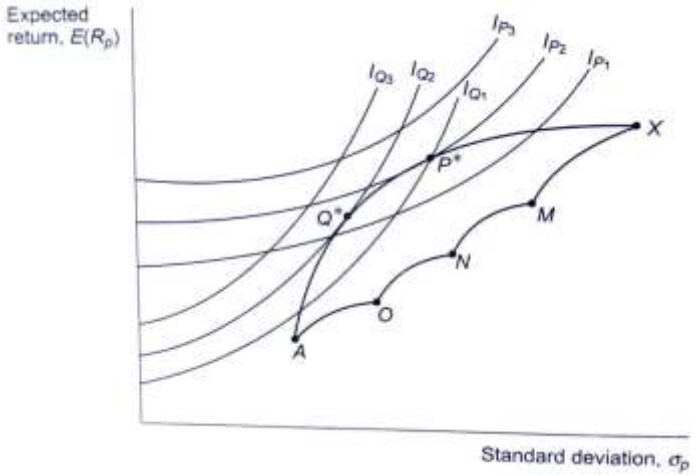
The utility curves for an individual specify the trade-offs he/she is willing to make between expected return and risk. These utility curves are used in conjunction with the efficient frontier to determine which efficient portfolio is the best for a particular investor. Two investors will not choose the same portfolio from the efficient set

unless their utility curves are identical. Consider curves which reflect risk return tradeoff function. In this case all the points lying on an indifference curve provide the same level of satisfaction. The indifference curves Ip & Iq represents the risk return tradeoffs of two hypothetical investors, P & Q.



The optimal portfolio is found at the point of tangency between the efficient frontier and utility indifference curve. In this curve two investors P & Q having different indifference curve but same efficient frontier. From curve in general, the steeper the slope of the indifference curve, the greater the degree of risk aversion.

Investor's utility curves are important because they indicate the desired trade-off by investors between risk and return. Given the efficient frontier, they indicate which portfolio is preferable for the given investor. Notably, because utility curves differ one should expect different investors to select different portfolios on the efficient frontier.



Solved Problems

1. The following information is available.

	Stock A	Stock B
Expected return	24%	35%
Standard deviation	12%	18%
Coefficient of correlation	0.60	

a. What is the covariance between stocks *A* and *B* ?
b. What is the expected return and risk of a portfolio in which *A* and *B* are equally weighted?

Solution:

a) Covariance (A,B) $= P_{AB}$ x σ_A x σ_B

= 0.6 x 12 x 18 = 129.6

b) Expected return = 0.5 x 24 + 0.5 x 35 = 29.5 %

Risk (standard deviation) = $\sqrt{}$ w^2_A x $\sigma_A{}^2$ + w^2_B x $\sigma_B{}^2$ + 2 Cov (A,B)

$= \sqrt{} 0.5^2$ x 144 + 0.5^2 x 324 + 2 x 129.6

= 27.93%

2. The returns of two assets under four possible states of nature are given below:

State of nature	*Probability*	*Return on asset 1*	*Return on asset 2*
1	0.40	-6%	12%
2	0.10	18%	14%
3	0.20	20%	16%
4	0.30	25%	20%

a. What is the standard deviation of the return on asset 1 and on asset 2?
b. What is the covariance between the returns on assets 1 and 2?
c. What is the coefficient of correlation between the returns on assets 1 and 2?

Solution:

(a) $E(R_1)$ = 0.4(-6%) + 0.1(18%) + 0.2(20%) + 0.3(25%)

= 10.9 %

$E(R_2)$ = 0.4(12%) + 0.1(14%) + 0.2(16%) + 0.3(20%)

= 15.4 %

$\sigma(R_1)$ = $\sqrt{}$.4(-6 –10.9)^2 + 0.1 (18 –10.9)^2 + 0.2 (20 –10.9)^2 + 0.3 (25 –10.9)^2

= 13.98%

$\sigma(R_2)$ = $\sqrt{}$.4(12 –15.4)^2 + 0.1(14 –15.4)^2 + 0.2 (16 – 15.4)^2 + 0.3 (20 –15.4)^2

= 3.35 %

(b) The covariance between the returns on assets 1 and 2 is calculated below

State of nature	*Probability*	*Return on asset 1*	*Deviation of return on asset 1 from its mean*	*Return on asset 2*	*Deviation of the return on asset 2 from its mean*	*Product of deviation times probability*
(1)	(2)	(3)	(4)	(5)	(6)	(2)x(4)x(6)
1	0.4	-6%	-16.9%	12%	-3.4%	22.98
2	0.1	18%	7.1%	14%	-1.4%	-0.99
3	0.2	20%	9.1%	16%	0.6%	1.09
4	0.3	25%	14.1%	20%	4.6%	19.45
					Sum =	42.53

Thus, the covariance between the returns of the two assets is 42.53.

(c) The coefficient of correlation between the returns on assets 1 and 2 is:

$$\frac{\text{Covariance}_{12}}{\sigma_1 \text{ x } \sigma_2} = \frac{42.53}{13.98 \text{ x } 3.35} = 0.91$$

3. Consider two stocks, P and Q

	Expected return (%)	Standard deviation (%)
Stock P	18 %	12 %
Stock Q	24 %	17 %

The returns on the stocks are perfectly negatively correlated.
What is the expected return of a portfolio comprising of stocks P and Q when the portfolio is constructed to drive the standard deviation of portfolio return to zero?

Solution:

The weights that drive the standard deviation of portfolio to zero, when the returns are perfectly correlated, are:

$$w_P = \frac{\sigma_Q}{\sigma_P + \sigma_Q} = \frac{17}{12 + 17} = 0.586$$

$$w_Q = 1 - w_P = 1 - 0.586 = 0.414$$

The expected return of the portfolio is:

0.586 x 18 % + 0.414 x 24 % = 20.484 %

4. Consider two stocks, X and Y

	Expected return (%)	Standard deviation (%)
Stock X	10 %	18 %
Stock Y	25 %	24 %

The returns on the stocks are perfectly negatively correlated.

What is the expected return of a portfolio comprising of stocks X and Y when the portfolio is constructed to drive the standard deviation of portfolio return to zero?

Solution:

The weights that drive the standard deviation of portfolio to zero, when the returns are perfectly correlated, are:

$$wX = \frac{\sigma Y}{\sigma X + \sigma Y} = \frac{24}{18 + 24} = 0.571$$

$$wY = 1 - wX = 0.429$$

The expected return of the portfolio is:

0.571 x 10 % + 0.429 x 25 % = 16.435 %

Summary:

- The portfolio theory created by Harry Markowitz is the foundation of the concept. The model emphasises that systematic risk and unsystematic risk combine to form the risk element in portfolio theory.
- According to the model, a security's return is inversely proportional to its systematic risk, which cannot be mitigated by diversification.
- The overall risk is determined by combining the two categories of risks mentioned above.
- Market-related variation plus company-specific variance equals the total variance of returns.
- Efficient Frontier: A line created from the risk-reward graph, comprised of optimal portfolios.
- Co movements between the returns of securities are measured by covariance (an absolute measure) and coefficient of correlation (a relative measure).
- Covariance reflects the degree to which the returns of the two securities vary or change together.
- A positive covariance means that the returns of the two securities move in the same direction whereas a negative covariance implies that the returns of the two securities move in opposite direction.
- Correlation is showing co-movement between two variables.
- A value of -1.0 means perfect negative correlation, a value of 0 means no correlation and a value of +1.0 means perfect co movement.

Self-Assessment

- Major limitations of Markowitz model
- Discuss the assumptions of Markowitz model
- What do you mean by Portfolio selection? Write the assumptions of Harry Markowitz Model.
- What is Efficient Frontier or Dominating Portfolio?
- Explain the usefulness of Utility curves in portfolio selection.

Multiple Choice Questions

1. Modern Portfolio Theory was developed by …….
   A. **Harry Markowitz**
   B. Rangarajan
   C. Sharpe
   D. Treynor

2. According to Markowitz, rational investors will seek efficient portfolios because these portfolios are optimal based on:
   A. Expected Return
   B. Risk
   C. **Expected return & Risk**
   D. Transactions costs

3. Under the Markowitz model, investors
   A. Are assumed to be risk- seekers
   B. **Are not allowed to use leverage**
   C. Are assumed to be institutional investors.
   D. All of the above.

4. The Markowitz model assumes most investors are:
   A. **Risk Averse**
   B. Risk neutral
   C. Risk seekers
   D. Risk moderators

5. An indifference curve shows
   A. The one most desirable portfolio for a particular investor
   B. **All combination of portfolios that are equally desirable to a particular investor.**
   C. All combinations of portfolios that are equally desirable to all investors.
   D. The one most desirable portfolio for all investor.

6. The point of tangency between risk returns indifferences curves and efficient frontier highlights:
   A. **Optimal portfolio**
   B. Efficient portfolio
   C. Sub-optimal portfolio
   D. None of the above

7. A portfolio comprises two securities and the expected return on them is 12% and 16% respectively. Determine return of portfolio if first security constitutes 40% of total portfolio.
   A. 12.4%
   B. 13.4%
   C. 14.4%
   D. 15.4%

8. Efficient frontier comprises of
   A. Portfolios that have negatively correlated securities
   B. Portfolios that have positively correlated securities
   C. Inefficient portfolios
   D. **Efficient portfolios**

9. A portfolio having two risky securities can be turned risk less if
   A. The securities are completely positively correlated
   B. If the correlation ranges between zero and one
   C. **The securities are completely negatively correlated**
   D. None of the above.

10. Risk of two securities with different expected return can be compared with:
   A. **Coefficient of variation**
   B. Standard deviation of securities
   C. Variance of Securities
   D. None of the above

UNIT – 8	CAPITAL ASSET PRICING MODEL (CAPM)

8.1 Introduction

8.2 Meaning

8.3 Definition

8.4 Characteristics

8.5 Assumptions of CAPM Model

8.6 Importance of CAPM In Modern Finance

8.7 Brief History and Development of CAPM

8.8 Systematic Risk

8.9 Formulation of The CAPM Equation

8.10 The Security Market Line (Sml)

8.11 Practical Uses of CAPM In Finance

8.12 Real-World Case Studies

8.13 Limitations of CAPM Model

8.14 Illustration

- **Exercises**

Objectives:

The core objective of the Capital Asset Pricing Model (CAPM) chapter is to provide a theoretical framework for understanding the relationship between risk and return in financial markets. CAPM aims to explain how investors should be compensated for bearing systematic risk when investing in assets. By estimating the expected return of an asset based on its systematic risk relative to the market, CAPM assists investors in making informed decisions about asset pricing, portfolio construction, and risk management. The chapter explores key concepts such as beta coefficients, the risk-free rate, the market risk premium, and the Security Market Line (SML), shedding light on how CAPM influences investment theory, practice, and decision-making in finance.

8.1 Introduction

In the labyrinth of financial markets, one question echoes loudly: What is the true value of an asset? Investors, analysts, and finance enthusiasts alike seek a guiding light amidst the tumultuous sea of investment options. Enter the Capital Asset Pricing Model (CAPM), a beacon illuminating the path to rational valuation and risk assessment.

In this chapter, we embark on a journey into the heart of modern finance theory, where the CAPM stands as a cornerstone principle. Developed by William Sharpe in the 1960s, the CAPM revolutionized how we understand and evaluate investments. At its core, the model provides a framework for determining the expected return on an asset by considering its risk relative to the market as a whole.

Through a meticulous exploration, we will dissect the intricacies of the CAPM, unravelling its components and implications for investors. From the fundamental principles of risk and return to the application of beta coefficients, each facet of the model unveils new insights into the dynamics of financial markets.

Moreover, we will delve into the practical applications of the CAPM, exploring its role in portfolio management, asset allocation, and the valuation of securities. Armed with this knowledge, investors can navigate the complexities of the market with confidence, making informed decisions that align with their objectives and risk tolerance.

8.2 Meaning

The Capital Asset Pricing Model (CAPM) is a financial model used to determine the expected return on an investment based on its level of risk. It establishes a relationship between the expected return of an asset, the risk-free rate of return, the asset's beta coefficient (which measures its volatility relative to the market), and the market risk premium (the excess return expected from investing in the market portfolio over the risk-free rate). In essence, CAPM helps investors evaluate whether the potential return of an investment justifies the level of risk undertaken, providing a framework for making rational investment decisions within the context of an efficient market.

8.3 Definition

Investopedia: "The Capital Asset Pricing Model (CAPM) describes the relationship between systematic risk and expected return for assets, particularly stocks. CAPM is widely used throughout finance for pricing risky securities and generating expected returns for assets given the risk of those assets and cost of capital."

Corporate Finance Institute (CFI): "The Capital Asset Pricing Model (CAPM) is a model that describes the relationship between systematic risk and expected return for assets, particularly stocks. CAPM is widely used in portfolio management and asset pricing, helping investors determine the expected return on an investment given its risk."

Scholarly Definition: "The Capital Asset Pricing Model (CAPM) is a financial model that establishes the relationship between the expected return of an asset, the risk-free rate of return, the asset's beta coefficient, and the market risk premium. CAPM provides a theoretical framework for pricing risky assets and determining their expected returns based on their level of systematic risk."

8.4 Characteristics

1. **Systematic Risk Emphasis**: CAPM focuses on systematic risk, also known as market risk, which cannot be diversified away. It assumes that investors are only compensated for bearing systematic risk, not for bearing unsystematic risk, which can be diversified through portfolio construction.
2. **Single-Factor Model**: CAPM is a single-factor model that considers only one systematic risk factor: the market portfolio. It assumes that the risk and return of an asset can be explained solely by its correlation with the overall market.

3. **Beta Coefficient**: Central to CAPM is the concept of beta (β), which measures the sensitivity of an asset's returns to movements in the market portfolio. A beta of 1 indicates that the asset moves in line with the market, while a beta greater than 1 suggests higher volatility and a beta less than 1 implies lower volatility compared to the market.
4. **Risk-Free Rate**: CAPM incorporates the risk-free rate of return, typically represented by the yield on government securities, as a baseline for expected returns. This serves as the minimum return investors should expect for taking on any risk.
5. **Market Risk Premium**: CAPM considers the excess return investors demand for bearing market risk over the risk-free rate. It represents the difference between the expected return on the market portfolio and the risk-free rate.
6. **Efficient Market Assumption**: CAPM operates under the assumption of market efficiency, implying that all available information is reflected in asset prices. Therefore, investors cannot consistently earn excess returns by exploiting publicly available information.
7. **Homogeneous Expectations**: CAPM assumes that investors have homogeneous expectations regarding the inputs used in the model, such as the expected return on the market portfolio and the risk-free rate.
8. **Linear Relationship**: CAPM posits a linear relationship between an asset's expected return and its beta coefficient. This relationship is expressed by the security market line (SML), which represents the equilibrium expected return for all assets based on their systematic risk.

8.5 Assumptions of CAPM Model

The Capital Asset Pricing Model (CAPM) is based on several key assumptions, which form the foundation of the model's framework. Here are the primary assumptions of CAPM:

1. **Perfect Markets**: CAPM assumes that financial markets are perfectly efficient, meaning that all available information is reflected in asset prices instantaneously. This assumption implies that there are no transaction costs, no taxes, and no restrictions on borrowing or short-selling.
2. **Homogeneous Expectations**: CAPM assumes that all investors have the same expectations regarding inputs such as the expected return on the market portfolio, the risk-free rate, and the covariance structure of returns. In other words, there is a consensus among investors regarding the prospects of securities.
3. **Investor Rationality**: CAPM assumes that investors are rational and risk-averse. Rational investors aim to maximize their utility by making decisions based on expected returns and risk. Additionally, investors are assumed to prefer less risk to more risk, given the same level of expected return.
4. **Unlimited Borrowing and Lending**: CAPM assumes that investors can borrow and lend unlimited amounts of money at a risk-free rate of return. This implies that there are no constraints on investors' ability to leverage their investments or to invest in risk-free assets.
5. **Single-Period Investment Horizon**: CAPM assumes that all investments have a single-period investment horizon, meaning that investors hold assets for only one

period. This assumption simplifies the model by disregarding the effects of multiple holding periods and compounding returns.

6. **Markets Clearing**: CAPM assumes that markets are clear, meaning that there are no frictions such as transaction costs or bid-ask spreads that prevent the smooth flow of buying and selling activities in the market.
7. **No Taxes or Inflation**: CAPM assumes that there are no taxes or inflation, which could distort investment decisions and asset prices. This simplifies the model by eliminating the need to account for tax considerations or inflation adjustments in asset valuation.

These assumptions provide the theoretical framework upon which CAPM is built. While they may not fully reflect the complexities of real-world financial markets, they are crucial for understanding the implications and limitations of the model.

8.6 Importance of CAPM In Modern Finance

Understanding the Capital Asset Pricing Model (CAPM) is of paramount importance in modern finance for a multitude of reasons. Firstly, CAPM serves as a cornerstone in asset pricing and valuation, providing a framework to quantify the relationship between risk and expected return. This is instrumental in evaluating investment opportunities and determining whether the potential return justifies the level of risk involved. Additionally, CAPM plays a central role in portfolio management by guiding the construction of efficient portfolios. By helping investors strike the right balance between risk and return, CAPM enables the effective diversification of portfolios and the achievement of investment objectives.

Moreover, CAPM is indispensable for estimating the cost of equity capital, which is crucial for capital budgeting decisions and project evaluation. It allows businesses to factor in the risk associated with equity investments, thus determining the required rate of return expected by investors. Furthermore, CAPM aids in risk management by providing a standardized measure of systematic risk through the beta coefficient.

This enables stakeholders to assess and mitigate exposure to market risk effectively. CAPM also serves as a benchmark for performance evaluation, allowing portfolio managers to gauge the success of investment strategies.

Finally, CAPM underpins financial modelling and analysis, providing a theoretical foundation for understanding asset pricing dynamics and building more complex financial models. In essence, understanding CAPM equips investors, businesses, and financial professionals with the tools to make informed decisions, manage risk, and optimize capital allocation in today's dynamic financial landscape.

8.7 Brief History and Development of CAPM

The Capital Asset Pricing Model (CAPM) has its roots in the seminal work of Harry Markowitz in the 1950s, which laid the foundation for modern portfolio theory. Markowitz's work introduced the concept of diversification and the importance of considering risk alongside return when constructing investment portfolios. Building upon Markowitz's insights, William Sharpe, in his groundbreaking 1964 paper, "Capital Asset Prices: A Theory of Market Equilibrium Under Conditions of Risk," formalized the

CAPM framework. Sharpe derived the CAPM equation, which established a linear relationship between an asset's expected return, its beta coefficient (a measure of systematic risk), and the risk-free rate of return.

Shortly after, Jack Treynor, John Lintner, and Jan Mossin independently contributed to the development of CAPM, refining its concepts and expanding its applicability. Their collective efforts solidified CAPM as a cornerstone of modern finance, offering a theoretical framework for understanding asset pricing and risk management. Since its inception, CAPM has undergone further refinements and extensions, and while criticisms and challenges persist, it remains a fundamental tool in investment analysis, portfolio management, and corporate finance, shaping the way investors and financial professionals approach risk and return in the capital markets.

8.8 Systematic Risk

Systematic risk, also known as market risk or non-diversifiable risk, refers to the inherent uncertainty and volatility associated with the overall market or economy. Unlike unsystematic risk, which is specific to individual assets or industries and can be mitigated through diversification, systematic risk affects the entire market and cannot be diversified away.

Systematic risk arises from factors that are beyond the control of investors and are inherent in the broader economic environment. These factors include changes in interest rates, inflation, economic growth, geopolitical events, and market sentiment. Essentially, any event or development that impacts the entire market or economy can contribute to systematic risk.

The key characteristic of systematic risk is its pervasive nature, affecting all investments to some degree regardless of their characteristics. As a result, systematic risk is the primary driver of fluctuations in the prices of financial assets, such as stocks, bonds, and commodities, at the macroeconomic level.

Investors are compensated for bearing systematic risk through the risk premium, which is the excess return they demand over the risk-free rate of return to hold risky assets. The Capital Asset Pricing Model (CAPM) quantifies systematic risk through the beta coefficient, which measures the sensitivity of an asset's returns to movements in the overall market. Assets with higher betas are more sensitive to systematic risk and typically command higher expected returns to compensate investors for bearing this risk.

Overall, understanding systematic risk is essential for investors and financial professionals as it helps them assess the overall risk exposure of their portfolios, make informed investment decisions, and implement risk management strategies to navigate uncertain market conditions effectively.

8.9 Formulation of The CAPM Equation

The Capital Asset Pricing Model (CAPM) equation is a fundamental formula that quantifies the expected return of an asset based on its systematic risk relative to the overall market. The CAPM equation is expressed as follows:

$$E(Ri)=Rf+\beta i(E(Rm)-Rf)$$

Where:

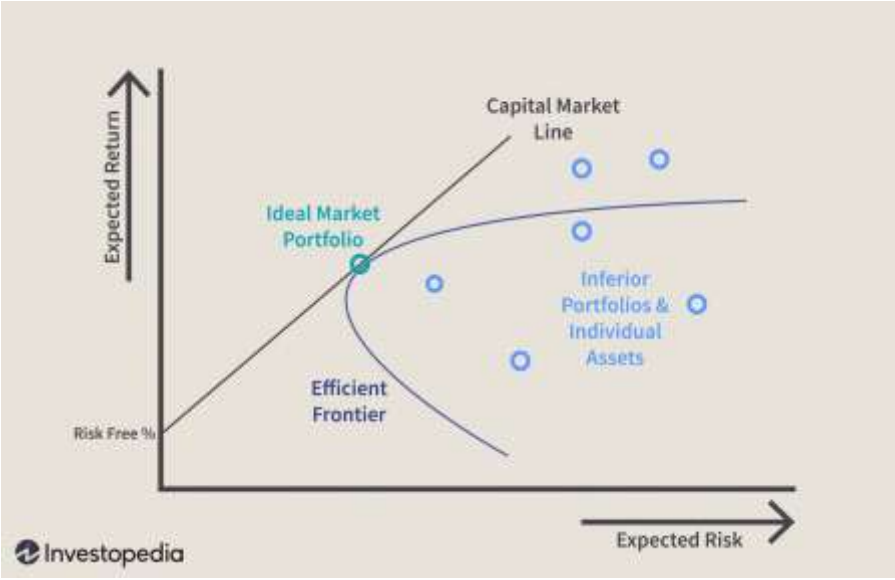
E(Ri) is the expected return on asset i.

Rf is the risk-free rate of return, representing the return on a risk-free investment such as Treasury bills.

βi is the beta coefficient of asset ii, measuring its sensitivity to movements in the overall market.

E(Rm) is the expected return on the market portfolio.

E(Rm)−Rf represents the market risk premium, which is the excess return investors demand for bearing market risk over the risk-free rate.
In essence, the CAPM equation states that the expected return on an asset is equal to the risk-free rate plus a risk premium determined by the asset's beta coefficient and the market risk premium. The beta coefficient measures how much an asset's returns move in response to changes in the overall market. Assets with higher betas are more sensitive to market movements and consequently have higher expected returns to compensate investors for bearing more systematic risk.



The CAPM equation provides a theoretical framework for pricing assets and evaluating investment opportunities based on their risk-return profile. It is widely used in finance for estimating the cost of equity capital, assessing the attractiveness of investment opportunities, and constructing efficient portfolios. Despite its simplicity and assumptions, the CAPM equation remains a cornerstone in financial theory and practice, providing valuable insights into the relationship between risk and return in the capital markets.

1. **Risk-Free Rate (Rf)**:

- The risk-free rate represents the return on an investment that is considered to have no risk of default.
- In practice, the risk-free rate is often approximated by the yield on short-term government securities, such as Treasury bills.
- It serves as a baseline return that investors can earn without taking on any risk.
- The risk-free rate is a crucial component of the CAPM equation because it represents the minimum return investors expect to receive for investing in a risk-free asset.

2. **Market Risk Premium E(Rm)−Rf)**:

- The market risk premium is the excess return that investors demand for bearing market risk over the risk-free rate.
- It reflects the compensation investors require for investing in risky assets instead of risk-free assets.
- The market risk premium captures the expected return on the market portfolio minus the risk-free rate.
- The magnitude of the market risk premium is influenced by various factors, including economic conditions, investor sentiment, and market volatility.

3. **Beta Coefficient (βi)**:

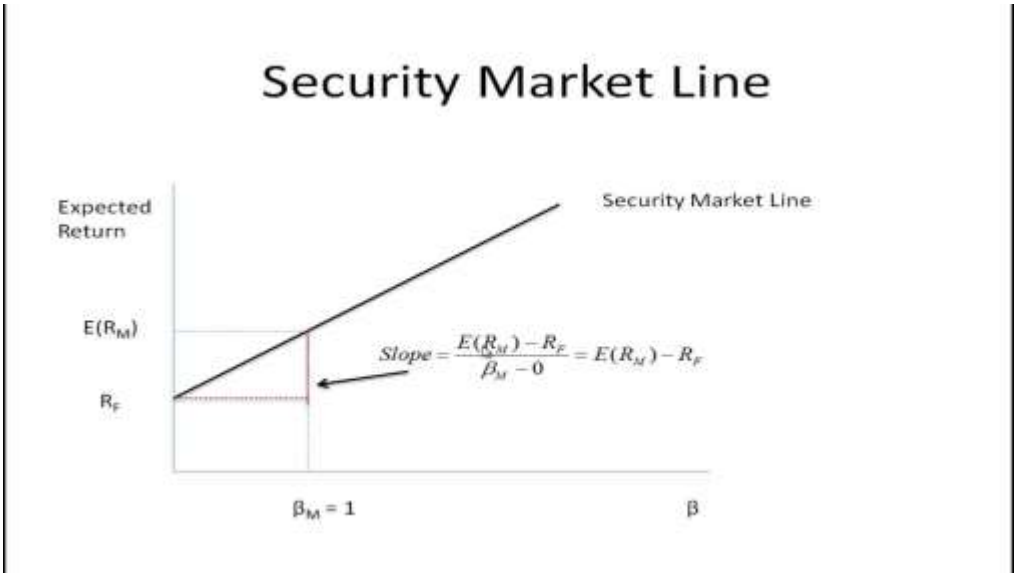
- The beta coefficient measures the sensitivity of an asset's returns to movements in the overall market.
- It quantifies the systematic risk of an asset relative to the market portfolio.
- A beta of 1 indicates that the asset's returns move in perfect correlation with the market.
- A beta greater than 1 implies that the asset is more volatile than the market, while a beta less than 1 suggests lower volatility compared to the market.
- Assets with higher betas are expected to have higher returns to compensate investors for bearing more systematic risk.
- The beta coefficient is a key input in the CAPM equation, as it determines the extent to which an asset's expected return is influenced by market movements.

In summary, each component of the CAPM equation plays a critical role in quantifying the expected return of an asset based on its risk characteristics. The risk-free rate provides a baseline return, the market risk premium compensates investors for bearing market risk, and the beta coefficient measures the asset's sensitivity to market movements. Together, these components form the foundation of the CAPM framework for asset pricing and investment analysis.

8.10 The Security Market Line (Sml)

The Security Market Line (SML) is a graphical representation of the Capital Asset Pricing Model (CAPM), depicting the relationship between the expected return and the systematic risk (measured by beta) of individual assets or portfolios. The SML is derived

from the CAPM equation and provides valuable insights into the risk-return trade-off in the capital markets.



Derivation of the SML:

1. **CAPM Equation**: The SML is derived from the CAPM equation, which relates the expected return E(Ri) of an asset to its beta coefficient (βi) and the expected return on the market portfolio E(Rm).

   E(Ri)=Rf+βi(E(Rm)−Rf)

   Plotting the SML: In the SML, the x-axis represents the beta coefficient (βi) of assets, which measures their systematic risk relative to the market. The y-axis represents the expected return E(Ri) of assets.

2. **Risk-Free Rate**: The SML starts at the y-intercept, which represents the risk-free rate (Rf). This is because assets with zero systematic risk (beta = 0) should still provide a return equal to the risk-free rate according to CAPM.

3. **Market Risk Premium**: The slope of the SML is determined by the market risk premium E(Rm)−Rf. This represents the additional return investors require for bearing one unit of systematic risk, as measured by the beta coefficient.

4. **Interpretation of the SML**: The SML provides a graphical depiction of the trade-off between risk and return in the capital markets. Assets or portfolios located above the SML are expected to provide returns that exceed what is justified by their systematic risk, offering investors an opportunity for excess returns (alpha). Conversely, assets or portfolios below the SML are expected to provide returns that are insufficient given their level of systematic risk, indicating that they are overvalued.

Interpretation:

1. **Efficient Frontier**: The SML represents the efficient frontier of the capital market, where assets or portfolios offer the highest possible expected returns for a given level of systematic risk. Assets or portfolios that lie directly on the SML are considered to be efficiently priced according to CAPM.
2. **Investment Decision Making**: Investors can use the SML to evaluate investment opportunities and construct portfolios that maximize expected return for a given level of risk. Assets or portfolios that deviate significantly from the SML may represent mispriced securities or opportunities for arbitrage.
3. **Risk-Adjusted Performance**: The SML provides a benchmark for evaluating the risk-adjusted performance of assets or portfolios. Assets or portfolios that consistently outperform the SML may indicate superior risk-adjusted returns, while those underperforming may suggest suboptimal risk-return characteristics.

In summary, the Security Market Line (SML) derived from the Capital Asset Pricing Model (CAPM) serves as a powerful tool for assessing the risk-return trade-off in the capital markets and guiding investment decision-making. It provides a graphical representation of the relationship between expected return and systematic risk, helping investors evaluate investment opportunities and construct efficient portfolios.

8.11 Practical Uses of CAPM In Finance

The Capital Asset Pricing Model (CAPM) has several practical applications in finance, spanning investment analysis, portfolio management, corporate finance, and risk management. Here are some key practical uses of CAPM in finance:

1. **Cost of Capital Estimation**: CAPM is widely used to estimate the cost of equity capital for businesses. By applying CAPM, companies can calculate the expected return that investors require for investing in the company's equity, taking into account the systematic risk associated with the company's stock. This information is essential for capital budgeting decisions, project evaluation, and determining the overall cost of capital for the company.
2. **Investment Analysis**: CAPM provides a framework for evaluating the attractiveness of individual investment opportunities. By comparing the expected return of an asset or investment project with its systematic risk, investors can assess whether the potential return justifies the level of risk undertaken. CAPM helps investors identify undervalued or overvalued securities and make informed investment decisions based on their risk-return preferences.
3. **Portfolio Management**: CAPM plays a crucial role in portfolio management by guiding the construction of efficient portfolios. Investors can use CAPM to determine the optimal mix of assets that maximizes expected return for a given level of risk or minimizes risk for a target level of return. CAPM helps investors diversify their portfolios effectively, balance risk exposures, and achieve their investment objectives.
4. **Risk Management**: CAPM aids in risk management by providing a standardized measure of systematic risk through the beta coefficient. Financial institutions,

corporations, and investors use CAPM to assess and manage their exposure to market risk. By understanding the systematic risk inherent in their portfolios, stakeholders can implement risk mitigation strategies, such as diversification, hedging, or asset allocation adjustments, to protect against adverse market movements.

5. **Performance Evaluation**: CAPM serves as a benchmark for evaluating the risk-adjusted performance of investment portfolios and financial assets. Portfolio managers compare the actual returns of their portfolios against the expected returns predicted by CAPM to assess whether they have outperformed or underperformed relative to market expectations. CAPM helps investors identify sources of alpha (excess returns) and evaluate the effectiveness of investment strategies.
6. **Corporate Finance Decision Making**: CAPM influences various corporate finance decisions, including capital budgeting, mergers and acquisitions, and capital structure decisions. By incorporating the cost of equity capital estimated using CAPM, companies can make more informed decisions about project investments, corporate valuations, and financing choices.

8.12 Real-World Case Studies

Here are two real-world case studies illustrating the application of the Capital Asset Pricing Model (CAPM):

1. **Company Valuation and Investment Decision-Making**:

   Case Study: Tech Start-up Valuation

A venture capital firm is considering investing in a tech start-up. The firm wants to determine the appropriate valuation for the start-up and assess the potential return on investment. They decide to use CAPM to estimate the cost of equity capital and inform their investment decision.

- **Data Gathering**: The venture capital firm collects relevant data, including the risk-free rate (10-year Treasury yield), the market risk premium (historical average), and the beta coefficient of comparable publicly traded technology companies.
- **Estimating Cost of Equity**: Using CAPM, the firm calculates the cost of equity capital for the tech start-up by adding the risk-free rate to the product of the start-up's beta coefficient and the market risk premium.
- **Valuation**: The firm applies the cost of equity capital to discount the start-up's expected cash flows to present value. This valuation provides an estimate of the start-up's intrinsic value and informs the investment decision.
- **Decision Making**: Based on the CAPM-derived valuation and considering other factors such as growth potential, competition, and market conditions, the venture capital firm decides whether to invest in the tech start-up and at what valuation.

2. **Portfolio Construction and Risk Management**:

   Case Study: Pension Fund Asset Allocation
   A pension fund manager is responsible for managing a diversified portfolio of assets to meet long-term retirement obligations for pensioners. The manager aims to construct a

portfolio that balances risk and return while meeting the fund's investment objectives. CAPM is used to guide asset allocation decisions and manage portfolio risk.

- **Asset Selection**: The pension fund manager selects a mix of asset classes, including equities, fixed income securities, and alternative investments, to construct a diversified portfolio.
- **Estimating Expected Returns**: Using CAPM, the manager estimates the expected return for each asset class based on their respective beta coefficients and the market risk premium.
- **Portfolio Optimization**: The manager constructs an efficient portfolio by allocating weights to each asset class that maximize expected return for a given level of risk or minimize risk for a target level of return.
- **Risk Management**: The manager monitors the portfolio's beta coefficient and adjusts asset allocation as needed to maintain the desired level of risk exposure. CAPM helps identify assets that contribute positively or negatively to portfolio risk and informs risk management decisions.
- **Performance Evaluation**: The manager evaluates the portfolio's performance relative to the SML derived from CAPM, assessing whether the portfolio has achieved its expected return given its systematic risk. Adjustments to the portfolio may be made based on performance evaluation results and changes in market conditions.

These case studies demonstrate how CAPM is applied in real-world scenarios to inform investment decisions, guide portfolio construction, and manage risk effectively. By incorporating CAPM into financial analysis and decision-making processes, investors and financial professionals can make informed choices that align with their objectives and risk tolerance.

8.13 Limitations of CAPM Model

The Capital Asset Pricing Model (CAPM) is a widely used framework in finance, but it also has several limitations that should be acknowledged:

1. **Market Efficiency Assumption**: CAPM assumes that markets are perfectly efficient, meaning that all investors have access to the same information and securities are always priced correctly. In reality, markets may not always be perfectly efficient, leading to mispricings and deviations from CAPM predictions.

2. **Sole Reliance on Beta**: CAPM relies heavily on the beta coefficient to measure systematic risk. However, beta may not capture all relevant sources of risk for an asset, such as political risk, liquidity risk, or event risk. As a result, using beta alone may oversimplify the risk assessment and lead to inaccurate expected returns.

3. **Risk-Free Rate Estimation**: CAPM requires an accurate estimation of the risk-free rate, which is typically based on government bond yields. However, the choice of the risk-free rate can vary, and different risk-free rates may lead to different estimates of expected returns, affecting the reliability of CAPM predictions.

4. **Single-Factor Model**: CAPM is a single-factor model that considers only systematic risk, represented by the market beta. It does not account for other factors

that may influence asset returns, such as size, value, momentum, or industry-specific factors. Ignoring these factors can limit the model's ability to explain asset returns accurately.

5. **Assumption of Homogeneous Expectations**: CAPM assumes that all investors have the same expectations about risk and return, which may not be true in practice. Investors may have different risk preferences, investment horizons, and information sets, leading to heterogeneous expectations and deviations from CAPM predictions.
6. **Historical Data Limitations**: CAPM relies on historical data to estimate expected returns and beta coefficients. However, historical data may not accurately reflect future market conditions or capture structural changes in the economy and financial markets, limiting the model's predictive power.
7. **Limited Applicability to Non-Tradable Assets**: CAPM is primarily designed for tradable financial assets with market prices. It may not be directly applicable to non-tradable assets such as real estate, private equity, or venture capital investments, which have different risk-return characteristics and valuation methodologies.
8. **Ignores Transaction Costs and Taxes**: CAPM does not consider transaction costs or taxes, which can impact investment returns, especially for frequent traders or taxable investors. Ignoring these costs may lead to overestimation of expected returns and suboptimal investment decisions.
9. **Sensitivity to Input Parameters**: CAPM's predictions are sensitive to the input parameters used, such as the risk-free rate, market risk premium, and beta coefficients. Small changes in these parameters can lead to significant variations in expected returns, affecting the reliability and robustness of CAPM estimates.
10. **Limited Empirical Support**: While CAPM is widely taught and used in finance, empirical studies have found mixed evidence supporting its validity and predictive power, especially in real-world applications. The model's assumptions and simplifications may not fully capture the complexities of financial markets, leading to discrepancies between theoretical predictions and observed market behaviour.

8.14 Illustration

Example 1: Cost of Equity Calculation

Assume the risk-free rate (RF) is 3%, the expected return on the market portfolio (RM) is 10%, and the beta coefficient (β) of a stock is 1.5. Calculate the cost of equity using CAPM.

$E(Ri)=Rf+\beta i(E(Rm)-Rf)$

$E(Ri)=0.03+1.5(0.10-0.03)$

$E(Ri)=0.03+1.5(0.07)$

$E(Ri)=0.03+0.105$

$E(Ri)=0.135$

Answer: The cost of equity for the stock is 13.5%.

Example 2: Expected Return Calculation

Assume the risk-free rate (RF) is 2%, the expected return on the market portfolio (RM) is 12%, and the beta coefficient (β) of a portfolio is 1.2. Calculate the expected return of the portfolio using CAPM.

$E(Ri)=Rf+\beta i(E(Rm)-Rf)$

$E(Ri)=0.02+1.2(0.12-0.02)$

$E(Ri)=0.02+1.2(0.10)$

$E(Ri)=0.02+0.12$

$E(Ri)=0.14$

Answer: The expected return of the portfolio is 14%.

Example 3: Beta Calculation

Assume the risk-free rate (RF) is 4%, the expected return on the market portfolio (RM) is 10%, and the cost of equity for a stock is 8%. Calculate the beta coefficient (β) of the stock using CAPM.

$\beta i=E(Ri)-RfE(Rm)-Rf$

$\beta i=E(Rm)-RfE(Ri)-Rf$

$\beta i=0.08-0.040.10-0.04$

$\beta i=0.10-0.040.08-0.04$

$\beta i=0.04 \text{ x } 0.06$

$\beta i=0.06 \text{ x } 0.04$

$\beta i=0.67$

$\beta i=0.67$

Answer: The beta coefficient of the stock is 0.67.

Example 4: Risk-Free Rate Calculation

Assume the expected return on a stock is 12%, the expected return on the market portfolio (RM) is 15%, and the beta coefficient (β) of the stock is 1.2. Calculate the risk-free rate (RF) using CAPM.

$Rf=E(Ri)-\beta i(E(Rm)-Rf)$

$Rf=0.12-1.2(0.15-Rf)$

$Rf=0.12-0.18+1.2Rf$

$0.18=1.2Rf$

$Rf=0.18 \times 1.2$

$Rf=0.15$

Answer: The risk-free rate is 15%.

❖ **EXCERCISES:**

- **MCQ:**

1. **Which of the following best describes the CAPM?**
   A) A model for calculating the cost of debt
   B) A framework for pricing assets and determining expected returns
   C) A method for calculating dividend yields
   D) A model for estimating inflation rates
   Answer: B) A framework for pricing assets and determining expected returns

2. **What does the beta coefficient measure in the context of CAPM?**
   A) The volatility of an asset's returns relative to the market
   B) The absolute return of an asset
   C) The correlation between an asset's returns and the risk-free rate
   D) The rate of inflation
   Answer: A) The volatility of an asset's returns relative to the market

3. **What is the risk-free rate in the context of CAPM?**
   A) The rate of return on low-risk assets such as Treasury bills
   B) The rate of return on high-risk assets such as stocks
   C) The rate of return on long-term bonds
   D) The expected market return
   Answer: A) The rate of return on low-risk assets such as Treasury bills

4. **According to CAPM, what is the expected return on an asset with a beta coefficient of 1?**
   A) Equal to the risk-free rate
   B) Equal to the market risk premium

C) Equal to the market return
D) Equal to zero
Answer: C) Equal to the market return

5. **Which of the following statements is true regarding assets lying above the Security Market Line (SML)?**
   A) They offer higher expected returns than justified by their systematic risk
   B) They offer lower expected returns than justified by their systematic risk
   C) They have a beta coefficient of 1
   D) They are risk-free assets
   Answer: A) They offer higher expected returns than justified by their systematic risk

6. **What is the slope of the Security Market Line (SML) in CAPM?**
   A) The risk-free rate
   B) The market risk premium
   C) The beta coefficient
   D) The expected return on the market portfolio
   Answer: B) The market risk premium

7. **In CAPM, what does a beta coefficient of less than 1 indicate about an asset?**
   A) The asset's returns are uncorrelated with the market
   B) The asset's returns are negatively correlated with the market
   C) The asset is less volatile than the market
   D) The asset is more volatile than the market
   Answer: C) The asset is less volatile than the market

8. **Which of the following is a key assumption of the CAPM model?**
   A) Investors are risk-neutral
   B) All investors have the same investment horizon
   C) Markets are perfectly efficient
   D) All of the above
   Answer: D) All of the above

9. **What is the primary purpose of using CAPM in portfolio management?**
   A) To maximize total return
   B) To minimize total risk
   C) To achieve the highest Sharpe ratio
   D) To balance risk and return effectively
   Answer: D) To balance risk and return effectively

10. **How does CAPM help investors in making investment decisions?**
    A) By providing a framework for estimating expected returns
    B) By identifying mispriced securities
    C) By guiding asset allocation decisions
    D) All of the above
    Answer: D) All of the above

❖ **Answer the following questions:**

1. What does CAPM stand for?
2. What is the primary objective of CAPM?
3. Explain the concept of systematic risk in the context of CAPM.
4. What is the risk-free rate, and why is it important in CAPM?
5. Describe the role of the beta coefficient in CAPM.
6. What is the Security Market Line (SML) in CAPM, and what does it represent?
7. What are the key assumptions underlying the CAPM model?
8. How is the expected return of an asset calculated using CAPM?
9. How does CAPM assist in portfolio management?
10. What are the limitations of CAPM in real-world applications?

UNIT – 9 SHARPE-THE SINGLE INDEX MODEL

Objectives:

The basic objective of Sharpe's Single Index Model is to provide investors with a systematic framework for analysing and managing portfolio risk and return. At its core, the model seeks to simplify the complex interplay between individual asset returns and broader market movements. By leveraging the concept of systematic risk, captured through the market beta, the model enables investors to disentangle the unique contributions of individual assets to portfolio performance. Through this lens, investors can identify assets that offer attractive risk-adjusted returns and construct portfolios that optimize the trade-off between risk and return. Ultimately, the Single Index Model serves as a powerful tool for guiding investment decisions, enabling investors to navigate the uncertainties of financial markets with greater clarity and confidence.

9.1 Introduction

In the dynamic landscape of finance, where uncertainty reigns supreme, the quest to understand and quantify risk has been a persistent challenge. Among the myriad tools and theories aimed at unravelling this complexity, William F. Sharpe's Single Index Model stands out as a cornerstone of modern portfolio theory.

At its core, the Single Index Model offers a simplified yet robust framework for assessing the relationship between risk and return in investment portfolios. Developed against the backdrop of the Efficient Market Hypothesis and the quest for a practical

method to gauge portfolio performance, Sharpe's model provides a lens through which investors can analyse and manage their exposure to market fluctuations.
This chapter embarks on a journey into the heart of Sharpe's Single Index Model, delving into its foundational principles, mathematical underpinnings, and real-world applications. Through a nuanced exploration of its assumptions and implications, we aim to equip readers with a deeper understanding of how this model has shaped modern portfolio management practices and continues to guide decision-making in the ever-evolving realm of finance.

9.2 Meaning

The Single Index Model, often associated with Nobel laureate William F. Sharpe, is a financial framework that aims to explain the relationship between the returns of individual assets and the overall market. At its core, the model assumes that the returns of an individual asset can be expressed as a linear function of the returns of a broad market index, such as the S&P 500. This linear relationship is represented mathematically, typically through regression analysis, where an asset's return is expressed as the sum of two components: a systematic component, which is proportional to the return of the market index (measured by the asset's beta), and an unsystematic component, which represents asset-specific risk or idiosyncratic factors. By decomposing an asset's return into these components, the Single Index Model provides insights into the sources of risk and return within a portfolio, facilitating better investment decision-making and risk management.

9.3 Definition

1. **William F. Sharpe:** "The Single Index Model is a financial framework that quantifies the relationship between the returns of individual assets and the overall market, expressed through a linear equation. It provides investors with insights into the systematic and unsystematic components of an asset's return, facilitating portfolio analysis and risk management."
2. **John C. Hull:** "In the realm of finance, the Single Index Model, as conceptualized by Sharpe, offers a simplified yet powerful approach to understanding portfolio risk and return. By assuming a linear relationship between asset returns and market movements, the model provides a structured framework for evaluating the risk exposure of individual assets within a portfolio."
3. **Eugene F. Fama:** "The Single Index Model, pioneered by Sharpe, provides a methodical approach to decomposing asset returns into systematic and unsystematic components. It serves as a cornerstone of modern portfolio theory, enabling investors to assess the impact of market fluctuations on individual asset performance and make informed decisions about portfolio construction and risk mitigation."
4. **Elton, Gruber, Brown, and Goetzmann (Modern Portfolio Theory and Investment Analysis):** "Sharpe's Single Index Model represents a fundamental tool in the arsenal of financial analysts and portfolio managers. By quantifying the relationship between asset returns and market movements, the model offers insights into the diversifiable and non-diversifiable risks inherent in investment portfolios, guiding the formulation of optimal asset allocation strategies."

5. **Robert C. Merton:** "The Single Index Model, formulated by Sharpe, provides a systematic framework for understanding the risk-return dynamics of investment portfolios. Through its decomposition of asset returns into systematic and idiosyncratic components, the model aids investors in assessing the impact of market risk on portfolio performance and devising strategies to enhance risk-adjusted returns."

9.4 Characteristics

The Single Index Model possesses several key characteristics that distinguish it as a valuable tool in financial analysis and portfolio management:

1. **Simplicity:** One of the defining characteristics of the Single Index Model is its simplicity. By assuming a linear relationship between asset returns and market movements, the model offers an intuitive framework for understanding portfolio risk and return.
2. **Systematic Risk Emphasis:** The model focuses on systematic risk, also known as market risk, which represents the portion of an asset's risk that cannot be diversified away. Through the estimation of each asset's beta coefficient, the model quantifies the sensitivity of individual assets to market fluctuations.
3. **Market Beta:** The concept of beta lies at the core of the Single Index Model. Beta measures the systematic risk of an asset relative to the market as a whole. Assets with betas greater than 1 are considered more volatile than the market, while those with betas less than 1 are deemed less volatile.
4. **Risk Decomposition:** A fundamental aspect of the Single Index Model is its ability to decompose an asset's total risk into two components: systematic risk and unsystematic risk (also known as idiosyncratic risk). Systematic risk is represented by the asset's beta coefficient, while unsystematic risk reflects the asset-specific factors that can be diversified away through portfolio diversification.
5. **Portfolio Applications:** The Single Index Model finds practical applications in portfolio management, risk assessment, and performance evaluation. Investors can use the model to construct well-diversified portfolios that optimize the trade-off between risk and return, while also assessing the performance of their portfolios relative to a benchmark index.
6. **Assumptions:** Like any financial model, the Single Index Model is based on certain assumptions, including the efficient market hypothesis, homogeneity of expectations among investors, and constant risk over time. While these assumptions may not perfectly reflect real-world conditions, they provide a useful framework for analysis and decision-making.
7. **Flexibility:** Despite its simplicity, the Single Index Model offers flexibility in its application. It can be adapted to accommodate different market conditions, investment objectives, and risk preferences, making it a versatile tool for investors and financial analysts alike.

9.5 Assumptions

The Sharpe Single Index Model is built upon several key assumptions, which form the foundation of its theoretical framework. These assumptions include:

1. **Efficient Market Hypothesis (EMH):** The model assumes that markets are efficient, meaning that asset prices fully reflect all available information. In an efficient market, investors cannot consistently earn abnormal returns by analysing past market data or using other information that is already publicly available.
2. **Linear Relationship:** The Single Index Model assumes a linear relationship between the returns of individual assets and the returns of a broad market index, such as the S&P 500. This assumption simplifies the modelling process and allows for the estimation of systematic risk.
3. **Homogeneous Expectations:** The model assumes that all investors have homogeneous expectations regarding the relationship between asset returns and market movements. In other words, investors interpret market information in the same way and have similar expectations for future returns.
4. **Constant Risk:** The Single Index Model assumes that the risk associated with an asset, as measured by its beta coefficient, remains constant over time. This assumption simplifies the analysis of risk-return relationships and allows for the estimation of long-term portfolio performance.
5. **No Transaction Costs or Taxes:** The model assumes that there are no transaction costs or taxes associated with buying or selling assets. This assumption allows for a clean analysis of portfolio performance without the complications introduced by real-world frictions.
6. **No Short Sales or Borrowing Constraints:** The model assumes that investors can freely short sell assets or borrow at the risk-free rate to finance their investments. This assumption ensures that investors can fully diversify their portfolios and take advantage of all available investment opportunities.

While these assumptions may not perfectly reflect real-world market conditions, they provide a useful framework for analysing portfolio risk and return and guiding investment decisions. It's important for practitioners to be aware of these assumptions and their implications when applying the Single Index Model in practice.

9.6 Importance of Understanding Sharpe Single Index Model In Modern Finance

Understanding the Sharpe Single Index Model holds paramount importance in modern finance due to its multifaceted applications across portfolio management, risk assessment, and performance evaluation. At its core, the model provides a systematic framework for analysing portfolio risk, allowing investors to identify and manage sources of risk within their portfolios. By decomposing an asset's total risk into systematic (market) risk and unsystematic (idiosyncratic) risk, the model enables investors to construct well-diversified portfolios that balance risk and return optimally.

Moreover, portfolio managers leverage the Single Index Model to evaluate the performance of their portfolios relative to a benchmark index, facilitating the assessment

of their ability to generate excess returns and make informed adjustments. Additionally, the model aids in asset allocation decisions by considering the beta coefficients and correlations of individual assets with the market, enabling investors to allocate capital effectively across different asset classes.

Furthermore, the Single Index Model serves as a tool for calculating risk-adjusted performance metrics such as the Sharpe ratio and Jensen's alpha, providing comprehensive measures of investment success. Overall, the model's significance lies in its role as an educational tool, guiding students and professionals in finance to grasp the principles of modern portfolio theory, asset pricing models, and risk management techniques, thereby enhancing their understanding of financial markets and investment strategies.

9.7 Brief History and Development

The Single Index Model, commonly associated with Nobel laureate William F. Sharpe, has a rich history rooted in the evolution of modern portfolio theory. Its development can be traced back to the mid-20th century, amidst the pioneering work of Harry Markowitz and other scholars in the field of finance.

In 1952, Harry Markowitz introduced the concept of portfolio optimization in his seminal paper "Portfolio Selection," which laid the foundation for modern portfolio theory. Markowitz emphasized the importance of diversification and risk management in constructing investment portfolios, sparking a paradigm shift in the way investors approached portfolio construction.

Building upon Markowitz's work, William F. Sharpe further advanced the field with his contributions to asset pricing and portfolio management. In the early 1960s, Sharpe developed the Capital Asset Pricing Model (CAPM), which provided a framework for pricing risky assets based on their systematic risk or beta.

The Single Index Model emerged as a simplified version of the CAPM, focusing on the relationship between individual asset returns and the returns of a broad market index, such as the S&P 500. Sharpe's insight was to express an asset's return as a linear function of the market return, capturing both systematic and unsystematic risk components.

The model gained widespread recognition and adoption due to its intuitive nature and practical applications in portfolio management. By quantifying the sensitivity of individual assets to market movements, the Single Index Model enabled investors to assess portfolio risk more effectively and construct diversified portfolios that optimized the trade-off between risk and return.

Over the years, the Single Index Model has evolved alongside advancements in financial theory and empirical research. While its assumptions may not perfectly reflect real-world market conditions, the model remains a cornerstone of modern portfolio management, guiding investment decisions and risk management strategies in an ever-changing market environment.

9.8 Formulation of Equation

The formulation of the Sharpe Single Index Model involves expressing the return of an individual asset as a linear function of the return of a broad market index. Mathematically, the model can be represented as follows:

$Ri=\alpha i+\beta iRm+ei$

Where:

Ri is the return of asset i.

αi is the asset-specific return not explained by the market.

βi is the sensitivity of asset ii to changes in the market (market beta).

Rm is the return of the market index.

ei is the error term representing asset-specific risk or idiosyncratic risk.

In this equation, βiRm represents the systematic component of an asset's return, reflecting its sensitivity to market movements. The coefficient βi quantifies this sensitivity, indicating how much an asset's return is expected to change for a one-unit change in the market return.

The term αi+ei captures the unsystematic component of an asset's return, which represents asset-specific factors that are independent of the market. αiαi represents any excess return not explained by the market, while ei represents random fluctuations or idiosyncratic risk associated with the asset.

Overall, the formulation of the Sharpe Single Index Model provides a structured framework for understanding the relationship between asset returns and market movements, allowing investors to analyse portfolio risk and return more effectively.

9.9 Alpha & Beta

In the Sharpe Single Index Model, alpha (αiαi) and beta (βiβi) are key parameters used to quantify the risk and return characteristics of individual assets within a portfolio. Let's explore each of these concepts:

1. **Alpha (αi):**
    - Alpha represents the excess return of an asset that is not explained by the market.
    - Mathematically, alpha (αi) is the intercept term in the regression equation of the Single Index Model: $Ri=\alpha i+\beta iRm+ei$
    - Alpha measures the asset's performance relative to what would be expected given its level of systematic risk (as captured by beta) and the overall market performance.
    - A positive alpha indicates that the asset has outperformed the market, generating excess returns. Conversely, a negative alpha suggests underperformance.

- Alpha is a measure of the asset manager's skill in selecting securities or timing the market. Positive alpha implies superior performance beyond what can be explained by market movements alone.

2. **Beta (βi):**
   - Beta represents the sensitivity of an asset's returns to changes in the market.
   - Mathematically, beta (βi) is the coefficient of the market return (Rm) in the regression equation of the Single Index Model.
   - A beta of 1 implies that the asset's returns move in perfect correlation with the market. A beta greater than 1 indicates that the asset is more volatile than the market, while a beta less than 1 suggests lower volatility.
   - Beta measures the systematic risk of an asset, which cannot be diversified away. It reflects how much an asset's returns are affected by general market movements.
   - Assets with higher betas tend to have higher expected returns, but they also carry higher risk. Conversely, assets with lower betas offer lower expected returns but are less volatile.

In summary, alpha and beta in the Sharpe Single Index Model provide valuable insights into an asset's risk-adjusted performance and its sensitivity to market movements. Alpha measures the asset's excess returns relative to the market, while beta quantifies its systematic risk exposure. By understanding and analysing alpha and beta, investors can assess the performance and risk characteristics of individual assets within their portfolios, aiding in portfolio construction and management decisions.

9.10 Practical Example

Let's consider a practical example to illustrate the application of the Sharpe Single Index Model:
Suppose we have a portfolio manager, Sarah, who manages a diversified portfolio of stocks. She wants to assess the risk and return of one of the stocks in her portfolio, XYZ Inc., using the Single Index Model. Sarah believes that the S&P 500 index is an appropriate benchmark for measuring market performance.

1. **Data Collection:** Sarah collects historical data on the returns of XYZ Inc. stock and the S&P 500 index over a specific period, such as one year.
2. **Regression Analysis:** Using the collected data, Sarah conducts a regression analysis to estimate the parameters of the Single Index Model equation: $Ri=\alpha i+\beta iRm+ei$
3. **Parameter Estimation:** Sarah estimates the alpha (αi) and beta (βi) coefficients for XYZ Inc. stock. The alpha represents the excess return not explained by the market, while the beta quantifies the sensitivity of XYZ Inc. stock to market movements.
4. **Interpretation:** After estimating the parameters, Sarah interprets the results. Suppose the regression analysis yields the following results:
   - Alpha (αi): 1%
   - Beta (βi): 1.2

This indicates that XYZ Inc. stock has an excess return (alpha) of 1% that is not explained by the market. Additionally, the stock's beta of 1.2 suggests that it is 20% more volatile than the market (S&P 500 index).

5. **Risk and Return Assessment:** Sarah uses the estimated parameters to assess the risk and return of XYZ Inc. stock within her portfolio. Based on its beta of 1.2, she expects XYZ Inc. stock to exhibit higher volatility than the market. However, the stock's excess return of 1% suggests that it may offer attractive risk-adjusted returns compared to the market.
6. **Portfolio Management:** Armed with insights from the Single Index Model, Sarah makes informed decisions about XYZ Inc. stock's weighting within her portfolio. She may adjust the allocation of XYZ Inc. stock based on its risk and return characteristics relative to other assets in her portfolio, aiming to optimize portfolio performance.

By applying the Sharpe Single Index Model in this practical example, Sarah gains valuable insights into the risk and return dynamics of XYZ Inc. stock, enabling her to make informed portfolio management decisions.

9.11 Real-World Case Studies Illustrating Sharpe Single Index Model Application

Here are two real-world case studies illustrating the application of the Sharpe Single Index Model:

Tech Company Analysis in India: An equity analyst in India is tasked with analysing the risk and return of a leading technology company, Tech Innovations India Ltd. The analyst gathers historical data on Tech Innovations' stock returns and the returns of a relevant market index, such as the Nifty 50 or the BSE Sensex.

After conducting a regression analysis using the Sharpe Single Index Model, the analyst finds that Tech Innovations India's stock has a beta (βi) of 1.2. This suggests that the stock is 20% more volatile than the market represented by the Nifty 50 or BSE Sensex.

Additionally, the analysis reveals that Tech Innovations India's stock has an alpha (αi) of 1.5%, indicating that the stock has outperformed the market by 1.5% on average, after adjusting for market risk.

Based on these findings, the analyst concludes that Tech Innovations India's stock offers attractive risk-adjusted returns compared to the Indian market. Investors seeking higher returns may consider allocating capital to Tech Innovations India's stock, recognizing its higher volatility compared to the broader market.

Portfolio Management Decision in India: A portfolio manager in India is evaluating the risk and return characteristics of various assets within a diversified investment portfolio. One of the assets under consideration is a pharmaceutical company, Pharma Health India Ltd.

Using historical data on Pharma Health India's stock returns and the returns of a broad market index such as the Nifty 50 or BSE Sensex, the portfolio manager applies the Sharpe Single Index Model to estimate the stock's beta (βi) and alpha (αi) coefficients.

The analysis reveals that Pharma Health India's stock has a beta of 0.9, indicating that it is 10% less volatile than the overall Indian market represented by the Nifty 50 or BSE Sensex. Furthermore, the stock has an alpha of 1.2%, suggesting that it has consistently outperformed the Indian market by 1.2% on average.

Armed with this information, the portfolio manager decides to increase the weighting of Pharma Health India's stock within the portfolio. Despite its lower volatility, the stock's alpha indicates that it has the potential to enhance the portfolio's overall risk-adjusted returns in the Indian market context.

These adapted case studies illustrate how the Sharpe Single Index Model can be applied in the Indian context to assess the risk and return of individual assets and inform portfolio management decisions. By quantifying the relationship between asset returns and the Indian market movements, the model provides valuable insights that help investors and portfolio managers optimize their investment strategies in the Indian financial landscape.

9.12 Limitations of Single Index Model

While the Sharpe Single Index Model offers valuable insights into portfolio risk and return, it also has several limitations that investors and analysts should consider:

1. **Assumption of Linearity:** The model assumes a linear relationship between asset returns and market movements. In reality, this relationship may not always hold, particularly during periods of extreme market volatility or structural changes in the market.
2. **Homogeneous Expectations:** The model assumes that all investors have homogeneous expectations regarding asset returns and market movements. In practice, investor expectations can vary widely, leading to discrepancies between predicted and actual returns.
3. **Constant Risk:** The Single Index Model assumes that the risk associated with an asset, as measured by its beta coefficient, remains constant over time. However, asset risk profiles can change due to factors such as changes in industry dynamics, regulatory developments, or shifts in investor sentiment.
4. **Inadequate Consideration of Non-Market Factors:** The model primarily focuses on market risk (systematic risk) captured by beta and may not adequately account for non-market factors that influence asset returns, such as company-specific events, management decisions, or industry trends.
5. **Data Requirements:** The model requires historical data on asset returns and market index returns, which may not always be readily available or reliable, particularly for assets with limited trading history or in emerging markets.
6. **Limited Predictive Power:** While the Single Index Model can provide insights into past performance and risk characteristics, its ability to predict future returns

or identify undervalued assets may be limited, especially in dynamic and uncertain market environments.

7. **Potential for Model Misspecification:** The model's reliance on simplifying assumptions and regression analysis leaves it vulnerable to model misspecification, where the chosen model may not accurately capture the true relationship between asset returns and market movements.
8. **Difficulty in Capturing Non-Linear Relationships:** The model's linear framework may not capture non-linear relationships between asset returns and market factors, leading to potential inaccuracies in risk and return assessments.
9. **Limited Scope for Assets with Unique Characteristics:** Assets with unique characteristics or unconventional risk-return profiles may not fit well within the framework of the Single Index Model, limiting its applicability in certain situations.
10. **Market Efficiency Assumption:** The model assumes market efficiency, implying that asset prices fully reflect all available information. However, if markets are not perfectly efficient, the model's predictions may deviate from actual market outcomes.

In summary, while the Sharpe Single Index Model provides a valuable framework for portfolio analysis, investors should be mindful of its limitations and consider supplementing its insights with additional tools and techniques to make well-informed investment decisions.

9.13 Practical

Example 1: Calculating Portfolio Beta

Suppose you are a portfolio manager responsible for managing a diversified portfolio of stocks. You want to calculate the portfolio beta to assess its sensitivity to market movements. You have the following data:

- Stock A: Beta = 1.2, Portfolio Weight = 30%
- Stock B: Beta = 0.8, Portfolio Weight = 40%
- Stock C: Beta = 1.5, Portfolio Weight = 30%
- Market Index: Return = 8%

Calculate the portfolio beta using the Sharpe Single Index Model.

Solution: Portfolio Beta=(0.30×1.2)+(0.40×0.8)+(0.30×1.5)

Portfolio Beta=0.36+0.32+0.45=1.13

So, the portfolio beta is 1.13, indicating that the portfolio is slightly more volatile than the market.

Example 2: Assessing Risk-Adjusted Performance

Suppose you are evaluating the risk-adjusted performance of two mutual funds, Fund X and Fund Y, over the past year. You have the following information:

- Fund X:
  - Annual Return: 12%
  - Beta: 1.2
- Fund Y:
  - Annual Return: 10%
  - Beta: 0.8
- Risk-Free Rate: 4%
- Market Return: 8%

Calculate the Sharpe ratio for each fund and determine which fund performed better on a risk-adjusted basis.

Solution:

Sharpe Ratio (X)=Beta (X) Annual Return (X)−Risk-Free Rate=1.212%−4%=1.28% =6.67%

Sharpe Ratio (Y)=Beta (Y) Annual Return (Y)−Risk-Free Rate=0.810%−4%=0.86% =7.5%

Since Fund Y has a higher Sharpe ratio (7.5%) compared to Fund X (6.67%), Fund Y performed better on a risk-adjusted basis.

These examples demonstrate how the Sharpe Single Index Model can be applied in practical scenarios to calculate portfolio beta and assess risk-adjusted performance.

Example 3: Estimating Alpha and Beta

Suppose you are an investment analyst tasked with analysing the risk and return characteristics of a newly-listed stock, XYZ Ltd. You have collected historical data on XYZ Ltd.'s monthly returns and the returns of a relevant market index over the past three years. Using the Sharpe Single Index Model, estimate the alpha and beta coefficients for XYZ Ltd.'s stock.

Solution:

- Perform a regression analysis using the following equation: $Ri=\alpha i+\beta iRm+ei$
- Estimate the alpha (αi) and beta (βi) coefficients using the regression results.
- Interpret the estimated coefficients to assess XYZ Ltd.'s risk-adjusted performance relative to the market.

Example 4: Portfolio Optimization

Suppose you are a financial advisor assisting a client in constructing an optimal investment portfolio. The client has provided you with historical data on the returns of various asset classes (stocks, bonds, real estate, etc.) and the returns of a broad market index. Using the Sharpe Single Index Model, determine the optimal asset allocation for the client's portfolio to maximize the Sharpe ratio.

Solution:

- Calculate the beta coefficients for each asset class using the Sharpe Single Index Model.
- Determine the expected returns and standard deviations for each asset class.
- Construct multiple portfolios with different asset allocations.
- Calculate the Sharpe ratio for each portfolio.
- Identify the portfolio with the highest Sharpe ratio as the optimal asset allocation for the client.

Example 5: Risk-Adjusted Performance Comparison

Suppose you are comparing the risk-adjusted performance of two investment strategies: Strategy A and Strategy B. You have collected historical data on the monthly returns of both strategies and the returns of a relevant market index. Using the Sharpe Single Index Model, calculate the Sharpe ratio for each strategy and determine which strategy performed better on a risk-adjusted basis.

Solution:

- Calculate the beta coefficients for Strategy A and Strategy B using the Sharpe Single Index Model.
- Determine the expected returns and standard deviations for each strategy.
- Calculate the Sharpe ratio for each strategy.
- Compare the Sharpe ratios to identify which strategy performed better on a risk-adjusted basis.

These examples showcase the versatility of the Sharpe Single Index Model in various applications, including estimating alpha and beta coefficients, portfolio optimization, and comparing risk-adjusted performance.

❖ EXERCISES

Choose the correct answer from the options given below each of the following statements:

1. What does the beta coefficient represent in the Sharpe Single Index Model?
   A) Excess return of an asset
   B) Asset-specific risk
   C) Sensitivity of an asset's returns to market movements

D) Return of the market index
Answer: C) Sensitivity of an asset's returns to market movements

2. In the Sharpe Single Index Model, what does alpha (αiαi) measure?
   A) Market risk of an asset
   B) Risk-adjusted return of an asset
   C) Excess return of an asset not explained by the market
   D) Portfolio diversification
   Answer: C) Excess return of an asset not explained by the market

3. Which of the following statements is true regarding the Sharpe Single Index Model?
   A) It assumes perfect market efficiency.
   B) It can only be applied to individual stocks.
   C) It does not consider systematic risk.
   D) It assumes a non-linear relationship between asset returns and market movements.
   Answer: A) It assumes perfect market efficiency.

4. If an asset's beta coefficient (βi) is greater than 1 in the Sharpe Single Index Model, it indicates that the asset is:
   A) Less volatile than the market
   B) More volatile than the market
   C) Not sensitive to market movements
   D) Unrelated to the market
   Answer: B) More volatile than the market

5. Which of the following factors is NOT a limitation of the Sharpe Single Index Model?
   A) Assumption of linearity
   B) Requirement of historical data
   C) Difficulty in capturing non-linear relationships
   D) Consideration of non-market factors
   Answer: D) Consideration of non-market factors

6. How is the Sharpe ratio calculated using the Single Index Model?
   A) By dividing the asset's return by its beta coefficient
   B) By dividing the asset's excess return by its standard deviation
   C) By dividing the asset's return by the market return
   D) By dividing the asset's beta coefficient by its standard deviation
   Answer: B) By dividing the asset's excess return by its standard deviation

7. Which of the following is NOT an assumption of the Sharpe Single Index Model?
   A) Constant risk over time
   B) Homogeneous expectations among investors
   C) Perfect market efficiency
   D) Non-linear relationship between asset returns and market movements
   Answer: D) Non-linear relationship between asset returns and market movements

8. What is the main objective of the Sharpe Single Index Model?
   A) To predict future asset prices
   B) To identify undervalued assets

C) To assess portfolio risk and return
D) To eliminate systematic risk
Answer: C) To assess portfolio risk and return

9. In the Sharpe Single Index Model, what does the error term (eiei) represent?
   A) Systematic risk of an asset
   B) Market risk premium
   C) Asset-specific risk or idiosyncratic factors
   D) Portfolio diversification
   Answer: C) Asset-specific risk or idiosyncratic factors

10. How does the Sharpe Single Index Model aid in portfolio management?
   A) By eliminating unsystematic risk
   B) By providing insights into asset-specific factors
   C) By assessing the risk-adjusted performance of assets
   D) By focusing solely on market returns
   Answer: C) By assessing the risk-adjusted performance of assets

❖ **Answer the following questions in detail:**

1. What is the Sharpe Single Index Model?
2. What are the key components of the Sharpe Single Index Model equation?
3. What does the beta coefficient represent in the Sharpe Single Index Model?
4. How is alpha defined in the context of the Sharpe Single Index Model?
5. What assumptions underlie the Sharpe Single Index Model?
6. How does the model help in assessing portfolio risk?
7. How is the Sharpe ratio calculated using the Single Index Model?
8. What are the limitations of the Sharpe Single Index Model?
9. How does the model assist in portfolio optimization?
10. Can the Sharpe Single Index Model be applied to individual assets other than stocks?

UNIT – 10 FACTOR MODELS AND ARBITRAGE PRICING THEORY

10.1 Introduction

The evolution of asset pricing models has been one of the most influential areas of research in financial economics, particularly security analysis and portfolio management, profoundly shaping the way investors and analysts understand risk and return. Central to this development is the transition from single-factor to multi-factor models, representing a significant advancement in our approach to asset pricing. This chAPTer explores factor models and multi-asset pricing models including Arbitrage Pricing Theory (APT), delving into their theoretical frameworks and practical applications.

The Capital Asset Pricing Model (CAPM), explored in detail in the previous chAPTer, posits that the expected return on a security or portfolio is linearly related to its systemic risk, as measured by beta. This model, foundational in financial theory, introduced the concept that the market portfolio's excess return is the sole factor driving a security's return. However, its limitations became apparent when empirical studies consistently found anomalies and multiple sources of systematic risk that CAPM could not explain. Addressing these shortcomings, Stephen Ross introduced the Arbitrage Pricing Theory (APT) in 1976, proposing a more nuanced model where multiple factors could influence a security's return. Unlike CAPM, which is grounded in market equilibrium, APT is based on a no-arbitrage condition across assets, which posits that the expected return of a portfolio is driven by its exposure to various macroeconomic, industry-specific, and firm-specific factors. This multi-factor approach allows for a more nuanced understanding of the forces that influence asset prices and acknowledges the complex interplay of various risk factors beyond the market index.

Despite its theoretical appeal, the practical implementation of APT and other multi-factor models has been challenging. Identifying and quantifying the relevant factors that influence asset returns is a significant hurdle. The theoretical factors identified by Ross—such as changes in industrial production, inflation, and risk premiums—are not directly observable and must be proxied by measurable variables, which may not perfectly cAPTure the intended risks. Furthermore, the statistical methods required to estimate these models are complex and data-intensive, making them less accessible to practitioners who may lack the necessary computational resources or expertise.

Despite their complexity and the challenges associated with their implementation, multi-factor models have continued to evolve and expand. They offer a richer framework for understanding asset prices than CAPM, accommodating a broader array of investing styles and risk considerations. This chAPTer aims to provide a comprehensive overview of these models, from their theoretical foundations to their practical applications.

By examining the progression from CAPM to multi-factor models such as APT, we gain not only a deeper insight into asset pricing dynamics but also a framework for exploring new theories and methodologies in financial economics.

10.2 Multi-Factor Model

A multi-factor model is a sophisticated financial tool that utilizes several explanatory variables or factors in its computations to elucidate market phenomena and determine equilibrium asset prices. Unlike single-factor models, such as the Capital Asset Pricing Model (CAPM), which relies on a singular market index to predict returns, multi-factor models incorporate a broader range of factors. These might include, but are not limited to, economic growth, interest rate, inflation, economic cycles, and sector-specific variables. By doing so, multi-factor models offer a more granular analysis of the risks and returns associated with individual securities or entire portfolios. They analyse the relationships between various factors and their collective impact on asset performance, providing a deeper insight into the underlying drivers of returns. This multifaceted approach allows for enhanced predictive power and more robust portfolio management strategies, aligning more closely with the complex dynamics of modern financial markets.

10.3 The Building Blocks of Multi-Factor Models

When discussing different factors in multi-factor models, it's crucial to cover a range of macroeconomic, fundamental, statistical, and other industry-specific factors that can impact asset returns. Each factor is selected based on its ability to explain the return on assets beyond what is cAPTured by market movements alone. It is important to note that each of these factors may or may not impact other assets in the same way.

1. **Macroeconomic Factors**

   (a) GDP

   Changes in economic output can affect corporate earnings and investment returns.

   (b) Interest rate

   The cost of borrowing has a significant impact on both businesses and consumer spending.

(c) Inflation

Rising prices can erode real returns and affect the valuation of assets.

(d) Unemployment Rates

Higher unemployment can indicate economic distress, affecting consumer confidence and spending.

(e) Changes in Foreign Exchange Rate

The exchange rate may impact the earnings of the firm. If the business is related to the import and export of goods and services then changes in forex can impact heavily otherwise magnitude of the impact may be very low.

The above list is not limited but it may include changes in direct and indirect tax rates, economic cycles, other economic factors, etc.

2. Fundamental Factors

(a) Earnings Yield

The inverse of the P/E ratio indicates the earnings generated per unit of price.

(b) Book-to-Market Ratio

A comparison of a company's book value to its market value is used to identify undervalued or overvalued stocks.

(c) Dividend Yield

Reflects the dividend payout relative to the stock price, indicating the income return on the investment.

(d) Size (Market Capitalization)

Smaller companies might yield higher returns due to higher growth potential and risks.

3. Statistical Factors

(a) Volatility

Measures the standard deviation of asset returns, cAPTuring the risk associated with an investment.

(b) Momentum

CAPTures the tendency of assets to continue moving in their current trajectory over the short to medium term.

(c) Principal Components

These are factors derived from a statistical method called Principal Component Analysis (PCA), which reduces the dimensionality of the data set to cAPTure the most significant variances.

4. Sector-specific Factors

Technological advancements, regulatory changes, market share, trends, etc. factors are particular to certain industries and can influence the returns of stocks within those sectors.

The impact of these factors on asset returns is not uniform across all assets. Different factors may influence various securities and portfolios to varying degrees, depending on the specific characteristics of the asset, such as industry sector, market capitalization, and geographical location. Thus, the sensitivity to these factors can significantly differ, underlining the need for a tailored approach in applying multi-factor models.

10.4 Theoretical Framework of Multi-Factor Models

1. Basis in Arbitrage Pricing Theory (APT)

The theoretical underpinnings of multi-factor models often begin with the Arbitrage Pricing Theory (APT), introduced by Stephen Ross. APT suggests that the returns of an asset can be modelled as a linear function of various macroeconomic factors, where each factor has its beta coefficient representing its sensitivity. Unlike CAPM, which assumes a single market factor, APT allows for multiple risk factors, which can better cAPTure the diverse sources of systematic risk affecting asset prices.

2. Statistical Factor Analysis

Central to the theoretical framework is statistical factor analysis, which is used to identify and validate the factors that most significantly affect asset returns. Techniques such as principal component analysis (PCA) and exploratory factor analysis (EFA) are commonly used to extract these factors from historical data. These statistical methods help in reducing dimensionality in the data by identifying a few underlying factors that explain the majority of the variance observed in asset returns.

3. Econometric Modelling

Once factors are identified, econometric models are employed to estimate the relationships between these factors and asset returns. Regression analysis, both cross-sectional and time-series, is used to estimate the sensitivities (factor loadings) of the securities to the identified factors. These models test the significance of each factor and their predictive power in explaining the returns of different assets.

4. Risk Premium Estimation

In the theoretical framework of multi-factor models, each factor is associated with a risk premium, which compensates investors for bearing that specific type of risk. The expected return on an asset, therefore, is the sum of these risk premiums weighted by their respective sensitivities. This component of the framework addresses how different factors contribute to the overall expected return and how these contributions can be quantitatively measured.

5. Integration with Portfolio Theory

Multi-factor models are also integrated into modern portfolio theory, which involves optimizing the combination of assets to achieve the desired risk-return trade-off. These models provide a more detailed mechanism for assessing diversification benefits and risks associated with different investment strategies, enabling investors to construct portfolios that more effectively target specific factors.

6. Behavioural Finance Insights

Adding a layer of complexity, some multi-factor models incorporate insights from behavioural finance to explain why certain anomalies persist in the market, such as

why investors may systematically overvalue or undervalue certain types of stocks. These insights can help explain the empirical performance of factors like momentum and value, which traditional economic theories may fail to fully justify.

This theoretical framework provides a robust basis for understanding how multi-factor models operate and why they are an essential tool in the arsenal of modern financial analysts and portfolio managers. By leveraging both economic theory and statistical analysis, these models offer a sophisticated approach to asset pricing and risk management.

10.5 Decoding Multi-Factor Models: Formula and Components

When exploring multi-factor models, it's essential to delve into the mathematical formula and its key components. This approach provides clarity on how these models quantify the intricate relationships between various risk factors and the returns of different assets. Below is an overview that includes the formula used in these models, along with a detailed explanation of each component.

Formula Representation

A typical multi-factor model can be represented by the following linear equation:

$$R_i = \alpha_i + \beta_{i1}F_1 + \beta_{i2}F_2 + \ldots + \beta_{in}F_n + \epsilon_i$$

Where: R_i is the expected return on the asset

α_i is the asset's expected return unexplained by the risk factors (often interpreted as the asset-specific return or alpha).

β_{ij} represents the sensitivity of the asset's returns to factor

F_j is the value of factor j, which could be macroeconomic indicators, company-specific metrics, or statistical factors.

ϵ_i is the error term, cAPTuring the idiosyncratic risk of the asset (not explained by the factors).

Explanation of the Formula Components

Expected Return (R_i):

This is the return that investors expect to earn from an asset or portfolio. It is the dependent variable in the model, which the factors try to predict.

Alpha (α_i):

Alpha represents the return on the asset that is not explained by the exposure to the factors included in the model. A positive alpha indicates that the asset has performed better than what the factor exposures would predict, suggesting superior management or other unique advantages.

Factor Sensitivities (β_{ij}):

These are coefficients that measure how much the returns of asset i are expected to change in response to a change in factor j. Each beta coefficient is specific to an asset-factor pair and quantifies the degree of exposure of the asset's returns to that particular factor.

Factors (F_j):

These are the variables believed to influence or explain asset returns. Factors might include economic conditions like inflation, industry-specific trends, or other market-wide phenomena. Each factor is quantitatively measured and included in the model.

Error Term (ϵ_i):
This term cAPTures the portion of the asset's returns that cannot be explained by the model. It includes any effects attributable to random chance or external influences not cAPTured by the included factors.

Application of the Formula

In practice, the model is used to estimate the betas through regression analysis, using historical data on returns and factor values. By regressing the historical returns of an asset against the historical values of each factor, the model calculates how much each factor has historically contributed to the asset's returns. These beta coefficients can then be used to predict future returns, adjust for risk, or optimize a portfolio by selecting assets with desirable factor exposures.

This mathematical representation and the associated statistical estimation allow investors and analysts to dissect the complex dynamics of asset returns, enhance risk management practices, and improve investment decision-making. The model also provides a framework for ongoing research and adAPTation as market conditions change and new factors emerge.

10.6 Different Factor Models in Asset Pricing

In the landscape of securities analysis and portfolio management, several factor models stand out, each extending the conceptual framework beyond the simple yet groundbreaking Capital Asset Pricing Model (CAPM). These models provide a more comprehensive view of the risks and returns associated with different securities, accommodating various market conditions and investor behaviours. Here is a brief overview of some of the most influential factor models:

1. **Capital Assets Pricing Model (CAPM)**

   It is a Single Factor Model and the foundational stone of modern financial theory, introduced in the 1960s by Sharpe, Lintner, and Mossin. It suggests that the expected return of a security is a function of its systematic risk relative to the overall market (beta). This model asserts that the only type of risk priced by the market is systemic, as idiosyncratic risks can be diversified away.

2. **Arbitrage Pricing Theory (APT)**

   Unlike CAPM, which is tied to a single market factor, APT posits that the returns on assets are affected by several macroeconomic factors such as changes in inflation, GDP growth, and interest rates. The theory asserts that no arbitrage opportunities exist when the relationship between these factors and asset returns is in equilibrium. APT is more flexible than CAPM because it does not require the market portfolio to be efficient, and it accommodates multiple sources of risk.

3. **Fama-French Three-Factor Model**

   Expanding on the CAPM, Eugene Fama and Kenneth French introduced their three-factor model in 1992, which includes three key risk factors: market risk,

size risk (small vs. large caps), and value risk (high vs. low book-to-market ratios). This model was developed in response to empirical findings that suggested CAPM did not fully explain the variations in stock returns and that size and value factors also play a crucial role in pricing.

4. **Carhart Four-Factor Model**

   Building upon the Fama-French model, Mark Carhart added momentum as a fourth factor in 1997. The momentum factor accounts for the tendency of stocks that have performed well in the past to continue performing well in the near future, and conversely, stocks that have performed poorly to continue underperforming. This model has been widely adopted, particularly in evaluating the performance of mutual funds and other portfolios.

5. **Fama-French Five-Factor Model**

   The Fama-French five-factor model expands upon their earlier three-factor framework by incorporating two additional factors: Profitability (RMW) and Investment (CMA). The profitability factor (RMW) cAPTures the differential returns between companies with high operating profitability and those with low or negative operating profitability. Sometimes, this profitability factor is substituted with a quality factor for broader evaluation. The investment factor (CMA) measures the intensity of a company's capital investments, recognizing how assets are utilized for maintenance and business growth. This factor often shows a negative correlation with the value factor, suggesting a divergent influence on asset pricing. Due to its complexity and the comprehensive nature of the factors it considers, the Fama-French five-factor model can sometimes be impractical for implementation in certain economic environments.

These models represent an evolution from a simplistic view of market risk to a more detailed framework that includes various dimensions of risk. They provide critical insights for portfolio management, allowing investors to construct more diversified portfolios and manage risk more effectively. Each model has its strengths and is applicable in different scenarios, making them essential tools for modern financial analysts and investors.

10.7 Arbitrage Pricing Theory (APT)

The Arbitrage Pricing Theory (APT) was developed primarily by Ross (1976).
It is a one-period model in which every investor believes that the stochastic properties of returns of capital assets are consistent with a factor structure. Ross argues that if equilibrium prices offer no arbitrage opportunities over static portfolios of the assets, then the expected returns on the assets are approximately linearly related to the factor loadings. (The factor loadings, or betas, are proportional to the returns' covariances with the factors.)

The APT is an extension for the Capital Asset Pricing Model (CAPM) in that both assert a linear relation between assets' expected returns and their covariance with other random variables. The covariance is interpreted as a measure of risk that investors cannot avoid by diversification. The slope coefficient in the linear relation between the expected returns and the covariance is interpreted as a risk premium.

- Arbitrage involves the simultaneous buying and selling of an asset across different markets, exploiting minor price differences to secure a risk-free profit from the transactions.

- The Arbitrage Pricing Theory provides traders with a framework to calculate the theoretical fair market value of an asset.
- Once the fair market value is established, traders seek out small discrepancies from this benchmark price and base their trading decisions on these variances.
- This theory is applied to evaluate financial assets, enabling traders to determine whether an asset is undervalued or overvalued in the market.
- APT acknowledges that markets can sometimes misprice securities, but it also suggests that market dynamics should eventually realign prices with their true fair value.
- For arbitrageurs, securities that are temporarily mispriced represent a short-term opportunity to achieve virtually risk-free profits.
- APT is a financial model that predicts the expected returns on assets or securities by accounting for multiple sources of systematic risk.

APT can be applied to arbitrage mispricing primarily in virtual markets, where the simultaneous buying and selling of assets without initial investment and minimal transaction costs is nearly feasible, as it is nearly impossible to achieve in most physical markets. Hypothetically, one could consider an example where securities are purchased from the Bombay Stock Exchange (BSE) and sold simultaneously on the National Stock Exchange (NSE) or vice versa if there is a price discrepancy between the two.

10.8 Assumptions of APT

The Arbitrage Pricing Theory (APT) is based on a few key assumptions that facilitate its application in predicting asset returns using a multi-factor model. Here are the primary assumptions underpinning APT:

No Arbitrage Condition: A fundamental assumption of the APT is that there are no arbitrage opportunities in the market. This means that it should not be possible to make a risk-free profit with zero net investment. The market is assumed to correct itself to eliminate such opportunities, ensuring that prices of assets fully reflect their intrinsic values relative to their risk.

Factor Model Structure: The returns on assets are assumed to be generated by a factor model, where asset returns are linearly related to various macroeconomic, industry-specific, or company-specific factors. Each asset's return is a linear function of these factors plus a random error term that is specific to the asset.

Sufficiently Diversified Portfolios: It is assumed that investors hold sufficiently diversified portfolios. This diversification eliminates unsystematic risk, or the risk that is specific to individual assets. Thus, only systematic risks, which are associated with the factors and cannot be diversified away, are priced in the market.

Well-functioning Markets: Markets are assumed to be well-functioning, where information is freely available and rapidly reflected in asset prices. Investors are rational and markets are efficient, meaning assets are fairly valued based on available information.

Large Number of Securities: The theory assumes that there are a large number of securities in the market, which enables the diversification necessary to focus only on systematic risks.

Homogeneous Expectations: Investors are assumed to have homogeneous expectations regarding the returns generated by these factors. This means that all investors agree on the prospects of the factors influencing the asset prices, even if they might differ on other aspects of the securities.

These assumptions are idealized and serve as the basis for the theoretical structure of APT. In practical applications, some of these assumptions may not hold perfectly, which can lead to deviations from the theory's predictions.

10.9 Mathematical Formulation of APT

The expected return of an asset according to APT can be described using the following linear equation:

$E(R_i) = r_f + \beta_{i1}(R_{m1} - R_f) + \beta_{i2}(R_{m2} - R_f) + \ldots + \beta_{in}(R_{mn} - R_f) + \epsilon_i$

$E(R_i) = r_f + \beta_{i1}F_1 + \beta_{i2}F_2 + \ldots + \beta_{in}F_n + \epsilon_i$

Where:

(R_i) is the expected return on asset i.

r_f is the risk-free rate, representing the time value of money and the minimum return expected by investors for any investment.

β_{ij} represents the sensitivity of the return of asset i to factor j, which quantifies how much the asset's return will change with a change in the factor.

F_j is the risk premium associated with factor j, reflecting the extra return expected from an asset for its exposure to this systematic risk.

ϵ_i is the idiosyncratic risk or specific risk to the asset that is not explained by the model.

Explanation of the Components

Risk-Free Rate (r_f):

The baseline returns an investor would expect from a risk-free investment. It sets the foundation upon which the risk premiums of other factors are added.

Factor Sensitivities (β_{ij}):

These are coefficients that measure the responsiveness of the asset's returns to changes in each systematic risk factor. These values are estimated statistically through regression analysis of historical data.

Risk Premiums (F_j):

Each factor has an associated risk premium that compensates investors for the risk taken by exposing their portfolio to that particular factor. These premiums are essentially the expected excess returns over the risk-free rate attributable to each factor.

Idiosyncratic Risk (ϵ_i):

This term represents the portion of an asset's return that is not explained by the systematic factors included in the model. It is unique to the asset and can be due to a variety of reasons, such as management decisions, company-specific events, or other non-systematic influences.

10.10 Application of APT

In practice, to apply APT, analysts perform regression analysis to estimate the

β coefficients for each factor based on historical data. They then use these estimates to calculate the expected returns of the securities, adjusting for the risk profiles based on exposure to the identified factors. APT is particularly useful for constructing diversified portfolios that are balanced across various types of systematic risks and for identifying securities whose priced risks do not align with their expected returns based on their factor exposures.

Let us develop a practical example of the Arbitrage Pricing Theory (APT) to calculate the expected rate of return for Reliance Industries, incorporating two specific factors: CNX Nifty and inflation. Here's a detailed outline of the methodology:

Data Collection

- Source and Period: Data was sourced from the National Stock Exchange (NSE) website, covering a period from April 2023 to April 2024.
- Securities and Indices: The data includes monthly returns for Reliance Industries and the CNX Nifty index.
- Inflation Data: Monthly inflation rates for the same period were also collected from tradingeconomics.com.

Risk-Free Rate

The annual rate for a 364-day Treasury Bill was used as the proxy for the risk-free rate.

Market Returns

Market returns for CNX Nifty and the inflation rates were calculated based on the collected data for the specified period.

Factor Sensitivities (Betas)

Betas for both CNX Nifty and inflation were derived through statistical analysis, representing Reliance Industries' sensitivity to changes in these factors.

This structured approach provides a clear framework for applying APT to estimate the expected returns for Reliance Industries, considering both market and non-market risk factors.

R_f = 7.07%, RP_N = 13.39%, RP_I = 12.53% β_N = 0.85, β_I = 0.02

$E(R_R) = Rf + RP_N \times \beta_N + RP_I \times \beta_I$

$E(R_R)$ = 7.07% + 13.39% x 0.85 + 12.53% x 0.02

$E(R_R)$ = 7.07% + 11.41% + 0.08%

$E(R_R) = 18.56\%$

In the example provided, it appears that inflation has minimal influence on the returns of Reliance Industries. However, without conducting a formal analysis, it's challenging to definitively determine whether a specific factor, such as inflation, should be factored into the calculations. It underscores the necessity of performing empirical analysis to accurately assess the sensitivity of returns to different factors before making any conclusions.

10.11 Specification of Factors

Estimating the factor loading matrix β, which indicates how different factors influence asset returns, requires identifying those factors. Here are three common approaches used for this purpose:

1. **Algorithmic Analysis of the Covariance Matrix:** This method analyses the estimated covariance matrix of asset returns to uncover common factors. Techniques like factor analysis and principal component analysis are employed to identify and understand the significant patterns and relationships within the data.
2. **Judgment-Based Approach:** Here, the researcher uses their judgment to select factors based on the observed correlations in the asset returns. For instance, correlations observed between the returns of firms of similar sizes might lead to the selection of firm size as a factor. Similarly, the relationship between the book-to-market equity ratio and stock returns can prompt the inclusion of this ratio as a factor.
3. **Intuitive Approach:** In this approach, the researcher primarily relies on intuition to choose factors, often selecting financial and macroeconomic variables such as equity index returns, interest rate spreads, default premiums, inflation rates, and growth rates of industrial production and consumption. Once selected, the researcher then checks if these factors can explain variations in the expected returns of different assets.

Each of these methods provides a unique way to understand and predict asset returns by identifying the underlying factors that drive market movements.

10.12 Practical Applications of the Arbitrage Pricing Theory

The Arbitrage Pricing Theory (APT) is versatile and flexible, making it suitable for various practical applications such as asset allocation, calculating the cost of capital, and evaluating the performance of managed funds.

Asset Allocation:

APT is particularly useful in asset allocation due to its ability to link specific factors with the overall efficiency of the investment portfolio. The theory suggests that by understanding the relationship between a small number of factors and asset returns, investors can create an efficient portfolio with just a few assets. This simplifies the investment process by reducing the complexity of the decisions investors need to make. However, if the factors chosen are not accurate, the resulting portfolio might not be as efficient as expected, which means adjustments might be needed based on how much investors trust the model.

Cost of Capital:

APT can also help in calculating the cost of capital, which is essential for businesses, especially utilities, to understand how much return investors expect for the risks they take. Some studies have tried to use APT for this purpose by considering various economic factors like changes in interest rates, inflation, and economic growth. However, different studies using different factors have led to varied results. This inconsistency is a major reason why some organizations, like the Federal Reserve, have decided against using APT for important financial calculations.

Performance Evaluation of Managed Funds:

In terms of evaluating investment managers, APT can be used to assess how well the returns of managed funds can be explained by their exposure to certain risk factors. By comparing these results against standard benchmarks like Treasury bills, investors can better understand the skill level of their fund managers.

In summary, while APT offers a sophisticated approach to understanding and predicting financial outcomes by analysing a few key factors, its effectiveness greatly depends on the accuracy of the factors chosen. This highlights a fundamental challenge with the model: it doesn't specify which factors should be used, leading to variability in its application and effectiveness.

10.13 Challenges and Limitations of APT

APT is a sophisticated tool that offers a multi-factor approach to estimating the expected returns on assets. However, like any theoretical model, APT has several limitations that can affect its practical application and accuracy.

Identification of Relevant Factors:

One of the primary challenges with APT is identifying which factors are relevant and should be included in the model. APT does not specify the exact factors, leaving it up to the analyst to determine. This can lead to variability in results depending on which factors are chosen.

Statistical and Model Risks:

APT relies heavily on statistical methods to estimate the sensitivities (betas) to the chosen factors. These estimations can be prone to model specification errors, and estimation risk, and could suffer from multicollinearity among factors, leading to unstable and unreliable beta estimates.

Assumption of No Arbitrage:

APT is built on the assumption that no arbitrage opportunities exist, which is seldom true in real-world markets. Short-lived arbitrage opportunities can and do exist, which can undermine the foundational assumption of the theory.

Market Efficiency:

The model assumes that markets are efficient and that all relevant information is quickly and accurately reflected in security prices. In reality, markets can be inefficient, information can be asymmetric, and sometimes prices reflect irrational behaviours or sentiments rather than fundamental values.

Theoretical vs. Empirical Validation:

While APT is grounded in strong theoretical underpinnings, its empirical testing has often yielded mixed results. The effectiveness of APT in explaining asset returns can vary greatly across different periods and market conditions.

Homogeneous Expectations:

The assumption that all investors have homogeneous expectations about factor returns is quite strong and unrealistic. In real markets, investors have diverse opinions and access to different information, which can lead to significant disparities in expectations.

Diversification:

APT assumes that investors can and do hold well-diversified portfolios that eliminate unsystematic risk. However, achieving such diversification is not always possible in practice, especially for investors with constraints on their investment universe.

Handling of Non-linear Risks:

The model assumes a linear relationship between asset returns and underlying factors, which may not adequately cAPTure the complexities of market dynamics where non-linear relationships can exist.

These limitations suggest that while APT provides a valuable framework for understanding asset prices, it should be used with caution and in conjunction with other analyses and tools to make well-rounded investment decisions.

10.14 Conclusion

This chAPTer has traversed the intricate landscape of factor models and multi-asset pricing models, with a particular focus on the Arbitrage Pricing Theory (APT). We have explored the evolution from the simplistic yet foundational Capital Asset Pricing Model (CAPM) to the more elaborate and inclusive frameworks of multi-factor models. These models not only enhance our understanding of market dynamics but also refine our approach to assessing asset prices and managing investment risks.

The transition to multi-factor models signifies a critical evolution in financial economics, providing a broader spectrum of factors—ranging from macroeconomic to sector-specific influences—that shape asset returns. These models facilitate a deeper analysis of risk factors, offering investors and financial analysts a more robust toolset for portfolio management and investment strategy formulation.

Despite their theoretical appeal and broad applicative potential, we've acknowledged the challenges and limitations inherent in these models. The identification of relevant factors, the assumptions of market efficiency, and the empirical validity of these models are among the hurdles that need careful consideration.

Moving forward, the continued development and refinement of multi-factor models will likely focus on integrating more dynamic factors and improving the models' adAPTability to changing market conditions. This ongoing evolution will necessitate a blend of advanced statistical techniques and practical financial insight, aiming to bridge the gap between theoretical robustness and practical efficacy in investment management.

By critically examining these models, we gain not only insights into asset pricing dynamics but also valuable frameworks for exploring new theories and methodologies in the constantly evolving field of financial economics. This knowledge equips us to better anticipate and react to the complexities of global financial markets.

❖ **Exercise**

Multiple Choice Questions

Choose the correct answer from the options given below each of the following statements:

1. Which of the following best describes the theoretical basis for APT?

   A) Market efficiency B) Diversification of idiosyncratic risk
   C) No-arbitrage condition D) Behavioural finance

2. What type of risk factors does APT primarily focus on?

   A) Systematic risks B) Idiosyncratic risks
   C) Unforeseeable risks D) Negligible risks

3. APT is known for using multiple factors to explain asset returns. Which type of analysis is often used to select these factors?

   A) Factor analysis B) Regression analysis
   C) Variance analysis D) Ratio analysis

4. APT differs from CAPM by:

   A) Ignoring market risk B) Using multiple risk factors
   C) Excluding the risk-free rate D) Focusing only on unsystematic risk

5. Which of the following is NOT a typical macroeconomic factor used in APT?

   A) GDP growth rate B) Corporate profit margins
   C) Inflation rates D) Interest rates

6. How does APT handle the prediction of asset returns?

   A) By assuming assets follow a random walk
   B) Through a linear combination of selected risk factors
   C) By calculating the geometric mean of past returns
   D) Using a quadratic equation based on past prices

7. In the context of APT, what does 'beta' represent?

   A) The total return on the market
   B) The sensitivity of an asset's returns to a specific risk factor
   C) The constant, or alpha, in a regression model
   D) The expected growth rate of dividends

8. Which of the following best explains the practical use of APT in portfolio management?

   A) To ensure portfolio diversification
   B) To identify undervalued stocks based on CAPM
   C) To predict the exact future prices of securities
   D) To evaluate the impact of economic changes on asset prices

9. APT assumes that returns are:

   A) Highly predictable in the short term
   B) Only influenced by market movements
   C) Linearly related to various factors
   D) Independent of economic condition

10. Which outcome can be a challenge when applying APT due to its reliance on multiple factors?

    A) Overfitting the model
    B) Simplifying the investment analysis
    C) Ignoring stock-specific information
    D) Reducing the cost of capital

11. How do multi-factor models generally treat idiosyncratic risks?

    A) They are the primary focus.
    B) They are ignored due to diversification.
    C) They are multiplied by beta.
    D) They are considered unimportant.

12. What is a significant challenge in implementing multi-factor models?

    A) Identifying and quantifying relevant factors
    B) Finding enough investors
    C) Achieving a high rate of return
    D) Simplifying the models for easy understanding

Answers:

(1) C (2) A (3) A (4) B (5) B (6) B (7) B (8) D (9) C (10) A
(11) B (12) A

Answer the following questions in one or two sentences:

1. How does APT differ fundamentally from the CAPM?
2. Which type of risks does APT primarily focus on?
3. Name any five typical macroeconomic factors included in APT models.
4. What does a high beta in an APT model indicate about an asset's sensitivity?
5. Can APT be used to predict the exact future returns of an asset?
6. What challenges might arise from using too many factors in an APT model?

Answer the following questions in detail:

13. Discuss how the Arbitrage Pricing Theory (APT) extends beyond the Capital Asset Pricing Model (CAPM) in explaining asset returns. Include in your discussion how APT handles multiple risk factors compared to CAPM's single market factor approach.
14. Assess the practical implications of employing the APT in portfolio management. Discuss the potential challenges and benefits of using APT for asset allocation and risk management strategies in comparison to simpler models like CAPM.
15. Evaluate the role of macroeconomic factors in multi-factor models. Provide examples of such factors and explain how they potentially impact asset returns. How do analysts determine which macroeconomic factors to include in their models?

16. Analyse the limitations of the Arbitrage Pricing Theory in the context of real-world financial markets. What are the main challenges in applying APT, and how do these challenges affect the theory's predictive power and practical usability?
17. Describe the process of estimating factor sensitivities (betas) in APT. Discuss the implications of these sensitivities for investment decisions and what they reveal about an asset’s response to various market conditions.
18. Assume an investor is evaluating the expected return of a stock using APT. The risk-free rate is 4%, and the stock has the following factor sensitivities: 0.5 to market premium (which has a premium of 5%), 0.3 to interest rate changes (interest rate risk premium is 2%), and 0.4 to oil price fluctuations (oil price risk premium is 4%). Calculate the expected return of the stock using APT.
19. You have the following information for a bond: the risk-free rate is 6.5%, the bond's sensitivity to inflation is 0.8 (inflation risk premium is 1.5%), and its sensitivity to changes in credit spread is 1.2 (credit spread risk premium is 2%). APT suggests an expected return for the bond. If the current market return on the bond is 6.5%, determine whether the bond is overpriced or underpriced according to APT.
20. A company’s stock has a beta of 1.0 to an industrial production index (risk premium of 4%), 0.5 to an interest rate factor (risk premium of 2%), and 0.3 to a foreign exchange factor (risk premium of 1.5%). If the interest rate risk premium decreases by 0.5%, determine the impact on the expected return of the stock, keeping other factors constant.

NOTES

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સ્વાધ્યાયઃ પરમં તપઃ
સ્વાધ્યાયઃ પરમં તપઃ
સ્વાધ્યાયઃ પરમં તપઃ

શિક્ષણ, સંસ્કૃતિ, સદ્‌ભાવ, દિવ્યબોધનું ધામ
ડૉ. બાબાસાહેબ આંબેડકર ઓપન યુનિવર્સિટી નામ;
સૌને સૌની પાંખ મળે, ને સૌને સૌનું આભ,
દશે દિશામાં સ્મિત વહે હો દશે દિશે શુભ-લાભ.

અભણ રહી અજ્ઞાનના શાને, અંધકારને પીવો ?
કહે બુદ્ધ આંબેડકર કહે, તું થા તારો દીવો;
શારદીય અજવાળા પહોંચ્યાં ગુર્જર ગામે ગામ
ધ્રુવ તારકની જેમ ઝળહળે એકલવ્યની શાન.

સરસ્વતીના મયૂર તમારે ફળિયે આવી ગહેકે
અંધકારને હડસેલીને ઉજાસના ફૂલ મહેંકે;
બંધન નહીં કો સ્થાન સમયના જવું ન ઘરથી દૂર
ઘર આવી મા હરે શારદા દૈન્ય તિમિરના પૂર.

સંસ્કારોની સુગંધ મહેંકે, મન મંદિરને ધામે
સુખની ટપાલ પહોંચે સૌને પોતાને સરનામે;
સમાજ કેરે દરિયે હાંકી શિક્ષણ કેરું વહાણ,
આવો કરીયે આપણ સૌ
ભવ્ય રાષ્ટ્ર નિર્માણ...
દિવ્ય રાષ્ટ્ર નિર્માણ...
ભવ્ય રાષ્ટ્ર નિર્માણ

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