Subject: SAPM

Subject Code: MBPC3005

 Branch: MBA Semester: 3RD SEM

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<u>Disclaimer:</u>

Course Objectives:

1. Comprehend the investment scenario, including investment objectives, alternatives, and basics of stock market operations.
2. Analyze risk and return on investment, including total risk factors, historical and expected returns, and systematic versus unsystematic risk.
3. Understand portfolio analysis and selection methods, such as the Markowitz Model, Sharpe's Single Index model, and CAPM, for optimal portfolio construction.
4. Explore fundamental and technical analysis techniques, efficient market hypothesis, and portfolio management strategies for effective investment decision-making.

Module-I:

Investment:Investment Scenario: Concept of investment, investment objectives and constraints, Investment alternatives, Basics of Stock Market Operations, Concept of Index and methodology; Risk & Return on investment: total risk and its factors-concept and components of total risk-security returns: measuring historical and ex ante (expected) returns, systematic and unsystematic risk

Module-II

Portfolio Analysis and Selection: Risk and Return on a portfolio, Markowitz Model for portfolio selection, feasible set portfolios, efficient set, selection of optional portfolio. Sharpe's Single Index model, Alpha, Beta, Efficient frontier with risk free lending and borrowing. CAPM, pricing of securities with CAPM, Arbitrage pricing theory.

Module-III:

Fundamental and Technical Analysis and evaluation: Economic, Industry and Company Analysis, Technical Analysis, Charting tools, Volume and price trends, technical indicators, Efficient Market Hypothesis, Performance Evaluation of portfolio, Portfolio management strategies.

Course Outcomes:

CO-1: Identify the investment opportunities and the nature of investment decisions.
CO-2: Design optimal portfolio and evaluate them using models.
CO-3: Apply precise modules to securities performance and forecasting.
CO-4: Outline and examine the relational and exploratory methods and influences considered by technical analysts.

Books:

- Security Analysis & Portfolio Management, S.Kevin, PHI
- Investments, Bodie, Kane Marcus and Mohanty, McGraw Hill
- Security Analysis & Portfolio Management, P Singh, HPH
- Security Analysis & Portfolio Management, A P Dash, IK International, New Delhi

Investment and Portfolio Management

Investing in various types of assets is an activity that attracts people from all walks of life. A potential investor is one who has more money than required for current consumption. The surplus funds can be invested in securities, gold, real estate, or even deposited in a bank account. All these actions represent investment in a broader sense, as they involve committing present resources for future benefits.

Meaning of Investment

Investment refers to the employment of funds in assets with the aim of earning income or capital appreciation. It involves a sacrifice of current money or other resources to gain benefits in the future. Investment has two key attributes – time and risk. The sacrifice occurs in the present and is certain, whereas the benefit is expected in the future and is uncertain. Thus, every investment decision inherently involves risk.

The time element is crucial, as investment involves waiting for a reward. For example, purchasing a flat or a house can be considered an investment if it is made with the expectation of receiving rent or appreciation in value. In short, investment means employing funds with the goal of earning additional income or achieving growth in value.

Concepts of Investment

Investment can be understood in three different ways: economic investment, general investment, and financial investment. To an economist, investment means the net addition made to the nation's capital stock such as new buildings, equipment, or inventories used in the production process. For a layman, investment may simply mean a commitment of money, such as buying a new car, which does not necessarily yield financial returns. Financial investment, which is of our main concern, refers to the allocation of money to financial assets that are expected to provide income or capital gains over time.

Financial investments can range from safe to risky options. Bank deposits are considered safe investments with lower returns, government bonds offer moderate risk with moderate returns, while equity shares and mutual funds are highly risky but offer the potential for higher returns.

Portfolio and Portfolio Management

A portfolio is a combination of securities and assets held by an investor. It may include both financial assets such as bank deposits, bonds, and stocks, and real assets such as a house or a vehicle. A portfolio is constructed to meet the investor's goals of earning maximum return with minimum risk. To achieve this, the investor diversifies the portfolio by allocating funds among various assets. Diversification helps in reducing the overall risk, just like spreading eggs in multiple baskets rather than keeping all in one.

Portfolio management is a dynamic process that involves evaluating and revising the portfolio according to the investor's objectives. Portfolio analysis studies the relationship between risk and return for individual securities and examines the effects of combining them in a portfolio to optimize results.

Investment Attributes

The important attributes of an investment are return, risk, marketability, tax shelter, and convenience. Return refers to the income or capital gain earned on an investment. Risk represents the possibility of loss due to uncertainty. Marketability or liquidity means the ease with which an investment can be converted into cash without significant loss of value. Tax shelter relates to the tax benefits associated with certain investments, while convenience refers to the ease and simplicity of managing an investment.

Investment vs Speculation

Investment and speculation are often confused because both involve committing funds to assets in expectation of returns. However, speculation generally refers to taking business risks in the hope of making quick gains from short-term price fluctuations, whereas investment focuses on long-term and stable returns. Investment and speculation both involve risk-taking, but they differ in purpose and approach. Investment is a well-grounded, carefully planned activity aimed at achieving long-term financial growth, whereas speculation focuses on short-term gains through market movements. Thus, an intelligent investor should balance risk and return by diversifying the portfolio and aligning investments with personal goals and risk tolerance.

Point of Difference	Investment vs Speculation
Risk	Investment involves limited risk and focuses on safety of principal, while speculation involves high risk where the speculator accepts greater uncertainty.
Capital Gain / Appreciation	Investment is based on proper investigation and analysis to earn stable returns over time, whereas speculation aims at profiting from short-term price changes.

Time Horizon	Investment has a longer holding period, usually at least one year, while speculation has a short-term horizon focused on quick returns.
Basis for Decision	Investment decisions are based on careful evaluation of company performance and fundamentals, whereas speculation relies on market rumors and price behavior.
Leverage	Investors generally use their own funds and avoid borrowing, while speculators often use borrowed funds to increase potential gains.

Investment Objectives

Investment objectives can be broadly classified into two categories: Risk Objective and Return Objective.

1. Risk Objective

The risk objective represents the investor's capacity and willingness to accept fluctuations in investment returns. It reflects both the psychological and financial readiness to face potential losses. When both willingness and ability are high, the investor is said to have high risk tolerance, whereas low willingness and ability indicate risk aversion.

Determining the risk objective involves several steps. The first is to specify the measure of risk, which can be expressed either in absolute terms (such as variance or standard deviation of returns) or relative terms (such as tracking error). Next, the investor's willingness to take risks must be assessed, which is influenced by behavioral and psychological factors as well as by personal circumstances like spending needs, wealth goals, and liabilities. Finally, the investor's ability to take risk is evaluated based on financial factors, such as income stability, time horizon, and overall wealth. A person with a long-term horizon and fewer liabilities has a greater ability to bear risk.

2. Return Objective

The return objective specifies the level of return that the investor desires and requires from the portfolio. Determining this involves identifying how returns will be measured—in absolute or relative terms, and in nominal or real terms. Nominal returns are unadjusted for inflation, while real returns account for inflation.

The desired return refers to the level of return the investor hopes to achieve, while the required return indicates the minimum acceptable return needed to meet financial goals. It is also important to align specific return objectives with risk objectives; for example, an investor targeting higher returns must be prepared to assume a higher level of risk. This balance between risk and return is essential for constructing a suitable investment portfolio.

Definition of Investment Constraints

Investment constraints are the limitations or restrictions that affect an investor's choice of investments. These constraints can be internal (arising from the investor's personal circumstances) or external (imposed by regulatory or legal bodies). Understanding these constraints ensures that the portfolio remains realistic and compliant with the investor's needs and the governing environment.

Types of Investment Constraints

1. Liquidity Constraint

Liquidity constraints are related to the investor's need for cash to meet expected or unexpected expenses. A prudent investor should maintain sufficient liquidity to cover short-term obligations without significantly disturbing the portfolio's long-term value. The financial advisor must ensure that some assets can be easily converted into cash when required.

2. Time Horizon Constraint

The time horizon represents the duration over which the investor plans to achieve specific financial goals. A longer time horizon generally allows for more investment in riskier, higher-return assets, while a shorter horizon demands safer, more liquid investments. For example, an investor saving for retirement over 25 years can tolerate more risk compared to one saving for a child's education in five years.

3. Tax Constraint

Tax considerations play a vital role in portfolio planning. Different types of income—such as dividends, interest, and capital gains—may be taxed differently. The investor's tax status influences decisions on asset selection and holding periods. Advisors must consider both pre-tax and post-tax returns to ensure the portfolio is tax-efficient.

4. Legal and Regulatory Constraint

These constraints are mostly external and are particularly relevant for institutional investors such as pension funds, trusts, or insurance companies. Legal or regulatory rules may restrict investment in certain asset classes or impose limits on asset allocations. For example, a trust portfolio may be legally bound to invest only in government-approved securities.

5. Unique Circumstances

Unique constraints include specific preferences, values, or restrictions that are personal to the investor. Some investors may avoid companies involved in alcohol, tobacco, gambling, or defense production due to ethical or religious reasons. These special considerations must be respected and incorporated into the investment policy statement to ensure that the portfolio aligns with the investor's beliefs and priorities.

Investment Avenues / Alternatives

Investment avenues refer to the various options available to investors for deploying their surplus funds to earn returns. The choice of investment depends on the investor's financial goals, risk tolerance, time horizon, income level, and liquidity needs. For both individuals and corporate entities, selecting the right investment avenue is essential to ensure safety, adequate return, and liquidity. Each investment avenue has distinct features in terms of risk, return, marketability, and maturity period. Before investing, it is important to analyze these alternatives carefully to strike a proper balance between risk and reward.

Definition and Importance of Investment Avenues

Investment avenues are the channels through which investors can park their idle funds for productive use. The key objective behind investing is to generate future income or appreciate capital value over time. Investors can choose among several alternatives such as equity shares, bonds, mutual funds, insurance, real estate, and gold. Corporates generally prefer investments that balance profitability and liquidity, while individuals often aim for safety, stability, and steady returns. The selection of a suitable avenue depends on the investor's objectives, constraints, and overall financial planning.

Major Types of Investment Avenues

1. Equity Shares

Equity shares represent ownership in a company and entitle the investor to share in the profits and assets of that company. Equity investment offers no fixed returns, and the risk level is relatively high compared to other avenues. However, equity also provides the potential for higher returns and capital appreciation over time. The liquidity of equity investments depends on the trading activity of the stock in the secondary market.

Equity shares can be classified into several categories such as blue-chip scrips (large, stable companies), growth scrips (fast-growing firms), income scrips (companies offering regular dividends), cyclical scrips (sensitive to business cycles), and speculative scrips (high-risk, high-return stocks). Investors in equity markets generally analyze company fundamentals, market conditions, and economic indicators before investing.

2. Debentures or Bonds

Debentures or bonds are long-term fixed-income securities issued by governments, public sector units, or private companies. These instruments pay a fixed rate of interest at regular intervals and return the principal amount on maturity. Compared to equity, they are less risky but subject to interest rate risk and price risk. The degree of risk depends on the creditworthiness of the issuer; for example, government securities are almost risk-free, whereas corporate debentures carry higher risk.

Different types of debentures and bonds include Government Securities (G-Secs), Savings Bonds, Public Sector Bonds, Corporate Debentures, and Preference Shares. Investors seeking regular income and capital protection often prefer this avenue.

3. Money Market Instruments

Money market instruments are short-term financial instruments with maturity periods of less than one year. They are primarily used by corporate entities and financial institutions to manage short-term liquidity and working capital. These instruments are low-risk and offer moderate returns. Examples include Treasury Bills (T-Bills) issued by the government, Commercial Papers (CPs) issued by corporations, and Certificates of Deposit (CDs) issued by banks.Money market instruments are highly liquid and suitable for investors who prioritize safety and short-term investment horizons.

4. Mutual Funds

Mutual funds pool money from multiple investors and invest in diversified portfolios of securities such as equity, debt, or a combination of both. They are professionally managed by fund managers and provide an easy and cost-effective way for investors to gain exposure to a variety of asset classes.

The major advantages of mutual funds include diversification, professional management, liquidity, and transparency. Depending on the investment objective, mutual funds can be classified into Equity Schemes, Debt Schemes, Balanced Funds, and Sector-Specific Funds. Open-ended mutual funds also allow investors to buy or sell units at any time, providing flexibility and convenience.

5. Life Insurance and General Insurance

Insurance is not just a protection tool but also an important investment avenue. Life insurance provides financial security to the policyholder's family in case of death, while general insurance protects against loss or damage to property, health, or business. Common life insurance products include Endowment Policies, Money Back Plans, Whole Life Policies, and Term Insurance Plans.

For corporate investors, general insurance such as fire, marine, and liability insurance helps protect assets and ensure business continuity. Although the primary purpose of insurance is risk protection, certain policies like endowment and ULIP (Unit Linked Insurance Plans) also offer investment benefits.

6. Real Estate

Investment in real estate involves acquiring property such as residential buildings, commercial complexes, or land with the objective of earning rental income or capital appreciation. Real estate is considered a tangible and stable investment, though it requires substantial capital and involves higher transaction costs.

Common forms of real estate investment include residential property, commercial property, agricultural land, semi-urban plots, and farmhouses. Although illiquid compared to other assets, real estate offers inflation protection and can serve as collateral for loans.

7. Precious Objects

Investments in precious objects such as gold, silver, diamonds, and artifacts are traditional and popular, especially in India. Gold is often considered a safe-haven asset and acts as a hedge against inflation and currency fluctuations. Investors may also invest in modern options like Gold Exchange-Traded Funds (ETFs) and Sovereign Gold Bonds (SGBs).

Art and collectibles, though niche, can provide significant returns over the long term but require expertise in valuation and authenticity verification.

8. Derivatives

Derivatives are financial instruments whose value is derived from the value of underlying assets such as stocks, bonds, commodities, or currencies. They include forwards, futures, options, and swaps. Derivatives are primarily used for hedging risk, speculation, and

arbitrage. Although they can offer high returns, they also carry high risk and are suitable mainly for experienced investors or institutions. The derivative market plays a crucial role in risk management and market efficiency.

9. Non-Marketable Securities

Non-marketable securities are financial assets that cannot be easily traded or transferred in the open market. These include Bank Fixed Deposits, Post Office Savings, Company Deposits, and Provident Fund (PF) Accounts. Such investments are typically low-risk and offer steady returns but lack liquidity. They are ideal for conservative investors seeking safety and predictable income.

Stock Market Operations: Meaning, Functions, Types & Participants

Stock market operations encompass all the activities involved in the trading and management of securities such as shares, bonds, and derivatives in financial markets. These operations ensure that capital flows efficiently from investors to companies while providing a platform for investors to buy, sell, and manage their financial assets. Stock market operations include listing of securities, trading, settlement, monitoring of transactions, risk management, and compliance with regulatory norms. Major stock exchanges in India, such as the Bombay Stock Exchange (BSE) and the National Stock Exchange (NSE), facilitate these operations by maintaining transparent and efficient markets. Understanding stock market operations allows investors to participate confidently and make informed decisions.

Functions of the Stock Market

The stock market serves several key functions that are vital for the economy and investors:

Capital Formation: The stock market enables companies to raise capital for business expansion, research and development, and other operational needs. For example, when Zomato launched its Initial Public Offering (IPO), it raised funds from public investors to support its growth.

Trading of Securities: It allows the buying and selling of various securities, including shares, bonds, and derivatives. Investors can buy stocks such as Tata Motors shares today and sell them later for potential profit.

Price Discovery Mechanism: The stock market determines the price of securities based on demand and supply. For example, if demand for Infosys shares increases, their price rises.

Liquidity Provision: Investors can quickly convert their holdings into cash, ensuring liquidity. For instance, if an investor urgently requires funds, they can sell shares immediately in the market.

Risk Management and Monitoring: Stock market operations include monitoring market trends and managing financial risks, ensuring transparency and fairness in trading.

Types of Stock Market

The stock market is broadly divided into Primary Market and Secondary Market, based on the type of transactions conducted.

1. Primary Market

The primary market is where companies issue new securities to investors for the first time. This typically occurs through an Initial Public Offering (IPO). The funds raised in the primary market are used for business expansion, infrastructure development, and other corporate purposes. Companies may set the share price through fixed pricing or book-building, where demand determines the price.

Advantages of Primary Market:

- Provides capital for business growth
- Offers early investment opportunities
- Enhances public image of the company

Disadvantages:

- Limited information on new companies
- Higher investment risk due to uncertainty

Example: Paytm's IPO allowed the company to raise funds and enabled investors to purchase shares directly.

2. Secondary Market

The secondary market facilitates the buying and selling of securities that have already been issued. The issuing company is not directly involved in these transactions. Prices in the secondary market fluctuate based on real-time demand and supply.

Advantages of Secondary Market:

- High liquidity for investors
- Transparent pricing based on demand and supply

- Easy entry and exit for investors

Disadvantages:

- Subject to volatility and market risks

- Potential for speculative trading

Example: Buying HDFC Bank shares from another investor on NSE is a secondary market transaction.

Participants in Stock Market Operations

Stock market operations involve several participants, each playing a critical role in maintaining market efficiency and stability.

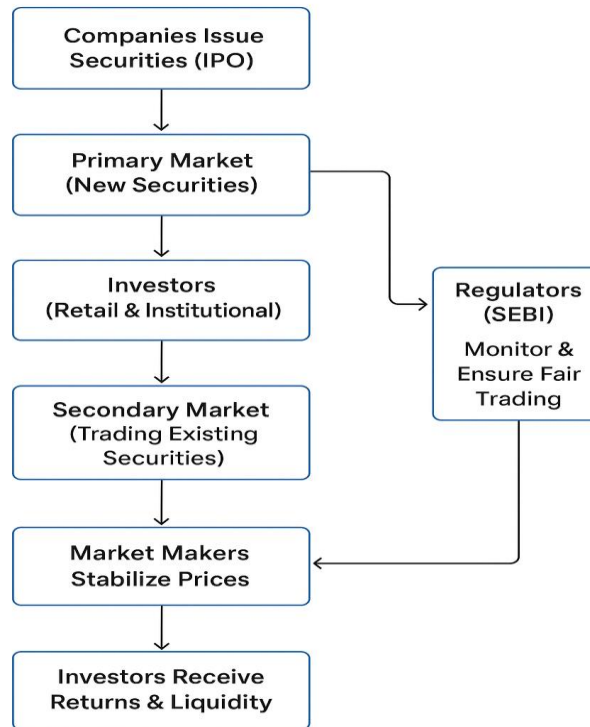1. *Retail Investors:* Individual investors who buy and sell shares for personal investment purposes. They contribute to market liquidity. Example: A student investing ₹5,000 in Infosys shares.

2. *Institutional Investors:* Large entities such as mutual funds, insurance companies, and pension funds that invest substantial amounts and can influence market trends. Example: LIC investing in top Indian companies.

3. *Stock Brokers:* Professionals or firms acting as intermediaries between investors and the stock exchange. They facilitate buying and selling of securities. Example: Zerodha and Upstox.

4. *Market Makers:* Entities that maintain market activity by consistently buying and selling securities, thus stabilizing prices. Example: Large financial houses like JP Morgan.

5. *Regulators:* Government authorities such as the Securities and Exchange Board of India (SEBI) ensure fair, transparent, and safe trading in the market.

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│  Companies Issue    │
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│  Primary Market     │───────▶│  Regulators      │
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│  Investors Receive  │
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Flow Explanation:

1. Companies raise funds by issuing shares via IPO.

2. Primary Market is where these new securities are issued.

3. Investors (retail and institutional) purchase these securities.

4. Secondary Market allows trading of already issued securities.

5. Brokers facilitate trades, and Market Makers maintain liquidity and stabilize prices.

6. Regulators (SEBI) ensure transparency, fairness, and compliance.

7. Finally, investors enjoy returns and liquidity from their investments.

Stock Market Index

A stock market index is a statistical measure that reflects the performance of a specific set of stocks selected based on defined criteria such as trading frequency, market capitalization, or industry type. Indices provide a snapshot of market trends and fluctuations, helping investors and analysts track market performance efficiently. Essentially, an index summarizes the movement of multiple stocks into a single figure, providing insights into the overall market or a specific sector.

Stock market indices serve multiple purposes:

- Performance indicators: They show how a market segment or the overall market is performing.
- Benchmarking: Investors and fund managers use indices as a benchmark to compare portfolio performance.
- Investment decision-making: Indices guide investors in identifying market trends, opportunities, and risks.

Types of Stock Market Indices

1. *Sectoral Index*

- Sectoral indices track stocks from a specific industry or sector.
- They indicate the performance and trends of companies within a particular sector.
- Examples:
    - S&P BSE Healthcare – pharmaceutical sector
    - NSE Pharma – pharmaceutical sector
    - S&P BSE PSU – public sector units
    - Nifty PSU Bank – public sector banks
- Purpose: Investors use sectoral indices to focus on specific industries based on growth potential or economic trends.

2. *Benchmark Index*

- A benchmark index reflects the performance of the overall market.
- Composed of top-performing companies, it sets standards for comparison.
- Examples:
    - Nifty 50 (NSE): Top 50 large companies across sectors.
    - Sensex (BSE): Top 30 well-established companies.
- Purpose: Benchmark indices are considered reliable indicators of general market trends and investor sentiment.

3. *Market Capitalization (Market Cap) Index*

- Companies are selected based on their market capitalization – the total market value of their outstanding shares.
- Examples:
    - S&P BSE SmallCap 50
    - NSE SmallCap 50
- Purpose: Helps investors focus on companies of specific sizes, such as large, mid, or small-cap firms.

4. *Other Indices*

- Larger indices include more stocks, covering diverse market segments.
- Examples: S&P BSE 500, NSE 100, S&P BSE 100
- Purpose: Provides broad market coverage and diversification for investors

Formation of a Stock Market Index

An index is formed by selecting stocks with similar characteristics such as industry type, business size, or market capitalization. Simply adding stock prices does not work because each stock has a different price range. Hence, weightage allocation is applied:

1. Market Cap Weightage

- Weight is based on a company's market capitalization relative to the total market capitalization of the index.
- Formula:

$$\text{Stock Weight} = \frac{\text{Company Market Cap}}{\text{Total Index Market Cap}} \times \mathbf{100}$$

- Example: A stock with market capitalization of ₹100,000 in an index of ₹2,000,000 will have a weight of 5%.
- Note: In India, free-float market capitalization is often used, considering only publicly traded shares.

2. Price Weightage

- Stocks with higher prices have more weight in the index.
- Affects index value based on price movement rather than market cap.
- Example: A ₹200 stock will influence the index more than a ₹50 stock, regardless of the number of shares issued.

Major Stock Exchanges in India

1. National Stock Exchange (NSE)

- Founded in 1992; based in Mumbai.
- Fully electronic trading platform ensuring fast, transparent, and secure trading.
- Main index: Nifty 50, tracking 50 top companies across sectors such as banking, IT, and manufacturing.

2. Bombay Stock Exchange (BSE)

- Established in 1875; Asia's oldest stock exchange, based in Mumbai.
- Main index: Sensex, tracking 30 well-established companies.
- Offers thousands of listed companies across sectors, providing a wide range of investment options.

Regulation: Both NSE and BSE are regulated by the Securities and Exchange Board of India (SEBI) to ensure fairness and investor protection.

Aspect	National Stock Exchange (NSE)	Bombay Stock Exchange (BSE)
Establishment	1992	1875 – Asia's oldest stock exchange
Headquarters	Mumbai	Mumbai
Type of Trading	Fully electronic trading system; no physical trading floor	Started as an open outcry system; now fully electronic but historically a trading floor
Main Index	Nifty 50 (tracks top 50 companies across sectors)	Sensex (tracks top 30 well-established companies)
Number of Listed Companies	Over 1,800 companies listed on NSE	Over 5,500 companies listed on BSE
Market Capitalization	Second largest in India by market capitalization (after BSE in total companies' value)	Largest in India by total market capitalization; BSE has historically high value of listed stocks
Focus	Primarily large and liquid stocks; derivatives trading is highly active	Focuses on both large and smaller companies; historical significance and retail investor base
Trading Volume	Higher trading volume due to electronic trading and derivatives market	Comparatively lower than NSE in daily turnover
Derivatives Market	NSE is the largest derivatives exchange in India; Nifty Futures & Options are highly traded	BSE also has derivatives trading, but smaller in scale than NSE
Technological Advancement	Highly modern, computerized trading, algorithmic trading, electronic clearing and settlement	Modernized with electronic trading and clearing but historically slower adoption than NSE
Global Ranking	Among the top 10 largest exchanges in the world by trading volume	Older and historic but smaller in global volume compared to NSE
Transparency & Regulations	Strong regulatory practices and reporting; transparent electronic system	Transparent electronic trading; historically less automated but regulated by SEBI
Investor Base	Institutional investors dominate trading; highly preferred by foreign institutional investors	Large retail investor base; attracts small and medium investors

Aspect	National Stock Exchange (NSE)	Bombay Stock Exchange (BSE)
Products Traded	Equity, equity derivatives, currency derivatives, debt, mutual funds	Equity, equity derivatives, debt, mutual funds, ETFs
Settlement System	T+1 for reporting, T+2 for settlement of stocks; advanced clearing mechanisms	T+2 settlement system for equity; clearing through NSCCL (National Securities Clearing Corporation Limited)
Liquidity	Highly liquid; preferred for trading high-volume stocks	Slightly lower liquidity compared to NSE; good for diversified investments
Special Features	Nifty index is widely used for derivatives and portfolio benchmarking	Sensex is widely used for market sentiment and historical comparison

How Are Stock Market Indices Calculated?

1. Each stock is assigned a weight based on its size or price.
2. Index values are updated regularly to reflect stock price changes.
3. Larger companies or higher-priced stocks have a greater impact on the index.
4. Example: If the majority of Nifty 50 companies experience price increases, the Nifty index rises. Conversely, if prices fall, the index declines.

Popular Indices in India

Index	Focus
Nifty 50	Top 50 companies (all sectors)
Sensex	Top 30 companies (all sectors)
Nifty Bank	Major banks listed on NSE
Nifty IT	Technology companies in NSE
BSE MidCap	Medium-sized companies in BSE
BSE SmallCap	Smaller companies with growth potential

Significance: Investors can select indices based on market capitalization, sector, or risk appetite.

Importance of Stock Market Indices

1. Market Performance: Track the overall trend of the stock market.
2. Benchmarking: Compare portfolio returns with the market.
3. Sector Analysis: Evaluate performance of specific sectors (IT, banking, pharma, etc.).
4. Investment Guidance: Helps investors identify growth opportunities and manage risk.
5. Economic Indicator: Index movements often reflect economic trends, investor confidence, and market sentiment.

Concept of Investment Risk and Return

Investment decisions are primarily guided by two fundamental considerations — risk and return. Every investor expects a return from the investment but faces the possibility that the actual outcome may differ from what was expected.

Concept of Investment Risk

Definition

Investment risk refers to the uncertainty or variability in expected returns from an investment. It is the possibility that the actual return will deviate from the expected return, whether positively or negatively.

Nature of Risk

- In finance, risk does not only imply loss, but variability of returns — both higher and lower than expected.

- A risk-free security offers guaranteed returns (e.g., government bonds).

- A risky security has uncertain returns (e.g., equities, corporate bonds).

Risk Attitude of Investors

1. Risk-Averse Investors: Prefer stability and safety, even with lower returns.

2. Risk-Neutral Investors: Indifferent to risk — focus only on expected return.

3. Risk-Seeking Investors: Prefer riskier options with potential for high returns.

3. Concept of Return

Definition

Return is the reward or gain that an investor expects or realizes from an investment. It is the compensation for postponing current consumption and bearing risk.

Components of Total Return

1. Current Income (Yield): Regular income earned such as dividends, interest, or rent.

2. Capital Gain or Loss: Appreciation (or depreciation) in the value of the asset between the purchase and sale dates.

$$\text{Total Return} = \frac{\text{Income received} + (\text{Price change})}{\text{Initial Investment}}$$

Example:
If a share was bought at ₹70, dividend received = ₹5, and current price = ₹80, then:

$$\text{Total Return} = \frac{\mathbf{5 + (80 - 70)}}{\mathbf{70}} = \mathbf{21.4}\%$$

Types of Return

1. Historical (Realized) Return:

    o Return actually earned in the past.

    o Used to assess performance and estimate future expectations.

    o Calculated using historical price and income data.

2. Expected (Forecasted) Return:

- o The return an investor anticipates earning in the future based on probability estimates.

- o Given by:

$$E(R) = \sum P_i R_i$$

where P_i= probability of a return R_i.

3. Nominal Return:

- o Return expressed in money terms without adjusting for inflation.

4. Real Return:

- o Return adjusted for changes in purchasing power (inflation).

$$\text{Real Return} = \text{Nominal Return} - \text{Inflation Rate}$$

Relationship Between Risk and Return

Risk and return are directly proportional — the greater the risk, the higher the expected return. This is known as the Risk–Return Trade-off.

Investment Type	Expected Return	Risk Level
Government Bonds	Low	Very Low
Corporate Bonds	Moderate	Medium
Equity Shares	High	High
Speculative Stocks	Very High	Very High

A rational, risk-averse investor will only take on additional risk if adequately compensated with higher expected returns.

<u>Sources of Investment Risk</u>

Investment risk arises from various sources that influence return variability. These sources are detailed below.

Market Risk

This risk arises from overall market fluctuations caused by economic, political, or psychological factors. Even when a company performs well, its stock price may fall if the market sentiment turns negative.

Example: Global recession or war causing a broad decline in stock prices.

Interest Rate Risk

Refers to the inverse relationship between interest rates and bond prices. When interest rates rise, bond prices fall, and vice versa. This directly affects fixed-income securities and indirectly influences equities through changes in borrowing costs.

Inflation Risk (Purchasing Power Risk)

This is the risk that inflation will erode the real value of investment returns. Rising prices reduce the purchasing power of money income received from investments.

Example: If inflation is 6% and your investment returns 5%, your real return is negative (-1%).

Business Risk

This risk stems from uncertainty in a company's operational environment. It includes changes in demand, costs, competition, government policy, or business cycles.

Example: Automobile or steel industries face cyclical ups and downs based on economic conditions.

Financial Risk

When a company uses debt financing, it assumes financial risk. Fixed interest obligations increase variability in shareholders' returns and may lead to insolvency if earnings decline.

Example: High-leverage companies like infrastructure firms face financial risk when unable to service debt during downturns.

Management Risk

This arises from poor managerial decisions or inefficiency. Examples include:

- Failure to innovate or adapt.

- Excessive executive perks.

- Neglect of product diversification.

Liquidity Risk

Occurs when an investor cannot sell an asset quickly at its fair market value. Securities of smaller companies are often illiquid compared to blue-chip stocks.

Example: An investor forced to sell during a downturn might have to accept a price much below the market average.

Social or Regulatory Risk

Results from changes in government regulations or social policies that reduce business profitability.

Examples:

- Price or rent control regulations.

- New taxation policies.

- Nationalization of industries.

Foreign Investment Risks

When investing internationally, investors face:

- Political Risk: Changes in government or instability.

- Exchange Rate Risk: Adverse currency movements reducing returns.

- Sovereign Risk: Default or asset seizure by foreign governments.

Types of Risk

Systematic Risk

Definition:
Systematic risk is the portion of total risk caused by factors that affect the entire market or economy. It cannot be diversified away.

Causes / Examples:

- Change in government interest rate policy.
- Rise in inflation rate.
- Recession or boom in the economy.
- Credit policy changes by the central bank.
- Political instability or fiscal deficit.

Features:

- Affects all securities simultaneously.
- Non-controllable by investors.
- Also known as *non-diversifiable risk* or *market risk.*
- Measured using Beta (β).

Interpretation of Beta:

- $\beta = 1 \rightarrow$ Stock moves with the market.
- $\beta > 1 \rightarrow$ Stock is more volatile than the market.
- $\beta < 1 \rightarrow$ Stock is less volatile than the market.

Unsystematic Risk

Definition:
Unsystematic risk arises from factors specific to a company or industry. It can be eliminated through diversification.

Causes / Examples:

- Labor strikes or management failure.
- Loss of major contracts.
- Sudden departure of key personnel.

- Product obsolescence or supply shortages.

Features:

- Affects only particular companies or sectors.

- Can be minimized by holding a diversified portfolio.

- Also called *specific risk* or *diversifiable risk.*

Detailed Comparison between Systematic and Unsystematic Risk

Basis of Comparison	Systematic Risk	Unsystematic Risk
Meaning	Risk arising from market-wide factors beyond control of individual firms.	Risk specific to an individual firm or industry.
Nature	Non-diversifiable (cannot be eliminated through diversification).	Diversifiable (can be reduced/eliminated through diversification).
Scope	Affects the entire market or economy.	Affects specific companies or industries.
Examples	Inflation, interest rate changes, recession, monetary policy.	Strikes, loss of contracts, poor management decisions.
Control	Cannot be controlled by investor actions.	Can be controlled by spreading investment across sectors.
Measurement	Measured by Beta (β) or correlation with market index.	Measured through variance of individual security returns.
Compensation	Investors are rewarded for bearing systematic risk through higher expected returns.	Investors are not compensated for unsystematic risk, since it can be diversified away.

Basis of Comparison	Systematic Risk	Unsystematic Risk
Alternative Names	Market risk, non-diversifiable risk.	Specific risk, diversifiable risk, residual risk.

Total Risk Formula

Total Risk = Systematic Risk + Unsystematic Risk

In a well-diversified portfolio, the unsystematic portion tends to approach zero, leaving only systematic risk as the relevant factor.

Measuring Historical and Expected Return

(i) Historical (Realized) Return

$$R = \frac{C + (P_E - P_B)}{P_B}$$

Where:
C= cash received (dividend/interest)
P_E= ending price
P_B= beginning price

Example:
Price = ₹70 → ₹80, Dividend = ₹5

$$R = \frac{5 + (80 - 70)}{70} = 21.4\%$$

(ii) Historical Risk

Measured through Variance (σ^2) and Standard Deviation (σ).

$$\sigma = \sqrt{\frac{\Sigma(R_i - \bar{R})^2}{n - 1}}$$

Higher standard deviation → greater fluctuation in returns → higher risk.

(iii) Expected Return and Risk

Expected return is the weighted average of all possible returns:

$$E(R) = \Sigma P_i R_i$$

Expected risk (variance) is:

$$\sigma^2 = \Sigma P_i [R_i - E(R)]^2$$

and

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

📘 Example:

State of Economy	Probability (P)	Return (R%)
Boom	0.30	16
Normal	0.50	11

State of Economy	Probability (P)	Return (R%)
Recession	0.20	6

$$E(R) = (0.3)(16) + (0.5)(11) + (0.2)(6) = 11.5\%$$

Standard Deviation (σ) = 3.5%

Hence, the stock with higher σ is riskier.

Risk vs. Uncertainty

Basis	Risk	Uncertainty
Meaning	Situation where probabilities of outcomes are known.	Situation where probabilities are unknown.
Quantification	Quantifiable through statistical measures.	Non-quantifiable.
Example	Tossing a coin (50–50 outcome).	Sudden political upheaval or new regulation.
Decision Type	Based on probabilities and expected values.	Based on judgment or intuition.

- Risk represents the possibility of variation in actual returns, while return is the gain expected or realized from an investment.

- The risk–return trade-off is fundamental — higher risk demands higher potential return.

- Systematic risk cannot be diversified away; unsystematic risk can be reduced through diversification.

- Major sources of risk include market, interest rate, inflation, business, financial, management, liquidity, regulatory, and foreign exchange risks.

- Statistical tools like variance, standard deviation, and beta measure risk levels.

- Rational investors analyze both risk and return before investment, aiming to maximize return for a given level of risk or minimize risk for a given level of return.

Portfolio Analysis and Management

Introduction

A portfolio refers to a collection of investments owned by an individual or an organization. It is essentially a bundle of securities such as stocks, bonds, mutual funds, and cash equivalents, all designed to achieve specific financial objectives. A portfolio represents the financial profile of an investor and reflects his or her investment preferences, risk appetite, and time horizon.

In practical terms, portfolios include various instruments such as stocks, which represent ownership in a business; bonds, which represent debt investments that generate interest; and mutual funds, which are pooled investments managed professionally or based on specific indices. The purpose of building a portfolio is to balance risk and return, ensuring long-term financial stability and growth.

Definition of Portfolio Analysis

Portfolio Analysis is the systematic process of reviewing and assessing the elements of a portfolio to evaluate the relationship between risk and return. The goal of this analysis is to optimize the portfolio's performance by maintaining an appropriate mix of assets.

Regular portfolio analysis enables investors to restructure or rebalance their portfolios in response to market changes or personal financial goals. This process ensures that resources are allocated effectively among various asset classes. In essence, portfolio analysis provides insights into whether the current investment mix aligns with the investor's financial objectives and risk tolerance.

Portfolio Management

Portfolio Management refers to the art and science of making strategic decisions about investment mix, asset allocation, and investment policy. It focuses on matching investments with the investor's goals and balancing the trade-off between risk and performance. The main objective is to maximize returns at an acceptable level of risk.

It involves analyzing the strengths, weaknesses, opportunities, and threats of different investment alternatives to arrive at a balanced investment strategy. Portfolio management helps investors make informed decisions about where to invest, when to invest, and how much to invest. It also emphasizes the dynamic nature of markets and requires constant monitoring and adjustment of investment

strategies. By doing so, portfolio management seeks to achieve the optimal balance between growth and safety, debt and equity, and domestic and international investments.

Types of Portfolio

There are two major types of portfolios:

Market Portfolio

A market portfolio is a theoretical bundle of all available assets in the market, each weighted according to its market value. This means every asset contributes to the portfolio in proportion to its market capitalization. The expected return of a market portfolio equals the overall market's return. It serves as a benchmark for measuring the performance of other portfolios.

Zero Investment Portfolio

A zero-investment portfolio consists of securities purchased and sold simultaneously in such a way that the net investment value is zero. This is often used in arbitrage strategies, where an investor simultaneously takes long and short positions in related securities to profit from price discrepancies.

Need for Portfolio Management

Portfolio management is crucial because it helps individuals and institutions plan and manage their investments efficiently. It provides customized investment strategies based on income, age, financial goals, and risk tolerance.

It not only minimizes risk but also enhances the possibility of generating consistent returns. Through professional portfolio management, investors gain access to expert analysis and advice, ensuring that their funds are directed into suitable and profitable investment avenues.

In essence, portfolio management acts as a risk-control mechanism that helps investors stay aligned with their long-term financial goals while adapting to changing economic and market conditions.

Modern Portfolio Management

Modern portfolio management differs from traditional approaches primarily in its scientific assessment of risk and return. Traditional methods often focused on qualitative judgments and personal preferences. Modern portfolio theory, introduced by Harry Markowitz, applies statistical tools to quantify risk and determine optimal asset combinations.

Unlike traditional analysis, which was influenced by individual investor needs and instincts, the modern approach emphasizes the quantitative evaluation of expected returns, variances, and covariances of securities. This leads to a more objective and data-driven investment process.

Types of Portfolio Management

Portfolio management can be categorized into several types based on the investor's involvement and the manager's strategy:

1. Active Portfolio Management

In active portfolio management, the manager is constantly involved in buying and selling securities to outperform the market benchmark (such as BSE Sensex or NSE Nifty 50). The manager seeks to exploit market inefficiencies and achieve superior returns through timely trading and analysis.

2. Passive Portfolio Management

Passive management involves creating a portfolio that mirrors a specific market index. The aim is not to outperform the market but to replicate its performance. The portfolio composition remains relatively stable, and trades are made infrequently.

3. Discretionary and Non-Discretionary Management

Under discretionary portfolio management, the investor gives the portfolio manager full authority to make investment decisions on their behalf. In contrast, in non-discretionary management, the manager provides investment advice, but the final decision remains with the investor.

Elements of Portfolio Management

a) Proper Asset Allocation

Asset allocation is the foundation of portfolio management. It involves deciding how to distribute investments among different asset classes (equity, debt, real estate, etc.) to balance risk and return. The allocation is based on the understanding that various assets react differently to market movements. Conservative investors lean toward stable, low-risk assets, while aggressive investors allocate more to volatile securities.

b) Diversification Diversification reduces risk by spreading investments across different asset classes, sectors, and regions. Since it is difficult to predict which investments will perform best, diversification ensures that poor performance in one area can be offset by better performance in another.

c) Rebalancing and Restructuring

Over time, the portfolio composition changes due to market fluctuations. Rebalancing restores the original target allocation, ensuring that the portfolio remains consistent with the investor's risk tolerance. It often involves selling overperforming assets and reinvesting in undervalued or underweighted ones.

Portfolio Selection

Portfolio selection is the process of identifying the optimal combination of securities that offers the highest return for the lowest level of risk. This involves analyzing the risk-return characteristics of various combinations to form an opportunity set of potential portfolios.

A portfolio is considered efficient if it provides the maximum possible return for a given level of risk, or equivalently, the minimum possible risk for a given level of return. Investors, being rational and risk-averse, prefer portfolios that yield higher returns for the same risk or lower risk for the same return.

Efficient Portfolio

An efficient portfolio represents the most desirable set of investments based on the dominance principle, which states that investors prefer portfolios offering higher returns for the same risk or lower risk for the same return.

For example, if two portfolios offer a 13% return but one carries a lower risk, it will be preferred. Similarly, among portfolios with equal risk, the one providing a higher return will be chosen. Efficient portfolios, therefore, dominate inefficient ones in the investment decision process.

Markowitz Model (Modern Portfolio Theory)

The Markowitz Model, introduced by Harry Markowitz in 1952 through his research paper *"Portfolio Selection"* (published in *The Journal of Finance*), marked a revolutionary shift in the field of investment analysis. Before his contribution, investors generally selected individual securities based primarily on their standalone returns and perceived risks. Markowitz changed this perspective by introducing a scientific and quantitative approach to portfolio selection, emphasizing the importance of diversification and correlation among assets.

The central idea of the Markowitz model is that an investor can construct an "efficient portfolio" that offers the maximum possible return for a given level of risk, or conversely, the minimum possible risk for a given level of return. The model introduced the concept of analysing portfolio risk as a function not only of the individual risks of securities but also of how they move together (covariance or correlation).

Essence of the Model

The Markowitz model suggests that risk should not be evaluated in isolation. Instead, investors should examine how the returns of different securities behave in relation to one another. Two securities might both be risky when viewed independently, but when combined in a portfolio, they can reduce total risk if their returns do not move in perfect correlation.

Thus, the Markowitz model demonstrates that through scientific diversification, investors can construct portfolios that minimize risk without necessarily sacrificing expected return. This approach is based on the principle that "not all eggs should be kept in one basket."

Objectives of the Model

The objectives of the Markowitz model are:

1. To identify combinations of securities that create the most efficient portfolios in terms of risk and return.

2. To minimize total portfolio risk through diversification by combining assets with less-than-perfect correlations.

3. To derive the efficient frontier—a graphical representation of optimal portfolios available to investors.

4. To assist investors in making rational investment choices according to their risk tolerance.

Assumptions of the Markowitz Model

The Markowitz model operates under the following major assumptions:

1. Rational and Risk-Averse Investors: Investors are rational and prefer higher returns for a given level of risk. They avoid unnecessary risk unless compensated by higher returns.

2. Decision Based on Expected Return and Risk: Investment decisions are made considering two parameters — expected return (mean) and risk (standard deviation).

3. Single Period Investment Horizon: Investors plan for one investment period and evaluate returns accordingly.

4. Efficient and Perfect Market: All investors have access to the same information and can borrow or lend unlimited amounts at a risk-free rate.

5. Returns Follow a Normal Distribution: Asset returns are normally distributed, and risk is measured by variance or standard deviation.

6. No Transaction Costs or Taxes: There are no external frictions affecting investment decisions.

Concept of Expected Return and Risk

The expected return of a portfolio is the weighted average of the expected returns of individual securities:

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

Where:

- $E(R_p)$= Expected return of the portfolio

- $E(R_i)$= Expected return of security i

- w_i= Proportion of total funds invested in security i

The risk (or variance) of the portfolio depends not only on the variances of individual securities but also on their covariances (the degree to which they move together).

The formula for portfolio variance is:

$$\sigma_p^2 = \sum_{i=1}^{n} \sum_{j=1}^{n} w_i w_j \sigma_{ij}$$

Where:

- σ_p^2= Variance of the portfolio

- σ_{ij}= Covariance between returns of securities i and j

- w_i, w_j= Proportion of funds invested in securities i and j

If two securities move in opposite directions (negative correlation), the portfolio risk reduces significantly. If they move perfectly together (positive correlation = 1), diversification offers no benefit.

Diversification and Correlation

A key contribution of the Markowitz model is its demonstration that diversification reduces unsystematic risk. However, the extent of risk reduction depends on the correlation between assets:

- Perfect Positive Correlation ($\rho = +1$): No risk reduction; all assets move together.

- Perfect Negative Correlation ($\rho = -1$): Risk can be entirely eliminated.

- Zero Correlation ($\rho = 0$): Partial diversification benefit; assets move independently.

This mathematical relationship highlights that combining securities with low or negative correlations creates portfolios with lower overall risk than the weighted average of individual risks.

Efficient Frontier, Capital Market Line, and Security Market Line

1. Efficient Frontier

The Efficient Frontier, developed by Harry Markowitz in 1952, represents all efficient portfolios that offer the maximum possible expected return for a given level of risk or the minimum possible risk for a given level of return. It is the foundation of Modern Portfolio Theory. Each point on the efficient frontier corresponds to an optimal combination of assets that provides the best trade-off between risk and return. Portfolios below this frontier are inefficient, and those above it are unattainable.

Mathematically, for a two-asset portfolio, the expected return ($E(R_p)$) and standard deviation (σ_p) are given by:

$E(R_p) = w_A * E(R_A) + w_B * E(R_B)$

$\sigma_p = \sqrt{(w_A^2 \sigma_A^2 + w_B^2 \sigma_B^2 + 2 w_A * w_B * \sigma_A * \sigma_B * \rho_{AB})}$

Here, ρ_{AB} is the correlation coefficient between the two assets. The efficient frontier forms an upward-sloping concave curve when plotted on a graph with risk (standard deviation) on the X-axis and expected return on the Y-axis.
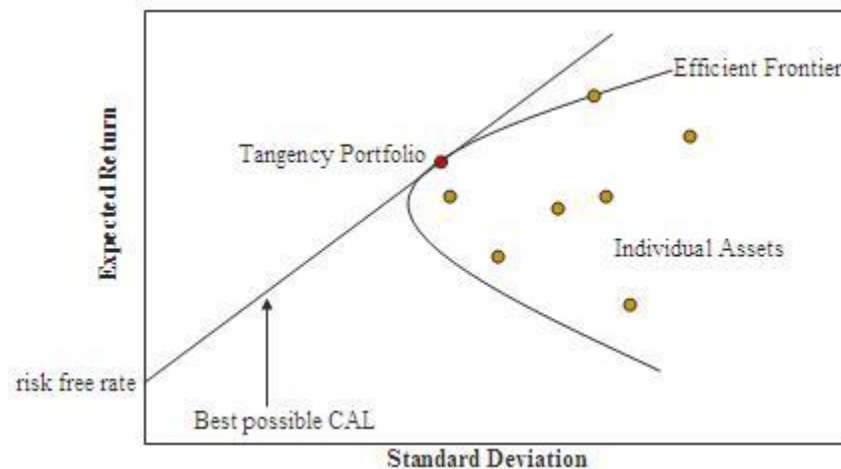
The leftmost point of the curve is known as the Minimum Variance Portfolio (MVP), representing the portfolio with the least possible risk. Moving upward along the curve, both risk and return increase.

Each investor selects a point on the efficient frontier according to their risk tolerance—conservative investors prefer points near the MVP, while aggressive investors choose points with higher risk and higher return.

2. Capital Market Line (CML)

The Capital Market Line (CML) arises when a risk-free asset is introduced to the efficient frontier model. It represents the set of portfolios that combine the risk-free asset with the market portfolio to achieve the best risk-return trade-off. The CML shows the highest possible expected return for each level of total risk when investors can borrow and lend at the risk-free rate.

The equation of the CML is:

$$E(R_p) = R_f + [(E(R_M) - R_f) / \sigma_M] * \sigma_p$$

Where R_f is the risk-free rate, $E(R_M)$ is the expected return of the market portfolio, σ_M is the standard deviation of the market portfolio, and σ_p is the total risk of the portfolio. The slope of the line, $(E(R_M) - R_f) / \sigma_M$, represents the market price of risk.

Graphically, the CML is a straight line starting at Rf on the Y-axis (risk = 0) and tangent to the efficient frontier at the market portfolio (M). Every point on the CML represents a different combination of the risk-free asset and the market portfolio. Portfolios below the CML are inefficient, while those above it are unattainable.
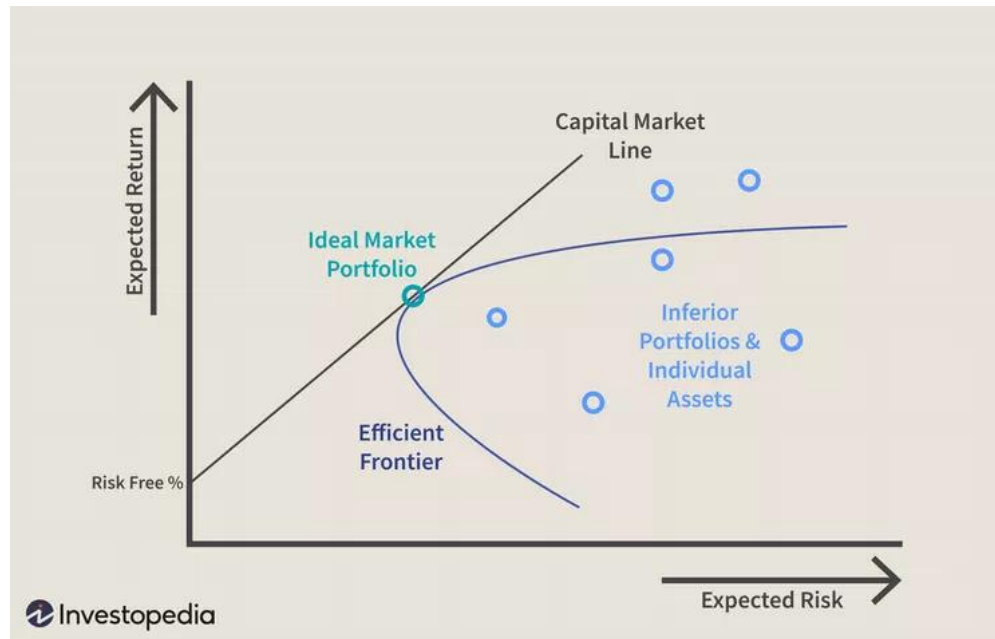
Conservative investors prefer portfolios closer to Rf (lower risk and return), while aggressive investors borrow at Rf to invest more in the market portfolio, increasing risk and expected return.
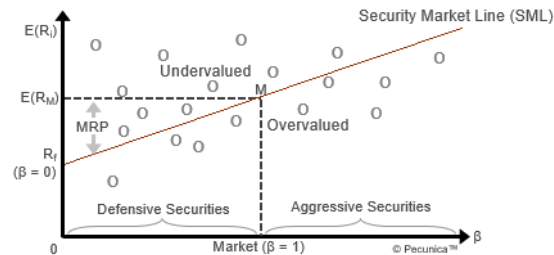
3. Security Market Line (SML)

The Security Market Line (SML) is a concept derived from the Capital Asset Pricing Model (CAPM), developed by William Sharpe. It shows the relationship between expected return and systematic risk, measured by Beta (β). Unlike the CML, which uses total risk (standard deviation), the SML focuses on systematic risk only.

The equation of the SML is:

$$E(R_i) = R_f + \beta_i * [E(R_M) - R_f]$$

Where $E(R_i)$ is the expected return on a security, R_f is the risk-free rate, β_i is the security's beta (systematic risk), and $(E(R_M) - R_f)$ is the market risk premium.

Graphically, the SML is a straight line that starts from the risk-free rate (Rf) on the Y-axis and passes through the market portfolio (β = 1, E(RM)). The slope of the SML is the market risk premium. Points above the line represent underpriced securities (offering higher returns for given risk), while points below the line represent overpriced securities (offering lower returns).

Comparison Between CML and SML

Aspect	Capital Market Line (CML)	Security Market Line (SML)
Based on	Modern Portfolio Theory	Capital Asset Pricing Model
Risk Measure	Total Risk (Standard Deviation, σ)	Systematic Risk (Beta, β)
Applicable To	Efficient portfolios only	Individual securities and portfolios
Slope	(E(RM) − Rf) / σM	(E(RM) − Rf)
X-axis	Standard Deviation (σ)	Beta (β)
Intercept	Rf	Rf
Key Point	Tangency Portfolio (Market Portfolio)	Market Portfolio (β = 1)

The Efficient Frontier, Capital Market Line, and Security Market Line together form the foundation of Modern Portfolio Theory and CAPM. The Efficient Frontier shows optimal portfolios of risky assets. The CML extends this concept by adding a risk-free asset, showing the best risk-return combinations available to investors. The SML, on the other hand, provides a framework to evaluate whether individual securities are correctly priced based on their systematic risk (Beta). Together, these tools help investors understand and manage the trade-off between risk and return effectively.

Markowitz model

The Markowitz model transformed the way investors think about risk. Before his theory, diversification was often random — investors simply bought many securities hoping it would reduce risk. Markowitz proved mathematically that the degree of correlation among securities determines how much risk can actually be reduced.

He showed that holding around 8–15 securities from unrelated industries provides substantial diversification benefits. However, excessive diversification may lead to diminishing returns and higher management costs, a concept known as over-diversification.

Limitations of the Markowitz Model

Despite its innovation, the Markowitz model has certain practical limitations:

1. Complexity of Calculation: The model requires a large number of calculations, especially covariance terms. For n securities, there are $n(n–1)/2$ covariance estimates, which is computationally intensive.

2. Unrealistic Assumptions: Assumptions such as perfect markets, rational investors, and normal distribution of returns may not hold true in reality.

3. Static Model: It assumes a single-period investment horizon, whereas real-world investment decisions are multi-period.

4. Ignoring Behavioral Aspects: The model assumes rational behavior, but investors are often influenced by emotions, biases, and market sentiment.

5. Dependence on Historical Data: Expected returns and variances are usually estimated from past data, which may not accurately predict future performance.

Conclusion

The Markowitz Model laid the foundation for modern investment theory and remains a cornerstone of portfolio management. It provides a rational and quantitative framework for understanding how diversification and correlation affect overall portfolio risk.

By identifying the efficient frontier and emphasizing the importance of risk-return optimization, the model enables investors to make informed choices that align with their financial goals and risk preferences. Despite its limitations, the Markowitz model continues to guide portfolio construction, risk management, and academic research in finance worldwide.

Sharpe'sSingleIndex Model

The modern portfolio theory was developed in early 1950s by Nobel Prize Winner Harry Markowitz in which he made a simple premise that almost all investors invest in multiple securities rather than in a single security, to get the benefits from investing in a portfolio consisting of different securities.

In this theory, he tried to show that the variance of the rates of return is a meaningful measure of portfolio risk under a reasonable set of assumptions and also derived a formula for computing the variance of a portfolio. His work emphasizes the importance of diversification of investments to reduce the risk of a portfolio and also shows how to diversify such risk effectively.

Limitations of MPT

One of the most significant limitations of Markowitz's model is the increased complexity of computation that the model faces as the number of securities in the portfolio grows. To determine the variance of the portfolio, the covariance between each possible pair of securities must be computed, which is represented in a covariance matrix.

If there are n securities in a portfolio, the Markowitz's model requires n average (or expected) returns, n variance terms

and $\dfrac{n(n-1)}{2}$ covariance terms (i.e. in total $\dfrac{n(n+3)}{2}$ data-inputs).

To this direction, in 1963 William F. Sharpe had developed a simplified Single Index Model (SIM) for portfolio analysis taking cue from Markowitz's concept of index for generating covariance terms.

Sharpe's Single Index Model is very useful to construct an optimal portfolio by analyzing how and why securities are included in an

optimal portfolio, with their respective weights calculated on the basis of some important variables under consideration.

Assumptions of Single Index Model

- The Sharpe's Single Index Model is based on the following assumptions:

- All investors have homogeneous expectations.

- A uniform holding period is used in estimating risk and return for each security.

- The price movements of a security in relation to another do not depend primarily upon the nature of those two securities alone. They could reflect a greater influence that might have cropped up as a result of general business and economic conditions.

Single Index Model Graphical illustration
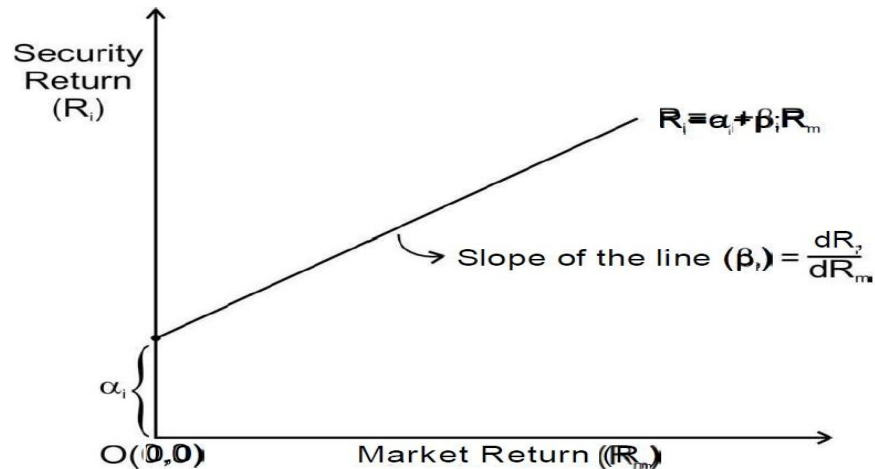
Singleindexmodel

Stock prices are closely related to the movement of the market index, and this relationship can be used to estimate the expected return of a stock. The relationship is represented by the **Single Index Model equation**:

$$R_i = \alpha_i + \beta_i R_m + e_i$$

Where:

- R_i – Expected return on security i

- α_i – Intercept of the regression line, also known as the **alpha coefficient**

- β_i – Slope of the regression line, known as the **beta coefficient**

- R_m – Rate of return on the market index

- e_i – Error term representing the unsystematic (firm-specific) component of risk

- According to the equation, the return of stock can be divided into two components, the return due to the market and the return independent of the market. βi indicates the sensitivity of stock return to the changes In market return. For example βi of 1.5 means the stock return is expected to increase by 1.5% if market increases by 1% and vice versa. The estimate of βi and αi can be obtained using regression analysis.

- The single index model is based on the assumption that stocks vary together because of common movement in the stock market and there are no effects beyond the market (i.e. any fundamental factor effects) that accounts the stock co-movement. The expected return, standard deviation, and co-variance of single index model represents the joint movement of securities. The mean return is

$R_i = \alpha_i + \beta_i R_m + e_j$

- The variance of security's return is $\sigma^2 = \beta i^2 \sigma^2_m + \sigma_{e}i^2$

- The covariance of returns between securities i and j is

$\sigma i_j = \beta i \beta_j \sigma^2_m$

- The variance of security has two components namely, systematic risk or market risk and unsystematic risk or unique risk. The variance explained by index is called systematic risk and the unexplained variance is called unsystematic risk.

Systematic risk= βi^2 x variance of market index

$$= \beta i^2 \sigma^2_m$$

Unsystematic risk= total variance − systematic risk

$$ei^2 = \sigma^2 i - \text{ systematic risk}$$

Thus total risk= $\beta i^2 \sigma^2 + ei^2$

- From this the portfolio variance can be derived

$$\sigma^2{}_p = [\,(\Sigma xi\beta i)^2 \sigma^2{}_m\,] + [\,\Sigma xi^2\ ei^2\,]$$

$\sigma^2{}_p$ = variance of portfolio

$\sigma^2{}_m$ = expected variance of index

ei^2 = variation in security return not related to the market index

xi = the portion of stock i in the portfolio

	X stock	Y stock	Sensex
Average return	0.15	0.25	0.06
Variance of return	6.30	5.86	2.25
β	.71	.27	
Correlation coefficient	.424		
Coefficient of determination	.18		

- The coefficient of determination gives the percentage of the variation in the security's return that is explained by variation of the market index return. In the X company stock return, 18 percent of variation is explained by index whereas 82% is not.
- Explained by index = variance x coefficient of determination

    = 6.3 x .18 = 1.134
- Not Explained by index = variance x $(1 - r^2)$

= 6.3 x .82 = 5.166

Company X

- Systematic risk = β^2 x variance of market index

$= (.71)^2 \times 2.25 = 1.134$

Unsystematic risk = total variance of security return – systematic risk = $e^2 = 6.3 - 1.134 = 5.166$

Total risk = 1.134 + 5.166 = 6.3

Company y

- Systematic risk = $\beta i^2 \times \sigma^2 m$
- $(.27)^2 \times 2.25 = 0.1640$
- Unsystematic risk = total variance of security retur
- $= 5.86 - .1640 = 5.696$
- $\sigma^2 p = [\,(\Sigma xi\beta i)^2 \sigma^2 m] + [\,\Sigma xi^2 \, ei^2]$
- $= \{(.5 \times .71 + .5 \times .27)^2 \times 2.25\} + \{(.5)$
  $(5.696)\}$
- $= (.540 + 2.716)$
- $= 3.256$

Alpha and Beta

1. Alpha (α)

Alpha measures an investment's performance on a risk-adjusted basis. It indicates whether a portfolio manager or investment has outperformed or underperformed the market after considering the amount of risk taken. In essence, Alpha represents the excess return of an investment compared to its expected return based on its Beta (systematic risk).

Formula:

Alpha = $(R_i - Rf) - \beta (R_m - Rf)$

Where:
R_i = Actual return of the investment
Rf = Risk-free rate
R_m = Market return
β = Beta of the investment

Interpretation of Alpha:

Alpha Value	Meaning	Interpretation

α = 0	Fairly valued investment	The return exactly compensates for the risk taken.
α > 0	Outperformance	The investment has generated excess returns compared to its expected performance.
α < 0	Underperformance	The investment has not provided adequate returns for the level of risk assumed.

Alpha evaluates performance after adjusting for Beta (volatility). According to Modern Portfolio Theory (MPT): an investment twice as volatile as the market should offer twice the return for assuming additional risk. If less volatile, a lower return may still be acceptable.

Example of Alpha:

Suppose company XYZ earned a 12% return during the year. The benchmark index earned 10%, and XYZ's Beta is 1.5. Expected return (using CAPM) = 1.5 × 10% = 15%. Actual return = 12%, which is 3% less than expected. Hence, Alpha = -3%, meaning the stock did not compensate for the additional risk.

Significance of Alpha:

• Positive Alpha: Manager added value through skillful selection.
• Negative Alpha: Underperformance due to poor selection or timing.
• Zero Alpha: Performance consistent with market expectations.

2. Beta (β)

Beta measures an investment's systematic risk — the risk inherent to the market that cannot be diversified away. It shows the sensitivity of an asset's returns to movements in the overall market or a benchmark index.

Formula:

$$\beta = Covariance(R_i, R_m) / Variance(R_m)$$

Where:
R_i = Return on individual asset
R_m = Return on the market (benchmark)

Interpretation of Beta:

Beta Value	Meaning	Interpretation
β = 1.0	Same as market	Moves in same direction and magnitude as market.
β > 1.0	More volatile than market	Riskier; amplifies market movements.
β < 1.0	Less volatile than market	Defensive; smaller movements than market.
β = 0	No correlation	Moves independently of market.
β < 0	Inversely correlated	Moves opposite to market; useful for hedging.

Examples of Beta:

• β = 2.0 → Twice as volatile as the market.
• β = 0.5 → Moves half as much as the market.
• β = -1 → Moves opposite to the market.

Practical Use:

Beta helps investors understand market-related risk and construct portfolios aligned with their risk tolerance. High-beta stocks suit aggressive investors; low-beta stocks suit conservative investors.

3. Difference Between Alpha and Beta

Basis	Alpha (α)	Beta (β)
Meaning	Measures excess return compared to expected performance.	Measures sensitivity of asset returns to market movements.
Type of Risk	Indicates unsystematic (manager's skill) performance.	Represents systematic (market) risk.
Focus	Performance measurement.	Risk measurement.
Interpretation	Positive Alpha = outperformance; Negative Alpha = underperformance.	Beta > 1 = aggressive; Beta < 1 = defensive.
Formula	$\alpha = (R_i - Rf) - \beta(R_m - Rf)$	$\beta = Cov(R_i, R_m) / Var(R_m)$
Indicates	Whether returns justify the risk.	How much risk compared to market.
Dependency	Depends on Beta and market returns.	Calculated from historical correlation with market.
Ideal Value	Higher positive Alpha preferred.	Depends on investor's risk appetite (1 = market risk).

In summary, Alpha evaluates performance efficiency—whether the investor earned returns beyond what risk predicts—while Beta evaluates volatility, showing how much the investment fluctuates compared to the market. Together, they provide a complete picture of risk and return in portfolio analysis.

Capital Asset Pricing Model (CAPM)

1. Introduction

The Capital Asset Pricing Model (CAPM) is one of the most fundamental models in finance that explains the relationship between the expected return of an investment and its systematic risk. It is primarily used to estimate the cost of equity, which represents the return expected by investors for holding a company's stock. Developed under the framework of Modern Portfolio Theory (MPT), CAPM assumes that investors must be compensated both for the time value of money and the risk they assume beyond a risk-free investment.

2. Concept and Working of CAPM

The CAPM establishes a direct linear relationship between the expected return on an asset and its risk (measured by Beta). It assumes that investors are rational and markets are efficient, meaning securities are fairly priced based on their risk levels. The expected return on equity under CAPM is calculated using three main variables: the Risk-Free Rate (rf), the Beta (β) of the security, and the Equity Risk Premium (ERP).

The model essentially identifies the required rate of return—also known as the discount rate—that investors demand to compensate for systematic risk. This discount rate becomes the "hurdle rate" for investments, representing the minimum acceptable rate of return for undertaking a project or investing in an asset.

Capital Asset Pricing Model
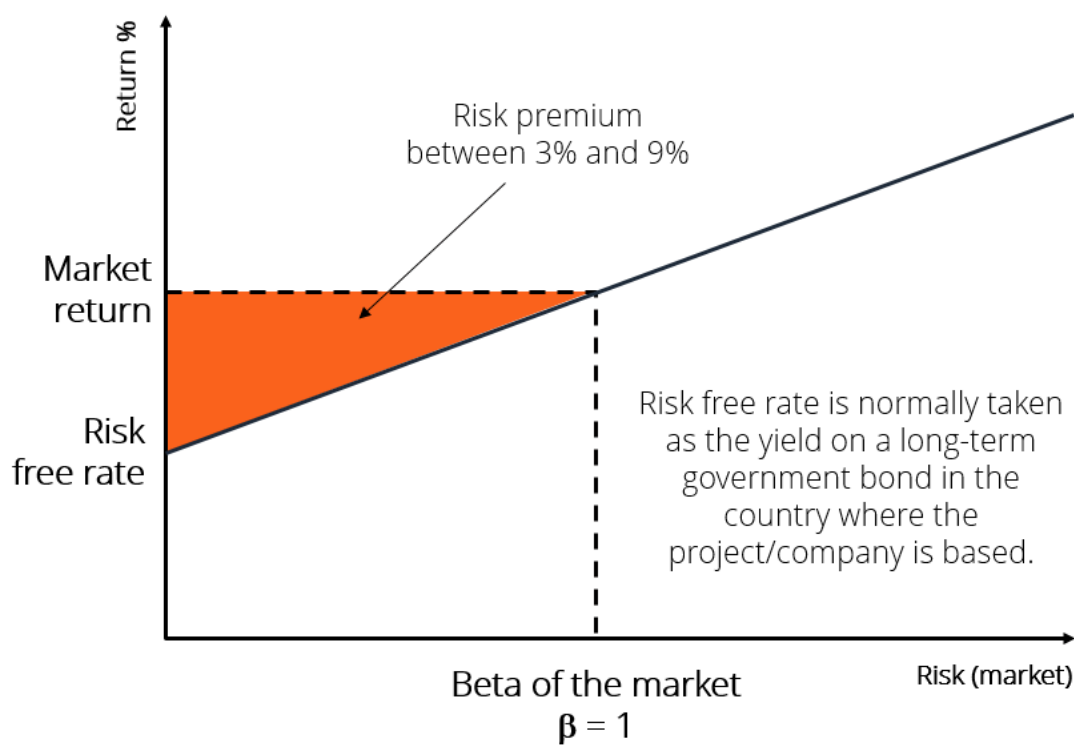
3. CAPM Formula and Explanation

The CAPM equation is expressed as:
Expected Return (Ke) = Rf + β (Rm - Rf)
Where:
Ke = Expected return or cost of equity
Rf = Risk-free rate (return on government bonds)
β = Beta of the security (systematic risk)
(Rm – Rf) = Equity Risk Premium (ERP)
This formula implies that the expected return on a security equals the return on a risk-free asset plus a premium for taking additional market risk.

4. Components of CAPM

a. Risk-Free Rate (Rf): Represents the return on a security with no risk of default, typically government bonds.
b. Beta (β): Measures the systematic risk of a security compared to the market. A β of 1 means the asset moves in line with the market; β > 1 indicates higher volatility, and β < 1 indicates lower volatility.
c. Equity Risk Premium (ERP): Represents the additional return investors demand for investing in equities over risk-free assets. It compensates for higher uncertainty associated with stocks.

5. Assumptions of CAPM

CAPM is based on Modern Portfolio Theory and assumes that:
1. Markets are efficient — all available information is quickly reflected in asset prices.
2. Investors are rational and risk-averse — they seek to maximize returns for a given level of risk and prefer less risk for the same expected return.

6. Interpretation through the CAPM Graph

The CAPM is graphically represented by the Security Market Line (SML), which plots expected return (y-axis) against Beta (x-axis). The intercept represents the risk-free rate, and the slope represents the Equity Risk Premium. Assets above the SML are undervalued (positive alpha), while those below it are overvalued (negative alpha).

7. CAPM Calculation Example

Example 1:
Risk-free rate (Rf) = 3%, Market return (Rm) = 10%, Beta (β) = 0.8
Ke = 3% + 0.8(10% - 3%) = 8.6%
Hence, the cost of equity is 8.6%.
Example 2:
Company A (β = 0.5) → Ke = 5.3%
Company B (β = 1.0) → Ke = 8.0%
Company C (β = 1.5) → Ke = 10.8%
A higher Beta leads to a higher required return because of greater risk.

8. Systematic vs. Unsystematic Risk

CAPM focuses only on systematic risk (market risk), which cannot be eliminated through diversification. Examples include recessions, inflation, and interest rate changes. Unsystematic risk, on the other hand, is firm-specific and can be reduced through diversification. CAPM assumes investors are diversified and thus compensated only for systematic risk.

9. Criticisms and Limitations

Although CAPM is widely used, it faces criticism due to the reliability of its assumptions and inputs. Beta, being derived from past data, may not accurately predict future volatility. Market efficiency and investor rationality are idealistic assumptions, as real-world markets display behavioral biases. Despite this, CAPM remains a cornerstone model for estimating expected returns and cost of equity.

10. Modern Enhancements with AI

Recent developments in Artificial Intelligence (AI) have refined CAPM-based analysis by integrating machine learning algorithms that process large-scale market data. AI captures complex, non-linear relationships between risk factors and returns, improving predictive accuracy and reducing dependence on historical Beta values.

Conclusion

The Capital Asset Pricing Model (CAPM) quantifies the trade-off between risk and expected return. By combining the risk-free rate, Beta, and equity risk premium, CAPM helps investors determine the cost of equity and make rational investment decisions. Though based on simplifying assumptions, its clarity and wide applicability make it a foundation of modern finance and investment analysis.

Arbitrage Pricing Theory (APT)

1. Introduction

The Arbitrage Pricing Theory (APT) is a financial model developed by Stephen Ross in the early 1970s as an alternative to the Capital Asset Pricing Model (CAPM). It explains the expected return of an asset based on its sensitivity to multiple systematic risk factors rather than a single market factor. APT provides a more flexible and realistic framework for asset pricing by considering several macroeconomic variables that affect asset returns.

2. Concept of APT

APT assumes that the return on any asset is influenced by various common risk factors, such as changes in interest rates, inflation, GDP growth, exchange rates, or industry-specific conditions. The model suggests that if an asset is mispriced, arbitrage opportunities will arise, and rational

investors will act to eliminate them. The resulting equilibrium ensures that all assets are fairly priced according to their exposure to these risk factors.

3. Key Principles of APT

a) Factor Identification: Identify the relevant systematic risk factors that affect asset returns, such as inflation, market indices, interest rate changes, or industrial production.

b) Factor Sensitivity (Beta) Estimation: Estimate the sensitivity (β) of each asset to these factors using regression analysis to measure how asset returns respond to changes in each factor.

c) Factor Pricing: Model expected return as a linear function of the risk-free rate plus the product of each factor's sensitivity and risk premium.

d) Arbitrage and Price Adjustment: Assume no arbitrage opportunities exist; mispricing is corrected through arbitrage, restoring equilibrium.

4. Formula of APT

$$E(R_i) = R_f + \beta_{i1}\lambda_1 + \beta_{i2}\lambda_2 + \ldots + \beta_{ik}\lambda_k + \varepsilon_i$$

Where: $E(R_i)$ = Expected return on asset i; R_f = Risk-free rate; β_{ij} = Sensitivity of asset i to factor j; λ_j = Risk premium of factor j; ε_i = Idiosyncratic risk. This expresses that expected return equals the risk-free rate plus compensation for exposure to systematic risks.

5. Assumptions of APT

a) Separation of Risks: APT distinguishes between systematic and unsystematic risk, assuming the latter can be diversified away.

b) Efficient Markets: Markets are efficient and reflect all available information.

c) Rational Expectations: Investors are rational and form unbiased expectations based on all available data.

d) Absence of Arbitrage: No risk-free arbitrage opportunities exist; any mispricing is corrected through arbitrage.

e) Rational Investor Behavior: Investors are risk-averse and seek appropriate compensation for risk.

6. Theoretical Foundations

a) Law of One Price: Assets with identical risk characteristics should have the same expected returns to prevent arbitrage.

b) No Arbitrage Equilibrium: Asset prices adjust so that no arbitrage opportunities remain in equilibrium.

c) Multiple Risk Factors: APT allows for multiple sources of systematic risk, unlike CAPM's single market factor.

7. Advantages of APT

• Multi-Factor Model – Accounts for several systematic risks for more accurate pricing.

• Flexibility – Does not require predefined factors; adaptable to various economic contexts.

• Empirical Relevance – Allows statistical identification of influencing factors.

• Realistic Assumptions – Less restrictive and more reflective of real markets than CAPM.

8. Limitations of APT

• Difficulty in identifying correct factors and their number.

• Heavy dependence on historical data for accuracy.

• Assumes perfect efficiency and rationality, which may not hold true in practice.

• Computationally more complex than single-factor models like CAPM.

9. Comparison: APT vs. CAPM

Basis	CAPM	APT
Developer	William Sharpe (1964)	Stephen Ross (1976)
Type	Single-factor model	Multi-factor model
Risk Factors	Market risk only	Multiple systematic risks
Assumptions	Market efficiency, investors hold market portfolio	No arbitrage, efficient markets
Formula	$E(R_i) = R_f + \beta_i (R_m - R_f)$	$E(R_i) = R_f + \Sigma\beta_{ij}\lambda_j$
Arbitrage	Not directly based on arbitrage	Central concept
Flexibility	Less flexible	More flexible and dynamic

10. Conclusion

The Arbitrage Pricing Theory (APT) provides a broader and more realistic approach to asset pricing compared to CAPM. By considering multiple sources of systematic risk and emphasizing the absence of arbitrage, it offers a comprehensive understanding of how economic forces impact expected returns. However, its success depends on identifying relevant factors accurately and assuming efficient markets.

MEANING OF FUNDAMENTAL ANALYSIS

Fundamental analysis is really a logical and systematic approach to estimating the future dividends and share price. Hence, the economy fundamentals, industry fundamentals and company fundamentals have to be considered while analysing a security for investment purpose.

Each share is assumed to have an economic worth based on its present and future earning capacity. This is called its intrinsic value or fundamental value. The investor can then compare the intrinsic value of the share with the prevailing market price to arrive at an investment decision. If the market price of the share is lower than its intrinsic value, the investor would decide to buy the share as it is underpriced.

On the contrary, when the market price of a share is higher than its intrinsic value, it is perceived to be overpriced. The market price of such a share is expected to come down in future and hence, the investor would decide to sell such a share.

ECONOMY-INDUSTRY-COMPANY ANALYSIS FRAMEWORK

The analysis of economy, industry and company fundamentals constitute the main activity in the fundamental approach to security analysis. These can be viewed as different stages in the investment decision-making process and can be depicted graphically with three concentric circles as shown in Fig. 7.1.
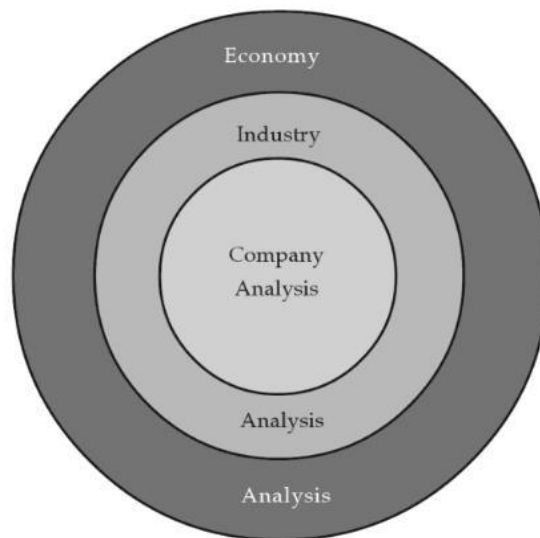
Fig. 7.1 EIC analysis framework.

The logic of these three analyses is that the company performance depends not only on its own efforts, but also on the general industry and economy factors. The multitude of factors affecting the performance of a company can be broadly classified as:

- ❖ Economy-wide factors such as growth rate of the economy, inflation rate, foreign exchange rates, etc. which affect all companies.

- ❖ Industry-wide factors such as demand-supply gap in the industry, the emergence of substitute products, changes in government policy relating to the industry, etc.

- ❖ Company-specific factors such as the age of its plant, the quality of management, brand image of its products, its labour-management relations, etc. These factors are likely to make a company's performance quite different from that of its competitors in the saine industry.

Fundamental analysis thus involves three steps:

- ❖ Economy Analysis
- ❖ Industry Analysis
- ❖ Company Analysis.

ECONOMY ANALYSIS

The performance of a company depends on the performance of the economy. If the economy is booming, incomes rise, demand for goods increases, and hence the industries and companies in general tend to be prosperous. On the other hand, if the economy is in recession, the performance of companies will be generally bad. A study of these economic variables would give an idea about future corporate earnings and the payment of dividends and interest to investors.

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

Growth Rates of Notional income

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

The four stages of an econimetric cycle are depression, recovery, boom and recession.

- ✓ *Depression* is the worst of the four stages. During a depression, demand is low and declining. Inflation is often high and so are interest rates. Companies are forced to reduce production, shut down plant and lay off workers.

- ✓ During the *recovery* stage, the economy begins to revive after a depression. Demand picks up leading to more investments in the economy. Production, employment and profits are on the increase.

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

Inflation

Inflation prevailing in the economy has considerable impact on the performance of companies, Higher rates of inflation upset business plans, lead to cost escalation and result in a squeeze on profit margins. On the other hand, inflation leads to erosion of purchasing power in the hands of consumers. This will result in lower demand for products. Thus, high rates of inflation in an economy are likely to affect the performance of companies adversely. Industries and companies prosper during times of low inflation.

Interest Rates

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

Government Revenue, Expenditure and Deficits

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

However, when government expenditure exceeds its revenue, there occurs a deficit, This deficit is known as budget deficit. All developing countries suffer from budget deficits as governments spend large amounts of money to build up infrastructure.

Exchange Rates

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

The exchange rates of the rupee are influenced by the balance of trade deficit, the balance of payments deficit and also the foreign exchange reserves of the country. The excess of imports over exports is called balance of trade deficit.

Infrastructure

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

The availability of infrastructure facilities such as power, transportation and communication systems affects the performance of companies, Bad infrastructure leads to inefficiencies, lower

productivity, wastage and delays. An investor should assess the status of the infrastructural facilities available in the economy before finalizing his investment plans.

Monsoon

The Indian economy is essentially an agrarian economy and agriculture forms a very important sector of the Indian economy. Because of the strong forward and backward linkages between agriculture and industry, performance of several industries and companies are dependent on the performance of agriculture. Moreover, as agricultural incomes rise, the demand for industrial products and services will be good and industry will prosper. But the performance of agriculture to a very great extent depends on the monsoon, The adequacy of the monsoon determines the success or failure of the agricultural activities in India.

Economic and Political Stability

A stable political environment is necessary for steady and balanced growth. No industry or company can grow and prosper in the midst of political turmoil. Stable long-term economic policies are what are needed for industrial growth. Such stable policies can emanate only from stable political systems as economic and political factors are inter-linked.

ECONOMIC FORECASTING

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

FORECASTING TECHNIQUES

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

Anticipatory Surveys

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

Anticipatory surveys are the surveys of intentions of people in government, business, trade and industry regarding their construction activities, plant and machinery expenditures, level of inventory, etc. Such surveys may also include the future plans of consumer with regard to their spending on durables and non-durables.

Barometric or Indicator Approach

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

Leading Indicators

- ✓ Average weekly hours of manufacturing production workers
- ✓ Average weekly initial unemployment claims

- ✓ Contracts and orders for plant and machinery
- ✓ Number of new building perinits issued
- ✓ Index of S and P 500 stock prices
- ✓ Moneey supply (M2)
- ✓ Change in sensitive materials prices
- ✓ Change in manufacturers' unfilled orders (durable goods industries)
- ✓ Index of consumer expectations

Coinciderrial Indicators

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

Lagging Indicators

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

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

Econometric Model Building

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

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

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

Opportunistic Model Building

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

Initially, an analyst estimates the total demand in the economy, and based on this he estimates the total income or GNP for the forecast period. This initial estimate takes into consideration the prevailing economic environments such as the existing tax rates, interest rates, rate of inflation and other economic and fiscal policies of the government. After this initial forecast is arrived at, the analyst now begins building up a forecast of the GNP figure by estimating the levels of various components of GNP. For this, he collects the figures of consumption expenditure, gross privy to domestic investment, government purchase of goods and services and net exports. He adds these figures together to arrive at the GNP forecast,

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

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INDUSTRY ANALYSIS

An investor ultimately invests his money in the securities of one or more specific companies. Each company can be characterized as belonging to an industry. The performance of companies would, therefore, be influenced by the fortunes of the industry to which it belongs. For this reason, an analyst has to undertake an industry analysis so as to study the fundamental factors affecting the performance of different industries.

Industry Life Cycle

Marketing experts believe that each product has a life cycle- They have identified four stages in the life of a product, namely introduction *stage, growth stage, maturity stage* and *the decline* stage. In the same way, an industry is also said to have a life cycle.

Technological advances in one industry can affect the growth of another industry. The jute industry began to decline when alternate and cheaper packing materials came into use, The popularity of synthetic textiles can adversely affect the demand for cotton textiles, and vice versa,

The first step in industry analysis, therefore, is to determine the stage of growth through which the industry is passing.

Pioneering Stage

This is the first stage in the industrial life cycle of a new industry where the technology as well as the product are relatively new and have not reached a state of perfection, The pioneering stage is characterized by rapid growth in demand for the output of industry. As a result there is a great opportunity for profit. Many caul panics compete with each other vigorously. As large number of companies attempt to capture their share of the market, there arises high business mortality rakes. Weak firms are eliminated and a lesser number of firms survive the pioneering stage.

It is difficult for the analyst to identify those companies that are likely to survive and come out strongly later on, Therefore investment m companies in an industry that is in the pioneering stage is highly risky. Industries in the pioneering stage are called sunrise industries, Telecommunication, computer software, information technology, etc. are examples of sunrise industries in India at present.

Expansion Stage

Once an industry has established itself it enters the second stage of expansion or growth. The industry now includes only those companies that have survived the pioneering stage. These companies continue to become stronger. Each company finds a market for itself and develops its

own strategies to sell and maintain its position in the market. The competition among the surviving companies brings about improved products at lower prices.

Stagnation Stage

This is the third stage ill the industry life cycle. In this stage, the growth of the industry stabilizes. The ability of the industry to grow appears to have been lost. Sales may be increasing but at a slower rate than that experienced by competitive industries or by the overall economy. The industry begins to stagnate. The transition of the industry from the expansion stage to the stagnation stage is often very slow. Two important reasons for this transition are change in social habits and development of improved technology_ Example: The black and white television industry in India provides a good example of an industry which passed from the expansion stage to the stagnation stage during the eighties. Sometimes ant industry may stagnate only for a short period. By the introduction of a technological innovation or a new product, it may resume a process of growth, thereby starting a new cycle. Therefore, an investor or analyst has to monitor the industry developments constantly and with diligence. An investor should dispose of his holdings in an industry which begins to pass from the expansion stage to the stagnation stage because what is to follow is the decay of the industry.

Decay Stage

From the stagnation stage the industry passes to the decay stage. This occurs when the products of the industry are no longer in demand. New products and new technologies have come to the market. Customers have changed their habits, style and liking, As a result, the industry becomes obsolete and gradually ceases to exist. Thus, changes ill social habits, changes in technology and declining demand are the causes of decay of an industry. An investor should get out of the industry before the onset of the decay stage.

The profit associated with the different stages in the life of an industry can be illustrated in the form of an inverted '5' curve as shown in Fig, 8.1,
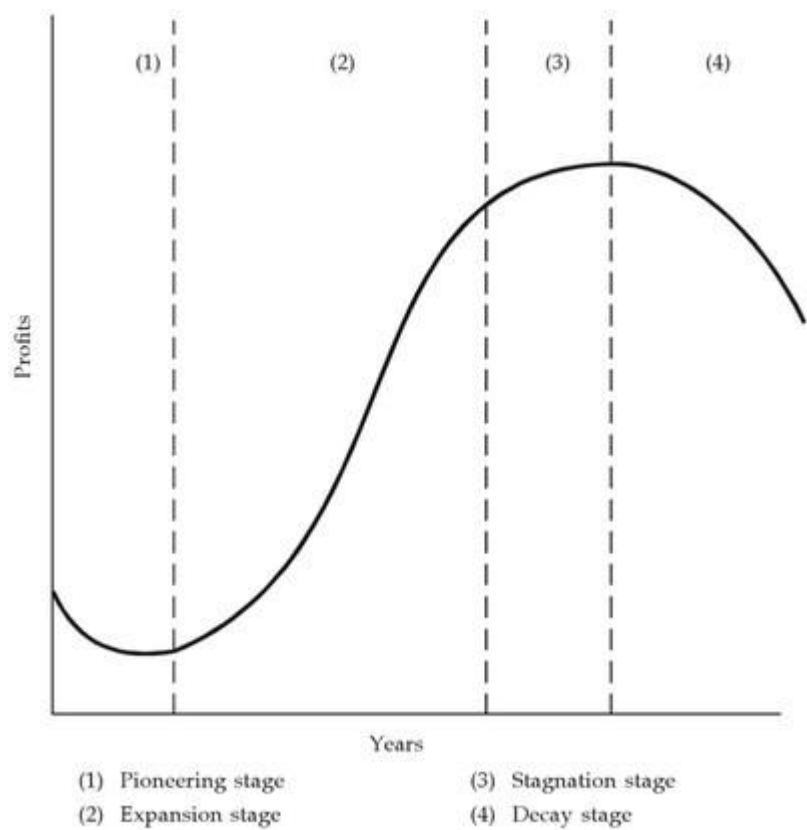

(1) Pioneering stage   (3) Stagnation stage
(2) Expansion stage   (4) Decay stage

Fig. 8.1 Industry life cycle.

Industry Characteristics

In an industry analysis, there are a number of key characteristics that should be considered by the analyst. Some of these are discussed below:

Demand supply Gap

The demand for a product usually tends to change at a steady rate. whereas the capacity to produce the product tends to change at irregular intervals, depending upon the installation of additional production capacity. As a result, an industry is likely to experience under-supply and over-supply of capacity at different times. Excess supply reduces the profitability of the industry through a decline in the unit price realization. On the contrary, insufficient supply tends to improve the profitability through higher unit price realization.

Competitive Conditions in the Industry:

Another significant factor to be considered in industry analysis is the competitive conditions in the industry. The level of competition among various companies in an. industry is determined by 'certain competitive forces., These competitive forces are: barriers to entry, the threat of substitution, bargaining power of the buyers, bargaining power of the suppliers and. the rivalry of the competitors.

New entrants to an industry increase the capacity in an industry. But these. new entrants may face certain barriers to their entry- The barriers to entry may arise because of product differentiation, absolute cost advantage kir economy of scale. Product differentiation refers to the preference buyers have for the products of established firms- their products enjoy a premium in the market.

Economy of scale refers to the situation in which it is necessary to attain a fairly high level of production in order to obtain economically feasible levels. of cost-50me industries it may not be economical to set up small capacities

Permanence:

In this stage of rapid technological change, the degree of permanence of line industry is an important consideration in industry analysis. Permanence is a phenomenon related to the products and the technology used by the industry. If an analyst feels that the need for a particular industry will vanish in a short period., or that the rapid technological changes would render the products obsolete within a short time, it would be foolish to invest in such an industry.

Labour Conditions

The state of labour conditions in the industry under analysis is an important consideration in an economy such as ours where the labour unions are very powerful. If the labour in a particular industry is rebellious and is inclined to resort to strikes frequently, the prospects of that industry cannot become bright.

Attitude of Government:

The government may encourage the growth of certain industries and can assist such industries through favorable legislation. On the contrary, the government may look with disfavor on certain other industries. In India, this has been the experience of alcoholic drinks and cigarette industries. The government may place different kinds of legal restrictions or its development.

Supply of Raw Materials

The availability of raw materials is an important factor determining the profitability of an industry. Some industries may have no difficulty in obtaining the major raw materials as they may be indigenously available in plenty. Other industries may have to depend on a few manufacturer within the country or on imports from outside the country for their raw material supply, Industry analysis trust take into consideration the availability of raw materials and its impact on industry prospects.

Cost Structure

Another factor to be considered in industry analysis is the cost structure of the industry, viz, the proportion of fixed costs to variable costs. The higher the fixed cost component, higher is the sales volume necessary to achieve break-even point_ Conversely, the lower the proportion of fixed cost

relative to variable cost, lower would be the break-even point. Lower break-even point provides higher margin of safety. An analyst would consider favorably an industry that has a Lower break-even point.

An analyst must evaluate all the above factors before making an investment decision. If the above factors indicate that the industry has favorable future prospects, funds may be committed to that industry.

COMPANY ANALYSIS

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

Company analysis deals with the estimation of return and risk of individual shares. This calls for information. Many pieces of information influence investment decisions. Information regarding companies can he broadly classified into groups: internal and external. internal information consists of data and events made public by companies concerning their operations. The internal information sources include annual reports to shareholders, public and private statements of officers of the company, the company's financial statements, etc. External sources of information are those generated independently outside the company. These are prepared by investment services and the financial press, in company analysis, the analyst tries to forecast the Future earnings of the company because. there is strong evidence that earnings have a direct and powerful effect upon share prices. The level, trend and stability of earnings of a company, however, depend upon a number of factors concerning the operations of the company.

Financial Statements

The *prosperity* of a company would depend upon its profitability and financial health, The financial statements published by a company periodically help us to assess the profitability and financial health of the company. The two basic financial statements provided by a company are the balance sheet and the profit and loss account. The first gives us a picture of the company's assets and liabilities while the second gives us a picture of its earnings.

The *balance sheet* gives the list of assets and liabilities of a company on a specific date. The major categories of assets are fixed assets and current assets, Fixed +Issas are those assets which are intended to be used up over a period of several years. Current. assets are those assets which are intended to be converted into cash in the near future (within one year). The major categories of liabilities are outside liabilities and liability towards shareholders.. The outside liabilities are categorized as short-term and long-term liabilities, The short-term liabilities which are expected to be paid off within the next one year are known as current liabilities. The balance sheet indicates the financial position of a company on a particular date, namely the last day of the accounting year,

The *profit and loss account*, also called income statements, reveals the revenue earned... the cost incurred and the resulting profit or loss of the company for one accounting year. The profit after tax (PAT) divided by the number of shares gives the earnings per share (EFS) which is a figure in which most investors are interested. The profit-and-loss account summarized the activities of a company during an accounting year.

Analysis of Financial Statements

The financial statements of a company can be used to evaluate the financial performance of the company. Financial ratios are most extensively used for the purpose. Ratio analysis helps an investor to determine the strengths and weaknesses of a company. It also helps him to assess

whether the financial performance and financial strength are improving or deteriorating. Ratios can he used for comparative analysis either with other firrn.5 in the industry through a cross sectional analysis or with the past data through a time series analysis.

Different ratios measure different aspects of a company's performance or health. Four groups of ratios may be used for analysing the performance of a company.

Liquidity Ratios

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

1. Current ratio $= \dfrac{\text{Current assets}}{\text{Current liabilities}}$

2. Quick ratio (or Acid test) ratio

$= \dfrac{\text{Current assets} - \text{Inventory} - \text{Prepaid expenses}}{\text{Current liabilities}}$

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

Leverage Ratios

These ratios are also known as capital structure ratios. They measure the company's ability to meet its long-term debt obligations. They throw light on the long-term solvency of a company, The commonly used leverage ratios are the following:

1. Debt-equity ratio $= \dfrac{\text{Long-term debt}}{\text{Shareholders' equity}}$

2. Total debt ratio or Debt to total assets ratio $= \dfrac{\text{Total debt}}{\text{Total assets}}$

3. Proprietary ratio $= \dfrac{\text{Shareholders' equity}}{\text{Total assets}}$

4. Interest coverage ratio $= \dfrac{\text{Earnings before interest and taxes (EBIT)}}{\text{Interest}}$

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

Profitability Ratios

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

1. Profitability related to sales

(a) Gross profit ratio $= \dfrac{\text{Gross profit (Sales} - \text{Cost of goods sold)}}{\text{Sales}}$

(b) Operating profit ratio $= \dfrac{\text{EBIT}}{\text{Sales}}$

(c) Net profit ratio $= \dfrac{\text{Earnings after tax (EAT)}}{\text{Sales}}$

(d) Administrative expenses ratio $= \dfrac{\text{Administrative expenses}}{\text{Sales}}$

(e) Selling expenses ratio $= \dfrac{\text{Selling expenses}}{\text{Sales}}$

(f) Operating expenses ratio $= \dfrac{\text{Administrative expenses + Selling expenses}}{\text{Sales}}$

(g) Operating ratio $= \dfrac{\text{Cost of goods sold + Operating expenses}}{\text{Sales}}$

2. Profitability related to investment

(a) Return on assets $= \dfrac{\text{Earnings after tax}}{\text{Total assets}}$

(b) Return on capital employed $= \dfrac{\text{EBIT}}{\text{Total capital employed}}$

(c) Return on equity $= \dfrac{\text{EAT}}{\text{Shareholders' equity}}$

3. Profitability related to equity shares

(a) Earnings per share (EPS)

$$= \dfrac{\text{Net profit available to equity shareholders}}{\text{Number of equity shares}}$$

(b) Earnings yield $= \dfrac{\text{EPS}}{\text{Market price per share}}$

(c) Dividend yield $= \dfrac{\text{DPS (dividend per share)}}{\text{Market price per share}}$

(d) Dividend payout ratio $= \dfrac{\text{DPS}}{\text{EPS}}$

(e) Price earnings ratio (P/E ratio) $= \dfrac{\text{Market price per share}}{\text{EPS}}$

4. Overall profitability (or earning power)

Return on investment (ROI) $= \dfrac{\text{EAT}}{\text{Sales}} \times \dfrac{\text{Sales}}{\text{Total assets}}$ or $\dfrac{\text{EAT}}{\text{Total assets}}$

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

Activity or Efficiency Ratios

These are also known as turnover ratios. These ratios measure the efficiency in asset management. They express the relationship between sales and the different types of assets, showing the speed with which these assets generate sales. Important activity ratios are enumerated below.

1. Current assets turnover $= \dfrac{\text{Sales}}{\text{Current assets}}$

2. Fixed assets turnover $= \dfrac{\text{Sales}}{\text{Fixed assets}}$

3. Total assets turnover $= \dfrac{\text{Sales}}{\text{Total assets}}$

4. Inventory turnover $= \dfrac{\text{Sales}}{\text{Average inventory}}$

5. Debtors turnover $= \dfrac{\text{Sales}}{\text{Average debtors}}$

Ratio analysis is a method of interpreting the financial shteinents of a company_ A single ratio by itself is not of much use. A comprehensive evaluation of the financial performance of a company emerges only from a study of all the important ratios.

Other Variabies

The future prospects of a company would also depend upon a number of other variables, some of which are given below.

- ✓ Company's market share
- ✓ Capacity utitilisation
- ✓ Modernisation and expansion plans
- ✓ Order book position
- ✓ Availability of raw materials

Some of these informations may be available in the directors' report and the chairman's speech at the annual general meeting of the company. Others may be available in financial journals and magazines.

Assessment of Risk

Company analysis involves not only an estimation of future returns, but also an assessment of the variability in returns called risk. The variability in returns arises primarily because of variability in sales_ The sensitivity of profits to changes in the level of sales is measured by a ratio called

$$DTL = \dfrac{\text{Contribution}}{\text{Profit before tax (PBT)}}$$

degree of total leverage (DM), This ratio is used as a measure of risk_ It is calculated as follows!

It may be noted that contribution means sales minus the variable costs.

DTL may be subdivided into two components! (a) the degree of operating leverage (DOL) arising from the cost structure of the company, and (b) the degree of financial Leverage (DFL) arising from the capital structure of the company,

DOL measures the percentage change in HIT for a one per cent change in sales and computed as:

$$DOL = \dfrac{\text{Contribution}}{\text{EBIT}}$$

$$DFL = \dfrac{\text{EBIT}}{\text{PBT}}$$

The degree of total leverage (DTL) is the product of DOL. and DFL and measures the percentage charge in PBT for a one per cent change in sales.

The investment decision is ultimately a decision to invest in the shares of one or more specific companies. Company analysis deals with an analysis of various factors affecting the performance

of companies so as to forecast the future earnings of a company as also its variability better known as risk.