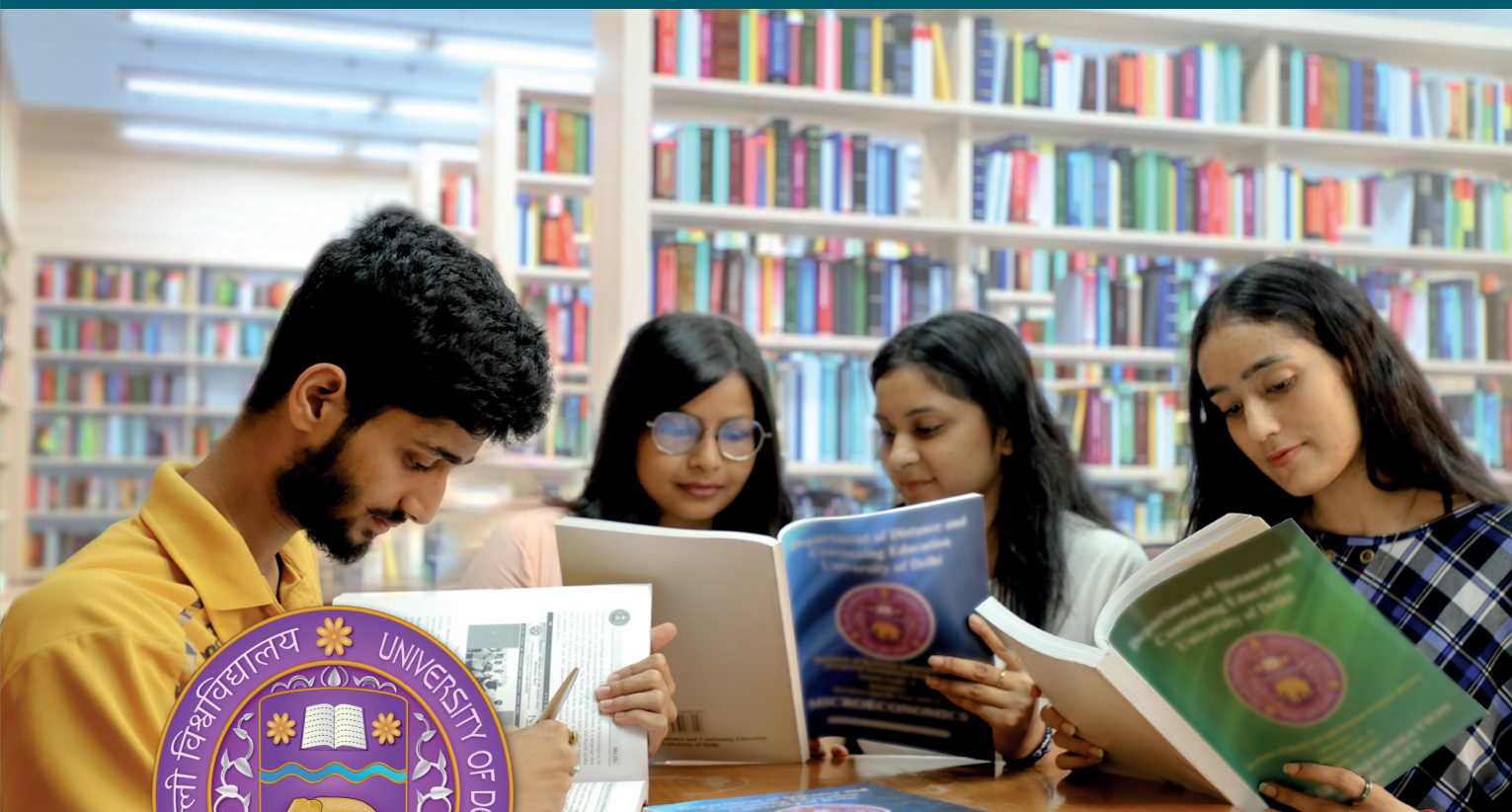


SECURITY ANALYSIS AND PORTFOLIO MANAGEMENT

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Introduction to Financial Investments

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STRUCTURE

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1.1 Learning Objectives

- ◆ To understand the meaning of Investment.
- ◆ To understand the factors affecting Investment decisions.
- ◆ To understand the various types of investment.



- ◆ To understand the process of investment decisions.
- ◆ To explain the various avenues of investment.
- ◆ To understand the Investment Environment.
- ◆ To understand the various Investment Philosophies.
- ◆ To understand the concept of Investment Wisdom.

1.2 Introduction

The allocation of resources, often money, with the goal of generating future advantages or returns is referred to as investment. It entails devoting capital to various assets such as stocks, bonds, real estate, mutual funds, or enterprises with the hopes of producing income, capital appreciation, or both in the long run.

The following are important investment concepts to understand:

Risk and Return: Different investments carry varied degrees of risk. bigger-risk investments, in general, offer the potential for bigger profits, but they also involve a higher risk of loss. Low-risk investments typically yield lesser returns. Finding the correct mix of risk and return is critical based on a person's risk tolerance and financial goals.

Diversification: Spreading assets across multiple asset classes (diversification) helps minimize portfolio risk. If one investment underperforms, the overall portfolio suffers as a result.

Time Horizon: The time horizon refers to how long an investor intends to retain an investment. Different investment instruments are appropriate for various time horizons. Long-term investments may offer the possibility of compounding returns, although short-term investments are sometimes more liquid.

Compounding: Compounding is the process by which an investment generates returns that are reinvested to generate greater returns in succeeding periods. Compounding can greatly raise the value of an investment over time.



Research and Analysis: Successful investment frequently necessitates extensive research and analysis of market patterns, economic indicators, corporate financials, and other pertinent data.

Market Fluctuations: Due to market fluctuations, economic events, and other factors, investment values might be erratic. Patience and a long-term outlook are frequently required to navigate market ups and downs. Before making investing decisions, individuals should evaluate their financial situation, goals, risk tolerance, and investment knowledge. Consultation with financial advisors or specialists can assist in tailoring an investing strategy to specific requirements and circumstances.

Meaning of Financial Investment:

The allocation of funds with the expectation of creating a financial return or profit over a specific period of time is referred to as financial investment. It entails devoting resources, such as money, to various financial instruments or assets in order to increase the value of the investment or generate income from it. Individuals, businesses, institutions, and governments make financial investments to attain certain financial goals.

Important Points:

The basic goal of financial investment is to generate good financial outcomes such as capital appreciation (growth in the value of the investment) or regular income (e.g., interest, dividends).

Stocks, bonds, mutual funds, exchange-traded funds (ETFs), real estate, commodities, certificates of deposit (CDs), money market instruments, and other financial assets are examples of financial investments:

- 1. Risk and Return:** The risk and possible return of various sorts of financial investments differ. In general, investments with larger potential returns have a higher amount of risk.
- 2. Investment Horizon:** Depending on the investor's aims and time frame, financial investments can be short-term, medium-term, or long-term. The choice of investment tools is influenced by the investment horizon.
- 3. Diversification:** Spreading investments across multiple asset classes and industries in an investment portfolio can help control risk and improve overall portfolio performance.
- 4. Liquidity:** The ability of an investment to be converted into cash quickly and without considerable loss of value is referred to as liquidity.



Some investments, such as publicly traded equities, are more liquid than others, such as real estate.

5. Factors Influencing Investment Decisions: Market conditions, economic outlook, interest rates, inflation, regulatory environment, and investor risk tolerance all influence investment decisions.

6. Passive vs. Active Investing: Passive investing entails constructing a diversified portfolio with the goal of replicating the performance of a specific market index. Active investing entails picking and managing individual investments in order to outperform the market.

7. Emotional Discipline: When making investment decisions, emotional discipline is essential. Emotional reactions to market volatility might lead to rash decisions that harm investment outcomes.

8. Tax Considerations: Different investments may have different tax consequences. It is critical to consider how investment gains and income are taxed.

9. Financial Objectives: Investors have several financial objectives, such as saving for retirement, funding schooling, accumulating wealth, or creating income. The investments chosen should be in line with these objectives.

The investment process entails performing research, researching potential investments, estimating risk and return, making informed decisions, and monitoring and changing the portfolio on a regular basis. To summarize, financial investing entails allocating resources strategically to various financial assets with the goal of achieving financial growth, creating income, or both. Personal finance, asset management, and company strategies all rely on it.

1.3 Types of Investment

Stocks: Stocks are ownership shares in a corporation that can increase in value and pay dividends.

Bonds: Debt instruments issued by governments or corporations that provide set interest payments and principal repayment.

Real Estate: Investment in tangible properties such as residential or commercial real estate.



Mutual funds and exchange-traded funds (ETFs): Pooled funds that invest in a diverse portfolio of assets managed by professionals.

Savings Accounts/CDs: Low-risk investments with good liquidity but low yields.

Commodities, hedge funds, private equity, and other alternative investments are examples. Individuals may invest for a variety of purposes, including retirement planning, asset growth, paying education, or reaching financial goals.

1.4 Process of Investment

The investment process consists of a set of processes that individuals or organizations must take in order to make informed and strategic investment decisions. While the specific procedure may differ depending on individual goals, risk tolerance, and investment experience, the following is a rough summary of the investment process:

Setting Investment Objectives and Goals: Define specific and attainable financial objectives, such as retirement planning, property ownership, education finance, or wealth accumulation. Determine whether each goal's time horizon is short-, medium-, or long-term.

Risk Evaluation: Assess your risk tolerance, which represents your level of comfort with probable investing losses. Consider your age, financial obligations, income stability, and investment experience.

Allocation of Assets: Determine how much of your investment portfolio should be allocated to each asset class, such as stocks, bonds, real estate, and cash. Asset allocation seeks to balance risk and return in accordance with your objectives and risk tolerance.

Analysis and research: Conduct extensive study on potential investments within your asset classes of choice. Examine financial statements, market patterns, economic indicators, and any news or developments that are pertinent.

Choosing an investment: Select specific investments that correspond to your investment strategy and goals. Consider aspects such as past success, management quality, fees, and development prospects.



Diversification: To reduce risk, diversify your investments among industries, sectors, geographic locations, and asset classes. Diversification helps to lessen the impact of a single investment's poor performance.

Execution: After careful analysis and research, arriving at the final set of investment options across various asset classes, industries, sectors, etc. For instance, after having done proper research and analysis Mr. Rahul finally holds a portfolio comprising stocks of Tata Steel Ltd.; Reliance Industries Ltd. and Sovereign Gold Bonds.

Monitoring and evaluation: Review your investing portfolio on a regular basis to ensure that it is still aligned with your goals and risk tolerance. Changes in your financial circumstances or market conditions may necessitate adjustments to your portfolio.

Rebalancing: Rebalance your portfolio on a regular basis to maintain the correct asset allocation. Rebalancing entails selling outperforming assets and purchasing underperforming ones to return your portfolio to its target allocation.

Keeping Up to Date: Keep up to date on market trends, economic developments, and any changes that may affect your assets. Continue to learn about investment techniques, possibilities, and risks.

Considerations for Taxation: Consider the tax implications of your financial choices. Investigate tax-saving methods such as tax-efficient investing and the use of tax-advantaged accounts.

Long-Term Prospects: Keep a long-term perspective in mind and avoid making rash decisions based on short-term market volatility. Unless there are significant changes in your financial status or ambitions, stick to the current investment approach.

It is critical to understand that the investment process necessitates continual attention, adjustment, and a commitment to keeping educated. Seek guidance from financial professionals to help you personalize your investment approach to your specific circumstances and goals.

1.5 Avenues of Investment

Individuals and institutions can invest in a variety of ways, each with a particular level of risk, return potential, and liquidity. Here are some common investment options:



Stocks (Equities): Investing in publicly traded company shares. Stocks offer the potential for high gains, but they also carry a higher level of risk owing to market volatility.

Bonds (Fixed Income): Purchasing government or corporate debt instruments. Bonds offer monthly interest and refund the principal at maturity, making them less risky than equities.

Mutual Funds: Collectively managed funds that invest in a diverse range of stocks, bonds, and other assets. Mutual funds, which are professionally managed, provide diversity and are appropriate for investors with varied risk tolerances.

ETFs are like mutual funds but are traded on stock markets like individual stocks. ETFs provide diversification, transparency, and cheaper fees.

Real Estate: Real estate investing refers to the purchase of tangible properties such as residential or commercial real estate. Rental income and possible property value appreciation can be obtained through real estate.

REITs are publicly listed organizations that own and manage income-generating real estate assets, providing an opportunity to invest in real estate without physically owning properties.

Savings Accounts and Certificates of Deposit (CDs): Banks offer low-risk choices with low interest rates and strong liquidity.

Commodities: Commodities are physical items such as gold, silver, oil, agricultural products, and so on. Commodities can be used to hedge against inflation and diversify portfolios.

Investing in precious metals such as gold, silver, platinum, and palladium. Precious metals can be used as a store of value as well as a hedge against economic insecurity.

Forex: The trading of currencies on the foreign exchange market. Forex trading is highly speculative and necessitates a thorough understanding of market dynamics.

Cryptocurrencies: Cryptocurrencies are digital or virtual currencies such as Bitcoin and Ethereum. Cryptocurrencies are high-risk, speculative investments.



Peer-to-Peer Lending: Investing in loans to individuals or small businesses via internet platforms, with the potential for interest income.

Startup Investments: Making equity investments in early-stage enterprises or startups. This is a high-risk, high-reward investment.

Hedge Funds and Private Equity: Investment funds that seek higher returns through a variety of tactics, sometimes with minimal regulatory monitoring and admittance only available to authorized investors.

Annuities: Annuities are insurance contracts that offer regular payments over time and are frequently used to plan for retirement income.

Antiques: Investing in priceless art, antiques, rare coins, or other collecting goods is known as art and collectibles. These investments might be illiquid and necessitate specialized knowledge.

Investing in education, training, and skill development to increase earning potential and job options.

Before committing cash, it is critical to undertake thorough study and understand the characteristics, dangers, and potential returns of any investment channel. Diversification across several channels can aid in risk management and the creation of a balanced portfolio that is aligned with your financial goals and risk tolerance. Financial professionals can provide significant insights and advice geared to your individual situation.

1.6 Investment Environment

The investment environment refers to the different elements, situations, and dynamics that influence investment decision-making and outcomes. These variables can have a substantial impact on an investment's prospective returns, hazards, and overall success. Economic conditions, market trends, regulatory regulations, geopolitical events, technical breakthroughs, and other factors all contribute to the investing environment. The following are some significant elements of the investment environment:

- 1. Economic Conditions:** The state of the economy as a whole, including elements such as GDP growth, inflation, interest rates, and unemployment, can have a significant impact on investment decisions. A healthy economy generally creates a favorable climate



for investment, but a weak economy might raise uncertainty and risk.

2. **Market Trends:** Investment decisions can be influenced by trends in many asset types such as stocks, bonds, real estate, commodities, and cryptocurrencies. Understanding market patterns assists investors in identifying prospective opportunities and risk management.
3. **Government Laws:** Government rules, policies, and tax laws can all have a substantial impact on investment plans. Regulation changes can have an impact on businesses, sectors, and specific investment vehicles.
4. **Location:** Geopolitical events can add uncertainty and volatility into the investment landscape, impacting investor mood and market performance.
5. **Technology:** Technological innovations have the potential to offer new investment possibilities, disrupt established sectors, and impact consumer behavior. Staying up to date on developing technologies is critical for identifying prospective investment opportunities.
6. **Social Environment:** Social and environmental aspects are increasingly being considered by investors when making investment decisions. Environmental, Social and Governance (ESG) issues can influence investor preferences and effect the attractiveness of specific projects.
7. **Market mood:** Investor psychology, mood, and behavior all have an impact on market patterns and asset values. Sentiment can fluctuate between optimistic and pessimistic, influencing investment flows.
8. **Global and Local issues:** Global and local variables can both have an impact on investments. Global economic events like the 2008 financial crisis, as well as local events like changes in area rules, can have a significant impact on investment outcomes.
9. **Monetary Policy:** Central bank policies, such as interest rate choices and monetary stimulus packages, can have an impact on borrowing rates, inflation, and overall market conditions.
10. **Risk and Return:** In the investment world, the link between risk and potential return is critical. Investors examine their risk tolerance and strive for a balance of prospective gains and potential losses.



- 11. Investor Education and Information:** Accurate and timely information is essential for making sound investing decisions. Technological improvements have increased access to information, allowing investors to undertake thorough research.
- 12. Diversification:** To distribute risk across different asset classes and investments, investors frequently diversify their portfolios. Diversification can help minimize risk while also increasing possible profits.

The investment landscape is complex and ever-changing. Successful investors are aware of these variables and adjust their strategy accordingly. So every intelligent investor keeps in mind all the factors, situations and latest technological changes before taking investment decisions. Making informed selections requires due investigation, research, and a complete awareness of the investment landscape.

1.7 Investment Philosophies

Investment philosophies are guiding principles and beliefs that influence how an investor makes investment decisions. These ideas provide a framework for investors to examine opportunities, manage risk, and allocate resources. Different investment philosophies represent different views about risk, return, and the investment process as a whole. Here are some examples of common investment philosophies:

- 1. Value Investing:** Value investors look for undervalued instruments, such as stocks or bonds, that are trading at a discount to their intrinsic or fair value. They believe that markets misprice assets from time to time due to short-term swings of investor mood, and they want to profit from these differences.
- 2. Growth Investing:** Growth investors are interested in companies or assets that have a high potential for growth. Even though the present price looks to be excessive, they select companies with above-average profit growth and expansion possibilities. The idea is to capture future value appreciation.
- 3. Income Investing:** Income-oriented investors place a premium on earning a consistent source of income from their investments. This



sometimes entails investing in dividend-paying stocks, bonds, real estate, or other assets that pay out regular interest or dividends.

4. **Index Investing:** Index investors believe in the market's efficiency and strive to duplicate the performance of a certain market index, such as the S&P 500. To attain wide market exposure, they employ passive investment strategies such as index funds or exchange-traded funds (ETFs).
5. **Dividend Investing:** Dividend-focused investors seek out equities or funds that pay out steady dividends. Dividends may offer them stability and income, especially during market downturns.
6. **Contrarian Investing:** Contrarian investors act in opposition to market sentiment. When the market is pessimistic, they hunt for opportunities, and when the market is optimistic, they sell. This viewpoint is based on the idea that market mood can cause mispricing.
7. **Technical Analysis:** Technical analysts use price movements, trends, and past trading volumes to forecast future market behavior. They believe that historical price patterns can predict future price fluctuations.
8. **Fundamental Analysis:** Fundamental analysts examine aspects such as financial statements, earnings, cash flow, and industry dynamics to determine an investment's inherent value. They look for investments that are trading at a discount to their intrinsic worth.
9. **Long-Term Investing:** Long-term investors place a premium on holding investments for a long length of time, frequently years or even decades. They trust in the power of compounding and are less worried with market changes in the short term.
10. **Social Analysis:** Socially Responsible Investing (SRI) / Environmental, Social, and Governance (ESG) Investing: When making investment decisions, SRI and ESG investors consider ethical, social, and environmental factors. They try to match their investments to their values and may avoid corporations in contentious areas.
11. **Quantitative Investing:** Quantitative investors make investment judgments based on mathematical models and data analysis. To discover trends and execute trades, they frequently rely on computer algorithms.



12. Hedge Fund Strategies: Hedge funds use a variety of strategies to generate returns that are uncorrelated with broader market movements, such as long/short equities, event-driven, and macroeconomic.

Individuals may use a combination of these investment philosophies or develop their own unique method depending on their financial goals, risk tolerance, and values. Successful investors frequently perform extensive study, exercise discipline, and adhere to their chosen investment philosophy.

Investment wisdom is the cumulative knowledge, insights, and concepts gained through time by experienced investors through their observations, successes, mistakes, and continual learning. This expertise is frequently condensed into concise and valuable pieces of advice that can help individuals make informed and cautious investing decisions. Here are some timeless investment pearls of wisdom:

1. **“Buy Low, Sell High”:** This timeless adage underlines the necessity of investing when assets are undervalued and selling when they are overpriced. It is a fundamental premise of profit-seeking investing.
2. **“Diversification Reduces Risk”:** Spreading your investments across several asset classes can help lessen the impact of poor performance in any one area and lower your portfolio’s overall risk.
3. **“Time in the Market, Not Timing the Market”:** Long-term investing and remaining invested are more important than predicting short-term market changes.
4. **“Don’t Put All Your Eggs in One Basket”:** Avoid putting all of your investment cash into a single asset or firm, as this might expose you to severe risk if that investment underperforms.
5. **“Understand What You Invest In”:** Thoroughly research and comprehend the investments you’re thinking about making. Knowledge is your best line of defense against making rash decisions.
6. **“Patience is a Virtue”:** Successful investment frequently necessitates patience. Allowing your investments to compound over time can result in considerable compounding and improved long-term results.
7. **“Emotions Can Cloud Judgment”:** Emotional decision-making can result in impulsive behavior. Maintain a logical attitude to investing, even when markets are volatile.



8. **“Don’t chase performance”**: Just because an investment has performed well recently does not guarantee future success. Make no investment decisions based purely on historical performance.
9. **“Stay Invested Throughout Market Cycles”**: Markets experience ups and downs. It is critical to stay involved and avoid the temptation to sell during market downturns, as markets tend to recover over time.
10. **“Know Your Risk Tolerance”**: Recognize your risk tolerance and invest accordingly. Don’t take on more danger than you can handle.
11. **“Avoid Herd Mentality”**: Just because everyone else is investing in a particular asset does not mean it is the best option for you. Make no investment decisions based entirely on what others are doing.
12. **“Keep Costs Low”**: Over time, high fees and expenses can eat into your investment profits. When possible, choose low-cost investment solutions.
13. **“Invest for Goals, Not Noise”**: Rather than getting caught up in short-term market noise or fads, focus on your long-term financial goals.
14. **“Continuous Learning is Critical”**: The investment landscape is constantly changing. Stay informed by reading, researching, and adjusting your strategy in response to new knowledge.
15. **“Have an Exit Strategy”**: It is critical to plan when to sell an investment. Having an exit strategy can help you make reasonable decisions, whether it’s to meet a specific price target or to adjust to changing conditions.

1.8 Investment Wisdom

Keep in mind that investment knowledge is not a one-size-fits-all solution. When implementing these ideas to your own investment strategy, keep in mind your personal financial status, goals, and risk tolerance. Every individual and organisations have their own set of goals, priorities and environment which is different for every organisation so keeping in mind their culture and objectives every individual and organisation decide for their investment decisions.

**IN-TEXT QUESTIONS**

1. What is the primary goal of diversification in an investment portfolio?
 - (a) To eliminate all risk
 - (b) To maximize potential returns
 - (c) To reduce overall portfolio risk by spreading investments across different assets
 - (d) To focus solely on high-risk, high-reward assets
2. Which investment philosophy focuses on identifying undervalued assets that are trading below their intrinsic value?
 - (a) Growth investing
 - (b) Index investing
 - (c) Value investing
 - (d) Dividend investing
3. What does the term “ROI” stand for in the context of investments?
 - (a) Rate of Inflation
 - (b) Return on Investment
 - (c) Risk of Investment
 - (d) Ratio of Income
4. Which investment vehicle is designed to track the performance of a specific market index?
 - (a) Mutual fund
 - (b) Real estate property
 - (c) Individual stock
 - (d) Exchange-Traded Fund (ETF)
5. What is the general relationship between risk and potential return in investments?
 - (a) Higher risk is always associated with higher potential return
 - (b) Higher risk is always associated with lower potential return



- (c) There is no relationship between risk and potential return
 - (d) Risk and potential return are independent factors
6. What is the term for an investment strategy that involves buying and holding investments for an extended period, often years or decades?
- (a) Day trading
 - (b) Swing trading
 - (c) Active investing
 - (d) Long-term investing
7. Socially Responsible Investing (SRI) takes into account which factors when making investment decisions?
- (a) Only financial factors
 - (b) Only environmental factors
 - (c) Only social factors
 - (d) Environmental, Social and Governance (ESG) factors
8. Which of the following investment options typically carries the highest level of risk?
- (a) Government bonds
 - (b) Blue-chip stocks
 - (c) Certificate of deposit (CD)
 - (d) Startup company equity

1.9 Summary

The act of allocating financial resources to diverse assets with the goal of earning returns over time is known as investing. It entails making decisions on where to invest money in order to meet specific financial objectives. The investing process includes a variety of factors, techniques, and concepts that influence individuals and institutions in their quest of wealth building and financial security.

**Important Points:**

The basic goal of investment is to increase wealth by receiving a return on the cash invested. Capital appreciation, interest, dividends, or rental income can all be used to generate this return.

Diversification: To reduce risk, diversify a portfolio by distributing assets among several asset classes (such as stocks, bonds, real estate, and commodities). Diversification seeks to protect against a single investment's poor performance.

Risk and reward: Generally, investments include a trade-off between risk and potential reward. bigger-risk investments have the potential for bigger returns, but they also carry greater uncertainty and the chance of loss.

Investing Philosophies: Various investment philosophies influence decision-making. These include value investing (looking for discounted assets), growth investing (looking for high-growing companies), income investment (looking for consistent income), and others.

Long-Term View: Long-term investing focuses on holding investments for a lengthy period of time in order to profit from the power of compounding and ride out short-term market volatility.

Due Diligence and Research: Successful investing necessitates extensive research and analysis. Investors should comprehend the basics of the investments they select and stay current on market movements and economic situations.

Asset Allocation: Choosing how to allocate investments across different asset classes is an important part of investment strategy. The asset mix chosen should correspond to an investor's risk tolerance, goals, and time horizon.

Stocks, bonds, mutual funds, exchange-traded funds (ETFs), real estate, commodities, and other investment vehicles are all available. Each has its own set of qualities, advantages, and disadvantages.

Market Timing vs. Market Timing: Attempting to time the market (predicting short-term price fluctuations) is difficult and risky. A better strategy is to focus on time in the market and stay invested for the long term.



Investment Risks: There are inherent risks in all investments, including market risk, interest rate risk, credit risk, and liquidity risk. Understanding and controlling these risks is critical for profitable investing.

Emotional Discipline: Emotions have the potential to influence financial decisions. Maintaining emotional control and avoiding impulsive decisions are critical to meeting investment goals.

Monitoring and Adjustments: Regularly assessing investment performance and making necessary adjustments to the portfolio will assist guarantee that it remains aligned with changing financial goals and market conditions. Finally, investing entails making informed decisions about allocating financial resources to diverse assets in order to achieve financial development and security. Research, discipline, risk management, and a long-term view are all required for successful investing.

1.10 Answers to In-Text Questions

1. (c) To reduce overall portfolio risk by spreading investments across different assets
2. (c) Value investing
3. (b) Return on Investment
4. (d) Exchange-Traded Fund (ETF)
5. (a) Higher risk is always associated with higher potential return
6. (d) Long-term investing
7. (d) Environmental, Social and Governance (ESG) factors
8. (d) Startup company equity

1.11 Self-Assessment Questions

1. What do you mean by investment decisions? Explain the process of Investment.
2. Explain the types of Investment.
3. Write a note on various avenues of investment.



4. Explain the Concept of philosophies of Investment.
5. Write a note on Investment wisdom.

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1.13 Suggested Readings

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Fundamental Analysis, Technical Analysis, Equity Valuation and Market Efficiency

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STRUCTURE

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2.1 Learning Objectives

- ◆ To understand the relationship between prices of the stock and the economy.
- ◆ To understand the information available from various sources and decide about the future of the economy.
- ◆ To understand the relationship between the economy and the industry.
- ◆ To determine various factors influencing industries.
- ◆ To understand the implication of new information on various industries and their future prospects.
- ◆ To understand evaluation of the operational and financial health of a company.
- ◆ To understand the active and passive strategies of investing.
- ◆ To estimate the fair value and intrinsic value of a share.
- ◆ To understand the various tools of technical analysis.
- ◆ To learn about the various forms of efficiency in the stock market.

2.2 Introduction

Investment in equity has to be made on the basis of an in depth analysis. It cannot be just done on the basis of rumours and speculative motives. Rather it requires a rational analysis of the company, industry and the economy along with the study of the past patterns and forecasting the future prices. Analysis of the economy, industry and the company, being referred to as the EIC framework is known as the fundamental analysis. Also, as the share prices are quite volatile and uncertain, the past behaviour of these prices is analysed with the help of charts and patterns to understand the future equity prices and the stock market. This use of charts of patterns is being referred to as technical analysis. Even though equity share prices and the stock market cannot be predicted with accuracy both the fundamental and the technical analysis help to make rational investment decisions.

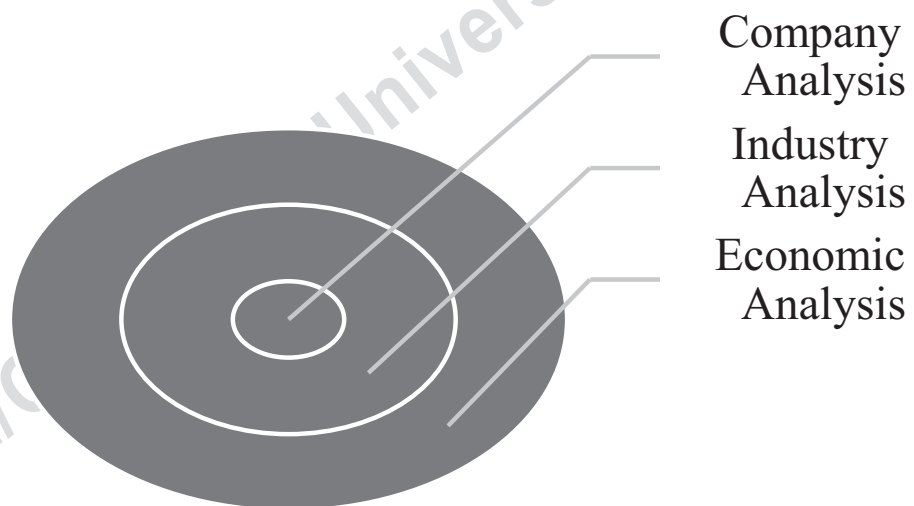


2.3 Fundamental Analysis

Fundamental analysis is a systematic approach to estimate the true values of the share and the corresponding return. It is the analysis of the various determining factors of the fair value of the share. It basically includes analysing the economy, industry and the company.

Fundamental analysis consists of two approaches: “Bottoms up approach” and “Top down approach”. The Bottoms up approach is for small investors who directly analyse the company with focus on its financial statements, competitive strength and market position. This approach does not require investor to analyse the economy and the industry. Whereas the “Top down Approach” in the fundamental analysis is the study of the economic scenario in which the company operates, then moving on to the study of the industry prospects, followed by the specific company analysis.

Top Down Approach



2.3.1 Economic Analysis

Economic analysis is the study of the various forces operating in the overall economy. The overall economic conditions and the economic activities do impact the company’s profits thereby impacting the share prices. If the economic analysis depicts a strong picture, investors will buy the shares with expectation of increased share prices and high profits in



future whereas if the economic analysis shows a weak future, industries will struggle to survive and there would be selling pressure leading to decline in the share prices. Economic analysis entails analysing both the international as well as the country specific economy. The international economy does affect both the direct and the portfolio investments coming into the country and thus leading the change in the stock market. Regarding the domestic economy, one needs to analyse various variables like inflation, interest rates, GDP, fiscal and monetary policies, business cycles, level of competition etc. The economic analysis requires a lot of expertise and is a tedious exercise.

2.3.2 Industry Analysis

With the economic analysis the direction of the movement of economy is identified however, different industries respond in a different manner. This makes industry analysis an important part of the fundamental analysis. Industry analysis entails analysing the industry life cycle, labour conditions, market conditions, stage of competition, government policies regarding that industry, past performance of the industry, availability of raw material for that industry, level of technology and its permanence and so on. The industry life cycle analysis helps to determine whether that industry is in the introduction stage or expansion stage. These stages would attract investment whereas the stagnation and the decay stage of the industry would lead to pulling out money from the industry.

2.3.3 Company Analysis

After the economic and the industry analysis, fundamental analysis provides for the company specific analysis. The company specific analysis has the objective of: (a) forecasting the earnings of the company (b) finding out the intrinsic value of the share.

Intrinsic or fair value of the share depends majorly on the forecasted earnings capacity of the company along with leverage, asset utilisation, sales, operating profit margin etc. For forecasting the future earnings, a study of the company's past financial statements and annual report is undertaken. These financial statements include the balance sheet, profit and loss account, cash flow statement and the notes to accounts. The



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information extracted from these sources is used to analyse the profitability, liquidity and solvency of the company. The method of determination of intrinsic value of the share has been discussed subsequently in this chapter. However, the various ratios being analysed for profitability analysis are: return on equity, earnings per share, price to earnings ratio, dividend pay-out ratio, earnings yield and dividend yield ratio.

Investors also use the concept of Economic Value Added (EVA) as profitability measure while doing company analysis. EVA is what is earned over the cost of funds employed. It's the operating profit less the cost of capital. Higher EVA adds more wealth to the shareholders net worth and therefore such companies command better valuation in the stock market. A company can increase EVA through increasing its operating efficiency, liquidating unproductive capital and accepting new projects which give higher returns than the cost of new funds.

2.4 Valuation and Equity Pricing

Valuation of equity shares is a bit complicated owing to their residual ownership characteristic. Equity shares neither have a guaranteed dividend nor the rate remains constant over the life of the share. With these differences from bonds and preference shares, the valuation method used for bonds and preference shares cannot be used for valuing equity. The various different approaches in valuing equity shares are:

- ◆ Valuation based on accounting information
- ◆ Valuation based on dividend
- ◆ Valuation based on earnings

2.4.1 Valuation Based on Accounting Information

The information extracted from the financial statements is sufficient to determine the value of an equity share. Based on accounting information, we can use the book value method and the liquidation value method for valuing equity shares.

Book Value method: This method values equity shares based on the stated values of the assets and liabilities in the balance sheet. Book value of an equity share is the value of firm's ownership divided by the number of



outstanding equity shares. The underlying assumption is that all the assets are expected to realise the values stated in the balance sheet. The book value method of valuing equity shares is one of the simplest techniques of valuation but at the same time it ignores the profit making capacity of the company and also the book values are the historical values which are outdated.

Liquidation Value method: This method values equity shares based on the realisable value of the asset minus the liabilities to be paid. This concept of liquidation value is actually the value; the holder of one equity share will receive if the company goes into liquidation immediately.

Amongst the book value and liquidation value method, liquidation value method is more realistic but this method also fails to consider the profit earning capacity of the company and also determining the net realisable value of all assets is also a tedious task.

2.4.2 Valuation Based on Dividends

Value of an equity share is the sum of the present value of expected benefits from holding of the equity share. Though paying dividend on equity shares is not mandated by law companies do pay dividends to satisfy the expectation of equity holders. This valuation method is based on the assumption that dividend is payable annually only and the first dividend is received only at the end of year one.

Value of equity shares for companies which pay dividend every year and the investor holds it for a given finite time period (n) is given by:

$$P_0 = \sum_{t=1}^n \frac{D_1}{(1+K_e)^1} + \frac{D_2}{(1+K_e)^2} + \dots + \frac{D_n}{(1+K_e)^n}$$

Where,

$D_1/D_2/D_n$ = Dividend expected at the end of year 1/year 2 and so on

P_0 = Value of the equity shares

k_e = Required rate of return of the equity shareholders specific to that risk class



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For companies where there is no growth in dividends *i.e.* the company pays constant dividend for infinite period of time, the value of equity share is given by:

$$P_0 = \frac{D}{k_e}$$

Where,

D = Constant dividend expected at the end of every year

P_0 = Value of the equity shares

k_e = Required rate of return of the equity shareholders specific to that risk class

The constant dividend model significantly helps in valuing equity shares, but the major shortcoming is that the dividend does not remain constant over the holding period and also the holding might not be till perpetuity.

For companies which do not pay the same amount of dividend every year and the dividend grows every year at a constant rate, the value of equity share is given by:

$$P_0 = \frac{D_1}{k_e - g}$$

Where,

D_1 = Dividend expected at the end of year 1

P_0 = Value of the equity share

k_e = Required rate of return of the equity shareholders specific to that risk class

g = Growth rate in dividends provide $g < k_e$

The constant growth model is an important model for valuing equity shares, but the underlying assumption of constant growth rate in dividends is not practical and in real life the dividend grows at varying rates.

For companies, which pay dividend growing at different rates, the value of equity share can be determined using

$$P_0 = \sum_{t=1}^5 \frac{D_0(1+g_1)^t}{(1+K_e)^t} + \sum_{t=6}^{10} \frac{D_5(1+g_2)^{t-5}}{(1+K_e)^t} + \sum_{t=11}^{\infty} \frac{D_{10}(1+g_3)^{t-10}}{(1+K_e)^t}$$



Where,

$D_0 / D_5 / D_{10}$ = Dividend at the end of respective time period

P_0 = Value of the equity share

k_e = Required rate of return of the equity shareholders specific to that risk class

$g_1 / g_2 / g_3$ = Different growth rate in dividends for different time periods

In case of finite holding period, the value of equity share can be determined using:

$$P_0 = \frac{D_1 + P_1}{(1 + k_e)}$$

Where,

D_1 = Dividend expected at the end of year one

P_0 = Value of the equity shares

P_1 = Expected market price of the equity share at the end of year one

k_e = Required rate of return of the equity shareholders specific to that risk class

To use this valuation method, the investor needs to estimate the market value at the end of year one.

Example 2.1

The dividend expected at the end of current year is ₹ 108 and the required rate of return appropriate for that risk class is 15%. Determine the current value of the equity share using the constant dividend model.

Solution: Where the company pays constant dividend for infinite period of time, the value of equity share is given by:

$$P_0 = \frac{D}{k_e}$$

Given,

$D = 108$

$k_e = 15\%$



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$$P_0 = \frac{108}{0.15}$$

$$P_0 = 720$$

The value of equity share is ₹ 720.

Example 2.2

The dividend expected at the end of current year is ₹ 210 and the required rate of return appropriate for that risk class is 12%. Determine the current value of the equity share if the dividend grows at a given constant rate of 4%.

Solution: For companies which do not pay the same amount of dividend every year, but the dividend grows at a constant rate g every year, the value of equity share is given by:

$$P_0 = \frac{D_1}{k_e - g}$$

Given,

$$D = 210$$

$$k_e = 12\%$$

$$g = 4\%$$

$$P_0 = \frac{210}{.12 - .04}$$

$$P_0 = 2625$$

The value of equity share is ₹ 2625.

Example 2.3

Aman Ltd. forecasts a growth rate in dividends of 8 percent p.a. for next 2 years and which is then likely to fall at 5 percent p.a. and get stabilised there. The last year dividend was ₹ 10 and the expected rate of return of equity investors of this risk class is 10 per cent. Determine the value of one equity share of Aman Ltd. using the varying growth rate dividend model.

Solution: Value of an equity share of Aman Ltd. (with varying growth rate in dividends) will be the sum of the present values of (i) dividends



during years 1 and 2 and (ii) the expected market price immediately after 2 years, with a constant growth rate of 5% p.a.

The present value of dividends of year 1 and 2

Years	Dividends	PVIF (10%)	PV of dividends
1	10.8	.909	9.82
2	11.664	.834	9.73
Total			19.55

Immediately, at the end of year 2, the market price of the equity share will be

$$P_2 = \frac{D_3}{k_e - g}$$

$$P_2 = \frac{12.6}{.10 - .05}$$

$$P_2 = 252$$

Present value of ₹ 252 = $252 \times .834 = ₹ 210.17$

Fair value of this equity share as on date is ₹ 19.55 + ₹ 210.17 = ₹ 229.72

2.4.3 Valuation Based on Earnings

Some firms do not pay any dividend rather believe in retaining the earnings (partly or fully) for reinvestment in their expansion projects. As these firms are growth firms investors are willing to forego the current dividends in expectation of higher dividends in future. There are various approaches and models for determining the value of equity shares on the basis of earnings of the company.

Earnings multiplier Approach: The most common approach to value an equity share is the price to earnings ratio. As per this approach value of an equity share is:

Value = EPS × P/E Ratio

P/E ratio of the company is Market price divided by earning per share and is being used as a performance measure. In this approach, estimation of the P/E ratio is the most complicated task. One way is to use the



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industry P/E or the nearest competitor P/E which needs to be further adjusted as per the peculiar characteristics of the company.

Though this approach is the most widely used at the same time it suffers from certain misunderstandings. A high P/E ratio is not always good as it may be due to low EPS and similarly a low P/E ratio may not be bad if it is from high EPS .

Gordon's Model: This model is based on the assumption that retention ratio remains constant and secondly return on investment or reinvestment remains constant. Thus, it assumes that earnings of the company are either reinvested at the given reinvestment rate or distributed among the equity holders.

The value of equity share is given by:

$$P_0 = \frac{EPS_1(1-b)}{k_e - br}$$

Where,

EPS_1 = Earnings expected at the end of year one

P_0 = Value of the equity shares

b = retention ratio (percentage of earnings retained by the company)

k_e = Required rate of return of the equity shareholders specific to that risk class or the cost of equity capital

r = Return on investment

With this model, the value of the equity share will be high if the company is a growth firm and has a high retention ratio whereas if the company is a declining firm, a lower retention ratio or a 100% pay-out ratio would maximise the value of the equity share.

Walter's Model: As per this model of equity valuation, the value of an equity share is the sum total of the present value of an infinite stream of dividends and the present value of the infinite stream of returns earned from the investment of retained earnings. The model can be given by:

$$P_0 = \frac{D}{k_e} + \frac{r/k_e(E-D)}{k_e}$$



Where,

D = Dividend per share

E = Earnings per share

P_0 = Value of the equity shares

k_e = Required rate of return of the equity shareholders specific to that risk class or the cost of equity capital

r = Rate of return on investment

Thus, this model consists of the sum of two present values. The first phrase in the equation is the present value of dividend till perpetuity and the second phrase is the present value of an infinite stream of return on retained earnings. So, depending upon the relationship of r and k_e investors will value the equity share accordingly.

IN-TEXT QUESTIONS

1. Dividend discount model of equity valuation:
 - (a) Implicitly incorporates capital gain
 - (b) Ignores the amount of capital gain
 - (c) Includes capital gains after tax adjustment
 - (d) Cannot say
2. The sum of present value of all expected benefits to an investor from holding of equity share is _____.
 - (a) Retention ratio
 - (b) Intrinsic value
 - (c) Market capitalisation
 - (d) None of these

2.5 Strategies of Investing

The investment process is to determine where to invest (asset class) and when to invest. The answer to – where to invest, consists of asset allocation and the security selection. Asset allocation is to allocate the investible funds to different asset classes like real estate, gold, equity shares, preference shares, bonds etc. There is no standard rule for asset allocation to each of these classes, rather it is the choice of the investor



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based on his risk appetite. After the asset allocation, the next step is to select the specific security. In case of equity shares, it involves an in depth analysis. The prominent strategies for investing in equity shares are:

- ◆ Active Strategy
- ◆ Passive Strategy

2.5.1 Active Strategy

Active Strategy is to study and analyse the individual securities and then select the specific security for investment. This strategy is based on the premise that an investor has more information than other investors and is equipped to analyse the securities. The investor using an active strategy identifies the undervalued securities and invests in them and simultaneously also identifies the overvalued securities and sells them. During this process, the investor also identifies the high growth shares and makes investment in them. With these actions, the investor tries to “beat the market”.

2.5.2 Passive Strategy

This strategy entails investing in the market directly *i.e.* the index. The investor does not engage into individual security analysis rather buys the market index and gets the return which the market offers. An investor while using the passive strategy may either buy and hold the market index directly or may invest in the index funds of mutual funds. These index funds invest their corpus in equity shares in the same proportion as the benchmark index. There are different index funds options available and the investor has to carefully select the particular index fund.

2.6 Technical Analysis

Technical analysis is the study of the past prices and trends using charts and patterns to forecast the future prices and movements. The basic premise of technical analysis is that the past information on prices and volume give an idea of what lies ahead. The trend in prices is believed to continue and is used to predict the future.



Technical analysis is a reflection of the idea that the stock market moves in trends and that the direction is maintained unless a reversal of the trend is indicated. Technical analysis is based on the phrase that the “market narrates its own story”. A technical analyst identifies the trend in the prices and the point where the trend ends and prices start moving in the opposite direction.

Technical analysis is based on certain assumptions:

- ◆ Prices of any security in the market are determined by the demand and supply forces.
- ◆ Share prices tend to move in one direction for a long period.
- ◆ Change in demand and supply will lead to a shift in trend and this change in demand and supply can be detected earlier with the help of charts and graphs.
- ◆ These price patterns tend to repeat themselves and can be used to forecast the future prices.

Tools and techniques used in technical analysis are: charting and market indicators.

Charting

Charting is the basic tool of technical analysis, where charts are prepared using the past closing prices of the stocks. X axis shows time and Y axis shows the prices.

Dow Theory: Charles Dow: Father of technical analysis, said that stock prices do not behave randomly rather follow a specific trend. The three trends exhibited are- primary trend, secondary trend and minor trend.

Primary trend in stock prices lasts for a long time which may extend to many years. This trend may be bearish or bullish. Secondary trend exists within the primary trend and lasts for a few days to a few months. Secondary trends are the corrections in the primary trend. Minor trends are the day to day movements in the prices, have little analytical value as they are for a very short duration.

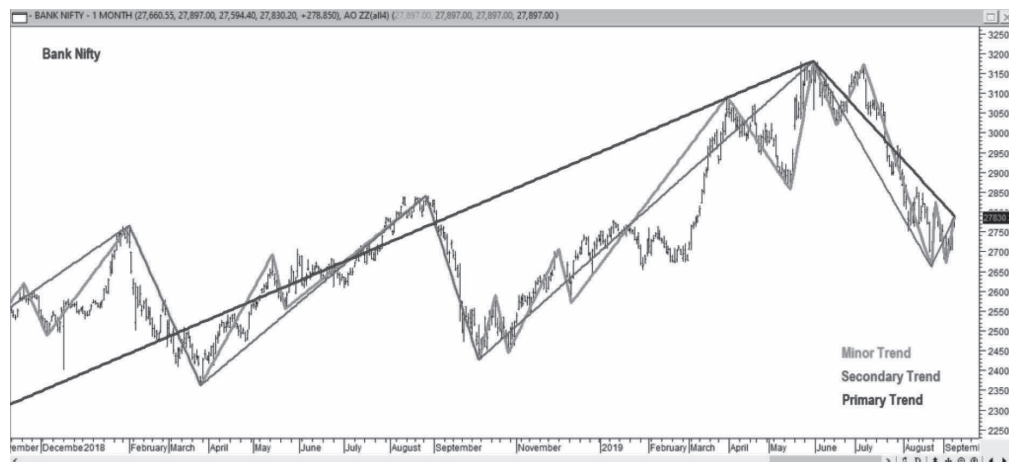


Figure 2.1: Dow Theory

Dow Theory states that the primary trend cannot be manipulated and the investors need to wait for trend reversal.

Elliott Wave Theory: This theory is based on the preposition that stock prices behave in a set of wave patterns and that the long term major pattern consists of five waves or patterns. In a bull market the first wave is upward whereas in a bear market the first wave is downward.

Both Dow Theory and Elliott Wave Theory both identify the long term trend with short term deviations and are easy to understand. The price volume charts use both the price as well as volume data to understand the past and forecast the future behaviour.

For plotting the prices on charts to study trends, patterns and indicators, prices need to be adjusted for stock splits and bonus issues. These charts can be prepared using free software. Some of the price charts developed and used are:

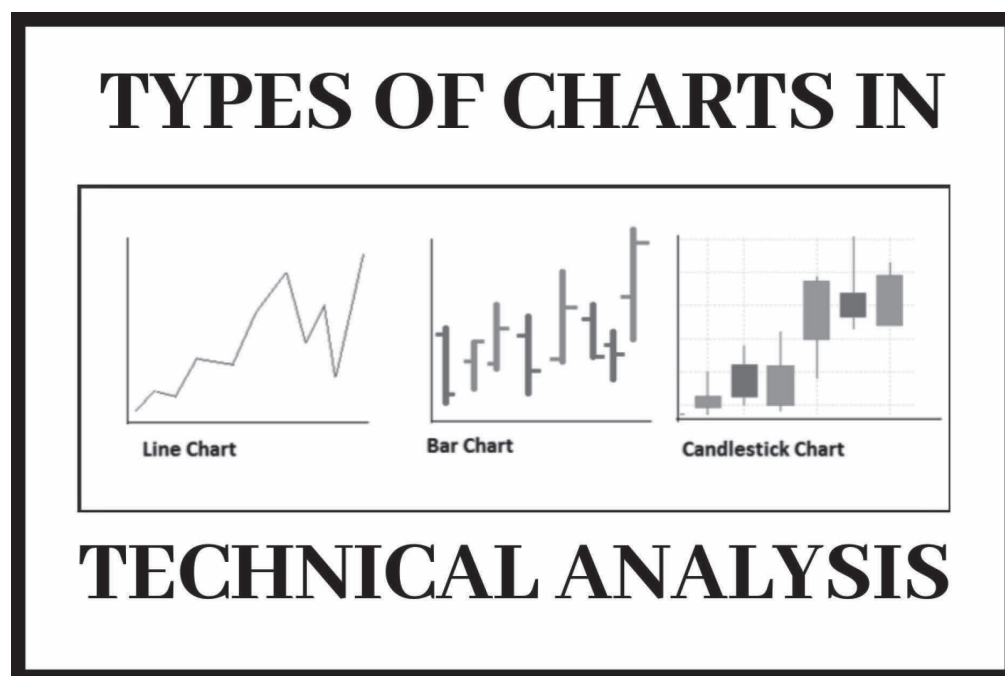
Bar chart: These charts use vertical bars for depicting price for each month or week or daily. These bars show the highest and the lowest price and a single horizontal line depicting the closing price.

Line chart: Line chart uses a line to join data points which may be monthly or weekly or daily closing prices or moving averages of prices etc.

Point and figure chart: These charts have no time scale; they just show significant positive and negative changes in price. A column of Xs shows increasing price whereas a column of Os shows decreasing price. Xs and Os are added only when the price changes beyond a predefined range.



Candlestick chart: These are similar to bar charts but differ in the visual impact. Opening and closing price are used to form a box and the bar depicts the high and low prices. If the closing price is higher than the opening price, the box is left empty and if its other way round, the box is coloured in black.



(Source: *Finowings.com*)

Support and Resistance levels charts: These levels indicate an end of the declining or increasing trend. The trend is expected to take U turn and reverse the direction at both these levels. Support level is the price level below which the prices are not supposed to fall and resistance level is that price level beyond which the price is not expected to rise. In case of price fall below the support level, it's a bear signal and in case of price rise beyond the resistance level, it's considered as a bull signal. However, these levels are indicative only and the range between them may change anytime.

The common price patterns which are being observed in these charts are: Trend, Head and Shoulders, Inverted head and shoulders, Double top and bottom, Triangles.



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Indicators: Indicators are a mathematical output of various calculations done using price and volume data to measure trend, volatility and momentum. These indicators help in predicting the direction of the price movement in near future. Various indicators being used to predict are:

Moving Averages: Moving averages of share prices evens out the price data and it's the average level of the closing prices calculated regularly. A sequence of average is calculated by using the daily averages. The moving average line is a visual presentation of the price behaviour of the share prices. When the price line cuts the moving average line from below, it's a buy signal and when it cuts from above it's a sell signal.

Moving Average Convergence Divergence (MACD): It's a momentum indicator and a combination of leading and lagging indicators. This uses two moving averages, where the longer moving average is subtracted from the shorter moving average. On the chart, it appears as two lines which fluctuate without limits. Intersection of these two lines generates indications- crossing above zero is regarded bullish and crossing below zero is regarded bearish.

Breadth indicators: These indicators indicate market strength and weakness. It's a ratio of number of stocks advancing to number of stock declining in the market. It does not give any signal at its own but helps in understanding the overall scenario of the market.

IN-TEXT QUESTIONS

3. Technical analysis is based on the concept that prices _____.
- (a) Move upwards only
 - (b) Move downwards only
 - (c) Move randomly
 - (d) Move in trends
4. The area in the chart where price has difficulty breaking through ____.
- (a) Support level
 - (b) Resistance level
 - (c) Both of these
 - (d) None of these



5. Bar charts are a series of _____ representing each data point.

- (a) Slanting lines
- (b) Vertical lines
- (c) Any of these
- (d) None of these

6. The two primary tool of technical analysis are:

- (a) Economic indicators and market index
- (b) Price and earnings
- (c) Price and volume
- (d) Market index and earnings

2.7 Market Efficiency and Anomalies

The stock market is the place for buying and selling of shares at prevalent market prices. These market prices keep on fluctuating regularly. The fluctuation is partly on account of the new information getting available every now and then. The prevailing stock prices get adjusted to these new pieces of information. The speed at which this movement in prices happens and attain equilibrium is dependent on the market efficiency.

The market efficiency may be defined as its ability to reflect the effect of all available information in the market prices of the shares. In an efficient capital market the prices of the shares are neither too low nor too high but just rational and adjust instantly with the new information. The efficient market hypothesis is based on the premise that the security prices are an unbiased reflection of all the available information and that every new information travels in a random fashion. The security prices reflect:

- (i) All past information regarding the company and the security.
- (ii) Information which has been announced not yet implemented.
- (iii) Information which is not known to public but only available to insiders.

The investor needs to find out the level of efficiency in the stock market before making any investment. The kind of information immediately



reflected and the speed at which this information gets reflected in the prices would determine the level of efficiency of the market. Based on this, there are three forms of market efficiency: weak form, semi-strong form and strong form of market efficiency.

2.7.1 Weak Form of Market Efficiency

In weak form of market efficiency all the historical information (past data) has already been absorbed in the market prices and thus future prices cannot be predicted using the past information. The weak form of market efficiency is also known as Random Walk Theory, as the security prices take a random walk as any new information randomly enters the market. The future prices cannot be predicted using trend analysis. It thus discards the utility of technical analysis.

2.7.2 Semi-strong Form of Market Efficiency

In this form of market efficiency the security prices reflect all the publicly available information. This form of market efficiency provides that as soon as the information is publicly available it gets absorbed in the prices. Such information may be with regard to financial statements or the merger/acquisition or product line or regarding the management. The investor buys or sells the shares based on the nature of the information and soon the impact gets reflected in the market prices of the shares. In semi strong form of market efficiency, as all the publicly available information is already reflected in the market prices, fundamental analysis is of new use in determining the value of the shares. This form supports that as any new information is available, all investors assess that information with same speed and accuracy and no one is able to out-perform the market.

2.7.3 Strong Form of Market Efficiency

In this form of market efficiency the share prices reflect all the information inclusive of the insider information and thus no one can make any abnormal profits. The strong form of market efficiency lays that even the privileged and the selected few insiders who have access to the inside



information are not able to earn superior returns. Thus when the stock markets are efficient in their strong form, the security analysts and the portfolio managers (having quick access to information) are also not able to earn higher amount of profits.

Thus, the weak form of market efficiency is the lowest level, followed by the semi strong form, which is higher than the weak form. The strong form of market efficiency is of the highest among the three.

IN-TEXT QUESTIONS

7. _____ A form of market efficiency shows that all publicly available information is reflected in the current market price.
- (a) Strong form
 - (b) Semi-strong form
 - (c) Weak form
 - (d) None of the above
8. _____ form of market efficiency shows that all publicly and privately available information is reflected in the current market price.
- (a) Strong form
 - (b) Semi-strong form
 - (c) Weak form
 - (d) None of the above
9. If the markets are inefficient, any new information received about a security:
- (a) No change in price
 - (b) Negative demand for stock
 - (c) Price will fall first and later rise
 - (d) There will be lag in the adjustment of the price
10. Random walk hypothesis is most related to:
- (a) Strong form
 - (b) Semi-strong form
 - (c) Weak form
 - (d) None of the above



2.8 Summary

- ◆ Fundamental analysis is a systematic analysis of various determining factors of the fair value of the share. It basically includes analysing the economy, industry and the company.
- ◆ It consists of two approaches: “Bottoms up approach” and “Top down approach”.
- ◆ Economic analysis is the study of the various forces operating in the overall economy.
- ◆ Industry analysis entails analysing the industry life cycle, labour conditions, market conditions, stage of competition, government policies regarding that industry, past performance of the industry, availability of raw material for that industry, level of technology and its permanence etc.
- ◆ The company specific analysis is done with the objective of: (a) forecasting the earnings of the company (b) finding out the intrinsic value of the share.
- ◆ Book value of an equity share is the value of a firm’s ownership divided by the number of outstanding equity shares.
- ◆ Liquidation Value method values equity shares based on the realisable value of the asset minus the liabilities to be paid.
- ◆ As per dividend discount model of valuation, value of an equity share is the sum of the present value of expected benefits from holding of the equity share.
- ◆ As per earnings multiplier approach, the value of an equity share is the earning per share multiplied with price to earnings ratio.
- ◆ As per Gordon’s model, the value of equity share is given by:

$$P_0 = \frac{EPS_1 (1-b)}{k_e - br}$$

- ◆ As per Walter’s model, $P_0 = \frac{D}{k_e} + \frac{r/k_e (E - D)}{k_e}$
- ◆ The two basic strategies of investing are active and passive strategies. Active strategy is to find stock and invest in individual stock. Passive strategy is to invest in a market index.



- ◆ Technical analysis is the study of the past prices and trends using charts and patterns to forecast the future prices and movements. Technical analysis uses various charts: bar chart, line chart, candle stick charts, point and figure chart etc.
- ◆ The common patterns studied are trend, head and shoulder, inverted head and shoulder, triangle, double top and bottom etc.
- ◆ The efficient market hypothesis is based on the premise that the security prices are an unbiased reflection of all the available information and that every new information travels in a random fashion.
- ◆ In the weak form of market efficiency all the historical information (past data) has already been absorbed in the market prices and thus future prices cannot be predicted using the past information. The weak form of market efficiency is also known as Random Walk Theory, as the security prices take a random walk as any new information randomly enters the market.
- ◆ In semi-strong form of market efficiency the security prices reflect all the publicly available information.
- ◆ The strong form of market efficiency lays that even the privileged and the selected few insiders who have access to the inside information are not able to earn superior returns.

2.9 Answers to In-Text Questions

1. (a) Implicitly incorporates capital gain
2. (b) Intrinsic value
3. (d) Move in trends
4. (c) Both of these
5. (c) Any of these
6. (c) Price and volume
7. (b) Semi-strong form
8. (a) Strong form
9. (d) there will be lag in the adjustment of the price
10. (c) Weak form



2.10 Self-Assessment Questions

1. Briefly discuss the EIC framework.
2. What is the difference between fundamental analysis and technical analysis?
3. State the assumptions of technical analysis.
4. Explain with example the support and resistance level.
5. Indicate the likely direction of change in the P/E ratio of a stock if the company increases its dividend pay-out ratio?
6. Which stage of the industry life cycle is recommended for investment and why?
7. Discuss the various strategies of investing in equity.
8. Why do international factors affect the Indian economy?
9. How is the stock market in India related to its economic activity?
10. Discuss the various form of market efficiency?
11. What are the implications of market efficiency for investors?
12. The dividend expected at the end of current year is ₹ 15 and the required rate of return appropriate for that risk class is 12%. Determine the current value of the equity share using the constant dividend model.
13. The dividend expected at the end of current year is ₹ 12 and the required rate of return appropriate for that risk class is 8%. Determine the current value of the equity share if the dividend grows at a given constant rate of 2%.
14. Determine the P/E ratio of ABC Ltd. When its market price is ₹ 125 and its earning per share is ₹ 10. What would be the impact on P/E ratio if the earning per share increases to ₹ 12?
15. Shiroma Ltd. has EPS of ₹ 12 and the equity capitalisation rate for this risk class is 10%. Determine the value of an equity share if the rate of return is 8% and the payout ratio is 75%.

2.11 References

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- ◆ Sharpe, W.F., Alexander, G.J. & Bailey, J. Investments, (6th edition), Prentice Hall of India.
- ◆ Frank K. Reilly & Keith C. Brown, (2012) Analysis of Investments and Management of Portfolios (12th edition), Cengage India Pvt. Ltd.
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2.12 Suggested Readings

- ◆ Fischer, D.E. & Jordan, R.J. Security Analysis & Portfolio Management, Pearson Education.
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Fixed Income

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STRUCTURE

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- 3.2 *Introduction*
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3.1 Learning Objectives

- ◆ Define bond valuation and explain its significance in finance and investment.
- ◆ Calculate the present value of future cash flows to determine the fair value of a bond.
- ◆ Analyze the relationship between bond prices, interest rates, and yield to maturity.
- ◆ Evaluate the risks associated with bond investments and strategies to manage them.



- ◆ Compare and contrast different bond valuation models for various scenarios.

3.2 Introduction

3.2.1 Overview of Fixed Income Securities

Fixed income securities are financial instruments that represent a debt obligation issued by a borrower, such as a government, municipality, or corporation, to raise capital. These securities are referred to as “fixed income” because they provide investors with a fixed or predetermined stream of income in the form of periodic interest payments and the return of principal at maturity.

Fixed income securities include various types of bonds, notes, and other debt instruments. They are typically characterized by the following key features:

- 1. Interest Payments:** Fixed income securities pay regular interest payments to the bondholders at predetermined intervals, such as semiannually or annually. The interest rate, also known as the coupon rate, is usually fixed at the time of issuance.
- 2. Maturity Date:** Fixed income securities have a specified maturity date, which is the date on which the issuer is obligated to repay the principal amount to the bondholders. Maturities can range from short-term (less than a year) to long-term (up to several decades).
- 3. Principal or Face Value:** The principal, also known as the face value or par value, represents the initial investment amount that the issuer agrees to repay to the bondholders at maturity.
- 4. Credit Quality:** Fixed income securities are assigned credit ratings that reflect the creditworthiness of the issuer. Higher-rated securities are considered less risky and typically offer lower yields, while lower-rated securities carry higher risk but potentially offer higher yields to compensate for the additional risk.
- 5. Market Price:** The market price of fixed income securities can fluctuate based on various factors such as changes in interest rates, creditworthiness of the issuer, market demand, and overall economic



conditions. These price fluctuations impact the yield and potential returns for investors.

Fixed income securities serve as important investment options for individuals, institutional investors, and governments seeking a steady income stream with relatively lower risk compared to other investment classes such as equities. They provide diversification benefits and are often considered a key component of a well-balanced investment portfolio.

Common types of fixed income securities include government bonds, corporate bonds, municipal bonds, Treasury bills, Treasury notes, and mortgage-backed securities. Each type of security has its own characteristics, risk profiles, and potential returns, offering investors a wide range of choices to suit their investment objectives and risk tolerance.

3.3 Importance of Bond Valuation

Bond valuation is the process of determining the fair value of a bond. It is crucial for several reasons:

- 1. Pricing:** Bond valuation allows investors to determine the fair value or intrinsic value of a bond. This is important because it helps investors make informed decisions about whether a bond is overpriced, underpriced, or fairly priced in the market. By comparing the market price of a bond to its intrinsic value, investors can identify potential opportunities for buying or selling bonds.
- 2. Investment Decision-Making:** Bond valuation plays a vital role in investment decision-making. It enables investors to assess the attractiveness of different bonds based on their yields, risk profiles, and potential returns. By valuing bonds, investors can compare them to alternative investment options and allocate their capital efficiently.
- 3. Yield Calculation:** Bond valuation is necessary for calculating the yield of a bond accurately. Yield is a critical measure of return for bond investors and helps determine the bond's income potential. By valuing the bond, investors can calculate metrics like Yield to Maturity (YTM) or Yield to Call (YTC), which are essential in assessing the bond's profitability.



- 4. Risk Assessment:** Bond valuation provides insights into the creditworthiness and default risk of a bond issuer. The valuation process involves analyzing various factors such as interest rates, credit ratings, and the issuer's financial health. By valuing bonds, investors can evaluate the risk associated with investing in a particular bond and make informed decisions accordingly.
- 5. Portfolio Management:** Bond valuation is crucial for managing bond portfolios effectively. By valuing individual bonds, investors can assess the overall risk and return characteristics of their bond holdings. This allows for diversification, duration management, and the optimization of portfolio performance based on the investor's risk tolerance and investment objectives.
- 6. Trading and Arbitrage:** Accurate bond valuation facilitates efficient trading in the bond market. Traders can identify mispriced bonds by comparing their valuation to market prices and take advantage of arbitrage opportunities. Proper bond valuation helps ensure fair and transparent pricing, contributing to the overall efficiency of the bond market.

In summary, bond valuation is essential for pricing bonds, making informed investment decisions, calculating yields, assessing risks, managing portfolios, and facilitating efficient trading. It is a fundamental tool for bond investors, traders, and market participants.

3.4 Bond Pricing

3.4.1 Bond Cash Flows

In bond pricing, understanding the cash flows associated with a bond is crucial. A bond represents a loan made by an investor to a borrower, typically a government or corporation. The borrower agrees to make periodic interest payments to the investor (bondholder) and repay the principal amount at maturity. These cash flows can be divided into two main components:

- 1. Coupon Payments:** Bonds usually pay periodic interest payments, known as coupon payments, to bondholders. The coupon rate is



the fixed annual interest rate specified by the bond. The coupon payments are typically made semi-annually, although some bonds may have different payment frequencies.

2. Principal Payment: At the bond's maturity, the issuer repays the bond's face value, also called the principal or par value. This represents the initial amount borrowed by the issuer.

Eg. - Suppose you have a bond with a face value (principal) of \$1,000, a coupon rate of 5% per annum, and a maturity period of 5 years. The bond pays coupons annually. Therefore, you would receive \$50 ($\$1,000 \times 5\%$) in coupon payments each year for five years.

The cash flows for this bond would look as follows:

Year 1: \$50 (Coupon payment)

Year 2: \$50 (Coupon payment)

Year 3: \$50 (Coupon payment)

Year 4: \$50 (Coupon payment)

Year 5: \$50 (Coupon payment) + \$1,000 (Principal repayment)

3.4.2 Time Value of Money and Discounting

The time value of money is a fundamental concept in bond pricing. It states that a dollar received in the future is worth less than a dollar received today due to the opportunity cost of capital and inflation. To account for the time value of money, future cash flows from a bond are discounted back to their present value using an appropriate discount rate.

Discounting involves applying a discount factor to each cash flow based on the time it will take to receive that cash flow. The discount factor is calculated using the discount rate, which is typically the yield required by investors to hold a bond with similar characteristics. The discount rate accounts for factors such as risk, market conditions, and interest rate environment.

3.4.3 Present Value of Bond Cash Flows

The Present Value (PV) of bond cash flows refers to the current worth of all expected future cash flows from a bond. It represents the fair value of



the bond in the market at a given point in time. To calculate the present value, each cash flow (coupon payments and principal) is discounted individually using the appropriate discount rate.

The formula for calculating the present value of bond cash flows can be expressed as:

$$PV = (C1/(1+r)^1) + (C2/(1+r)^2) + \dots + (Cn/(1+r)^n) + (F/(1+r)^n)$$

Where:

PV = Present value of the bond

C = Cash flow (coupon payment)

r = Discount rate (yield)

F = Face value (principal)

n = Number of periods (remaining years to maturity)

Eg. - To calculate the present value of the bond's cash flows, each future cash flow is discounted back to its present value. Let's calculate the present value of the cash flows for our example:

$$\text{Year 1: } \$50/(1 + 0.06)^1 = \$47.17$$

$$\text{Year 2: } \$50/(1 + 0.06)^2 = \$44.47$$

$$\text{Year 3: } \$50/(1 + 0.06)^3 = \$41.97$$

$$\text{Year 4: } \$50/(1 + 0.06)^4 = \$39.66$$

$$\text{Year 5: } (\$50 + \$1,000)/(1 + 0.06)^5 = \$874.99$$

To find the bond's price, we sum up the present values of all the cash flows:

$$\text{Bond Price} = \$47.17 + \$44.47 + \$41.97 + \$39.66 + \$874.99 = \$1,048.26$$

Therefore, the bond's price, considering a discount rate of 6%, would be approximately \$1,048.26.

3.5 Relationship between Bond Price and Yield

The price of a bond and its yield have an inverse relationship. When the yield on a bond increases, its price decreases, and *vice versa*. This relationship can be explained by considering the coupon payments and the discount rate:



- 1. Coupon Payments:** When the yield on a bond increases, the coupon payments become less attractive relative to other investment opportunities with higher yields. This reduces the demand for the bond, leading to a decrease in its price.
- 2. Discount Rate:** As the yield on a bond increases, the discount rate used to calculate the present value of its cash flows also increases. A higher discount rate lowers the present value of future cash flows, resulting in a lower bond price.

Conversely, when the yield on a bond decreases, the bond becomes more attractive compared to other investments. This increases demand for the bond, driving its price higher.

3.6 Factors Affecting Bond Prices

Several factors influence bond prices in addition to changes in yield. Some key factors include:

- 1. Interest Rates:** Changes in general interest rates affect bond prices. When interest rates rise, bond prices fall, and *vice versa*. This relationship is because new bonds with higher interest rates become available, making existing bonds with lower rates less attractive.
- 2. Credit Rating:** The creditworthiness of the bond issuer affects bond prices. If the issuer's credit rating improves or deteriorates, the bond price will be impacted accordingly. Higher credit ratings generally lead to higher bond prices.
- 3. Maturity:** The time remaining until a bond's maturity also affects its price. Generally, longer-maturity bonds are more sensitive to changes in interest rates, and their prices are more volatile compared to shorter-maturity bonds.
- 4. Market Sentiment:** Investor sentiment and market conditions can impact bond prices. Economic factors, geopolitical events, and market trends can influence demand for bonds and, consequently, their prices.
- 5. Call Provisions:** Callable bonds give the issuer the option to redeem the bonds before their maturity date. The presence of a call provision



can affect bond prices, as issuers may exercise this option when it becomes financially advantageous for them to do so.

3.7 Bond Yields

Bond yields represent the return an investor can expect to earn from a bond investment. There are several different yield measures that provide insights into different aspects of bond returns and are used for various purposes. Let's explore some common yield measures:

3.7.1 Coupon Yield

The coupon yield, also known as the nominal yield or the stated yield, represents the annual interest payment (coupon payment) of a bond as a percentage of its face value (principal). It is calculated using the following formula:

$$\text{Coupon Yield} = (\text{Annual Coupon Payment}/\text{Face Value}) \times 100$$

Example: Consider a bond with a face value of \$1,000 and an annual coupon payment of \$60. The coupon yield can be calculated as follows:

$$\text{Coupon Yield} = (\text{Annual Coupon Payment}/\text{Face Value}) \times 100$$

$$\text{Coupon Yield} = (60/1,000) \times 100$$

$$\text{Coupon Yield} = 6\%$$

The coupon yield provides information about the fixed income generated by a bond but does not consider changes in the bond's price.

3.7.2 Current Yield

The current yield is a measure of the annual return on a bond based on its current market price. It is calculated by dividing the annual coupon payment by the bond's market price and expressed as a percentage:

$$\text{Current Yield} = (\text{Annual Coupon Payment}/\text{Current Market Price}) \times 100$$

Example: Suppose a bond has a face value of \$1,000, an annual coupon payment of \$50, and a current market price of \$950. The current yield can be calculated as follows:



Notes

Current Yield = (Annual Coupon Payment/Current Market Price) × 100

Current Yield = (50/950) × 100

Current Yield = 5.26%

The current yield provides a more realistic measure of a bond's return since it considers the market price, which can vary from the bond's face value.

3.7.3 Yield to Maturity (YTM)

The yield to maturity represents the total return an investor will earn if they hold the bond until its maturity date. YTM considers both the annual coupon payments and the potential capital gain or loss if the bond is held to maturity.

YTM is the discount rate that equates the present value of a bond's cash flows (coupon payments and principal) to its current market price. It considers the time value of money and reflects the market's expectations about future interest rates.

Calculating YTM involves using trial and error or financial calculators, spreadsheets, or specialized software. The YTM is expressed as an annualized percentage.

Example: Let's consider a bond with a face value of \$1,000, an annual coupon payment of \$60, a remaining term to maturity of 5 years, and a current market price of \$950. To calculate the YTM, we need to solve the equation using trial and error or utilize financial calculators/spreadsheets:

$$\$950 = (\$60/(1 + \text{YTM})^1) + (\$60/(1 + \text{YTM})^2) + (\$60/(1 + \text{YTM})^3) + (\$60/(1 + \text{YTM})^4) + (\$1,060/(1 + \text{YTM})^5)$$

By iteratively trying different YTM values, we find that the YTM is approximately 6.8%.

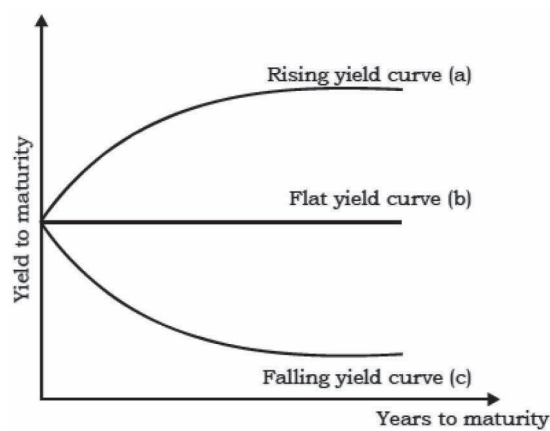
3.7.4 Yield Curve and Term Structure of Interest Rates

The yield curve is a graphical representation of the relationship between the yields of bonds with different maturities. It shows the yields (or interest rates) plotted against the bond's time to maturity.



The shape of the yield curve provides insights into market expectations, economic conditions, and interest rate trends. A normal yield curve slopes upward, indicating that longer-term bonds have higher yields than shorter-term bonds. However, yield curves can also be flat, inverted, or humped, reflecting different market conditions.

The term structure of interest rates refers to the pattern of interest rates across different maturities. It provides a more detailed analysis of the yield curve, capturing how yields change as bond maturities increase.



3.7.5 Understanding Yield Spreads

Yield spreads refer to the difference in yields between different types of bonds or between bonds with different credit ratings. They are indicators of relative risk and can provide insights into market sentiment and economic conditions.

For example, the yield spread between corporate bonds and government bonds of similar maturities is often used to gauge the credit risk associated with corporate debt. A wider yield spread indicates higher perceived risk for corporate bonds compared to government bonds.

Yield spreads can also be used to compare bonds with different credit ratings. The spread between bonds with higher credit ratings (*e.g.*, AAA-rated) and lower credit ratings (*e.g.*, BBB-rated) reflects the additional yield investors require to hold riskier bonds.



Understanding yield spreads helps investors assess relative value and make informed investment decisions based on their risk appetite and market expectations.

It's important to note that bond yields are subject to change due to various factors, including interest rate movements, market conditions, credit quality, and investor sentiment. Investors should carefully consider these factors and conduct thorough analysis when evaluating bond investments.

3.8 Risks in Fixed Income Securities

Fixed income securities, such as bonds, come with various risks that investors should consider when making investment decisions. Understanding and managing these risks is crucial for assessing the potential returns and protecting one's investment. Let's explore some key risks associated with fixed income securities:

3.8.1 Interest Rate Risk

Interest rate risk refers to the potential for changes in interest rates to impact the value of fixed income securities. When interest rates rise, bond prices tend to fall, and *vice versa*. This is because the fixed coupon payments of existing bonds become less attractive compared to newly issued bonds with higher coupon rates.

Example: Suppose you hold a 10-year bond with a fixed 5% coupon rate. If interest rates rise to 6%, new bonds will be issued with a 6% coupon rate, making your 5% coupon rate less competitive. As a result, the value of your bond may decline.

Mitigation: To manage interest rate risk, investors can consider diversifying their fixed income holdings by investing in bonds with different maturities and adjusting their portfolio's duration based on their risk tolerance and market expectations.

3.8.2 Credit Risk

Credit risk refers to the risk of the issuer defaulting on its payment obligations. It is particularly relevant for bonds issued by entities with



lower credit ratings or those facing financial distress. A higher credit risk generally translates into higher yields to compensate investors for taking on the additional risk.

Example: If a company's credit rating is downgraded due to deteriorating financial performance, the market may perceive it as having a higher likelihood of default. As a result, the price of the company's bonds may decline.

Mitigation: Investors can manage credit risk by diversifying their bond holdings across different issuers and considering bonds with higher credit ratings or investing in bond funds that provide exposure to a broader range of issuers.

3.8.3 *Default Risk*

Default risk specifically relates to the possibility of an issuer failing to make timely interest payments or repaying the principal amount at maturity. Default risk can vary depending on the creditworthiness of the issuer and prevailing economic conditions.

Example: If a government or corporate entity is unable to meet its debt obligations, it may default on its bonds, leading to significant losses for bondholders.

Mitigation: Investors can assess default risk by analyzing credit ratings assigned by reputable credit rating agencies. Diversification and conducting thorough research on issuers and their financial health can also help manage default risk.

3.8.4 *Reinvestment Risk*

Reinvestment risk refers to the potential for future cash flows from a fixed income security to be reinvested at lower interest rates. This risk can affect the overall return on a bond investment, especially when interest rates decline.

Example: If you own a bond with a fixed coupon rate and interest rates decrease, the reinvestment of future coupon payments or the principal repayment at maturity may yield lower returns.



Mitigation: Investors can manage reinvestment risk by considering bonds with lower coupon rates, shorter maturities, or by using zero coupon bonds or by implementing laddered bond portfolios to stagger maturities and potentially capture higher rates in the future.

3.8.5 Call Risk

Call risk arises when a bond issuer exercises its right to redeem a bond before its scheduled maturity date. Callable bonds give the issuer the option to repay the bond earlier, typically when interest rates have fallen, enabling them to refinance at a lower cost.

Example: If you hold a callable bond and interest rates decline, the issuer may decide to call the bond, forcing you to reinvest the principal at lower rates.

Mitigation: Investors can evaluate the call provisions and potential call risk associated with bonds before investing. Bonds with longer call protection periods or higher call premiums may offer more protection against call risk.

3.8.6 Liquidity Risk

Liquidity risk refers to the ease with which an investor can buy or sell a fixed income security without significantly impacting its price. Illiquid bonds may have wider bid-ask spreads, making it difficult to buy or sell at desired prices.

Example: If you own a bond that has low trading volume and limited market participants, it may be challenging to sell the bond quickly, potentially resulting in a lower sale price.

Mitigation: Investors can manage liquidity risk by investing in bonds with higher trading volumes, actively monitoring market liquidity conditions, and considering diversification across different types of fixed income securities.

3.8.7 Exchange Rate Risk

Exchange rate risk applies to fixed income securities denominated in



foreign currencies. Fluctuations in exchange rates can impact the returns for investors who hold bonds issued in foreign currencies.

Example: If you hold a bond denominated in a foreign currency and the value of that currency depreciates against your home currency, the bond's returns when converted back into your home currency may be reduced.

Mitigation: Investors can manage exchange rate risk by hedging their currency exposure using derivatives or by investing in bond funds that offer currency-hedged strategies.

3.8.8 Inflation Risk

Inflation risk refers to the potential for inflation to erode the purchasing power of fixed income returns. When inflation rises, the real value of fixed coupon payments and principal decreases.

Example: If you hold a bond with a fixed coupon rate, but inflation increases, the purchasing power of the fixed coupon payments may decline, resulting in lower real returns.

Mitigation: Investors can consider inflation-protected securities, such as Treasury Inflation-Protected Securities (TIPS) and Inflation Indexed Bonds (IIB), which provide returns linked to inflation, helping to mitigate the impact of inflation risk.

3.8.9 Assessing and Managing Risks

To assess and manage risks associated with fixed income securities, investors should:

- Conduct thorough research on issuers, including their creditworthiness, financial health, and industry trends.
- Diversify their bond holdings across different issuers, sectors, and geographies to spread risk.
- Stay informed about market conditions, economic indicators, and central bank policies that may impact interest rates and credit markets.
- Regularly review and rebalance their fixed income portfolio based on changing risk profiles and investment goals.



- Consider working with a financial advisor who can provide guidance and expertise in navigating fixed income risks.

By understanding these risks and implementing appropriate risk management strategies, investors can make informed decisions when investing in fixed income securities.

3.9 Duration and Convexity

3.9.1 Duration

Bond duration is a fundamental concept in fixed income investing that measures the sensitivity of a bond's price to changes in interest rates. It provides investors with an understanding of how much the price of a bond is likely to change in response to fluctuations in interest rates.

Duration is expressed in years and helps investors estimate the percentage change in a bond's price for a given change in interest rates. It is a useful tool for assessing interest rate risk and comparing the price sensitivity of different bonds.

The concept of bond duration is based on two key factors: the timing of a bond's cash flows and the present value of those cash flows. The duration calculation takes into account the timing and weighting of each cash flow to determine the bond's weighted average time to receive its cash flows.

The formula for bond duration is as follows:

$$\text{Duration} = [\sum(t \times \text{PV CF}_t) / \text{PV}]$$

Where:

- t represents the time period until each cash flow is received,
- PV CF_t represents present value of the cash flow at time period t ,
- PV represents the present value of the bond's future cash flows.

To calculate bond duration, one must determine the present value of each cash flow and then calculate the weighted average of the time periods based on the present value of each cash flow.



Let's consider an **example** to illustrate the concept of bond duration.

Assume you are considering two bonds: Bond A and Bond B.

Bond A has a face value of \$1,000, a coupon rate of 5% (paid annually), and a maturity of 5 years. The current yield-to-maturity (YTM) is 4%.

Bond B has a face value of \$1,000, a coupon rate of 3% (paid semi-annually), and a maturity of 10 years. The current yield-to-maturity (YTM) is 6%.

To calculate the duration of each bond, we need to determine the present value of each cash flow and the weighted average of their time periods.

For Bond A:

Period 1:

Coupon Payment: $\$1,000 \times 0.05 = \50

$PV = \$50 / (1 + 0.04) = \48.08

Period 2:

Coupon Payment: \$50

$PV = \$50 / (1 + 0.04)^2 = \46.30

Period 3:

Coupon Payment: \$50

$PV = \$50 / (1 + 0.04)^3 = \44.66

Period 4:

Coupon Payment: \$50

$PV = \$50 / (1 + 0.04)^4 = \43.15

Period 5:

Coupon Payment: $\$50 + \$1,000$ (principal)

$PV = (\$50 + \$1,000) / (1 + 0.04)^5 = \$1,038.74$

Using the formula, we can calculate the weighted average of the time periods:

Duration of Bond A = $[(1 \times 48.08) + (2 \times 46.30) + (3 \times 44.66) + (4 \times 43.15) + (5 \times 1,038.74)] / \$1,220.93$

Duration of Bond A = 4.48



Notes

For Bond B:

Period 1:

$$\text{Coupon Payment: } \$1,000 \times 0.03/2 = \$15$$

$$\text{PV} = \$15/(1 + 0.06/2) = \$14.15$$

Period 2:

$$\text{Coupon Payment: } \$15$$

$$\text{PV} = \$15/(1 + 0.06/2)^2 = \$13.35$$

Period 19:

$$\text{Coupon Payment: } \$15$$

$$\text{PV} = \$15/(1 + 0.06/2)^{19} = \$8.70$$

Period 20:

$$\text{Coupon Payment: } \$15 + \$1,000 \text{ (principal)}$$

$$\text{PV} = (\$15 + \$1,000)/(1 + 0.06/2)^{20} = \$967.84$$

Using the formula, we can calculate the weighted average of the time periods:

$$\text{Duration of Bond B} = [(0.5 \times 14.15) + (1 \times 13.35) + \dots + (19.5 \times 8.70) + (20 \times 967.84)]/\$1,220.93$$

$$\text{Duration of Bond B} = 7.54$$

In this example, we can see that Bond B has a longer duration of 7.54 compared to Bond A, which has a duration of 4.48. This means that Bond B is more sensitive to changes in interest rates than Bond A.

For example, if interest rates increase by 1%, we can estimate the approximate percentage change in bond prices using their respective durations. Using the formula:

$$\text{Percentage Change in Bond Price} \approx (-\text{Duration} \times \Delta\text{YTM})$$

For Bond A:

$$\text{Percentage Change in Bond A Price} \approx (-4.48 \times 0.01) =$$

$$-0.0448 \text{ or } -4.48\%$$

For Bond B:

$$\text{Percentage Change in Bond B Price} \approx (-7.54 \times 0.01) = -0.0754 \text{ or } -7.54\%$$



Based on these calculations, we can expect Bond B to experience a larger percentage decrease in price compared to Bond A for a 1% increase in interest rates.

This example demonstrates how bond duration provides insights into the price sensitivity of different bonds to changes in interest rates, allowing investors to make informed decisions based on their risk tolerance and investment objectives.

Bond duration provides investors with several important insights:

- 1. Interest Rate Sensitivity:** Duration quantifies a bond's sensitivity to changes in interest rates. The higher the duration, the more sensitive the bond's price is to interest rate changes. Bonds with longer maturities and lower coupon rates generally have higher durations because their cash flows are received further in the future.
- 2. Price Volatility:** Duration helps estimate the potential price volatility of a bond. If interest rates rise, the price of a bond with a higher duration is likely to decline more than a bond with a lower duration. Conversely, if interest rates decrease, the price of a bond with a higher duration is likely to increase more.
- 3. Duration Matching:** Duration can be used to match the duration of a bond portfolio to an investor's desired investment horizon or liability stream. By aligning the duration of the portfolio with the time horizon, investors can minimize the impact of interest rate fluctuations.

It's important to note that bond duration has some limitations. First, duration assumes a linear relationship between interest rates and bond prices, which may not hold true for large interest rate changes. Second, duration does not account for other factors such as credit risk, changes in portfolio due to maturity of some bonds and changes in interest rates or call provisions.

3.9.2 Convexity

Bond convexity is a measure of the curvature of the relationship between a bond's price and changes in interest rates. It provides additional information beyond bond duration, offering a more accurate estimate of how a bond's price will change in response to interest rate fluctuations.



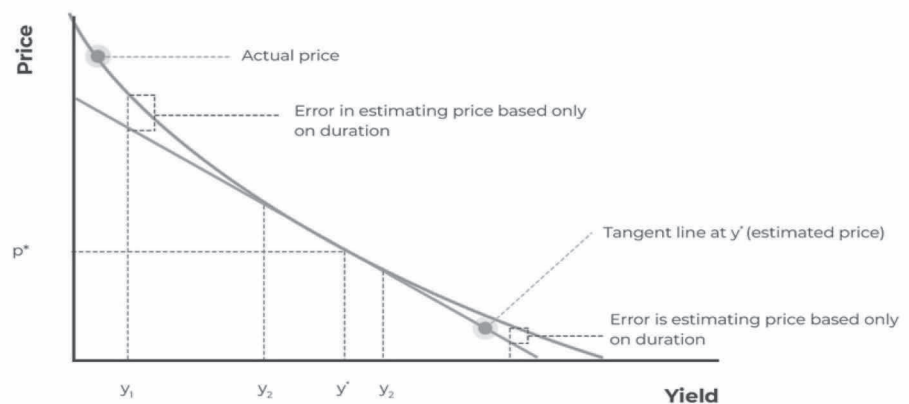
Notes

Convexity accounts for the fact that the relationship between bond prices and interest rates is not linear. As interest rates change, the percentage change in bond prices is not proportional to the change in interest rates. Convexity captures the non-linear behavior by quantifying the curvature of the price-yield relationship.

A positive convexity indicates that as interest rates change, bond prices will change by a greater percentage than what duration alone predicts. In other words, a bond with positive convexity will experience smaller price declines for a given increase in interest rates and larger price increases for a given decrease in interest rates.

Conversely, a negative convexity implies that bond prices will change by a smaller percentage than what duration alone suggests. Bonds with negative convexity, such as callable bonds, may experience larger price declines when interest rates increase.

Understanding bond convexity is crucial for investors as it helps refine the estimates provided by bond duration and provides insights into the potential risks and rewards associated with changes in interest rates. It allows investors to better manage their bond portfolios and make more informed investment decisions.



3.10 Active Strategies of Fixed Income Investments

Fixed income investors have the option to pursue active strategies to enhance returns and manage risks. Active management involves making



strategic investment decisions based on market analysis and research. Let's explore some common active strategies used in fixed income investments:

3.10.1 *Active Management vs. Passive Management*

Active management involves actively selecting and managing a portfolio of fixed income securities with the aim of outperforming a benchmark or generating superior risk-adjusted returns. This approach requires ongoing research, analysis, and decision-making by portfolio managers.

Passive management, on the other hand, involves replicating the performance of a specific fixed income index or benchmark through the use of index funds or exchange-traded funds (ETFs). Passive strategies aim to match the performance of the benchmark rather than outperform it.

Active management allows for flexibility in security selection, duration management, and sector allocation, giving portfolio managers the opportunity to respond to changing market conditions and potentially generate excess returns.

3.10.2 *Credit Analysis and Bond Selection*

Active fixed income managers conduct thorough credit analysis to assess the creditworthiness of issuers and make informed decisions about bond selection. They evaluate factors such as the issuer's financial health, debt structure, industry trends, and credit ratings.

By actively selecting bonds with attractive risk-return profiles, managers aim to enhance portfolio performance and manage credit risk. This involves seeking bonds with higher yields relative to their credit quality or identifying undervalued bonds with the potential for credit rating upgrades.

3.10.3 *Duration Management*

Duration is a measure of a fixed income security's sensitivity to changes in interest rates. Active fixed income managers actively manage the duration of their portfolios to capitalize on interest rate expectations and yield curve movements.



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If managers anticipate interest rates to rise, they may reduce portfolio duration by shortening bond maturities or investing in floating-rate securities. Conversely, if rates are expected to decline, they may increase duration to capture potential capital gains.

Duration management allows managers to control interest rate risk and potentially enhance returns by positioning the portfolio based on interest rate forecasts.

3.10.4 Yield Curve Strategies

Yield curve strategies involve taking positions along the yield curve to benefit from changes in the shape or level of the curve. Active managers may employ strategies such as:

- **Yield curve steepening:** Positioning the portfolio to benefit from an increase in the spread between short-term and long-term interest rates. This can be achieved by increasing exposure to longer-dated bonds.
- **Yield curve flattening:** Positioning the portfolio to benefit from a decrease in the spread between short-term and long-term interest rates. This can be achieved by increasing exposure to shorter-dated bonds.
- **Riding the yield curve:** Concentrating investments in bonds with maturities that align with the expected movement in interest rates. For example, if interest rates are expected to decline, investing in longer-dated bonds can capture capital gains as their prices rise.

These strategies require active monitoring of interest rate expectations, economic indicators, and central bank policies to make informed positioning decisions along the yield curve.

3.10.5 Sector Rotation

Sector rotation involves actively allocating investments across different sectors within the fixed income market based on economic and market conditions. Active managers assess factors such as sector fundamentals, credit spreads, and interest rate trends to identify sectors that may outperform or underperform.



For example, if managers believe that the financial sector will outperform due to favorable economic conditions, they may increase exposure to financial bonds. Conversely, if they anticipate headwinds for the energy sector, they may reduce or avoid exposure to energy-related bonds.

Sector rotation allows managers to take advantage of relative value opportunities and adjust portfolio allocations based on changing market dynamics.

3.10.6 Convexity and Callable Bonds

Convexity refers to the relationship between bond prices and changes in interest rates. Callable bonds, which give issuers the right to redeem bonds before maturity, exhibit convexity.

Active fixed income managers analyze the convexity characteristics of callable bonds and consider the potential impact on portfolio returns. They evaluate factors such as the bond's yield, call date, call premium, and potential reinvestment opportunities.

Managers may seek callable bonds with favorable convexity profiles, which can offer potential if interest rates decline and the issuer does not call the bonds.

By actively managing the convexity exposure of their portfolios, managers aim to enhance risk-adjusted returns and protect against potential losses resulting from interest rate movements.

Conclusion:

Active strategies in fixed income investments offer opportunities for investors to outperform benchmarks, manage risks, and capitalize on market conditions. Active managers employ various strategies such as credit analysis, duration management, yield curve strategies, sector rotation, and convexity management.

However, active management requires diligent research, monitoring, and decision-making to identify attractive investment opportunities and adjust portfolios accordingly. Investors should carefully consider their risk tolerance, investment objectives, and the expertise of the portfolio managers when deciding between active and passive fixed income strategies.



3.11 Passive Strategies of Fixed Income

Passive strategies in fixed income investments aim to replicate the performance of a specific bond index or benchmark. These strategies offer a more hands-off approach to investing, focusing on broad market exposure and minimizing transaction costs. Let's explore some common passive strategies used in fixed income investments:

3.11.1 Indexing and Bond ETFs

Indexing involves investing in a portfolio of bonds that mirrors the composition and weightings of a specific bond index, such as the S&P BSE India Bond Index Barclays U.S. Aggregate Bond Index or the Bloomberg Barclays Global Aggregate Index. The goal is to closely track the performance of the chosen index.

Passive fixed income investors can achieve index exposure through bond exchange-traded funds (ETFs). Bond ETFs trade on stock exchanges and provide investors with diversification across a broad range of bonds in a single investment vehicle.

By investing in bond ETFs or index funds, investors can gain access to a diversified portfolio of bonds without the need for individual security selection. This passive approach provides exposure to the overall performance of the bond market.

3.11.2 Bond Laddering

Bond laddering is a passive strategy that involves building a portfolio of bonds with staggered maturities. The portfolio consists of bonds with different maturity dates, such as 1 year, 3 years, 5 years, and so on.

With a bond ladder, as each bond matures, the proceeds can be reinvested in new bonds at the longest end of the ladder. This approach ensures a consistent cash flow stream while reducing the impact of interest rate fluctuations.

Bond laddering is a passive strategy because the portfolio is constructed with a predefined structure and requires less active management. It



provides investors with a disciplined approach to managing interest rate risk and cash flow needs.

3.11.3 Buy-and-Hold Strategy

The buy-and-hold strategy is a passive approach where investors purchase bonds with the intention of holding them until maturity. This strategy focuses on earning the stated coupon payments and principal repayment at maturity, rather than actively trading or timing the market.

The buy-and-hold strategy benefits from the fixed income securities' predictable cash flows and avoids transaction costs and the need for constant portfolio adjustments. It is suitable for investors with a long-term investment horizon and a desire for stability and income generation.

3.11.4 Immunization and Dedication

Immunization and dedication strategies aim to match the cash flow needs of investors with the cash flows generated by fixed income securities.

Immunization involves constructing a portfolio of bonds that generates sufficient cash flows to meet future liabilities, such as retirement expenses or pension payments. By aligning the duration and cash flows of the portfolio with the investor's time horizon, immunization minimizes the impact of interest rate fluctuations.

Dedication is a similar strategy that matches the duration and cash flows of the bond portfolio to a specific liability stream, such as the payments needed to fund a bond's principal and interest payments.

Both immunization and dedication are passive strategies that focus on cash flow matching and reducing interest rate risk. These strategies are commonly used by institutional investors and pension funds to meet their long-term obligations.

3.11.5 Risk-Return Trade-offs in Passive Strategies

Passive strategies in fixed income investments generally offer lower costs and lower portfolio turnover compared to active strategies. However,



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they may also result in lower potential returns and limited flexibility in responding to changing market conditions.

Investors pursuing passive strategies should consider the following risk-return trade-offs:

- **Lower Costs:** Passive strategies typically have lower expense ratios and lower trading costs compared to active strategies, which can improve overall returns.
- **Market Risk:** Passive strategies expose investors to market risk since the portfolio performance closely tracks the performance of the chosen index or benchmark. If the overall market experiences losses or volatility, passive portfolios will reflect those changes.
- **Limited Flexibility:** Passive strategies often lack the flexibility to adjust holdings based on individual security analysis or market conditions. They are designed to replicate the index composition, which may not align with specific investment objectives or market opportunities.
- **Income Generation:** Passive strategies focused on broad market exposure may provide relatively stable income generation, but they may not maximize income potential compared to active strategies that actively seek higher-yielding bonds or sectors.
- **Interest Rate Risk:** Passive strategies that replicate a bond index will be exposed to interest rate risk. If interest rates rise, bond prices will typically decline, potentially resulting in capital losses for passive portfolios.

Conclusion:

Passive strategies in fixed income investments provide investors with a more hands-off approach, focusing on replicating the performance of a specific bond index or benchmark. These strategies include indexing through bond ETFs, bond laddering, buy-and-hold strategies, and immunization/dedication.

While passive strategies offer benefits such as lower costs and reduced transaction activity, investors should be aware of the potential limitations, including limited flexibility, exposure to market risk, and potential lower returns compared to active strategies. It's important to align passive



strategies with individual investment objectives, risk tolerance, and time horizon.

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IN-TEXT QUESTIONS

1. Calculate the current yield for a bond with a face value of \$1,200, an annual coupon payment of \$60, and a current market price of \$1,150.
 - (a) 5.22%
 - (b) 4.35%
 - (c) 7.12%
 - (d) 6.52%
2. A bond has a duration of 7.8 years. If interest rates increase by 1%, what is the approximate percentage change in the bond's price?
 - (a) -7.8%
 - (b) -1.56%
 - (c) -7.08%
 - (d) -0.78%
3. Consider a bond with a face value of \$1,000, a coupon rate of 4% paid semi-annually, and a current market price of \$950. What is the bond's yield to maturity (YTM)?
 - (a) 4.42%
 - (b) 2.74%
 - (c) 3.62%
 - (d) 5.05%
4. What is the primary function of bond duration in fixed income investing?
 - (a) Measure of bond's face value
 - (b) Sensitivity to changes in interest rates
 - (c) Indicator of credit risk
 - (d) Coupon payment calculation



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5. Which risk refers to the potential for future cash flows from a fixed income security to be reinvested at lower interest rates?
 - (a) Credit Risk
 - (b) Reinvestment Risk
 - (c) Call Risk
 - (d) Liquidity Risk
6. What does yield to maturity (YTM) represent for a bond investor?
 - (a) Total return until maturity
 - (b) Annual coupon payment
 - (c) Current market price
 - (d) Capital gain at maturity
7. What does the yield curve indicate about the relationship between bond yields and maturities?
 - (a) It shows bond prices against time
 - (b) It shows the relationship between coupon rates and face values
 - (c) It illustrates the relationship between yields and maturities
 - (d) It represents the correlation between credit ratings and bond prices
8. Which strategy involves actively allocating investment across different sectors within the fixed income market?
 - (a) Yield Curve Strategies
 - (b) Sector Rotation
 - (c) Bond Laddering
 - (d) Buy-and-Hold Strategy
9. What is the primary goal of bond laddering in fixed income investments?
 - (a) Maximizing capital gains
 - (b) Minimizing credit risk
 - (c) Achieving consistent cash flow
 - (d) Reducing duration risk



10. What is the main advantage of passive fixed income strategies?

- (a) Higher potential returns
- (b) Lower transaction costs
- (c) Greater flexibility in security selection
- (d) Active management of duration

3.12 Summary

- ◆ Fixed income securities are financial instruments issued by a borrower to raise capital, providing investors with a steady income stream through periodic interest payments and principal return at maturity. Key features include fixed interest payments, maturity dates, principal or face value, credit quality, and market price fluctuations.
- ◆ Common types include government bonds, corporate bonds, municipal bonds, Treasury bills, notes, and mortgage-backed securities. Bond valuation is crucial for pricing, investment decision-making, capital allocation, risk assessment, portfolio management, trading, and arbitrage.
- ◆ The Present Value (PV) of bond cash flows represents the fair value of a bond at a given point in time. Factors affecting bond prices include interest rates, credit ratings, maturity, market sentiment, call provisions, and bond yields.
- ◆ $\text{Coupon Yield} = (\text{Annual Coupon Payment} / \text{Face Value}) \times 100$
 $\text{Current Yield} = (\text{Annual Coupon Payment} / \text{Current Market Price}) \times 100$
- ◆ The yield to maturity represents the total return an investor will earn if they hold the bond until its maturity date. YTM considers both the annual coupon payments and the potential capital gain or loss if the bond is held to maturity.
- ◆ Fixed income securities, such as bonds, face various risks that investors must consider when making investment decisions. These risks include interest rate, credit, reinvestment, call, liquidity, exchange rate, inflation, and bond duration. To manage these risks, investors



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should diversify their holdings, consider higher credit ratings, and invest in bond funds with a wider range of issuers.

- ◆ Bond duration measures the sensitivity of a bond's price to changes in interest rates, providing insights into interest rate sensitivity, price volatility, duration matching, and yield-to-maturity estimation.

$$\text{Duration} = [\sum(t \times \text{PV CF}_t) / \text{PV}]$$

Where:

- t represents the time period until each cash flow is received,
- CF_t represents the cash flow at time period t ,
- PV represents the present value of the bond's future cash flows.
 - ◆ Percentage Change in Bond Price $\approx (-\text{Duration} \times \Delta\text{YTM})$
 - ◆ Bond convexity measures the relationship between bond prices and interest rate fluctuations, providing accurate estimates. Understanding convexity helps investors make informed investment decisions.
 - ◆ Active management involves selecting and managing portfolios of fixed income securities to outperform benchmarks and generate superior risk-adjusted returns. Active managers conduct credit analysis, bond selection, duration management, and sector allocation to respond to changing market conditions and generate excess returns.
 - ◆ Passive strategies, like indexing and bond ETFs, replicate bond index performance, provide broad market exposure, and minimize transaction costs. Bond laddering, buy-and-hold, and immunization and dedication strategies are common in fixed income investments. These strategies offer lower costs and portfolio turnover, but may result in lower potential returns and limited flexibility.

3.13 Answers to In-Text Questions

1. (a) 5.22%
2. (a) -7.8%
3. (a) 4.42%



4. (b) Sensitivity to changes in interest rates
5. (b) Reinvestment Risk
6. (a) Total return until maturity
7. (c) It illustrates the relationship between yields and maturities
8. (b) Sector Rotation
9. (c) Achieving consistent cash flow
10. (b) Lower transaction costs

3.14 Self-Assessment Questions

1. What is bond valuation? How is it carried out in practice?
2. Calculate the present value of the bond's cash flows with a 7% annual coupon (par value of \$100) that matures in 4 years.
3. Describe the various types of bond yields and how to calculate them.
4. What are the risks involved in fixed income investing?
5. Describe duration and convexity of a bond.
6. Suppose a 15-year bond with an annual coupon of 7% is currently trading at \$98,550. The bond has a duration of 3.28. Compute and interpret the bond's duration for a 25 basis point decrease in all rates.
7. Contrast active and passive investment strategies for fixed income.

3.15 References

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Alternative Investments

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STRUCTURE

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4.1 Learning Objectives

- ◆ Understand the principles and benefits of real estate investing.
- ◆ Explain the role and significance of derivatives in financial markets.
- ◆ Evaluate the risks and rewards associated with commodities as an alternative asset class.
- ◆ Analyze the characteristics and strategies of alternative asset classes like cryptocurrency, P2P lending, hedge funds, and private equity.
- ◆ Compare and contrast the various alternative investment options discussed, considering their suitability for different investment objectives.



4.2 Introduction

In addition to traditional investment options like stocks and bonds, there is a wide range of alternative investment alternatives available to investors. This section will explore the importance of diversification, provide an overview of different investment alternatives, and discuss the benefits and risks associated with investing in alternative assets.

4.2.1 Importance of Diversification

Diversification is a fundamental principle in investing that involves spreading investment capital across a variety of assets to reduce risk and potentially enhance returns. It is based on the premise that different investments perform differently under varying market conditions. By diversifying, investors aim to achieve a balance between risk and return. There are several key reasons why diversification is important in investment portfolios:

- 1. Risk Reduction:** Diversification helps mitigate the impact of market volatility on a portfolio. Different asset classes have varying levels of risk, and their performances can be influenced by different factors. When one asset class experiences a downturn, other asset classes may perform better, thereby offsetting losses. By diversifying across different investments, such as stocks, bonds, real estate, commodities, and alternative assets, investors can potentially minimize the risk associated with any single investment.
- 2. Smoothing Out Returns:** Diversification can help smooth out investment returns over time. Different assets and sectors can experience different cycles of growth and decline. By having a mix of investments, gains from some assets may offset losses from others, resulting in a more consistent overall return pattern. This can provide a more stable investment experience and reduce the impact of short-term market fluctuations.
- 3. Capital Preservation:** Diversification helps protect against catastrophic losses. By avoiding over-concentration in a single investment or sector, investors reduce the risk of significant capital erosion if a particular asset or industry experiences a severe decline. Diversification



spreads risk and helps preserve capital by not relying too heavily on the performance of any one investment.

- 4. Exposure to Different Opportunities:** Diversification allows investors to participate in different investment opportunities and asset classes. Various asset classes have unique risk and return profiles, responding differently to economic conditions, industry trends, and geopolitical events. By diversifying, investors can access a broader range of investment possibilities, potentially benefiting from opportunities in different markets and sectors.
- 5. Behavioral Benefits:** Diversification can help investors manage their emotions and avoid impulsive investment decisions. Holding a diversified portfolio can reduce the urge to make drastic changes in response to short-term market fluctuations. It provides a disciplined approach to investing and helps investors stay focused on long-term goals by reducing the impact of individual investment performance.

It is important to note that diversification does not guarantee profits or protect against losses. It is not a foolproof strategy that can eliminate all investment risks. However, it is widely recognized as a prudent approach to managing risk and potentially enhancing long-term investment outcomes.

To effectively diversify a portfolio, investors should consider a mix of asset classes, industries, geographic regions, and investment strategies. The specific allocation will depend on individual goals, risk tolerance, and time horizon. Regular monitoring and periodic rebalancing may be necessary to maintain the desired diversification level as market conditions and investment performance evolve.

4.2.2 Overview of Different Investment Alternatives

Alternative investment alternatives are those that fall outside the traditional asset classes of stocks, bonds, and cash. They offer investors a broader range of options to allocate their capital and potentially generate returns. Some common alternative investment alternatives include real estate, commodities, derivatives, private equity, hedge funds, cryptocurrencies, art, and collectibles:

- 1. Real Estate:** Real estate investments involve purchasing and owning properties such as residential, commercial, or industrial real estate,



or investing in Real Estate Investment Trusts (REITs) that pool funds to invest in real estate assets.

2. **Commodities:** Commodities are tangible goods or primary products that can be traded, such as precious metals (gold, silver), energy commodities (oil, natural gas), agricultural commodities (corn, wheat), and industrial metals (copper, aluminum).
3. **Derivatives:** Derivatives are financial instruments whose value derives from an underlying asset. They include options, futures, and swaps, which provide investors with exposure to various assets without directly owning them.
4. **Private Equity:** Private equity involves investing in privately held companies that are not publicly traded. Private equity firms typically acquire ownership stakes in these companies and actively manage and improve their operations.
5. **Hedge Funds:** Hedge funds are investment funds that pool capital from accredited investors to employ various investment strategies aiming to generate returns regardless of market conditions. Hedge funds typically have a higher risk tolerance and flexibility compared to traditional investment funds.
6. **Cryptocurrencies:** Cryptocurrencies are digital or virtual currencies that use cryptography for secure transactions. Bitcoin and Ethereum are examples of popular cryptocurrencies. Investing in cryptocurrencies carries unique risks and opportunities due to their volatile nature and the underlying blockchain technology.
7. **Art and Collectibles:** Investing in art and collectibles involves purchasing items such as paintings, sculptures, rare coins, stamps, or vintage cars with the expectation that their value will appreciate over time.

4.2.3 Benefits and Risks of Investing in Alternative Assets

Investing in alternative assets offers several potential benefits and risks that differ from traditional investments:



1. Benefits:

- **Diversification:** Alternative assets provide a means to diversify a portfolio beyond stocks and bonds, potentially reducing overall risk.
- **Potential Returns:** Some alternative investments have historically delivered attractive returns, such as real estate or private equity investments.
- **Inflation Hedge:** Certain alternative assets, such as commodities, have the potential to act as a hedge against inflation.
- **Low Correlation:** Alternative assets often have a low correlation to traditional assets, meaning their performance may not move in tandem with stock or bond markets.

2. Risks:

- **Illiquidity:** Many alternative investments have limited liquidity, meaning they cannot be easily bought or sold, which can restrict investors' ability to access their funds.
- **High Minimum Investments:** Some alternative assets, like private equity or hedge funds, may have high minimum investment requirements, limiting access for smaller investors.
- **Complexity:** Alternative investments often involve more complex structures, legal agreements, and strategies that may require specialized knowledge or expertise to evaluate properly.
- **Lack of Transparency:** Compared to traditional investments, alternative assets may have limited transparency regarding their underlying valuation, performance, or risks.

It is crucial for investors to carefully assess the benefits and risks of alternative investments, consider their investment objectives, risk tolerance, and seek professional advice when necessary to make informed investment decisions.

In conclusion, diversification through alternative investment alternatives is an essential aspect of constructing a well-rounded investment portfolio. Understanding the benefits and risks associated with these alternatives is key to making informed investment decisions. The following sections will delve deeper into specific investment alternatives, their strategies, and factors to consider when investing in each asset class.



4.3 Real Estate Investments

4.3.1 Introduction to Real Estate as an Investment Option

Real estate is a tangible asset class that has long been recognized as a viable and attractive investment option. It encompasses properties such as residential homes, commercial buildings, industrial facilities, and land. Real estate investment offers various opportunities for investors seeking long-term capital appreciation, cash flow, and diversification within their investment portfolios. This section provides an overview of real estate as an investment option, highlighting its characteristics, historical performance, benefits, and factors influencing investment decisions.

Real estate investments possess unique characteristics that set them apart from other asset classes. Firstly, real estate is a physical asset that can provide intrinsic value and utility. Unlike stocks or bonds, which represent ownership in a company or debt obligations, real estate offers tangible properties that can generate income and appreciate in value over time. Additionally, real estate investments often have a low correlation with traditional financial markets, providing diversification benefits to investors.

Over the years, real estate has demonstrated a strong track record of performance. Historically, real estate investments have shown the potential for attractive returns, especially in the long term. These returns are driven by factors such as property appreciation, rental income, and tax advantages associated with real estate ownership. Furthermore, real estate has the potential to act as a hedge against inflation, as rental income and property values tend to increase with rising prices.

Investing in real estate offers several benefits that make it an appealing option for investors. Firstly, real estate investments can provide a steady stream of cash flow through rental income. This income can serve as a stable source of passive income, especially in the case of well-located and well-managed properties. Additionally, real estate investments offer the potential for capital appreciation over time, enabling investors to build wealth through property value appreciation.

Real estate also provides the opportunity for leveraging. Investors can finance a significant portion of a property's purchase price through



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mortgages or other forms of debt. By using leverage, investors can amplify their returns, as they benefit from the appreciation of the property value based on the total investment rather than just their initial equity.

Furthermore, real estate investments offer the possibility of tax advantages. Investors can take advantage of deductions such as mortgage interest, property taxes, depreciation, and other expenses related to property ownership. These tax benefits can help reduce the overall tax liability and enhance the investment returns.

When considering real estate as an investment option, several factors influence investment decisions. Location plays a critical role in the success of a real estate investment. Factors such as proximity to amenities, transportation, schools, and economic growth indicators can significantly impact the desirability and potential returns of a property.

Market conditions and trends also play a crucial role in real estate investment decisions. Understanding supply and demand dynamics, vacancy rates, rental yields, and projected market growth can help investors make informed decisions about which types of properties and locations are most likely to generate favorable returns.

Moreover, investors need to assess their risk tolerance, investment horizon, and financial goals when considering real estate investments. Real estate is typically considered a long-term investment, and investors should be prepared for illiquidity and potential fluctuations in property values.

4.3.2 Types of Real Estate Investments

Real estate investments offer a range of opportunities for investors to allocate their capital across different property types and strategies. Understanding the various types of real estate investments is essential for diversifying a portfolio and aligning investment choices with specific goals and risk preferences. This section provides an overview of different types of real estate investments, including residential properties, commercial properties, industrial properties, specialized properties, and land and development.

1. Residential Properties:

- Residential properties encompass homes and dwellings where individuals or families reside.



- Types of residential properties include single-family homes, multi-family properties (apartment buildings, condominiums), and vacation homes.
- Investment potential in residential properties includes rental income, property appreciation, and potential tax advantages.
- Residential real estate investment strategies include long-term rental properties, fix-and-flip, and vacation rentals.

2. Commercial Properties:

- Commercial properties are properties used for business or commercial purposes.
- Commercial properties include office buildings, retail spaces (malls, strip centers), hospitality (hotels, resorts), and mixed-use developments.
- Investing in commercial properties offers potential income from lease agreements, capital appreciation, and potential tax advantages.
- Commercial real estate investment requires analysis of market demand, location, tenant quality, and lease structures.

3. Industrial Properties:

- Industrial properties are properties used for industrial or manufacturing purposes.
- Industrial properties include warehouses, distribution centers, manufacturing facilities, and logistics properties.
- Investment potential in industrial properties is driven by factors such as increased e-commerce demand, supply chain dynamics, and proximity to transportation hubs.
- Industrial real estate investment strategies involve leasing properties to logistics companies, manufacturers, or distribution firms.

4. Specialized Properties:

- Specialized properties cater to specific industries or purposes.
- Examples of specialized properties include healthcare facilities (hospitals, medical offices), educational institutions (schools, universities), self-storage units, and data centers.



- Specialized properties often require industry-specific knowledge and analysis, but can offer unique investment opportunities and potentially higher rental income.

5. Land and Development:

- Land and development involve investing in undeveloped or raw land and participating in the development process.
- Investment potential in land and development comes from the appreciation of land value as it is developed or rezoned for specific purposes.
- Land and development investments require careful evaluation of zoning regulations, infrastructure development, and market demand for the intended use.

Each type of real estate investment comes with its own set of risks, rewards, and considerations. Factors to consider when investing in real estate include location, market conditions, property condition, financing options, tenant quality, and potential regulatory changes. It is essential for investors to conduct thorough due diligence and assess their investment goals, risk tolerance, and time horizon to select the most suitable real estate investment type for their portfolio.

By diversifying across different types of real estate investments, investors can potentially benefit from various income streams, potential appreciation, and risk mitigation. Additionally, the specific investment strategies within each property type may offer different opportunities for generating returns, such as long-term rental income, property renovations, or development projects.

4.3.3 Real Estate Investment Trusts (REITs)

Real Estate Investment Trusts (REITs) are a popular investment vehicle that allows individuals to invest in real estate without directly owning and managing properties. REITs offer investors the opportunity to access the benefits of real estate ownership, such as rental income and potential capital appreciation, while providing diversification, liquidity, and professional management. This section explores the definition, types, benefits, and considerations associated with investing in REITs.



1. Definition and Structure of REITs:

- REITs are companies that own, operate, or finance income-generating real estate properties.
- They are created as special investment vehicles that comply with specific legal and tax requirements.
- REITs pool investors' capital to acquire and manage a portfolio of properties, which can include commercial, residential, industrial, and specialized properties.
- They are required to distribute a significant portion of their taxable income as dividends to shareholders.

2. Types of REITs:

- **Equity REITs:** The majority of REITs fall into this category. Equity REITs own and operate income-generating properties, generating revenue primarily through rental income.
- **Mortgage REITs:** Mortgage REITs invest in mortgages and mortgage-backed securities, earning income from interest payments on these loans.
- **Hybrid REITs:** Hybrid REITs combine elements of both equity and mortgage REITs, investing in both properties and mortgages.

3. Benefits of Investing in REITs:

- **Diversification:** REITs provide diversification within the real estate sector, as they invest in various types of properties across different locations and markets.
- **Access to real estate:** Investing in REITs allows individuals to participate in the real estate market without the need for significant capital or direct property ownership.
- **Liquidity:** REITs are traded on stock exchanges, providing investors with the ability to buy and sell shares easily.
- **Professional management:** REITs are managed by experienced professionals who handle property acquisition, management, and leasing, reducing the burden on individual investors.



- **Potential for income:** REITs are required to distribute a significant portion of their taxable income to shareholders, providing the potential for consistent dividend income.
- **Potential for capital appreciation:** REITs can experience capital appreciation over time as the value of their underlying real estate holdings increases.

4. Drawbacks and Considerations:

- **Market sensitivity:** The performance of REITs can be influenced by real estate market conditions, interest rates, and economic factors.
- **Dividend taxation:** Dividends received from REITs may be subject to different tax treatment compared to other investments, so it is important to understand the tax implications.
- **Management fees:** Some REITs may charge management fees and expenses, which can impact overall returns.
- **Share price volatility:** Like other publicly traded securities, the share price of REITs can be subject to market volatility.
- **Real estate market risks:** REITs are exposed to risks associated with real estate investments, such as changes in property values, vacancies, and lease renewals.

5. Investing in REITs:

- **Direct investment:** Investors can purchase shares of publicly traded REITs on stock exchanges.
- **Publicly traded REITs:** These are REITs that are listed and traded on stock exchanges, offering liquidity and transparency.
- **Non-traded REITs:** Non-traded REITs are not listed on stock exchanges and typically have limited liquidity.
- **Due diligence:** It is crucial to conduct thorough research on REITs, including analyzing their financials, management team, investment strategy, and property portfolio.

In conclusion, REITs provide individuals with a convenient and accessible way to invest in real estate. They offer diversification, liquidity, and the potential for income and capital appreciation. However, investors should carefully consider their investment objectives, risk tolerance, and perform due diligence on specific REITs before making investment decisions.



REITs can be an effective addition to an investment portfolio, allowing individuals to participate in the real estate market while benefiting from professional management and potential returns.

4.4 Commodities Investing

4.4.1 Understanding Commodities

Commodities are essential raw materials or primary goods that can be traded in the market. Investing in commodities allows individuals to gain exposure to these tangible assets and potentially benefit from price movements:

- ◆ Commodities are tangible assets that can be classified into different categories: agriculture (wheat, corn, soybeans), energy (crude oil, natural gas), metals (gold, silver, copper), and others (livestock, lumber).
- ◆ The value of commodities is influenced by various factors, including supply and demand dynamics, geopolitical events, weather conditions, and global economic trends.
- ◆ Commodities have both industrial and investment uses, making them an essential component of the global economy.

4.4.2 Benefits of Commodities Investing

- ◆ **Diversification:** Investing in commodities can provide diversification benefits as their performance may have a low correlation with traditional asset classes like stocks and bonds. Commodities tend to behave differently than financial assets and can help reduce portfolio risk.
- ◆ **Inflation Hedge:** Commodities have historically been considered an effective hedge against inflation. When inflation rises, the prices of commodities tend to increase as well, allowing investors to protect the value of their assets.
- ◆ **Potential for Capital Appreciation:** Commodities can experience price volatility due to various factors such as supply and demand



imbalances, geopolitical tensions, or natural disasters. This volatility creates opportunities for active traders and long-term investors to potentially profit from price movements.

- ◆ **Portfolio Protection:** During times of economic uncertainty or market downturns, commodities can act as a hedge. Their prices may move independently of traditional financial assets, providing a potential safeguard against losses.

4.4.3 Risks and Challenges

- ◆ **Price Volatility:** Commodities are known for their price volatility. Sudden changes in supply and demand, geopolitical events, or natural disasters can lead to significant price fluctuations. Investors must be prepared for the inherent volatility of commodities markets.
- ◆ **Market Complexities:** Investing in commodities requires an understanding of specific market dynamics, such as futures contracts, spot prices, and supply chain factors. Investors need to grasp the intricacies of these markets to make informed decisions.
- ◆ **Storage and Transportation Costs:** Some commodities, such as crude oil or agricultural products, require storage and transportation facilities, which can add additional costs and logistical challenges for investors.
- ◆ **Regulatory and Political Risks:** Government policies, regulations, and political instability in commodity-producing countries can significantly impact prices and investment returns. Investors need to stay informed about geopolitical developments and regulatory changes that could affect their commodity investments.
- ◆ **Lack of Income:** Unlike stocks or bonds that may provide regular income through dividends or interest payments, commodities typically do not generate ongoing income. Investors primarily rely on price appreciation to generate returns.

4.4.4 Methods of Investing in Commodities

- ◆ **Futures Contracts:** One way to invest in commodities is through futures contracts. Investors can enter into agreements to buy or sell



a specific quantity of a commodity at a predetermined price and future date. Futures contracts allow investors to gain exposure to commodities without owning the physical asset.

- ◆ **Exchange-Traded Funds (ETFs):** ETFs offer investors the opportunity to gain exposure to a basket of commodities or specific commodity sectors without directly trading futures contracts. These funds can provide diversification and are traded on stock exchanges, offering liquidity.
- ◆ **Physical Ownership:** Some investors prefer to physically own commodities. For example, they may purchase gold bullion or agricultural products. Physical ownership allows investors to have direct control over the asset and potentially benefit from its long-term value appreciation.
- ◆ **Commodity-Linked Stocks:** Investing in stocks of companies involved in commodity production, exploration, or distribution can provide indirect exposure to commodities. These stocks may move in tandem with commodity prices and allow investors to participate in the commodity sector.
- ◆ **Mutual Funds:** Mutual funds focused on commodities or commodity-related companies provide diversified exposure to the commodity sector. These funds are managed by professionals who analyze and select commodities or commodity-related investments on behalf of the investors.

4.4.5 Factors to Consider when Investing in Commodities

- ◆ **Market Analysis:** Understanding supply and demand dynamics, geopolitical factors, weather patterns, and economic trends is crucial when assessing commodity investment opportunities. Investors need to conduct thorough research and stay informed about factors that can impact commodity prices.
- ◆ **Risk Management:** Managing risks is essential in commodities investing. Investors can employ various risk management strategies, such as setting stop-loss orders, diversifying their commodity holdings across different sectors, or using options and futures contracts to hedge against price volatility.



- ◆ **Investor Knowledge and Expertise:** Investing in commodities requires familiarity with specific markets, pricing mechanisms, and risk management techniques. Investors should educate themselves or seek professional advice before entering this asset class to make informed investment decisions.
- ◆ **Time Horizon and Investment Objectives:** The time horizon and investment goals of an individual will influence the choice between short-term trading or long-term investment strategies in commodities. Investors should align their investment approach with their objectives, whether it is capital appreciation, income generation, or portfolio diversification.

By considering these factors and conducting thorough research, investors can make informed decisions when investing in commodities. Commodities offer unique characteristics and potential benefits, but they also carry risks and require careful analysis and risk management.

4.5 Derivative Instruments

Derivatives are financial instruments that derive their value from an underlying asset, such as stocks, bonds, commodities, or currencies. They serve as tools for managing risk, speculating on price movements, and generating income. In this section, we will explore derivatives investments, including an introduction to derivatives, the types of derivatives, and strategies for investing in derivatives.

4.5.1 Introduction

- **Definition:** Derivatives are contracts between two parties that derive their value from an underlying asset. The value of a derivative is based on the price movements of the underlying asset. Derivatives can be traded on exchanges or over-the-counter (OTC).
- **Purpose:** Derivatives serve various purposes, including risk management, speculation, and income generation. They enable investors to hedge against price fluctuations, take speculative positions on market movements, and generate income through options premiums or interest rate differentials.

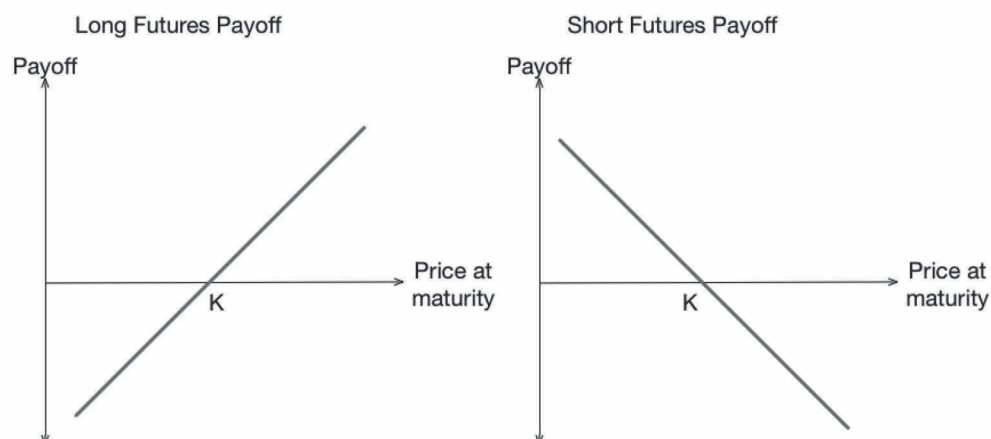


4.5.2 Types of Derivatives

There are several types of derivatives, each with its own characteristics and applications. The main types of derivatives include:

- **Long Futures Contract Payoff:** If an investor enters into a long futures contract, their payoff will increase as the price of the underlying asset rises. For example, if a trader buys a futures contract for crude oil at \$60 per barrel and the price increases to \$70 per barrel at expiration, they will make a profit of \$10 per barrel.
- **Short Futures Contract Payoff:** If an investor enters into a short futures contract, their payoff will increase as the price of the underlying asset decreases. For instance, if a trader sells a futures contract for wheat at \$0.5 per kg and the price falls to \$0.4 per kg at expiration, they will make a profit of \$0.1 per kg.

The predetermined price at which the underlying futures contract is to be bought or sold is called the strike price. It is usually denoted by K .



1. Options Contracts: Options give the holder the right, but not the obligation, to buy (call option) or sell (put option) an underlying asset at a predetermined price within a specified period. Options can be used for hedging against potential losses or for speculative purposes.

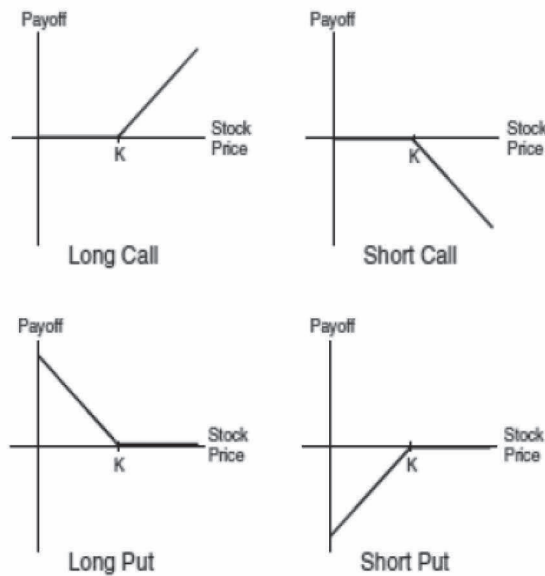
- **Call Option Payoff:** Suppose an investor purchases a call option on a stock with a strike price of \$50 and the market price of the stock rises to \$60. In this case, the investor can exercise the call



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option, buy the stock at the lower strike price, and sell it at the higher market price, resulting in a profit of \$10 per share.

- **Put Option Payoff:** If an investor buys a put option on a stock with a strike price of \$100 and the market price of the stock falls to \$90, the put option can be exercised. The investor can then sell the stock at the higher strike price, resulting in a profit of \$10 per share.



2. Swaps: Swaps are agreements between two parties to exchange cash flows or other financial instruments. Common types of swaps include interest rate swaps, currency swaps, and commodity swaps. Swaps are often used to manage interest rate or currency risks.

- **Interest Rate Swap Payoff:** In an interest rate swap, the payoff is based on the difference between fixed and floating interest rates. For example, if a company enters into an interest rate swap where it pays a fixed rate of 4% and receives a floating rate of LIBOR, and at the end of the swap period, LIBOR is at 3%, the company will receive a net payment of 1%.
- **Currency Swap Payoff:** In a currency swap, the payoff depends on the exchange rate between two currencies. For instance, if a company enters into a currency swap to exchange USD for EUR



at an agreed exchange rate of 1.2, and at the end of the swap, the exchange rate is 1.5, the company will receive a benefit of 0.3 EUR for each USD swapped.

3. Forward Contracts: Forward contracts are similar to futures contracts but are privately negotiated between two parties. They allow for customization of terms and are not traded on exchanges. Forward contracts are commonly used in over-the-counter markets for hedging or speculative purposes. Payoff -

- **Long Forward Contract Payoff:** If an investor enters into a long forward contract to buy gold at \$61,000 per kg, and at the expiration date, the market price of gold is \$65,000 per kg, the investor can buy the gold at the lower contract price and sell it at the higher market price, resulting in a profit.
- **Short Forward Contract Payoff:** If an investor enters into a short forward contract to sell wheat at \$0.6 per kg, and at expiration, the market price of wheat is \$0.5 per kg, the investor can buy the wheat at the lower market price and sell it at the higher contract price, resulting in a profit.

4. Options on Futures: Options on futures are similar to options contracts but are based on futures contracts as the underlying asset. They provide flexibility for investors to trade options on various commodities or financial instruments.

Differences between futures and options -

Basic of Comparison	Futures	Options
Meaning	Futures contract is a binding agreement, for buying and selling of a financial instrument at a predetermined price at a future specified date	Options are the contract in which the investor gets the right to buy or sell the financial instrument at a set price, on or before a certain date, however the investor is not obligated to do so
Obligation of buyer	Yes, to execute the contract	No, there is no obligation



Basic of Comparison	Futures	Options
Execution of contract	On the agreed date	Anytime before the expiry of the agreed date
Risk	High	Limited
Advance payment	No advance payment	Paid in the form of premiums
Degree of profit/loss	Unlimited	Unlimited profit and limited loss

Strategies for Investing in Derivatives

Investors can employ different strategies when investing in derivatives, depending on their investment objectives and risk tolerance. Here are three common strategies:

- 1. Hedging:** Hedging involves using derivatives to offset potential losses in an investment portfolio. For example, a stock investor concerned about a potential market downturn can use stock index futures to hedge against a decline in the overall market. By taking a short position in futures contracts, any losses in the stock portfolio can be offset by gains in the futures contracts.
- 2. Speculation:** Speculation involves taking positions in derivatives with the aim of profiting from price movements. Speculators may buy or sell futures contracts or options contracts based on their predictions of future price movements. Speculative strategies in derivatives carry higher risks and require a thorough understanding of the market and potential factors influencing prices.
- 3. Income Generation:** Derivatives can also be used to generate income. For example, selling covered call options on stocks held in a portfolio can generate premium income. If the stock price remains below the exercise price of the call options, the investor keeps the premium and continues to hold the stock. However, if the stock price rises above the exercise price, the investor may have to sell the stock at a predetermined price.

Conclusion

Derivative investments offer a range of opportunities for investors, including risk management, speculation, and income generation. Understanding



the different types of derivatives and their applications is essential for investors looking to incorporate derivatives into their investment strategies. It is important to consider the risks associated with derivatives, such as price volatility, leverage, and counterparty risk. Investors should conduct thorough research, seek professional advice, and carefully assess their risk tolerance before engaging in derivatives investments.

4.6 Other Alternative Asset Classes

4.6.1 Private Equity

Private equity is an investment strategy that involves investing in privately-held companies that are not publicly traded on stock exchanges. This form of investment is typically undertaken by institutional investors, such as private equity firms, pension funds, and wealthy individuals.

Definition and Structure: Private equity involves purchasing ownership stakes in companies with the aim of generating significant returns over a specific time period. Unlike public companies, which have shares traded on stock exchanges, private equity investments are made in companies that are not accessible to the general public. Private equity firms raise capital from investors and use it to acquire stakes in target companies, often with the goal of improving their operations, expanding their market share, and ultimately realizing a profitable exit.

Types of Private Equity: Private equity investments can be categorized into different types based on the stage of the company's development. These include venture capital, which focuses on early-stage companies with high growth potential; growth equity, which invests in established companies seeking capital for expansion; and leveraged buyouts, which involve acquiring established companies using a combination of equity and debt.

Returns and Risks: Private equity investments offer the potential for significant returns. However, they also carry certain risks. The illiquid nature of private equity means that investors may not have immediate access to their capital, as investments are typically held for several years. Moreover, the success of private equity investments depends on factors



such as the overall performance of the company, market conditions, and the expertise of the private equity firm. Additionally, private equity investments are subject to higher risks compared to publicly traded securities, as the companies may face challenges and uncertainties that can impact their valuation.

4.6.2 Hedge Funds

Hedge funds are alternative investment vehicles that pool capital from accredited investors and employ various strategies to generate returns. These funds are managed by professional fund managers and often have the flexibility to invest in a wide range of financial instruments. Here are the key points to consider when discussing hedge funds:

Definition and Structure: Hedge funds are privately organized investment funds that are typically open to a limited number of accredited investors. They are structured as limited partnerships or limited liability companies. Hedge funds aim to generate positive returns regardless of market conditions by employing a diverse range of investment strategies.

Investment Strategies: Hedge funds utilize a variety of investment strategies, including long and short positions, leverage, derivatives, and arbitrage. These strategies allow hedge fund managers to potentially profit from both rising and falling markets. Some common hedge fund strategies include equity hedge (long and short positions in stocks), global macro (investing based on macroeconomic trends), event-driven (trading around corporate events), and managed futures (trading in futures contracts).

Performance and Returns: Hedge funds aim to achieve absolute returns, meaning they seek positive returns regardless of the overall market performance. Hedge fund managers often strive to outperform traditional market indices or deliver positive returns in both up and down markets. However, hedge fund performance can vary significantly, and not all funds achieve consistent or positive returns. Investors should carefully assess a hedge fund's track record, risk management practices, and investment strategy before investing.

Fee Structure: Hedge funds typically charge management fees and performance fees. The management fee is a percentage of the assets



under management and is typically charged annually. Performance fees, also known as incentive fees, are based on a percentage of the profits earned by the fund. The fee structure is intended to align the interests of the fund manager with those of the investors.

4.6.3 Cryptocurrencies and NFTs

Cryptocurrencies are digital or virtual currencies that use cryptography for security and operate on decentralized networks called blockchain. Bitcoin, Ethereum, and Ripple are some well-known cryptocurrencies. As investment assets, cryptocurrencies offer several potential benefits:

- **Potential for High Returns:** Cryptocurrencies have demonstrated the potential for substantial returns over relatively short periods. However, it is important to note that they can also experience significant price volatility, and there is no guarantee of future performance.
- **Portfolio Diversification:** Cryptocurrencies can provide diversification benefits as they have a low correlation with traditional asset classes like stocks and bonds. Including cryptocurrencies in an investment portfolio may help reduce overall risk.
- **Accessibility and Liquidity:** Cryptocurrencies offer global accessibility and can be bought and sold on various cryptocurrency exchanges. The liquidity of cryptocurrencies allows investors to enter or exit positions relatively quickly.
- **Technological Innovation:** Cryptocurrencies are built on blockchain technology, which has the potential to revolutionize various industries. Investing in cryptocurrencies allows investors to participate in this technological innovation.

Non-Fungible Tokens (NFTs): NFTs are unique digital assets that are verifiable and indivisible, utilizing blockchain technology for authentication and ownership records. NFTs represent ownership or proof of authenticity of digital assets such as artwork, music, collectibles, and virtual real estate. Key points to consider regarding NFTs as investments include:

- ◆ **Unique and Scarce Assets:** NFTs represent ownership of unique digital items, creating scarcity and exclusivity. This uniqueness can contribute to their value and potential for appreciation.



- ◆ **Art and Collectibles:** NFTs have gained significant popularity in the art and collectibles market. Artists and creators can tokenize their works as NFTs, enabling direct ownership and the potential for monetization through sales and royalties.
- ◆ **Digital Ownership and Authenticity:** NFTs provide proof of ownership and authenticity for digital assets, addressing the issue of digital duplication and piracy. This aspect has attracted interest from collectors and investors seeking unique digital assets.
- ◆ **Market Volatility:** NFT prices can experience substantial volatility, driven by factors such as market demand, popularity of the underlying digital asset, and overall market sentiment. NFT investments can involve significant risks due to the nascent nature of the market and the potential for rapid changes in value.

4.6.4 Peer-to-Peer Lending

Peer-to-peer (P2P) lending, also known as marketplace lending, is an alternative investment option that allows individuals and small businesses to borrow and lend money directly through online platforms. Here are the key points to consider when discussing P2P lending as an investment:

- **Definition and Structure:** P2P lending platforms connect borrowers and lenders directly, cutting out traditional financial intermediaries such as banks. Borrowers submit loan applications on the platform, and lenders can review the loan requests and choose to fund them. The platform facilitates the loan process, including loan origination, repayment, and collections.
- **Potential Returns:** P2P lending offers the potential for attractive returns compared to traditional fixed-income investments. As lenders, investors earn interest on the loans they fund. The interest rates are typically determined based on factors such as the borrower's creditworthiness and the perceived risk of the loan. However, it is important to note that higher returns are typically associated with higher risk loans.
- **Risk and Default:** P2P lending carries certain risks. The primary risk is the potential for borrowers to default on their loan payments. P2P lending platforms employ credit assessment models to evaluate



borrowers' creditworthiness, but there is still a risk of loan defaults. Lenders should carefully consider the risk levels associated with different borrowers and diversify their investments to mitigate potential losses.

- **Regulation and Investor Protection:** P2P lending is subject to varying degrees of regulation in different jurisdictions. Some countries have established regulatory frameworks to govern P2P lending platforms and protect investor interests. Investors should ensure that they understand the regulatory environment and any investor protection mechanisms in place.

IN-TEXT QUESTIONS

1. What is the key difference between a futures contract and a forward contract?
 - (a) Futures contracts are standardized and traded on exchanges, while forward contracts are privately negotiated
 - (b) Futures contracts are only used for speculation, while forward contracts are primarily used for hedging
 - (c) Futures contracts have a longer expiration period than forward contracts
 - (d) Futures contracts have fixed prices, while forward contracts have variable prices
2. Which strategy involves using derivatives to offset potential losses in an investment portfolio?
 - (a) Speculation
 - (b) Income Generation
 - (c) Hedging
 - (d) Risk Tolerance
3. What is a common investment strategy associated with private equity?
 - (a) Day trading on stock exchanges
 - (b) Investing in publicly traded companies
 - (c) Purchasing ownership stakes in privately-held companies
 - (d) Speculating on cryptocurrency price movements



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4. What is a key characteristic of Non-Fungible Tokens (NFTs)?
 - (a) They are highly correlated with traditional asset classes like stocks
 - (b) They can be divided into smaller units for investment purposes
 - (c) NFTs provide proof of ownership and authenticity for digital assets
 - (d) NFT prices are stable and do not experience volatility
5. What is one of the benefits of investing in commodities?
 - (a) Immediate access to invested capital
 - (b) High correlation with traditional asset classes
 - (c) Potential for capital depreciation
 - (d) Effective hedge against inflation
6. Which method of investing in commodities allows investors to gain exposure to commodities without owning the physical asset?
 - (a) Physical Ownership
 - (b) Exchange-Traded Funds (ETFs)
 - (c) Commodity-Linked Stocks
 - (d) Mutual Funds
7. What is one of the benefits of investing in Real Estate Investment Trusts (REITs)?
 - (a) Direct ownership and management of properties
 - (b) Lack of liquidity and ease of trading
 - (c) Tax benefits on dividends
 - (d) Limited diversification within the real estate sector
8. Which type of REIT primarily generates revenue through rental income from income-generating properties?
 - (a) Equity REIT
 - (b) Mortgage REIT



(c) Hybrid REIT

(d) Non-traded REIT

9. What is one of the key reasons why diversification is important in investment portfolios?

(a) To maximize short-term gains

(b) To eliminate all investment risks

(c) To smooth out investment returns over time

(d) To rely heavily on the performance of a single investment

10. Which of the following is NOT mentioned as an example of an alternative investment?

(a) Stocks

(b) Hedge funds

(c) Cryptocurrencies

(d) Art and collectibles

4.7 Summary

- ◆ Diversification is a crucial principle in investing that involves spreading capital across various assets to reduce risk and enhance returns. It helps mitigate market volatility, smooth out returns, protect against catastrophic losses, and expose investors to different opportunities.
- ◆ To effectively diversify a portfolio, investors should consider a mix of asset classes, industries, geographic regions, and investment strategies. Alternative investment alternatives include real estate, commodities, derivatives, private equity, hedge funds, cryptocurrencies, art, and collectibles.
- ◆ Real estate is a tangible asset class that offers long-term capital appreciation, cash flow, and diversification for investors. It is a physical asset with intrinsic value and low correlation with traditional financial markets. Real estate investments provide steady cash flow through rental income and potential capital appreciation over time.



Notes

- ◆ There are three main types of real estate investments:
 - **Residential properties:** include single-family homes, and vacation homes.
 - **Commercial properties:** which include office buildings, retail spaces, and mixed-use developments.
 - **Industrial properties:** such as warehouses and distribution centers, offer investment potential due to factors like e-commerce demand and transportation hub proximity.
- ◆ Real Estate Investment Trusts (REITs) provide diversification, liquidity, and professional management without owning and managing properties. REITs are companies that own, operate, or finance income-generating real estate properties. They are special investment vehicles that meet legal and tax requirements.
- ◆ Commodities are essential raw materials and primary goods traded in the market. They offer diversification, inflation hedges, capital appreciation opportunities, and portfolio protection. However, they also present risks such as price volatility, market complexity, storage and transportation costs, and regulatory and political risks.
- ◆ Investing methods in Commodities include:
 - Futures contracts
 - Exchange-traded funds (ETFs)
 - Physical ownership
 - Commodity-linked stocks
 - Mutual funds

Physical ownership allows direct control over the asset, while commodity-linked stocks provide indirect exposure to the commodity sector. Commodity funds are managed by professionals who analyze and select investments:

- ◆ Derivatives are financial instruments that derive their value from an underlying asset, such as stocks, bonds, commodities, or currencies. They serve various purposes, including risk management, speculation, and income generation. There are several types of derivatives -
 - **Forwards and Futures:** which are standardized contracts traded on exchanges. The payoffs for long futures contracts increase



as the underlying asset price rises, while short futures contracts increase as the asset price decreases.

- **Options:** give investors the right to buy or sell an underlying asset at a predetermined price within a specified period. They can be used for hedging against potential losses or for speculative purposes.
- **Swaps:** such as interest rate swaps, currency swaps, and commodity swaps, are agreements between parties to exchange cash flows or financial instruments. The payoff depends on the difference between fixed and floating interest rates. Forward contracts, similar to futures contracts, are privately negotiated and are commonly used in over-the-counter markets for hedging or speculative purposes.
- ◆ Other alternative asset classes include -
 - **Private equity:** an investment strategy that involves investing in privately-held companies not publicly traded on stock exchanges. They carry risks, such as illiquidity and varying returns depending on factors like company performance, market conditions, and the expertise of the private equity firm.
 - **Hedge funds:** They use various investment strategies, such as global macro, event-driven trading, and managed futures, to profit from both rising and falling markets. They charge management and performance fees, aligning fund manager interests with investors' interests.
 - **Cryptocurrencies:** they offer potential high returns, portfolio diversification, accessibility, liquidity, and technological innovation. NFTs are unique digital assets using blockchain technology for authentication and ownership records. They represent ownership and authenticity of digital assets like artwork, music, collectibles, and virtual real estate.
 - **P2P lending:** it is an investment that connects borrowers and lenders directly, facilitating the loan process. It offers attractive returns, but carries risks of default and regulatory scrutiny. Lenders should carefully consider risk levels and diversify investments to mitigate losses.



4.8 Answers to In-Text Questions

1. (a) Futures contracts are standardized and traded on exchanges, while forward contracts are privately negotiated
2. (c) Hedging
3. (c) Purchasing ownership stakes in privately-held companies
4. (c) NFTs provide proof of ownership and authenticity for digital assets
5. (d) Effective hedge against inflation
6. (b) Exchange-Traded Funds (ETFs)
7. (c) Tax benefits on dividends
8. (a) Equity REIT
9. (c) To smooth out investment returns over time
10. (a) Stocks

4.9 Self-Assessment Questions

1. Why is diversification important? How can it be achieved?
2. What are the various considerations involved in real estate investing?
3. Describe the various kinds of real estate investments.
4. List down the various types of commodities and the risks associated with investing in them.
5. What is the difference between the various kinds of derivatives?
6. Write short notes on the following —
 - ◆ Private Equity
 - ◆ Hedge Funds
 - ◆ Cryptocurrencies
 - ◆ P2P Lending



4.10 References

Notes

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Modern Portfolio Theories

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STRUCTURE

- 5.1 *Learning Objectives*
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- 5.4 *Portfolio Management*
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5.1 Learning Objectives

- ◆ Understand the concept and process of portfolio management.
- ◆ Understand the concept of portfolio risk and return.
- ◆ Understand modern portfolio theories.



5.2 Introduction

Individual securities have their own risk and return characteristics. The expected future returns from security are variable in nature and the uncertainty of returns is known as risk. An investor never chooses to invest all of his savings in an individual security/asset. Rather, any investor needs to invest in a variety of financial securities simultaneously. The underlying idea is “Not to Put All the Eggs in One Basket”. It is an attempt to diversify and minimize risk, hence, the loss in one security will be compensated by the gain in others. The investment of money in a variety of securities to attain maximum return with a minimum level of risk leads us to the idea of a portfolio. The present chapter explains the concept of portfolio management and its theories to achieve portfolio optimisation.

5.3 Concept of Portfolio

A collection of securities together for an investment is termed a portfolio. For instance, an investor plans to invest his funds in shares of ABC Ltd. Alternatively, he can invest his funds in the shares of 5 different companies in equal proportion. In the former case, he will be exposed to high risk as the expected returns of all the investments made by him, will depend upon the performance of ABC Ltd. However, in the latter case, his risk will diversify as he invests his funds in different companies, hence, the loss in one share may be offset by the profits earned in other shares and ultimately portfolio risk will be reduced.

There can be any number of portfolios that can be constructed from a given set of securities. A wise investor always prefers to choose the most efficient portfolio to meet his investment objectives. The efficient portfolio attempts to maximize return at a given risk appetite.

5.4 Portfolio Management

Portfolio management involves the process of formulation, maintenance, revision and continuous evaluation of a portfolio. The steps involved are with the intent to manage the portfolio in such a way that helps in



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maximisation of return with the given risk profile of the investor. The steps involved in managing the combination of different securities that are held in a portfolio can be understood with the help of the flowchart shown in Figure 5.1. The five steps process for portfolio management is described below:

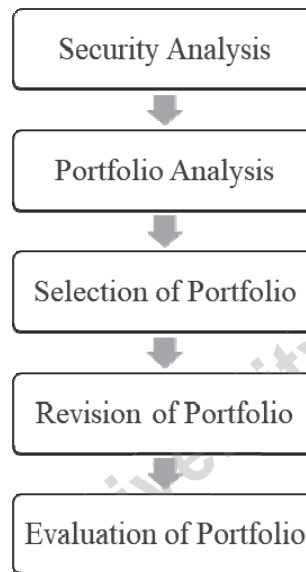


Figure 5.1: Process of Portfolio Management

- (a) **Security Analysis:** The primary step in portfolio management is to analyse the risk and return characteristics and the price level of a large number of available securities in the financial market. The available securities have been categorised as variable income securities *i.e.*, equity shares and fixed income securities including bonds and debentures. Due to reforms in the financial markets, several innovative financial instruments have been introduced. GDRs, ADRs, Convertible debentures, Floating rate bonds, Asset Linked Bonds, and Derivatives are some of them. The investor has to decide the financial security in which he should invest. The security analysis can be done through the Fundamental approach, the technical approach and the Efficient Market Hypothesis (EMH). The Fundamental analysis attempts to determine the intrinsic value of a security and compare it with the current market price which helps in investment decision-making in terms of whether to buy or not to buy the securities at the current prevailing prices. A financial analyst



has to forecast the true value of security using Economy, Industry and Company-wide factors into consideration. It is known as EIC or Top-down approach. On the other hand, the technical analysis attempts to forecast whether the security is overpriced, under-priced or fairly priced with the help of past trends in price and volume data. The EMH is based on the premise that the current market price of the securities can fully reflect all available information. Hence, an investor can anytime buy or sell the securities.

- (b) **Portfolio Analysis:** Once security analysis has been done, the next step is to construct an infinite number of possible portfolios based on information gathered through the first step *i.e.*, security analysis. It may be noted that not all the portfolios would be efficient, thus; portfolio analysis is required to select the optimal portfolio. The objective of portfolio analysis is to evaluate the efficiency of different portfolios in the context of the risk and return profile of each possible portfolio which helps to identify a portfolio that provides maximum returns for a given level of risk or a minimum risk for a given level of return.
- (c) **Selection of Portfolio:** In this step, an investor selects the efficient portfolio that optimises his utility given an investor's risk and return preferences. For portfolio selection, an investor constructs the indifference curves that measure his utility scores and the portfolio which maximises the utility of the investor will be taken into consideration as the optimum portfolio. Two popularly known portfolio theories *i.e.*, Harry Markowitz Model and Capital Market Theory are used by an investor to select an optimal portfolio.
- (d) **Revision of Portfolio:** Portfolio management is an ongoing process, that requires continuous monitoring of the portfolio to keep track if there are any changes taking place concerning to risk and return profile and price levels of the individual securities with the change in the financial environment which in turn will bring change in the portfolio risk and return profile. Moreover, the changes in the financial goals or investors' preferences require the portfolios to be revised accordingly. The portfolio needs to be revised if additional funds are invested. The ultimate objective is to increase the expected returns of the portfolio.



(e) **Evaluation of Portfolio:** The evaluation of a portfolio is the last step as well as an integral part of the portfolio management process. Portfolio evaluation is crucial to determine whether the selected efficient portfolios have been reaping the desired return or not. A portfolio should be assessed periodically to evaluate its performance in terms of risk and return. The performance of the portfolio is compared with a market/benchmark portfolio. Those portfolios which surpass the benchmark portfolio are held by the investor and others are sold or may be revised according to the macro-economic conditions. Some of the popular techniques used to evaluate the performance of the portfolios are Jensen's alpha, Sharpe's ratio, Treynor's ratio etc.

IN-TEXT QUESTIONS

1. A combination of various financial assets like bonds, shares, mutual funds and so on for investment is called _____.
 - (a) Speculation
 - (b) Portfolio
 - (c) Gambling
 - (d) Investment
2. Techniques used to evaluate the performance of the portfolio:
 - (a) Treynor's ratio
 - (b) Jensen's ratio
 - (c) Both (a) & (b)
 - (d) None of the above

5.5 Concept of Portfolio Risk and Return

The determination of the expected return and risk of the portfolio is designated as the first step in portfolio analysis.

5.5.1 Expected Portfolio Return

The expected return of a combination of securities is defined as the weighted average of the returns of individual assets/securities that are held in the portfolio. For example, if an investor invests in a portfolio



comprising two equity shares A and B which have expected returns of 30% and 20% respectively. If 60% of the total funds are invested in share A and 40%, in share B, then the expected portfolio return, $E(R_p)$, is:

**Portfolio Return = Weight of Security A × Return of Security A +
Weight of Security B × Return of Security B**

Symbolically,

$$E(R_p) = (.60 \times .30) + (.40 \times .20) \\ = 26\%$$

Therefore, the formula to determine the expected return on the portfolio is shown below:

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

where,

$E(R_p)$ = Expected Return on Portfolio

W_i = Proportion of funds invested in *ith* Security

$E(R_i)$ = Expected Return on *ith* Security

n = Number of securities in the portfolio

5.5.2 Portfolio Risk

Portfolio risk is defined as the combined risk of all the securities that are held in a portfolio. The variance (or standard deviation) is used to measure the overall riskiness of a portfolio. For calculating the risk of a portfolio, the weighted average of the standard deviation of each security is not taken into consideration rather covariance is used. The covariance measures the interactive risk between the securities that form a portfolio. In other words, covariance is a statistical measure of the co-movement between the security returns. It captures how the returns of two securities move together.

The formula to calculate risk (variance) in a 2-security case *i.e.*, X & Y is as follows:

$$\sigma_{xy} = \sqrt{w_x^2 \sigma_x^2 + w_y^2 \sigma_y^2 + 2w_x w_y \text{Cov}_{xy}}$$

where,

σ_p = Portfolio risk consisting of securities X & Y

w_x = Percentage of total funds invested in Security X



Notes

w_y = Percentage of total funds invested in Security Y

σ_x = Standard deviation of the returns of Security X

σ_y = Standard deviation of the returns of Security Y

Cov_{xy} = Covariance between security X & Y.

Like covariance, the correlation coefficient can also be used to capture the co-movement in the expected returns of the securities. It is a relative measure that is independent of the unit of measurement. The value of the coefficient of correlation ranges between -1 to $+1$. If it is $+1$, returns of the portfolio securities are said to be perfectly positively correlated and in the case of -1 , the opposite movement in securities return is, thus, said to be perfectly negatively correlated.

The formula is shown below:

$$Cov_{xy} = \rho_{xy} \sigma_x \sigma_y$$

Alternatively,

$$\rho_{xy} = Cov_{xy} / \sigma_x \sigma_y$$

where, ρ_{xy} = Coefficient of correlation between securities X & Y.

Hence, the formula to calculate risk (variance) in a 2-security case in terms of the correlation coefficient is as follows:

$$\sigma_{xy} = \sqrt{w_x^2 \sigma_x^2 + w_y^2 \sigma_y^2 + 2w_x w_y \rho_{xy} \sigma_x \sigma_y}$$

It is concluded from the above discussion that the expected return of the portfolio depends on the weight (or percentage) of total funds invested in each asset and the return of each security. However, the portfolio risk depends on the weight (or proportion) of funds invested in available security; the riskiness (σ) of each security, and the coefficient of correlation or covariance between the securities.

Example 1: The following information is given in respect of Security X and Security Y. Calculate portfolio risk and return if an investor invests

- (i) 70% in X and 30% in Y
- (ii) 50% in X and 50% in Y
- (iii) 30% in X and 70% in Y

Security	X	Y
Expected Return	15%	9%
Standard Deviation	5%	3%
ρ_{xy} between X and Y = -0.85		



Solution: (i) When an investor invests 70% in X and 30% in Y

Portfolio Return

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

$$E(R_p) = .70 \times 15 + .30 \times 9$$

$$E(R_p) = 13.2\%$$

Portfolio Risk

$$\sigma_{xy} = \sqrt{w_x^2 \sigma_x^2 + w_y^2 \sigma_y^2 + 2w_x w_y \rho_{xy} \sigma_x \sigma_y}$$

$$\sigma_{xy} = \sqrt{(0.7)^2(5)^2 + (.3)^2(3)^2 + 2(.7)(.3)(-0.85)(5)(3)}$$

$$\sigma_{xy} = 2.78\%$$

(ii) When an investor invests 50% in X and 50% in Y

Portfolio Return

$$E(R_p) = .50 \times 15 + .50 \times 9$$

$$E(R_p) = 12\%$$

Portfolio Risk

$$\sigma_{xy} = \sqrt{w_x^2 \sigma_x^2 + w_y^2 \sigma_y^2 + 2w_x w_y \rho_{xy} \sigma_x \sigma_y}$$

$$\sigma_{xy} = \sqrt{(0.5)^2(5)^2 + (.5)^2(3)^2 + 2(.5)(.5)(-0.85)(5)(3)}$$

$$\sigma_{xy} = 1.46\%$$

(iii) When an investor invests 30% in X and 70% in Y

Portfolio Return

$$E(R_p) = .30 \times 15 + .70 \times 9$$

$$E(R_p) = 10.8\%$$

Portfolio Risk

$$\sigma_{xy} = \sqrt{w_x^2 \sigma_x^2 + w_y^2 \sigma_y^2 + 2w_x w_y \rho_{xy} \sigma_x \sigma_y}$$

$$\sigma_{xy} = \sqrt{(0.3)^2(5)^2 + (.7)^2(3)^2 + 2(.3)(.7)(-0.85)(5)(3)}$$

$$\sigma_{xy} = 1.14\%$$



5.6 Relationship between Coefficient of Correlation, Portfolio Risk & Diversification

5.6.1 Relationship between Coefficient of Correlation & Portfolio Risk

There is a direct relationship between portfolio risk and how closely the returns of the securities that are held in a portfolio are related. If securities are less correlated, the portfolio risk will be lower and if they are highly correlated, the risk will be higher. If the returns of two securities are perfectly correlated, uncorrelated or negatively correlated affects the total risk of the portfolio can be explained with the help of a numerical given below:

Example 2: Suppose an investor invests equally in two securities – X and Y. The risk and return of the securities are as follows: —

Security	E(R)	σ
X	22	4.9
Y	14	2

Calculate and examine the portfolio risk if the coefficient of correlation is $-1, -0.2, 0, 0.2, 1$.

Solution: It should be noted that portfolio return will be the same in all five cases.

Portfolio Return

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

$$E(R_p) = .50 \times 22 + .50 \times 14$$

$$E(R_p) = 18\%$$

Portfolio Risk

$$\sigma_{xy} = \sqrt{w_x^2 \sigma_x^2 + w_y^2 \sigma_y^2 + 2w_x w_y \rho_{xy} \sigma_x \sigma_y}$$



$$\sigma_{xy} = \sqrt{(0.5)^2(1.9)^2 + (.5)^2(2)^2 + 2(.5)(.5)\rho_{xy}(4.9)(2)}$$

$$\sigma_{xy} = \sqrt{8.2025 + 4.9\rho_{xy}}$$

Case 1: $\rho_{xy} = -1$

$$\sigma_{xy} = \sqrt{8.2025 + 4.9\rho_{xy}}$$

$$= \sqrt{8.2025 + 4.9(-1)}$$

$$= 1.82$$

Case 2: $\rho_{xy} = -0.2$

$$\sigma_{xy} = \sqrt{8.2025 + 4.9\rho_{xy}}$$

$$= \sqrt{8.2025 + 4.9(-0.2)}$$

$$= 2.69$$

Case 3: $\rho_{xy} = 0$

$$\sigma_{xy} = \sqrt{8.2025 + 4.9\rho_{xy}}$$

$$= \sqrt{8.2025 + 4.9(0)}$$

$$= 2.86$$

Case 4: $\rho_{xy} = 0.2$

$$\sigma_{xy} = \sqrt{8.2025 + 4.9\rho_{xy}}$$

$$= \sqrt{8.2025 + 4.9(0.2)}$$

$$= 3.03$$

Case 5: $\rho_{xy} = 1$

$$\sigma_{xy} = \sqrt{8.2025 + 4.9\rho_{xy}}$$

$$= \sqrt{8.2025 + 4.9(1)}$$

$$= 3.62$$



Notes

Hence, the portfolio risk is minimum when the correlation coefficient is perfectly negative. It increases with an increase in the coefficient of correlation and becomes maximum when the returns on securities are perfectly positively correlated.

5.6.2 Relationship between Coefficient of Correlation & Diversification

The concept of diversification is based on the notion that if an investor invests his total funds in one place, there will be a possibility of high risk in terms of incurring a heavy loss or losing the entire invested money if that investment does not perform well. It is a method of minimizing risk by investing in different investment options. The benefits of diversification can be reaped if the returns of the securities that are held in a portfolio are less than perfectly positively correlated. For diversification, we can say the lower the value of the correlation coefficient, the better it is for the investor. Unsystematic risk can be avoided through diversification. When returns of two securities forming a portfolio are negatively correlated is termed hedging. However, when the coefficient of correlation is perfectly negative *i.e.*, -1 , such securities are termed as hedge assets. The relationship among diversification, correlation coefficient and portfolio risk has been summarized below.

Coefficient of correlation	Diversification	Portfolio Risk
$\rho_{AB} = +1$	No diversification or naive diversification.	Portfolio risk is not reduced. Only Risk averaging is there.
$0 < \rho_{AB} < 1$	Diversification is possible.	Portfolio risk can be reduced.
$\rho_{AB} = 0$	Diversification is possible and better than the previous case.	Portfolio risk can be further reduced.
$-1 < \rho_{AB} < +0$	Not only diversification, but hedging is also possible.	Portfolio risk will be lower.
$\rho_{AB} = -1$	Perfect hedging is possible.	Portfolio risk is least and it is the case when 0 risk portfolio is possible.



5.7 Modern Portfolio Theories

Every investor is risk-averse in the marketplace. However, they differ in terms of their attitude towards risk and return. Some investors are conservative while some are less conservative in terms of holding risk. The same security may provide different levels of satisfaction or utility to different investors depending upon the degree of risk possessed by a particular investor. The main objective of every investor is to maximise his utility scores by constructing an optimal portfolio which provides maximum return and minimizes the total risk of the portfolio. Now, the question is how to formulate an optimal portfolio. There are modern portfolio theories such as Portfolio Theory, Capital Market Theory etc. were proposed to select and construct a portfolio. The modern portfolio theories have been explained in detail in the following sections.

5.7.1 Portfolio Theory: The Harry Markowitz Model

The pioneering work of Harry Markowitz was published in an article titled “Portfolio Selection” in the Journal of Finance in the year 1952. The analytical and conceptual understanding to select an optimal portfolio by a rational investor has been provided in his seminal work. This theory is popularly known as the Markowitz Model. This model is also known as Mean-Variance Optimisation Model as it takes the risk and return of different portfolios into consideration.

Assumptions for the HM Model are as follows:

- ◆ An investor is risk-averse or conservative. He tends to avoid unnecessary risks.
- ◆ Portfolio analysis is to be done based on risk and return.
- ◆ An investor is rational. He would choose to invest in those securities which provide him with maximum return with a minimum degree of risk.
- ◆ The decision for the selection of an optimal portfolio will be based on means (returns) and variance (risk).
- ◆ Every investor has different preferences towards risk & return. It affects their utility scores resulting in their indifference curves being different.



Notes

- ◆ The financial markets are efficient, and investors have easy access to all the available information related to returns, risk and coefficient of correlation between the securities.

Based on the above assumptions, the HM model for portfolio selection is explained in the following four steps:

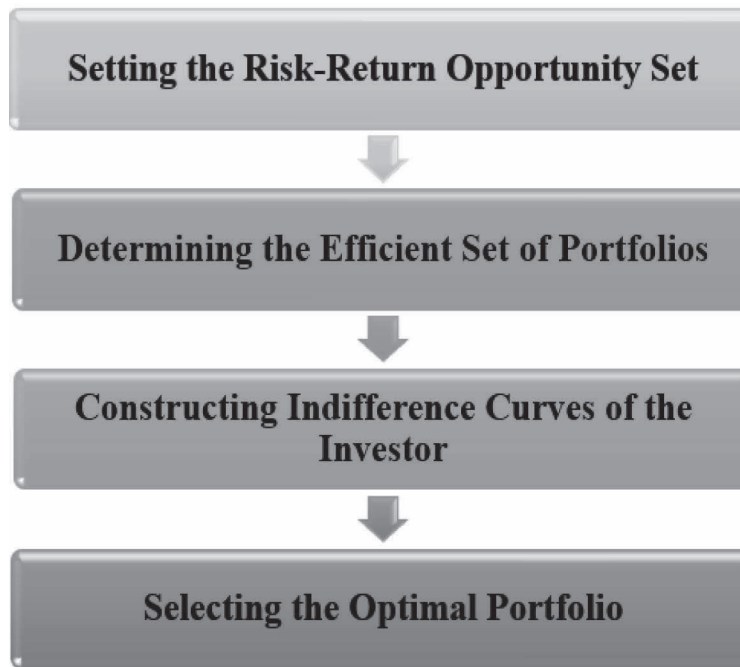


Figure 5.2: Steps in Optimal Portfolio Selection

(a) Setting the Risk-Return Opportunity Set

- ◆ The first step is to prepare an investment opportunity set. There are 'N' numbers of securities available in the financial market. An infinite number of possible portfolios can be made from the available securities in the market. An investor's portfolio opportunity set shows the expected returns and risk is associated with all the possible combinations that are formed from a set of available securities. A large number of portfolios can be constructed even with two securities by changing their weights only. For instance, 30% in X and 70% in Y can be combined to formulate a portfolio, 88% in X and 12% in Y to make another portfolio and all such possible combinations can be made by two securities only. It is important to



note that if the number of securities increases to 10 or 20 or 50 or maybe 100, the possible portfolios will also increase exponentially.

- ◆ In Figure 5.3, there is a shaded region PVWP which is also known as the investment opportunity region that shows the risk and returns of all the possible sets of portfolios *e.g.*, combination R represents x_1 level of risk and y_1 level of return. Every point in this region belongs to a particular portfolio.

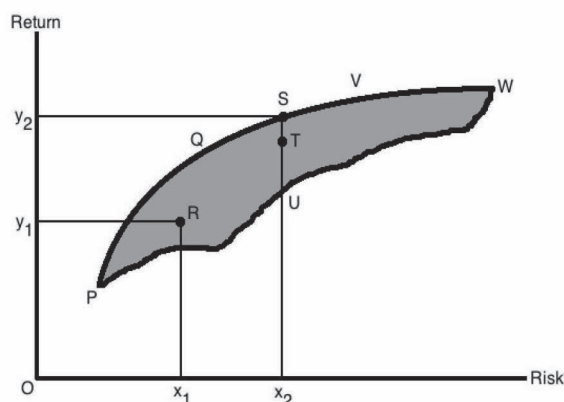


Figure 5.3: Investment Opportunity Set in case of N securities

- ◆ The region has many feasible portfolios in which an investor can invest. Now, an investor has to choose whether he will invest in portfolio P, which has a minimum degree of risk or in portfolio W, which provides maximum returns or some other portfolio, depending upon the minimum return he expects from the investment concerning his risk appetite.

(b) Determining the Efficient Set of Portfolios

- ◆ Once the investment opportunity set is determined, the next step is to identify the efficient set of portfolios. An efficient portfolio provides the maximum return for a given level of risk or has the lowest possible degree of risk for a given level of return.
- ◆ Rational investors always prefer more returns. In addition, since they are risk-averse, they would prefer less risk. The efficient set of portfolios will be subject to two prepositions:
 - Among all the possible portfolios providing an equal expected return, an investor would always prefer the portfolio which has the lowest degree of risk.



Notes

- Among all the possible portfolios having the same degree of risk, an investor would always prefer the portfolio which has the highest expected return.
- ◆ The set of efficient portfolios is known as **Efficient Frontier**. In simple words, “Efficient Frontier is the graphical representation of all the efficient portfolios out of the feasible portfolios”. All efficient portfolios are feasible but all feasible portfolios are not efficient due to their risk-return profile. In Figure 3, the points lie along the boundary PQSVW is called an efficient frontier. Portfolios to the right of this boundary are not efficient because there would be a greater risk for the given level of return. Also, portfolios at lower levels of the boundary are not good as there would be fewer returns for the given level of risk. It can be seen that portfolio S dominates all other portfolios lying below it.
- ◆ The reason is that all three portfolios *i.e.*, S, T, & U are providing the same degree of risk, x_2 at different levels of returns. However, portfolio S has the highest return *i.e.*, y_2 at x_2 level of risk and hence, it is called an efficient portfolio.

(c) Constructing Indifference Curves (IC) of the Investor

- ◆ Every investor wants to select an optimal portfolio to maximise his utility or satisfaction. The indifference curve is used to analyse the level of satisfaction of an investor. An indifference curve shows an investor’s risk-return trade-off. Every investor is basically risk averse; the indifference curve is upward-sloping for them. However, the slope of the IC changes with the change in the risk preference of the investor. The steeper the slope of the IC, the more risk-averse the investor is while the flatter the slope of the IC, the less risk-averse the investor is. The main characteristic feature of an investor’s utility curve is that they never intersect with each other *i.e.*, they are parallel.

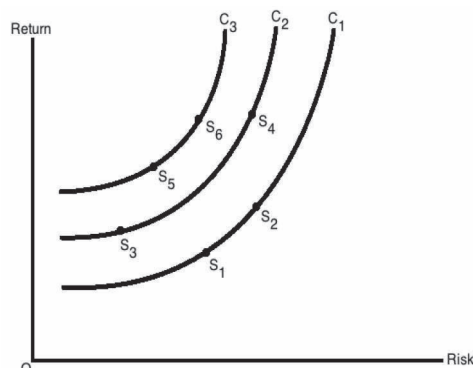


Figure 5.4: Indifference curves of a risk-averse investor

- ◆ In Figure 5.4, an investor has three ICs, C_1 , C_2 & C_3 . All the points on a particular IC represent different levels of risk and return with the same amount of satisfaction. The utility on C_1 is lowest and on C_3 is highest. Points S_1 and S_2 are on the same IC *i.e.*, IC_1 so they provide the same amount of utility. If the satisfaction increases, an investor will move to the higher IC *i.e.*, IC_2 and IC_3 . The higher the IC, the more will be the utility.

(d) Selecting the optimal portfolio

- ◆ The final step is to select the optimal portfolio. Every investor aims to select the portfolio that maximises his utility. He wants to attain the highest IC. However, the optimal portfolio is the one where the IC of the investor must lie on the efficient frontier. In simple words, the best portfolio selection will depend on the two conditions that need to be satisfied:

The portfolio must lie on an efficient frontier and

The satisfaction of the investor is maximised.

- ◆ Figure 5.5 shows the selection process for the best portfolio. We have placed the efficient frontier PRW on the indifference map. The goal of the investor is to get the maximum utility. The indifference curve C_1 and C_2 are attainable but inferior curves. An investor would like to attain C_3 but there are two portfolios lying on it *i.e.*, R and X, and both will provide him with the same level of satisfaction. However, X is not able to meet one of the two conditions required for the selection of an optimal portfolio. It is clearly shown in the



Notes

picture that X is not lying on the efficient frontier hence it is not an efficient portfolio. We can say that the portfolio R would be the best/optimal portfolio as it is on the efficient frontier as well as providing the maximum level of satisfaction to the investor.

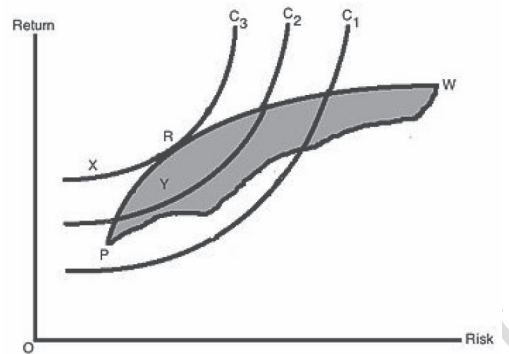


Figure 5.5: Selecting the Optimal Portfolio

According to HM Model, the optimal portfolio for an investor is the point of tangency where he will be able to get the maximum level of satisfaction and also the best combination of risk and return.

Limitations of the HM Model

The model makes a rational attempt to identify the efficient portfolios and then selection of optimal portfolios. However, the model suffers from the following weaknesses:

- ◆ This model requires a large amount of input data to measure a portfolio's risk and reward. If there are N securities in the portfolio, then N estimates of return, N standard deviations, and $N(N-1)/2$ covariances are required. So, for 50 securities in a portfolio, we want 50 returns, 50 standard deviations, and $50(50-1)/2$, or 1225 covariances. Hence total estimates required are 1325. For 100 securities, we want 100 returns, 100 standard deviations, and $100(100-1)/2$, or 4950 covariances. Hence total estimates required are 5150. If the number of securities increases in the portfolio to 100, then we need total estimates of 1,25,750. Handling such a huge quantum of data for analysis is cumbersome as well as a complex task.
- ◆ As per this model, there are as many optimal portfolios as there are several investors. However, this limitation is removed when we introduce a risk-free asset in the capital market.



5.7.2 Capital Market Theory Model

The capital market theory is an extension of the Portfolio theory with the addition of risk-free lending and borrowings. The existence of capital market theory developed by Sharpe came into light when a research paper titled “Capital Asset Price: A Theory of Market Equilibrium under Conditions of Risk” was published in the Journal of Finance in 1964.

Assumptions for the Capital Market Theory are as follows:

- ◆ Investors behave rationally *i.e.*; they are primarily assessing expected to mean and variance to make investment decisions.
- ◆ Securities are infinitely divisible.
- ◆ There are no limits on short sales/selling.
- ◆ There are a large number of investors and their buying or selling behaviour does not affect the price of the security.
- ◆ Frictionless markets *i.e.*, no transaction costs or taxes are involved.
- ◆ In addition to risky assets, there are also non-risky/risk-free assets in the market.
- ◆ Investors have uniform or identical expectations of returns, return variances and covariances for all the security pairs. This is an important assumption for ensuring a unique efficient frontier.

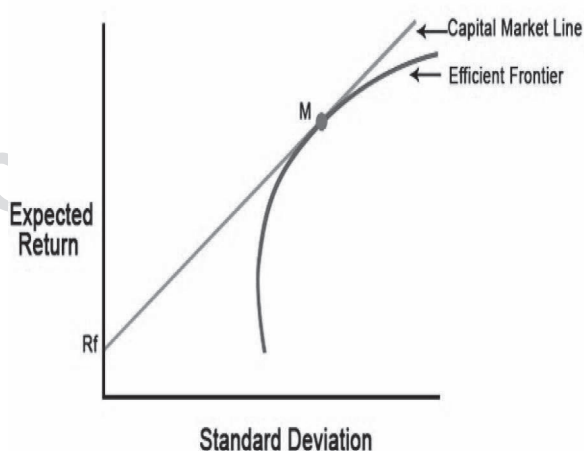


Figure 5.6: Capital Market Line



Notes

It is evident from Figure 5.6 that the efficient frontier is concave in shape. The efficient frontier becomes a straight line when it originates from a risk-free return on the Y axis and it happens when a risk-free security/asset is introduced in the capital market. The new efficient frontier which is a straight line is tangent to the original efficient frontier at point M. This new straight-line frontier is called the capital market line.

The CML is given by the following equation:

$$E(R_p) = R_f + \frac{\sigma_p \times (ER_m - R_f)}{\sigma_m}$$

where,

$E(R_p)$ = expected return of a portfolio

R_f = risk-free rate of interest

$E(R_m)$ = expected return on the market portfolio

σ_p = standard deviation of the portfolio

σ_m = standard deviation of the market portfolio

The capital market line shows that the expected portfolio return depends upon the risk-free rate, per unit market return, and the overall risk of the portfolio. In other words, the return of the portfolio is equal to the risk-free rate plus a risk premium. The higher the risk, the higher will be the expected return.

The characteristic features of CML are as follows:

- ◆ CML indicates a positive linear relationship between portfolio risk (σ_p) and expected return $E(R_p)$.
- ◆ The slope of CML is a risk-free rate because it originates from R_f .
- ◆ The CML slope is the reward-to-variability ratio, measured as $[E(R_m) - R_f]/\sigma_m$.
- ◆ CML is tangent to the original efficient frontier at point M *i.e.*, the optimal portfolio of risky assets or the market portfolio.
- ◆ Only efficient portfolios lie on CML consisting of risk-free assets and portfolios of risky assets.
- ◆ A risk-averse investor will never invest in a portfolio unless he would get compensation for the risk. Hence, CML slopes upward because the price of risk must be positive.



It can be understood from Figure 5.7, if there will be no risk-free assets then the investor will select a portfolio that lies on the efficient frontier depending upon his utility curve. However, with the inclusion of risk-free assets, the investor can choose the portfolio on CML which is a combination of risky and non-risky investments.



Figure 5.7: Capital Market Line & Optimal Portfolio

Portfolios to the left side of the market portfolio, (*i.e.*, M), are termed as Lending Portfolios or Defensive Portfolios and they are suitable for a more risk-averse investor. Portfolios to the right side of the market portfolio, (*i.e.*, M), are termed as Borrowing Portfolios or Aggressive Portfolios because they include risk-free borrowings. At point M (market portfolio) borrowing or lending does not take place.

Example 3: The information of three portfolios is available to an investor:

Portfolio	E(R)	σ
X	8%	3%
Y	20%	10%
Z	17%	7%

It is given that the risk-free interest rate is 4% and the estimated market return is 12%. The market portfolio is having a risk of 5%. Find out whether these portfolios are efficient or not.

Solution: An efficient portfolio lies on CML. To check if these are efficient portfolios, we have to calculate the expected return as per CML.

$$E(R_p) = R_f + \frac{\sigma_p \times (ER_m - R_f)}{\sigma_m}$$



Notes

Portfolio	E(R) (given)	E(R) as per CML	Efficient Portfolio or not
X	8%	$4 + (12-4)3/5 = 8.8\%$	Not Efficient
Y	20%	$4 + (12-4)10/5 = 20\%$	Efficient
Z	17%	$4 + (12-4)7/5 = 15.2\%$	Not Efficient

The estimated return of portfolio Y is equal to the return calculated as per CML. So, this portfolio is efficient. It may be noted that portfolios X & Z cannot persist in an efficient capital market. Here, Portfolio X has an actual return (given as 8%) less than the returns estimated by CML, so it is an overpriced portfolio. Portfolio Z has an actual return (given as 17%) higher than the returns estimated by CML, so it is underpriced.

5.7.3 Tobin's Separation Theorem/Property

- ◆ Tobin's Separation Theorem is based on the notion that decisions related to financing and investment are separate. An investment decision is to decide about investment in risky assets. A financing decision is to decide concerning to whether to lend or borrow.
- ◆ In CML, decisions related to both investment and financing are independent of each other. According to the capital market theorem, investment decisions are the same for all the investors *i.e.*, every investor is investing in an optimal portfolio of risky assets *i.e.*, portfolio M, also termed as market portfolio. On the other hand, in the case of financing decisions, different investors have different preferences concerning lending or borrowing *i.e.*, some prefer to lend while others prefer to borrow. Based on their risk preferences, investors make a separate financing decision either to lend *i.e.*, to be on the left side of M or to borrow *i.e.*, to be on the right side of M to achieve their desired point on the CML.
- ◆ The separation theorem has important implications:
 - (a) Any asset or security which is not a part of a market portfolio *i.e.*, M cannot be able to exist in the market. Every investor is investing in the market portfolio of risky assets *i.e.*, M and hence, there will be no takers of any other assets. In other words, all the securities that are held in portfolio M will survive in the capital market. Thus, portfolio M is termed a market portfolio.



(b) Every investor will invest in portfolio M, the only difference is the amount of investment. For example, assume that there are two investors Mr. A and Z who wanted to invest Rs. 10,000 each in the market portfolio comprises of three securities P, X and Y in the proportion of 10%, 20% and 70%. Mr. A is conservative and therefore, decided to invest Rs. 8000 in the portfolio of risky assets and the remaining Rs. 2000 to lend at a risk-free rate. It implies that Mr. A will have Rs. 800 invested in security P, Rs. 1600 in X and Rs. 5600 in Y along with Rs. 2000 in risk-free assets. Let us assume that Mr. Z is an aggressive investor, thus, borrows Rs. 2000 at a risk-free rate. So, he will have Rs. 12000 (*i.e.*, 10000 + 2000) to invest in portfolio M. It implies that the portfolio of Mr. Z consists of Rs. 1200 invested in security P, Rs. 2400 in security X and Rs. 8400 in security Y along with a borrowing amount of Rs. 2000 at risk-free rate.

5.7.4 Capital Asset Pricing Model

- ◆ The concept of CAPM was discussed by Sharpe (1964), Lintner (1965) & Mossin (1966) independently in their research papers. CAPM is an extension of Capital Market Theory which is used to predict the expected return on a security or portfolio. The expected return derived through CAPM can be used to ascertain if security is earning more or not as compared to the expected return. From an investor's point of view, it is always desirable that their securities provide higher returns than the one predicted by CAPM.
- ◆ CAPM shows the direct relationship between the return required on security and its systematic risk denoted by β . Since, there are two types of risk *i.e.*, systematic & unsystematic risk. The latter can be diversified by constructing a portfolio while the former cannot. Hence, as per this model, an investor must be rewarded for bearing the systematic risk only.
- ◆ CAPM is given by the following equation:

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



Notes

where,

$E(R_i)$ = Expected return from security or asset

R_f = Risk-free rate of return

$E(R_M)$ = Expected return on a market portfolio

β_i = Beta coefficient of security i , a measure of systematic risk

According to CAPM,

Expected Return = Risk-free rate + Market risk premium

In other words, it can be written as

Expected Return = Reward for Time + Reward for Risk

Example 4: Calculate the expected return for a security X using CAPM. The required information is given below:

$$R_f = 5\% \quad R_M = 10\% \quad \beta_i = 0.70$$

$$\begin{aligned} E(R_x) &= R_f + [E(R_M) - R_f] \beta_x \\ &= 0.05 + (.10 - 0.05) \times 0.70 \\ &= 0.085 \text{ or } 8.5\% \end{aligned}$$

It must be noted that there is a direct relationship between the estimated returns of security and systematic risk. So, securities with high β have higher expected returns:

- ◆ The graphical representation of CAPM is done through the security market line. It is a straight line which shows a linear relationship between the expected return on security and the systematic risk. The slope of SML is the market risk premium *i.e.*, $[E(R_M) - R_f]$.
- ◆ As shown in Figure 5.8, all the fairly priced securities are plotted on the SML. The assets above the line are undervalued because, for a given amount of risk (beta), they earn a higher return. The assets below the line are overvalued because, for a given amount of risk, they earn a lower return.

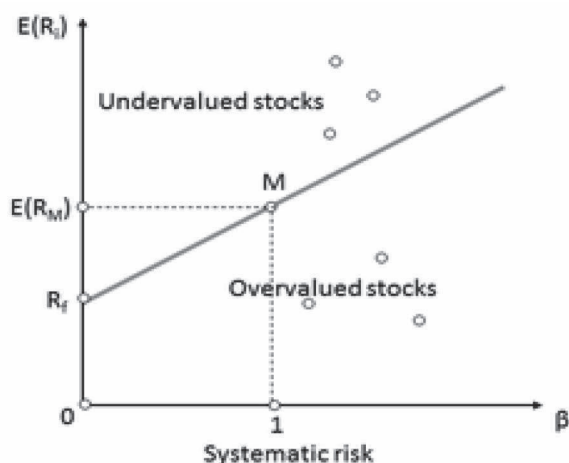


Figure 5.8: Security Market Line

Example 5: From the data given below, find out which of the securities are underpriced or overpriced in terms of the SML equation:

Security	Actual Return (%)	Beta
P	8	0.5
Q	24	2.0
R	22	1.6
S	15	1.0
T	20	1.2

The return on the market index is 15% and the return on risk-free assets is 6%.

Solution: As per SML,

$$E(R_x) = R_f + [E(R_M) - R_f] \beta_x$$

Security	Actual Return (%)	Beta	Return as per SML	Underpriced/Overpriced
P	8	0.5	$6 + (15-6) \times 0.5 = 10.5$	Overpriced
Q	24	2.0	$6 + (15-6) \times 2 = 24$	Fairly priced
R	22	1.6	$6 + (15-6) \times 1.6 = 20.4$	Underpriced
S	15	1.0	$6 + (15-6) \times 1.0 = 15$	Fairly priced
T	20	1.2	$6 + (15-6) \times 1.2 = 16.8$	Underpriced

The actual return from the security P is less than the return calculated as per SML, thus security P is overpriced and must be sold. However,



Notes

Security R and T, are underpriced and must be bought. In the case of security Q and S, have actual returns equal to the CAPM return and therefore, they are correctly priced.

5.7.5 Optimal Portfolio Construction Using Single Index Model

- ◆ The Single Index Model (SIM) was created in 1963 by William F. Sharpe, who is best known for developing the Capital Asset Pricing Model (CAPM), for which he received the Nobel Prize in Economics in 1990. Sharpe discovered that rather than calculating the covariance (how two variables differ) or correlation (how two variables are related) between every pair of stock returns, as proposed in the Markowitz model, this relationship can be found more simply through a market index (e.g., S&P 500 Index), reducing the number of calculations required in a portfolio analysis exercise.
- ◆ The SIM can be expressed, either in “raw returns” (i.e., ordinary returns) or in “excess returns.”

The SIM formula when it is expressed in raw returns is shown below:

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

where:

R_{it} = total return of a stock or portfolio i

β_i = investment beta

R_m = market portfolio return

α_{it} = time regression investment's alpha

ε_{it} = time regression residuals

The SIM formula when it is expressed in excess returns is shown below:

$$R_i - R_f = \alpha_i + \beta_i (R_m - R_f) + \varepsilon_i$$

where:

R_{it} = total return of a stock or portfolio i

β_i = investment beta.

R_m = market portfolio return



R_f = risk-free rate of return

α_{it} = time regression investment's alpha

ε_{it} = time regression residuals

It is important to note that Beta gauges systematic risk and shows the firm's sensitivity and reactivity to market index returns. A greater beta coefficient indicates that the portfolio or security is riskier. A smaller beta coefficient, on the other side, indicates less risk in the portfolio or asset, which can be more advantageous for an efficient portfolio. Alpha tells us how much the asset or portfolio excelled or underperformed the market index, adjusted for beta. Alpha shows the expected return on security (over the risk-free rate) beyond any returns due to movements in the market. Residuals (ε) describe how much of the security or fund's returns are being driven by random miscellaneous movements in the market that cannot be explained by the asset-pricing model, also known as "idiosyncratic volatility". The residual represents the facts that are driven by random firm-specific fluctuations rather than market returns of the alpha on any particular day:

- ◆ To elaborate, the SIM claims that a firm's returns are determined by a single factor, namely the market factor. In other terms, the SIM asserts that a stock's returns can be determined by its link to a market index. This makes the SIM valuable when investors want to learn how to predict a company's returns on any given day. This distinguishes it from multifactor models, which assert that the firm's returns are the result of more than one factor.

IN-TEXT QUESTIONS

3. _____ describes the association between estimated return and systematic risk for assets, particularly stocks.
 - (a) PERT
 - (b) CAPM
 - (c) Sharpe ratio
 - (d) Treynor ratio
4. In Capital Market Line every investment is:
 - (a) Finitely divisible
 - (b) Infinitely divisible



Notes

(c) Both (a) & (b)

(d) None of the above

5. The main objective of a portfolio is to reduce _____ by diversification.

(a) Return

(b) Risk

(c) Uncertainty

(d) Percentage

5.8 Solved Illustrations

Question 1: An investor is investing in securities X & Y whose details are given below:

	Security X	Security Y
E(R)	14.9%	20%
Risk (σ)	10%	14.9%
Weight (W)	50%	50%

The covariance between the returns of the securities is 100. Find out the portfolio risk and return. Also, find the correlation between the returns of X & Y.

Solution:

(a) Portfolio Return

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

$$E(R_p) = .50 \times 14.9 + .50 \times 20$$

$$E(R_p) = 17.45\%$$

(b) Portfolio Risk

$$\sigma_{xy} = \sqrt{w_x^2 \sigma_x^2 + w_y^2 \sigma_y^2 + 2w_x w_y Cov_{xy}}$$

$$\sigma_{xy} = \sqrt{(0.5)^2 (10)^2 + (.5)^2 (14.9)^2 + 2(.5) (.5) 100}$$

$$\sigma_{xy} = 11.42\%$$



(c) Correlation between the Returns:

$$Cov_{xy} = \rho_{xy} \sigma_x \sigma_y$$

$$100 = \rho_{xy} (10) (14.9)$$

$$\rho_{xy} = 0.67$$

Question 2: Mr. P is investing in securities X & Y whose details are given below:

	Security X	Security Y
E(R)	13%	15.5%
σ	3.5%	7%
Weight	40%	60%

Find out the expected return, minimum risk and maximum risk of the portfolio.

Solution:

(a) Portfolio Return

$$E(R_p) = .40 \times 13 + .60 \times 15.5$$

$$E(R_p) = 14.5\%$$

(b) Portfolio Risk

Case 1: Portfolio has minimum risk when $\rho_{xy} = -1$

$$\sigma_{xy} = \sqrt{w_x^2 \sigma_x^2 + w_y^2 \sigma_y^2 + 2w_x w_y \rho_{xy} \sigma_x \sigma_y}$$

$$\sigma_{xy} = \sqrt{(0.4)^2 (3.5)^2 + (.6)^2 (7)^2 + 2(.4) (.6) (-1) (3.5) (7)}$$

$$\sigma_{xy} = 2.8\%$$

Case 2: Portfolio has minimum risk when $\rho_{xy} = +1$

$$\sigma_{xy} = \sqrt{(0.4)^2 (3.5)^2 + (.6)^2 (7)^2 + 2(.4) (.6) (1) (3.5) (7)}$$

$$\sigma_{xy} = 5.6\%$$

Question 3: The information on security A and B is available below:

	Security A	Security B
E(R)	20%	25%
Risk (σ)	10%	15%
Weight (W)	70%	30%



Notes

The covariance between the returns of the securities is 100. Find out the portfolio risk and return.

Solution:

(a) Portfolio Return

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

$$E(R_p) = .70 \times 20 + .30 \times 25$$

$$E(R_p) = 21.5\%$$

(b) Portfolio Risk

$$\sigma_{xy} = \sqrt{w_x^2 \sigma_x^2 + w_y^2 \sigma_y^2 + 2w_x w_y Cov_{xy}}$$

$$\sigma_{xy} = \sqrt{(0.7)^2 (10)^2 + (.3)^2 (15)^2 + 2(.70) (.30) (100)}$$

$$\sigma_{xy} = 10.55\%$$

Question 4: The expected return and risk of X & Y are given below: -

	Security X	Security Y
E(R)	10%	12%
σ	20%	25%

The coefficient of correlation between the returns of two securities is 0.7. An investor has to decide about the portfolio of X & Y as 65% + 35% or 35% + 65%. Which one should he accept?

Solution:

For 65% + 35% portfolio of X & Y:

$$E(R_{xy}) = W_x R_x + W_y R_y$$

$$E(R_{xy}) = .65 \times 10 + .35 \times 12$$

$$E(R_{xy}) = 10.7\%$$

$$\sigma_{xy} = \sqrt{w_x^2 \sigma_x^2 + w_y^2 \sigma_y^2 + 2w_x w_y \rho_{xy} \sigma_x \sigma_y}$$

$$\sigma_{xy} = \sqrt{(0.65)^2 (20)^2 + (.35)^2 (25)^2 + 2(.65)(.35)(0.7)(20)(25)}$$

$$\sigma_{xy} = 20.12\%$$



For 35% + 65% portfolio of X & Y:

$$E(R_{xy}) = W_X R_X + W_Y R_Y$$

$$E(R_{xy}) = .35 \times 10 + .65 \times 12$$

$$E(R_{xy}) = 11.3\%$$

$$\sigma_{xy} = \sqrt{w_x^2 \sigma_x^2 + w_y^2 \sigma_y^2 + 2w_x w_y \rho_{xy} \sigma_x \sigma_y}$$

$$\sigma_{xy} = \sqrt{(0.35)^2 (20)^2 + (.65)^2 (25)^2 + 2(.35)(.65)(0.7)(20)(25)}$$

$$\sigma_{xy} = 21.72\%$$

The portfolios of both securities are having different expected returns and risks. An investor will choose the one which is less risky by calculating the coefficient of variation.

$$\begin{aligned} CV_{(65,35)} &= \sigma_{xy} / R \\ &= 20.12 / 10.7 \\ &= 1.88 \end{aligned}$$

$$\begin{aligned} CV_{(35,65)} &= \sigma_{xy} / R \\ &= 21.73 / 11.3 \\ &= 1.92 \end{aligned}$$

It is concluded that the investor should prefer the portfolio having weights 65% + 35% respectively. The CV of the another one is higher making it a risky investment.

Question 5: The expected return and risk of M & N are given below:

	Security M	Security N
E(R)	20%	15%
σ	15%	8%

The coefficient of correlation between the returns of two securities is 0.7. An investor has to decide about the portfolio of X & Y as 75% + 25%.



Notes

Solution:

Portfolio Return

$$E(R_{xy}) = W_x R_x + W_y R_y$$

$$E(R_{xy}) = .75 \times 20 + .25 \times 15$$

$$E(R_{xy}) = 18.75\%$$

Portfolio Risk

$$\sigma_{xy} = \sqrt{w_x^2 \sigma_x^2 + w_y^2 \sigma_y^2 + 2w_x w_y \rho_{xy} \sigma_x \sigma_y}$$

$$\sigma_{xy} = \sqrt{(0.75)^2 (15)^2 + (.25)^2 (8)^2 + 2(.75)(.25)(0.7)(15)(8)}$$

$$\sigma_{xy} = 12.73\%$$

Question 6: The information of three portfolios is available to an investor:

Portfolio	$E(R)$	σ
X	28%	30%
Y	22%	16%
Z	17%	10%

It is given that the risk-free interest rate is 10% and the estimated market return is 19%. The market portfolio is having a risk of 12%. Comment on whether these portfolios are efficient or not.

Solution: An efficient portfolio lies on CML. To check if these are efficient portfolios, we have to calculate the expected return as per CML.

$$E(R_p) = R_f + \frac{\sigma_p \times (ER_m - R_f)}{\sigma_m}$$

Portfolio	$E(R)$ (given)	$E(R)$ as per CML	Efficient Portfolio or not
X	28%	$10 + (19-10)30/12 = 32.5\%$	Not Efficient
Y	22%	$10 + (19-10)16/12 = 22\%$	Efficient
Z	19%	$10 + (19-10)10/12 = 17.5\%$	Not Efficient

The estimated return of portfolio Y is equal to the return calculated as per CML. So, this portfolio is efficient. It may be noted that portfolios X & Z cannot persist in an efficient capital market. Here, Portfolio X



has an actual return (given as 28%) less than the returns estimated by CML, so it is an overpriced portfolio. Portfolio Z has an actual return (given as 19%) higher than the returns estimated by CML, so it is an underpriced portfolio.

Question 7: The risk-free rate of interest is 7% and the return on the market portfolio is 17%. The risk of the market portfolio is 5%. An investor has constructed a portfolio having a risk of 10%. Find out the expected return as per CML.

Solution:

$$\begin{aligned} E(R_p) &= R_f + \frac{\sigma_p \times (ER_m - R_f)}{\sigma_m} \\ &= 7 + \frac{(17-7) \times 10}{5} \\ &= 7 + 20 \\ &= 27\% \end{aligned}$$

Question 8: The risk-free rate is 7% and the market risk premium is 12% and the beta of the security is 1.3. What is the expected return of the security under CAPM?

Solution:

$$\begin{aligned} E(R_x) &= R_f + [E(R_M) - R_f] \beta_x \\ &= 7 + (12) \times 1.3 \\ &= 22.6\% \end{aligned}$$

Question 9: The risk-free rate is 7%. The β of the security and the market return of the portfolio is 0.7 & 18% respectively. Calculate the expected rate of return of the security and also calculate β of the security which has an expected return of 20%.

Solution:

$$\begin{aligned} E(R) &= R_f + [E(R_M) - R_f] \beta \\ &= 7 + (18 - 7) \times 0.7 \\ &= 14.7\% \end{aligned}$$



Notes

β of the security which has an expected return of 20%:

$$E(R) = R_f + [E(R_M) - R_f] \beta$$

$$20 = 7 + (18 - 7) \times \beta$$

$$\beta = 1.18$$

Question 10: Find out the expected return of the following securities if the prevailing interest rate on Govt. securities is 7% and the rate of return on the market index is 10%. The beta factor of security A, B, C, & D are 1, 1.25, 1.70, & 1.50 respectively.

Solution:

$$E(R) = R_f + [E(R_M) - R_f] \beta$$

Expected Return for Security A

$$= 7 + (10 - 7) \times 1$$

$$= 10\%$$

Expected Return for Security B

$$= 7 + (10 - 7) \times 1.25$$

$$= 10.75\%$$

Expected Return for Security C

$$= 7 + (10 - 7) \times 1.70$$

$$= 12.10\%$$

Expected Return for Security D

$$= 7 + (10 - 7) \times 1.50$$

$$= 11.50\%$$

5.9 Summary

An investor never chooses to invest all of his savings in an individual security/asset. Rather, any investor needs to invest in a variety of financial securities simultaneously. It is an attempt to diversify and minimize risk, hence, the loss in one security will be compensated by the gain in others. Portfolio management involves the process of formulation, maintenance, revision and continuous evaluation of a portfolio. It starts with portfolio analysis which evaluates the efficiency of different portfolios



in the context of the risk and return profile of each possible portfolio. Then, modern portfolio theories *i.e.*, Harry Markowitz Model, Capital Market Theory, Separation theorem and single index model are discussed in the literature and have been used by an investor to select an optimal portfolio. Portfolio management is an ongoing process, that requires continuous monitoring of the portfolio to keep track of any changes that take place concerning risk and return profile and price levels of the individual securities with the change in the financial environment which in turn brings a change in the portfolio risk and return profile. Finally, the evaluation of a portfolio is the last step as well as an integral part of the portfolio management process. Portfolio evaluation is crucial to determine whether the selected efficient portfolios have been reaping the desired return or not.

5.10 Answers to In-Text Questions

1. (b) Portfolio
2. (c) Both (a) & (b)
3. (b) CAPM
4. (b) Infinitely divisible
5. (b) Risk

5.11 Self-Assessment Questions

1. What do you understand by the term portfolio? How do you measure the portfolio risk and return for a two-security portfolio?
2. What is Portfolio Management? Explain the steps involved in managing the portfolio.
3. Explain the concept of coefficient of correlation in the construction of a portfolio.
4. What is an efficient portfolio in the context of the HM Model?
5. Critically examine Portfolio Theory along with its assumptions and limitations.
6. Explain the characteristics of the Capital Market Line.



Notes

7. Differentiate Security Market Line and Capital Market Line.
8. Explain the concept of the Separation Theorem.
9. Explain the Capital Asset pricing model along with its assumptions and limitations.
10. Explain the concept of optimal portfolio construction using Single Index Model.
11. State True or False –
 - (a) A risk-averse investor always opts for the asset with the higher estimated return, when two assets have the same risk.
 - (b) The Technical Approach for security analysis deals with historical trends and patterns to estimate the price of securities.
 - (c) Diversification removes the risk completely.
 - (d) Covariance measures the variability in a particular stock's return.
 - (e) The coefficient of correlation should be either +1 or -1.
 - (f) HM model deals with the evaluation of a portfolio.
 - (g) Efficient Frontier consists of a large number of efficient portfolios.
 - (h) SML and CML have the same shape and are based on the same notion.
 - (i) If a portfolio lies below CML, it is not efficient.
 - (j) According to the Separation Theorem, investment and financing decisions are not independent of each other.

(Ans. (a) T, (b) T, (c) F, (d) T, (e) F, (f) F, (g) T, (h) F, (i) T, (j) F)
12. Write short notes on the following:
 - (a) Systematic Risk
 - (b) Diversification
 - (c) Beta Factor
 - (d) Unsystematic Risk
 - (e) Capital Market Theory
 - (f) Portfolio Risk



13. Harsh has 78% of his funds invested in Security A and 22% in Security B. The expected risk & return associated with Security A are 9.82% and 16.32% respectively. In the case of Security B, the expected return & risk are 14.97% and 32.86%. What is the portfolio's expected risk and return respectively?

(Ans. – Portfolio return = 10.95%, Portfolio risk = 15.13%)

14. Mr. Pranav has two securities for his portfolio whose details are given below:

	Security X	Security Y
E(R)	15%	19%
σ	5%	7%

If he invested 40% in X and 60% in Y, find the expected return, maximum and minimum risk of such portfolios.

(Ans. - Portfolio Return = 17.4%, Maximum Risk = 6.2%, Minimum Risk = 2.2%)

15. The expected return and risk of P & Q are given below:

	Security P	Security Q
E(R)	20%	15%
σ	15%	8%

The coefficient of correlation between the returns of two securities is 0.3. An investor has to decide about the portfolio of X & Y as 75% + 25%.

(Ans. - Portfolio Return = 18.75%, Risk = 12%)

16. An investor has two stocks: S and T. The risk is 0.25 for S and 0.14 for T. The correlation between the two securities is 0.1285. Calculate the covariance between the returns of S and T.

(Ans. – Covariance_{ST} = 0.0045)

17. An investor has two stocks: A and B. The risk is 30% for A and 20% for B. The covariance between the returns of A and B is 0.01. Calculate the coefficient of correlation.

(Ans. - ρ_{AB} = 0.167)



Notes

18. The risk and return of the market portfolio are 28% and 14% respectively. The risk-free rate is 10% and the standard deviation of the portfolio is 37%. Find out the expected return of the investor as per CML.

(Ans. - $E(R_p) = 15.28\%$)

19. The risk-free rate is 8%. The β of the security and the market return of the portfolio is 0.7 & 16% respectively. Calculate the expected rate of return of the security and also calculate β of the other security that has an expected return of 24%.

(Ans. - $E(R_s) = 13.6\%$, $\beta = 2$)

20. From the data given below, find out which of the securities are underpriced or overpriced in terms of the SML equation:

Security	$E(R)$	Beta
A	15	1.9
B	25	3
C	18	1.2
D	10	0.5
E	15	1.6

The return on the market index is 12% and the return on risk-free assets is 8%.

(Ans. – A is overpriced, B, C & E are underpriced, and D is fairly priced)

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Asset Pricing

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STRUCTURE

- 6.1 *Learning Objectives*
- 6.2 *Introduction*
- 6.3 *Capital Assets Pricing Model (CAPM)*
- 6.4 *Extensions to the CAPM*
- 6.5 *Arbitrage Pricing Theory*
- 6.6 *Active Portfolio Management*
- 6.7 *Summary*
- 6.8 *Illustrations*
- 6.9 *Answers to In-Text Questions*
- 6.10 *Self-Assessment Questions*
- 6.11 *References*
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6.1 Learning Objectives

- ◆ Understand the Standard Capital Asset Pricing Model (CAPM).
- ◆ Explore Extensions of the Capital Asset Pricing Model.
- ◆ Familiarize with Arbitrage Pricing Theory (APT).
- ◆ Develop knowledge of Active Portfolio Management.



6.2 Introduction

Understanding asset pricing is crucial for investors, portfolio managers, and financial analysts in the dynamic world of finance and investment. To successfully negotiate the complexity of precisely pricing financial assets, one must have extensive knowledge and cutting-edge methodologies of the capital markets. The depths of asset valuation are explored in this chapter, which also examines the underlying ideas and models that influence the current investment environment.

We set out on a quest to solve the secrets of asset pricing within the pages of this in-depth manual, building on the basis provided by the Standard Capital Asset Pricing Model (CAPM). A pillar of contemporary finance, the CAPM provides a place to begin understanding the connection between risk and return in the context of diversified portfolios. We will look at the CAPM's presumptions, computations, and implications in order to provide readers with a clear knowledge of both its advantages and disadvantages.

We go into the CAPM's extensions in order to look beyond its original confines. It is crucial to investigate more complicated frameworks that capture additional elements impacting asset values as the capital markets' complexity increases. This chapter examines various CAPM extensions, such as multifactor models that include elements like size, value, and momentum. We thoroughly analyse these extended models to reveal their strengths and weaknesses, giving readers a complete set of asset appraisal tools.

The Arbitrage Pricing Theory (APT) emerges as a significant alternative pricing model in addition to the CAPM and its extensions. The APT, created by Stephen Ross, provides a distinctive viewpoint on asset pricing by identifying macroeconomic variables that affect security returns. The reader will learn a lot about the APT's assumptions, applications, and empirical data as we navigate its complexities. Readers may properly analyse and compare these two well-known asset pricing theories and make wise investing decisions by learning both the CAPM and the APT. Investors and portfolio managers must understand the idea of active portfolio management in order to successfully traverse the dynamic world of asset



Notes

pricing. In-depth analysis of active portfolio management strategies is provided in this chapter, which looks at strategies such as stock selection, market timing, and risk management. Readers will have a thorough understanding of the subtleties and difficulties of active management, enabling them to put into practice successful investment strategies by drawing on the huge body of research and practical insights.

This chapter combines theoretical underpinnings with practical applications, using a hands-on approach to ensure applicability in real-world settings. The use of case studies, numerical examples, and empirical research will give readers a comprehensive understanding of asset pricing. We place a strong emphasis on the value of data analysis, quantitative methods, and critical thinking in order to efficiently assess and make wise financial decisions.

Students, scholars, financial professionals, and anybody else looking to get a deeper grasp of asset valuation will all benefit from Unit V: Asset Pricing. The information is organised logically and methodically, laying a solid foundation of understanding before exploring more complex subjects. This strategy makes sure that readers with different levels of competence can make use of the information and advance at their own speed.

In summary, the goal of this chapter is to provide readers with the information and resources they need to successfully negotiate the intricate world of asset pricing. Readers will get a thorough understanding of asset valuation by investigating the Standard Capital Asset Pricing Model, its extensions, the Arbitrage Pricing Theory, and active portfolio management strategies. Unit V: Asset Pricing will be a vital tool on your path to mastering asset pricing, whether you are a student of finance, an experienced professional, or an individual trying to improve your financial knowledge.

6.3 Capital Assets Pricing Model (CAPM)

One of the biggest advancements in portfolio theory is the capital asset pricing model. The model is straightforward yet effective; it is clear but profound. William Sharpe, John Lintner, Jack Treynor, and Jan Mossin all independently developed the CAPM, which expands on Harry Markowitz's prior research on diversification and contemporary portfolio theory. Given the beta of an asset, the model gives a linear anticipated



return-beta connection that exactly calculates the expected return. This shifts the focus from overall risk to systematic risk, which is the main driver of projected return. Remember the following formula:

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

According to the CAPM, the only factor that affects an asset's expected returns is its systematic risk, which is determined by beta. Regardless of the characteristics of the assets, two assets with the same beta will have the same expected return. All assets are solely defined by their beta risk due to the link between risk and return, which we will explain when we go over the underlying assumptions.

Assumptions of the CAPM

By using simple assumptions, the CAPM, like all other models, ignores many of the intricacies of financial markets. Without adding complexity to the investigation, these assumptions enable us to get crucial insights into how assets are valued. We can loosen the assumptions once the fundamental relationships have been discovered and then consider how our insights might need to be modified. Some of these presumptions are restrictive, while others are constructive. Additionally, some hypotheses only slightly or exclusively affect a specific group of assets or relationships:

1. Investors are risk-averse, utility-maximizing, rational individuals:

Investors that are risk-averse anticipate receiving compensation for taking on risk. It should be noted that the assumption merely needs that investors be risk averse; it does not demand that they be equally risk averse. According to utility maximisation, investors constantly desire more wealth (*i.e.*, they are never satisfied) and prefer higher returns over lower returns. It is assumed that investors make rational judgements because they accurately assess and analyse the information at hand. Although rational investors may arrive at various estimates of expected risk and expected profits using the same information, homogeneity among investors (see Assumption 4) necessitates that investors be reasonable people.

Most people agree that utility maximisation and risk aversion reflect a realistic perspective on the world. However, investors may allow their own prejudices and experiences to interfere with their decision-making, leading to unfavourable investments, and raising questions



about investor rationality. However, as long as it does not significantly alter prices (*i.e.*, the trades of irrational investors cancel each other out or are outweighed by the transactions of rational investors), the outcomes of the model are unaffected by such illogical behaviour.

- 2. Markets are frictionless, including no transaction costs and no taxes:** We can separate the analysis from the way that markets function thanks to frictionless markets. By doing this, we prevent factors like the volume of trade on the New York Stock Exchange or the spread between the asking and closing prices from having an impact on the risk-return relationship. Particularly, there are no transaction fees, taxes, or limitations on short sales in frictionless marketplaces. We also believe it is conceivable to lend and borrow at a risk-free rate.

Many major institutions have little transaction costs, and many of them do not pay taxes. Even non-zero transaction costs, taxes, or the inability to borrow money at risk-free rates have no discernible impact on the CAPM's overall findings. However, costs associated with short selling or prohibitions on short selling may result in an upward tilt in asset prices, thus jeopardising the validity of key CAPM findings.

- 3. Investors plan for the same single holding:** All investment decisions are based on the single period of the CAPM, which is a single-period model. Because working with multi-period models is more challenging, the assumption of a single period is used for convenience. However, learning cannot take place in a single-period paradigm, and poor choices may continue. Furthermore, decisions made in some periods that may appear suboptimal when seen from a single-period viewpoint may be necessary to maximise utility at the end of a multi-period horizon. The single holding period does not significantly restrict the CAPM's applicability to multi-period contexts, though.
- 4. Investors have homogeneous expectations or beliefs:** According to this supposition, every investor evaluates securities the same way, applying the same probability distributions and future cash flow inputs. The investors will also reach the same valuations given that they are sensible beings. They will produce the same ideal



risky portfolio, which we refer to as the market portfolio because they value all assets the same way. As long as the variations in expectations do not considerably produce distinct optimal risky portfolios, the premise of homogeneous beliefs can be ignored.

5. **All investments are infinitely:** According to this presumption, a person may invest in an item in any amount they choose, no matter how little or how big. As a result of this premise, the model can rely on continuous functions rather than discrete jump functions. The assumption is only for convenience and has no bearing whatsoever on the model's conclusions.
6. **Investors are price:** The CAPM makes the assumption that there are several investors, none of whom are large enough to have an impact on prices. Investors are price takers, thus we believe that trades by investors have little impact on security prices. This assumption is typically accurate because, despite the possibility that investors could influence the prices of small stocks, those stocks are typically too small to have an impact on the CAPM's pricing outcomes.

These presumptions are primarily intended to produce a marginal investor who makes predictable mean-variance-efficient portfolio selections. From a functional and informational standpoint, we assume away any market inefficiencies. Even though some of these hypotheses might seem implausible, most of them can be relaxed with little to no impact on the model's performance and predictions. In addition, the CAPM offers a standard for comparison and for generating preliminary return projections, despite all of its flaws and shortcomings.

Question 1: Assume that the market portfolio's expected return is 13% and that its standard deviation is 23%. The risk-free rate is 3%. Bajaj Auto, an Indian business, deviates from the market by a standard deviation of 50%. Determine the beta and projected return for Bajaj Auto.

Solution: Using the formula for β_i , we can calculate β_i and then the return.

$$\beta_i = \frac{\rho_{i,m} \sigma_i}{\sigma_m} = \frac{0.0 \times 0.50}{0.23} = 0$$

$$E(R_i) = R_f + \beta_i[E(R_m) - R_f] = 0.03 + 0 \times (0.13 - 0.03) = 0.03 = 3.0\%$$



Notes

Bajaj Auto's beta is zero because it has no association with the market portfolio. The predicted return for Bajaj Auto is the risk-free rate, which is 3%, as the beta is zero.

Question 2: Assume that the market portfolio's expected return is 13% and that its standard deviation is 23%. The risk-free rate is 3%. Mueller Metals, a German business, has a market correlation of 0.65 and a standard deviation of 50%. Determine the beta and expected return for Mueller Metal.

Solution: Using the formula for β_i , we can calculate β_i and then the return.

$$\beta_i = \frac{\rho_{i,m}\sigma_i}{\sigma_m} = \frac{0.65 \times 0.50}{0.23}$$

$$= 1.41$$

$$E(R_i) = R_f + \beta_i[E(R_m) - R_f] = 0.03 + 1.41 \times (0.13 - 0.03) = 0.171 = 17.1\%$$

Because Mueller Metals and the market have such strong correlations, the company's beta is 1.41 and its predicted return is 17.1%. Mueller Metals has an expected return that is higher than the expected return of the market because its systematic risk is higher than the market.

Question 3: Current expected risk-free return is 4%, the asset's beta is 1.40, and the equity risk premium is 4.6%, then calculate the asset's required return.

Solution: Required return on the share i = Current expected risk-free return + β_i (Equity risk premium)

$$= 0.040 + 1.40(0.046) = 0.1044$$

$$= 10.44\%$$

Limitations of the CAPM

There are theoretical and practical restrictions on the CAPM. Practical limits are those that develop from applying the model, whereas theoretical limitations are those that are inherent in the model's construction.

Theoretical Limitations of the CAPM

- ◆ **Single-factor model:** The CAPM only prices systematic or beta risk. As a result, the CAPM specifies that while evaluating returns, no additional investment characteristics should be taken into account.



As a result, despite being quite restrictive, it is prescriptive, simple to understand, and apply and

- ◆ **Single-period model:** The CAPM is a single-period model that does not take into account the consequences for many periods or the investment goals of subsequent periods, which might result in myopic and unfavourable investment choices. For instance, it can be best to skip an interest payment in order to maximise returns in the now, but doing so might have unfavourable effects in the future. It is impossible for a single-period model like the CAPM to account for factors that change over time and span multiple periods.

Practical Limitations of the CAPM

Implementing the CAPM raises a number of practical issues in addition to the theoretical ones, some of which are described below:

- ◆ **Market portfolio:** According to the CAPM, the actual market portfolio contains all assets, both financial and nonfinancial, including many that cannot be invested, such as human capital and assets in closed economies. The genuine market portfolio is not observable, as Richard Roll pointed out, which is one of the reasons the CAPM cannot be tested.
- ◆ **Proxy for a market portfolio:** Market players typically employ proxies when there isn't a real market portfolio. However, these proxies produce varying return estimates for the same asset depending on the analyst, the investor's nation, etc., which is not allowed by the CAPM.
- ◆ **Estimation of beta risk:** To calculate beta risk, a lengthy history of returns (three to five years) is needed. However, the historical state of the corporation might not be a reliable indicator of its present or future state. The CAPM is an ex ante model more generally, however it is typically used using ex post. Additionally, different estimates of beta are obtained when utilising various estimation periods. For example, A beta estimated with daily returns is unlikely to be the same as a beta estimated with monthly returns, and a three-year beta is unlikely to be the same as a five-year beta. As a result, depending on the beta risk estimate that is utilised in the model, we may estimate various returns for the same asset.



- ◆ If the CAPM were a good model, its estimate of asset returns would be highly correlated with realised returns.

The CAPM receives little empirical evidence, nevertheless. To put it another way, analyses of the CAPM demonstrate that asset returns are not solely influenced by systematic risk. Because return-generating models are employed to anticipate future returns, the CAPM has a severe flaw in that returns are not predictably predictable.

Homogeneity in investor expectations: For the CAPM to produce a single ideal risky portfolio (the market) and a single securities market line, homogeneity in investor expectations must exist. There will be many ideal risky portfolios and many security markets without this supposition. It is obvious that investors can rationally analyse the same information and arrive at various optimal risky portfolios.

IN-TEXT QUESTIONS

1. The CAPM assumes that investors are:
 - (a) Risk-averse
 - (b) Risk-neutral
 - (c) Risk-seeking
 - (d) None of the above
2. The CAPM states that the expected return of an asset is equal to:
 - (a) The risk-free rate plus the beta of the asset multiplied by the market risk premium
 - (b) The risk-free rate plus the alpha of the asset
 - (c) The beta of the asset multiplied by the market risk premium
 - (d) None of the above

6.4 Extensions to the CAPM

It is not unexpected that different models have been presented to alleviate some of the CAPM's shortcomings given their shortcomings. As we analyse the models, we will note that these new models have some limits of their



own. We categorise the models into two groups: theoretical models and practical models.

Theoretical Models

Theoretical models have a similar foundation as the CAPM but include more risk elements. Stephen Ross's creation, the arbitrage pricing theory (APT), is the best illustration of a theoretical model. APT suggests a linear relationship between expected return and risk, similar to the CAPM:

$$E(R_p) = R_F + \lambda_1\beta_{p,1} + \lambda_K\beta_{p,K}$$

where

$E(R_p)$ = the expected return of portfolio p

R_F = the risk-free rate

λ_j = the risk premium (expected return in excess of the risk-free rate) for factor j

$\beta_{p,j}$ = the sensitivity of the portfolio to factor j

K = the number of risk factors

APT, on the other hand, permits a wide range of risk factors—as many as are pertinent to a certain asset—in contrast to the CAPM. In addition, risk variables need not be universal and may differ from one asset to another, aside from the risk-free rate. The risk components are identified and their betas are estimated using a no-arbitrage condition in asset markets.

APT does not specify any of the risk factors, making it challenging to identify risk factors and calculate betas for each asset in a portfolio, despite the fact that it is theoretically more elegant, flexible, and superior to the CAPM. As a result, it is not frequently employed in practise. Therefore, the CAPM is recommended over the APT from a practical aspect.

Practical Models

Which factors, if any, account for returns if beta risk in the CAPM does not? Practical models use in-depth study to try to provide an answer to this query. As stated in Section 3.2.1, the four-factor model proposed by Fama and French (1992) and Carhart (1997) is the greatest illustration of such a model.

Fama and French (1992) claimed that three components appear to explain asset returns more effectively than just systematic risk based on



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an investigation of the link between past returns and a range of various factors. These three elements include the asset's beta, relative size, and relative book-to-market value. The model can be expressed as follows by including the relative previous stock returns introduced by Carhart (1997):

$$E(R_{it}) = \alpha_i + \beta_i \text{MKT} + \beta_i \text{SMB} + \beta_i \text{HML} + \beta_i \text{UMD} + T_i + B_i + L_i + D_i$$

where

$E(R_i)$ = the return on an asset in excess of the one-month T-bill return

MKT = the excess return on the market portfolio

SMB = the difference in returns between small-capitalization stocks and large-capitalization stocks (size)

HML = the difference in returns between high-book-to-market stocks and low-book-to-market stocks (value versus growth)

UMD = the difference in returns of the prior year's winners and losers (momentum)

The coefficient on MKT is not statistically different from zero, according to historical data, which suggests that stock return is unconnected to the market. Size (smaller firms outperform larger companies), book-to-market ratio (value companies outperform glamour companies), and momentum (past winners outperform past losers) are the elements that influence stock returns.

The four-factor model, which is widely employed in forecasting returns for US equities, has been found to predict asset returns substantially better than the CAPM.

There should be two observations. First, unlike the CAPM, which is supported by a theory of market equilibrium, the model does not. Second, there is no guarantee that the model will keep operating effectively in the future.

6.5 Arbitrage Pricing Theory

As a substitute for the CAPM, Ross (1976) created the arbitrage pricing theory (APT) in the 1970s. The expected return of an asset (or portfolio) in equilibrium is explained by the APT framework as a linear function



of the asset (or portfolio) risk with respect to a collection of factors that capture systematic risk. The APT, in contrast to the CAPM, does not reveal the name or even the total number of risk factors. Rather, the theory provides the related equation for the asset's expected return for any multifactor model that assumes return generation (a "return-generating process").

Suppose that K factors are assumed to generate returns. Then the simplest explanation for a multifactor model for the return of asset i is given by

$$R_i = a_i + b_{i1} I_1 + b_{i2} I_2 + \dots + b_{iK} I_K + \varepsilon_i, \dots \dots \dots (1)$$

where

- R_i = the return to asset i
- a_i = an intercept term
- I_k = the return to factor k , $k = 1, 2, \dots, K$
- b_{ik} = the sensitivity of the return on asset i to the return to factor k , $k = 1, 2, \dots, K$
- ε_i = an error term with a zero mean that represents the portion of the return to asset i not explained by the factor model

Given that all of the elements bet on a value of zero, the expected return of the asset i is represented by the intercept term (a_i). A multifactor return-generating process (a time-series model for returns) is shown in Equation 1. The error term indicates that, in any particular time, the model might not fully capture the asset's return. But a mistake is thought to be close to zero on average. Another popular version involves subtracting the risk-free rate from both sides of Equation 1, making the return above the risk-free rate the dependent variable and the factor return above the risk-free rate one of the explanatory variables. (The Carhart model discussed below is one illustration.)

The APT offers an expression for the anticipated return of asset i based on Equation 1, assuming that the financial markets are in equilibrium. The APT and the CAPM are comparable, although the APT has less firm assumptions. Only three fundamental assumptions are made by the APT:

- ◆ Asset returns are described using a factor model.



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- ◆ With a wide variety of assets available, investors can create well-diversified portfolios that remove the risk associated with particular assets.
- ◆ Well-diversified portfolios don't offer any prospects for arbitrage.

Arbitrage is a risk-free activity that needs no net financial investment but generates an anticipated net profit. (Note that "arbitrage," or the phrase "risk arbitrage," is also sometimes used in practice to indicate investing operations in which significant risk is present). An arbitrage opportunity is a chance to engage in an arbitrage—a chance to generate an anticipated positive net return with no risk and no net outlay of funds.

The initial assumption doesn't specify how many variables there are. Investors can create portfolios with factor risk but without asset-specific risk using the second supposition. Equilibrium in the financial market is the third presumption.

According to empirical evidence, Assumption 2 is reasonable (Fabozzi, 2008). The asset-specific or non-systematic risk of individual stocks in a portfolio with numerous stocks contributes almost nothing to the variance of portfolio returns. If these three premises are true, the following equation holds, according to the APT:

$$E(R_p) = R_F + \lambda_1 \beta_{p,1} + \dots + \lambda_K \beta_{p,K}, \dots \dots \dots (2)$$

where

$E(R_p)$ = the expected return to portfolio p

R_F = the risk-free rate

λ_j = the expected reward for bearing the risk of factor j

$\beta_{p,j}$ = the sensitivity of the portfolio to factor j

K = the number of factors

The expected return on every well-diversified portfolio is linearly proportional to the factor sensitivities of that portfolio, according to the APT equation, Equation 2. The formula presupposes the existence of a risk-free rate. In the absence of a risk-free asset, the expected return on a risky portfolio with no sensitivity to any of the components is represented by 0 in place of R_F . Although the number of components is not stated, it must be significantly less than the number of assets, a requirement that is actually met.



The expected benefit for taking on the risk of a portfolio with a sensitivity of 1 to factor j and a sensitivity of 0 to all other factors is represented by the factor risk premium (or factor price), j . Depending on the multifactor model that served as the foundation for Equation 2, the precise interpretation of “expected reward” will vary.

For instance, the risk premium for the market factor in the Carhart four-factor model is the projected return of the market over the risk-free rate (shown later in Equations 3a and 3b). The mean returns of the particular portfolios held long (for example, the portfolio of small-cap stocks for the “small minus big” factor) less the mean return for a related but opposite portfolio (for example, a portfolio of large-cap stocks, in the case of that factor) are the factor risk premiums for the other three factors. A pure factor portfolio for factor j (or simply the factor portfolio for factor j) is a portfolio with a sensitivity of 1 to factor j and a sensitivity of 0 to all other factors.

As an illustration, let’s say that our portfolio has a sensitivity of 1 to Factor 1 and a sensitivity of 0 to all other variables. Using Equation 2, the expected return on this portfolio is $E_1 = R_F + \lambda_1 \times 1$. If $E_1 = 0.12$ and $R_F = 0.04$, then the risk premium for Factor 1 is

$$0.12 = 0.04 + \lambda_1 \times 1.$$

$$\lambda_1 = 0.12 - 0.04 = 0.08, \text{ or } 8\%.$$

The Carhart four-factor model, usually referred to as the four-factor model or just the Carhart model, is a multifactor model that is frequently used in modern stock portfolio management. It is an expansion of the three-factor model Fama and French (1992) created to incorporate a momentum factor, as it is presented in Carhart (1997). The model shows that three categories of stocks typically outperform those indicated merely by their sensitivity to market returns:

- ◆ Stocks with small capitalizations.
- ◆ Stocks with a low price-to-book ratio, sometimes known as “value” stocks.
- ◆ “Momentum” stocks, or equities whose prices have been rising recently.



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The Carhart model postulates the existence of three systemic risk factors in addition to the market risk factor based on that data. They are named as follows, using the same order as above:

- ◆ Small Minus Big (SMB)
- ◆ High Minus Low (HML)
- ◆ Winners Minus Losers (WML)

The Carhart model, which is represented by equation 3a, explains the excess return on the portfolio as a function of the portfolio's sensitivity to a market index (RMRF), a market capitalization factor (SMB), a book-to-market factor (HML), which is essentially the reciprocal of the aforementioned price-to-book ratio, and a momentum factor (WML).

$$R_p - R_F = a_p + b_{p1} \text{RMRF} + b_{p2} \text{SMB} + b_{p3} \text{HML} + b_{p4} \text{WML} + \varepsilon_p, \dots\dots\dots (3a)$$

where

R_p and R_F = the return on the portfolio and the risk-free rate of return, respectively.

a_p = "alpha," or a return in excess of that expected given the portfolio's level of systematic risk (assuming the four factors capture all systematic risk).

b_p = the sensitivity of the portfolio to the given factor.

RMRF = the return on a value-weighted equity index in excess of the one-month T-bill rate.

SMB = small minus big, a size (market capitalization) factor; SMB is the average return on three small-cap portfolios minus the average return on three large-cap portfolios.

HML = high minus low, the average return on two high book-to-market portfolios minus the average return on two low book-to-market portfolios.

WML = winners minus losers, a momentum factor; WML is the return on a portfolio of the past year's winners minus the return on a portfolio of the past year's losers. (Note that WML is an equally weighted average of the stocks with the highest 30% 11-month returns lagged 1 month



minus the equally weighted average of the stocks with the lowest 30% 11-month returns lagged 1 month.)

ε_p = an error term that represents the portion of the return to the portfolio, p , not explained by the model.

Following Equation 2, the Carhart model can be stated as giving an equilibrium expected return as

$$E(R_p) = R_F + \beta_{p,1} \text{RMRF} + \beta_{p,2} \text{SMB} + \beta_{p,3} \text{HML} + \beta_{p,4} \text{WML} \dots\dots\dots (3b)$$

because the expected value of alpha is zero.

The Carhart model can be thought of as a multifactor modification of the CAPM that explicitly takes into account the factors that, from a pure CAPM perspective, are considered anomalies and cause disparities in expected returns among asset variables. (In this context, “anomaly” refers to an observed pattern in the capital markets that is not explained by, or contradicts, an asset pricing theory.) There are size, value, and momentum anomalies as seen by the CAPM. The Carhart model, however, views size, value, and momentum as systematic risk factors; exposure to them is anticipated to be made up for in the market through variations in mean return.

As prevalent themes in equities portfolio creation, size, value, and momentum all continue to play a significant role in active management risk decomposition and return attribution.

IN-TEXT QUESTIONS

3. In the APT, what is the role of arbitrage?
 - (a) It determines the expected return of an asset
 - (b) It eliminates mispriced assets through risk-free trading
 - (c) It helps in actively managing investment portfolios
 - (d) It identifies the systematic risk of an asset
4. Which pricing model is based on the assumption that an asset's expected return depends on multiple risk factors?
 - (a) Standard CAPM
 - (b) APT
 - (c) Active Portfolio Management
 - (d) Extensions of CAPM



6.6 Active Portfolio Management

The framework developed by Markowitz in 1952, formerly known as modern portfolio theory (MPT), is now widely used to explain and apply the concepts of risk and return in portfolio management. Later, Sharpe (1964) and other financial economists coupled a large portion of the mathematics and vocabulary of mean-variance portfolio theory with the idea of informational efficiency to produce equilibrium models, such as the conventional capital asset pricing model. Separately, Treynor and Black (1973) used the MPT's tools to help investors choose assets when prices deviate from their equilibrium values. By Grinold (1989) in "The Fundamental Law of Active Management" and by Black and Litterman (1992), the application of portfolio theory to active management was further expanded.

According to the active management hypothesis, an investor should build a portfolio based on a presumptive competitive advantage or expertise in return prediction. Active management hence is predicated on the idea that financial markets are not entirely efficient. Even while investors may ultimately be interested in overall risk and return, the right perspective is risk and return compared to a benchmark portfolio when asset management is left to professional investors in institutional settings (such as pension funds). The availability of passively managed portfolios necessitates an emphasis on value-added above and beyond the option of a low-cost index fund, in addition to the principal-agent problem in delegated asset management.

Active management seeks to enhance the value of the investment process by outperforming a benchmark portfolio. Value added, also referred to as passive investment, is a performance that is relative to investing in the benchmark portfolio. Positive value-added results from the investor outperforming the benchmark portfolio. Negative value-added results from the investor underperforming the benchmark portfolio. In the latter scenario, holding the benchmark portfolio would have been the investor's best course of action over the measurement period, especially when fees and expenses are taken into account.



Choice of Benchmark

To be an appropriate comparison for active management, a benchmark or passive portfolio should possess a number of characteristics.

The benchmark portfolio is frequently a readily accessible equity market index. The most popular market indices give each asset a weight based on their market capitalization. Since these indices typically self-rebalance and might have multiple investors holding them at once, capitalization weighting has been a key component in the development of capital market theory. By taking into consideration the portion of a security or asset that is publicly traded and not privately held, float-adjusted market capitalization-weighted indexes provide a slight improvement over non-float-adjusted indexes.

When all relevant assets are included in the market, one significant effect of employing a float-adjusted capitalization-weighted market index as the benchmark is that the value created through active management turns into a zero-sum game with respect to the market. Active investors as a group cannot outperform the market since the market portfolio is the average performance across all investors who possess securities before costs (active management is a zero-sum game). Active management is not a zero-sum game for benchmarks with a tighter definition than the entire market because investors can choose assets outside the benchmark.

The returns to the individual securities and the weights of each asset in the benchmark portfolio, R_B , are used to calculate the return on the portfolio:

$$R_B = \sum_{i=1}^N W_{B,i} R_i \dots\dots\dots (1)$$

where N is the number of stocks, $w_{B,i}$ is the security i 's benchmark weight, and R_i is its return. The weights of the stocks, i , held in the portfolio, $w_{P,i}$, and the returns on the individual securities both affect the return on an actively managed portfolio, R_P :

$$R_P = \sum_{i=1}^N W_{P,i} R_i \dots\dots\dots (2)$$

The benchmark could contain securities that, by definition, have a weight of zero because they are not a part of the actively managed portfolio or they could just not be factored into Equation 2's computation. Similarly, a shareholder might add stocks to their active portfolio that are not included



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in the benchmark, in which case Equation 1 would provide a benchmark weight of 0 to such securities. Please take note that, for the sake of simplicity, the managed portfolio return and the benchmark return are added together using the same notation, N, even if the managed portfolio may contain fewer or more securities than the benchmark.

Measuring Value Added

The simple difference between the return on an actively managed portfolio and the return on the benchmark portfolio is often used to measure the value added or “active return” of that portfolio.

$$R_A = R_P - R_B,$$

Hence, can be either positive or negative. The managed portfolio’s alpha, which we shall refer to as the risk-adjusted computation of value-added, includes an estimation of the risk of the managed portfolio in relation to the benchmark, which is frequently expressed by the portfolio’s beta, $\alpha_P = R_P - \beta_P R_B$. Sadly, the term “alpha” is frequently employed in practice to refer to “active return,” which implicitly assumes that the managed portfolio’s beta in relation to the benchmark equals 1.

The crucial idea that value added is ultimately determined by the variations in managed portfolio weights and benchmark weights can be illustrated by combining Equations 1 and 2: $\Delta w_i = w_{P,i} - w_{B,i}$. The symbol Δ (Greek letter delta) is used to denote the deviation from the benchmark weights, and these values are known as the active weights of the managed portfolio. The conceptually significant result that value added is the product of active weights and asset returns is obtained by combining Equations 1 and 2 and using this definition for active weights:

$$R_A = \sum_{i=1}^N \Delta W_i R_i$$

Given that the active weights’ sum is zero, the value-added may also be expressed as the sum of the active security returns and active weights:

$$R_A = \sum_{i=1}^N \Delta W_i R_{Ai} \dots\dots\dots (3)$$

$R_{Ai} = R_i - R_B$, etc. According to Equation 3, when securities with returns higher than the benchmark are overweighted and securities with returns lower than the benchmark are underweighted, positive value added is produced.



Decomposition of Value Added

Performance attribution systems frequently aim to break down the value added into several sources, in contrast to the prior straightforward example. The value added as a result of asset allocation and value added as a result of security selection are typically divided into two categories. Consider a stock and bond composite portfolio with asset allocation weights that are different from a composite benchmark and active security selection within each asset class. The discrepancy between the actual portfolio return and the benchmark return is the total value added:

$$R_A - \sum_{j=1}^M W_{P,j} R_{P,j} - \sum_{j=1}^M W_{B,j} R_{B,j}$$

Portfolio weights and returns on actively managed portfolios, denoted by the “P” subscript, are included in the initial summation. The “B” subscript indicates that the second summing includes benchmark returns as well as weights. The notation subscript $i = 1$ to N is left for use elsewhere to count the securities inside each asset class whereas the subscript $j = 1$ to M counts the number of asset classes.

The overall value added can be rewritten as the weighted sum of the value contributed through security selection, $R_{A,j} = R_{P,j} - R_{B,j}$, within each asset class, and the active asset allocation decisions:

$$R_A = \sum_{j=1}^M \Delta W_j R_{B,j} + \sum_{j=1}^M W_{P,j} R_{A,j} \dots\dots\dots (4)$$

Despite the fact that this formulation arbitrarily gives security selection an interactive effect. Equation 4’s performance attribution method could be simpler to understand if there were only two asset classes, stocks and bonds (or if $M = 2$). Equation 4 becomes Equation 4 with stocks and bonds as the subscripts:

$$R_A = (\Delta w_{stocks} R_{B,stocks} + \Delta w_{bonds} R_{B,bonds}) + (w_{P,stocks} R_{A,stocks} + w_{P,bonds} R_{A,bonds})$$

The value added as a result of the asset allocation choice is the first (parenthetical) term. The value added by security selection inside the stock and bond portfolios is the second term. The first term’s active weights refer to deviations from the policy portfolio.

Question 4: The following information is available for a portfolio comprising equities and bonds:

- ◆ ICICI (equity) mutual fund return: 36.4%
- ◆ Benchmark return: 33.3%



Notes

- ◆ Indiabulls (bond) return: -1.8%
- ◆ Benchmark return: -2.1%
- ◆ Strategic asset allocation: 60% in equities and 40% in bonds.
- ◆ Investor's asset allocation in the actively managed funds: 68% in ICICI and 32% in Indiabulls.

Given the above information, compute the total value added due to active asset allocation and security selection.

Solution:

$$\text{Portfolio return} = 0.68 \times 36.4 + (-1.8) \times 0.32 = 24.18\%$$

$$\text{Benchmark return} = 0.60 \times 33.3 + (-2.1) \times 0.4 = 19.14\%$$

$$\text{Value added} = 24.18\% - 19.14\% = 5.04\%$$

$$\text{Combined value from asset allocation} = 0.08(33.3) + (-0.08 \times -2.1) = 2.83\%$$

$$\text{Combined value added from security selection} \times 0.68 (3.1) + 0.32 (0.3) = 2.20\%$$

IN-TEXT QUESTIONS

5. Which approach involves active management of a portfolio to achieve superior returns?
 - (a) Passive Portfolio Management
 - (b) Efficient Market Hypothesis
 - (c) Active Portfolio Management
 - (d) Modern Portfolio Theory
6. Active Portfolio Management involves:
 - (a) Constructing a portfolio that closely mimics a specific benchmark
 - (b) Buying and holding a diversified portfolio of assets
 - (c) Attempting to outperform a benchmark through active trading and security selection
 - (d) Investing in assets with low systematic risk



6.7 Summary

The subject of asset pricing is covered in depth in Chapter X of Unit V, with an emphasis on the Standard Capital Asset Pricing Model (CAPM), CAPM extensions, Arbitrage Pricing Theory (APT), and Active Portfolio Management. Grasping the connection between risk and return in financial markets requires a grasp of these ideas.

Asset pricing is built on the Standard Capital Asset Pricing Model (CAPM). According to the CAPM, the expected return on an asset can be determined by multiplying the risk-free rate by a risk premium. The asset's beta, which gauges its volatility in relation to the market as a whole, determines this risk premium. To put it another way, the CAPM makes the assumption that investors want payment for assuming systematic risk, which is represented by the asset's beta.

The CAPM, however, has some drawbacks. As a result, a number of expansions have been suggested to improve its efficacy. The Fama-French model is one such extension, adding the two extra elements of size and value to the CAPM. While the value factor takes into account the outperformance of equities with lower price-to-book ratios, the size factor takes into account the propensity of smaller companies to outperform larger ones. The Fama-French model aims to more accurately reflect the intricacies of asset pricing by integrating these variables.

The Carhart four-factor model is another addition to the CAPM. The Carhart model includes a momentum element in addition to size and value, which accounts for the propensity for stocks that have done well in the past to do so in the future. The model attempts to represent the influence of market movements on asset values by incorporating this momentum element.

An alternative to the CAPM is provided by the arbitrage pricing theory (APT). APT is a more thorough theory that contends that various factors, as opposed to mere volatility as in the CAPM, affect an asset's expected return. The expected return on an asset can be computed using the APT by adding the risk-free rate and the risk premium for each factor that affects the asset's price. These variables can take many different forms and include economic ones like interest rates and inflation as well as non-financial ones like political developments or technological advances.



Notes

The APT is aware that there are many elements besides market volatility that affect asset pricing.

The process of choosing assets for a portfolio with the intention of beating a benchmark is known as active portfolio management. Active portfolio managers use a variety of techniques and variables to spot mispriced assets and profit from market imperfections. These tactics may involve using the CAPM, APT, or even the manager's personal discretion. To maximise profits and limit risks, active portfolio management constantly monitors and modifies the composition of the portfolio.

Finally, asset pricing is an important component of financial markets. A fundamental framework for comprehending the relationship between risk and return is provided by the Standard Capital Asset Pricing Model (CAPM). The CAPM has been expanded, though, with models like the Fama-French and Carhart models that include new variables to account for market complexities. APT provides a broader viewpoint on asset pricing by taking into account a larger range of variables in addition to volatility. These ideas and tactics are used in active portfolio management to actively choose assets with the goal of outperforming benchmarks. Investors can learn about asset value by studying these ideas, which will help them make wise choices as they pursue their financial goals.

6.8 Illustrations

Illustration 1: At the time of valuation, the estimated betas for JPMorgan Chase & Co. and Boeing Company were 1.4 and 0.90, respectively. The risk-free rate of was 4.45%, and the equity risk premium was 8.10%. Based on these data, calculate the required rates of return for these two stocks using the CAPM model.

Solution:

For JPMorgan Chase, the required return is

$$r = R_F + \beta [E(R_M) - R_F] = 4.45\% + 1.40(8.10\%) = 4.45\% + 11.34\% = 15.79\%$$

For Boeing the required return is

$$r = R_F + \beta [E(R_M) - R_F] = 4.45\% + 0.9(8.10\%) = 4.45\% + 7.29\% = 11.74\%$$



Illustration 2: An analyst's data source shows that X Mining has an estimated beta of -0.3 . The risk-free rate of return is 2.8% , and the equity risk premium is estimated to be 4.2% . Using the CAPM, calculate the required rate of return for investors in X Mining.

Solution:

The required return is given by

$$r = 0.028 + (-0.3)(0.042) = 0.028 - 0.0126 = 0.0154 = 1.54\%$$

Illustration 3: The benchmark weights and returns for each of the five stocks in the Capital Index are given in the following table. The BMS Fund uses the Capital Index as its benchmark, and the fund's portfolio weights are also shown in the table.

Stock	Portfolio Weight (%)	Benchmark Weight (%)	2022 Return (%)
1	25	22	15
2	25	22	16
3	20	20	13
4	15	18	9
5	15	18	10

What is the value added (active return) for the BMS Fund?

Solution:

The portfolio active return is equal to the portfolio return minus the benchmark return:

$$R_A = R_P - R_B$$

$$\text{The portfolio return } (R_P) = 0.25(15\%) + 0.25(16\%) + 0.20(13\%) + 0.15(9\%) + 0.15(10\%) = 13.2\%$$

$$\text{The benchmark return } (R_B) = 0.22(15\%) + 0.22(16\%) + 0.20(13\%) + 0.18(9\%) + 0.18(10\%) = 12.84\%$$

Thus, the active return is

$$R_A = R_P - R_B = 13.2\% - 12.84\% = 0.36\%$$

Illustration 4: Consider the following asset class returns for calendar year 2023.



Notes

Asset Class	Portfolio Weight (%)	Benchmark Weight (%)	Portfolio Return (%)	Benchmark Return (%)
Domestic equities	50	45	12	9
International equities	25	30	12	8
Bonds	25	25	6	7

What is the value added (or active return) for the managed portfolio?

Solution:

The active portfolio active return is equal to the portfolio return minus the benchmark return:

$$R_A = R_P - R_B$$

The portfolio return (R_P) = $0.50(12\%) + 0.25(12\%) + 0.25(6\%) = 10.5\%$

The benchmark return (R_B) = $0.45(9\%) + 0.30(8\%) + 0.25(7\%) = 8.2\%$

Thus, the active return is

$$R_A = R_P - R_B = 10.5\% - 8.2\% = 2.3\%$$

6.9 Answers to In-Text Questions

1. (a) Risk-averse
2. (a) The risk-free rate plus the beta of the asset multiplied by the market risk premium
3. (b) It eliminates mispriced assets through risk-free trading
4. (b) APT
5. (c) Active Portfolio Management
6. (c) Attempting to outperform a benchmark through active trading and security selection

6.10 Self-Assessment Questions

1. What is the Standard Capital Asset Pricing Model (CAPM) and how is the expected return of an asset calculated using it?
2. Describe the CAPM's assumptions and their limitations in practical applications.



3. What are the primary CAPM additions or adjustments done to enhance its precision and address its flaws?
4. Explain the Arbitrage Pricing Theory (APT) idea and how it differs from the CAPM in terms of how asset pricing is explained.
5. Compare and contrast the key assumptions and implications of the CAPM and APT.
6. Discuss the main factors or variables commonly used in the APT framework to explain asset returns.
7. Explain the concept of active portfolio management and the strategies employed by portfolio managers to outperform the market.
8. Analyze the empirical evidence on the effectiveness of active portfolio management strategies compared to passive management approaches.
9. Describe the different approaches or techniques used to evaluate the performance of actively managed portfolios.
10. Discuss the advantages and disadvantages of using active portfolio management strategies for individual investors.

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Evaluation of Investment Performances

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STRUCTURE

- 7.1 *Learning Objectives*
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7.1 Learning Objectives

- ◆ Understand the necessity of performance evaluation.
- ◆ Recognise the problems in assessing portfolio performance.
- ◆ Explains how performance evaluation fits into the investment management process.
- ◆ Recognise the necessity for portfolio revision.



- ◆ Contrast active and passive portfolio revision techniques.
- ◆ Recognise ideas like style analysis and performance attribution.
- ◆ Describe the objectives of return attribution and its function in the investment decision-making process.
- ◆ Describe the benefits of performance evaluation information to various stakeholders.
- ◆ Describe the main activities that make up the performance evaluation process and how they connect to one another.

7.2 Introduction

Information about the performance of an investor's investment portfolio that is accurate and up-to-date is essential for investment managers and investors. Such information is provided by performance evaluation. Without it, in a highly competitive investment management sector, investors and investment managers would find it increasingly challenging to meet stakeholders' present and future needs.

The measurement, analysis, interpretation, appraisal, and presentation of investment results are all parts of what is referred to as performance evaluation in the investment management sector. Performance evaluation in particular offers details on the return and risk of investment portfolios over predetermined time frames. Due to its role in keeping an eye on portfolios, performance evaluation is a crucial component of investment management.

Investment is the initial giving up of something that have value in exchange for the hope of receiving more in return. The return is the difference between what we invested and what we received; we make investments in order to generate this return. For financial assets, return comprises both the income received between the time of purchase and sale as well as the gain we will ultimately obtain when we either sell them to another party or wait for them to mature. Returns are a form of remuneration for forfeiting the use of capital in the interim.

Therefore, the "bottom line" of the investment process, which include assessing and comprehending the performance of a portfolio remains a crucial concern. Whether an individual investor manages his or her own



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money directly or indirectly through investing firms, this is crucial to understand.

Direct investing has large opportunity costs and can be time-consuming. On the other hand, it is important to understand how effective any professional portfolio managers (such as mutual fund managers) are if they are employed. Investors should favour manager A if manager A routinely outperforms manager B. Alternately, if neither A nor B outperforms an index fund, investors may favour neither. The apparent conclusion is that performance must be assessed before wise decisions about current portfolios can be made.

Over the years, techniques for evaluating investment performance have advanced, and portfolio clients' demands have grown increasingly stringent. The evaluation process and how it is perceived have changed as a result of current portfolio theory's widespread acceptance.

What goes into the appraisal of investment performance is covered in this chapter. In addition to discussing performance benchmarks, and performance presentation standards, it also includes well-known measures of portfolio performance such the Sharpe measure. An attempt has been made to address some of the issues that performance evaluation addresses like – What were the effects of the investment choices? Are portfolios being managed in accordance with investors' expectations and their mandates? And what steps have been taken to help clients reach their investment objectives?

7.3 Evaluation of Investment Performances

Performance evaluation enables investment managers (and the portfolio managers they employ) to take corrective actions to enhance investment decision making and management processes by providing reliable data and analysis on investment decisions and their outcomes. Information from performance evaluations aids in comprehending and managing investment risk, which should result in greater risk management.

Beginning with return calculation, performance evaluation encompasses a wide range of discrete but linked actions. These activities include details on both the final investment outcomes and the investment choices that led to those outcomes. Performance evaluation, describes performance



and examines why progress towards investor objectives took the course that it did. Performance assessment is a feedback method that aids in coordinating portfolio attributes with investor goals.

Because it offers feedback on the consequences of investment activities and decisions on portfolio performance, performance evaluation is a crucial step in the investment management decision-making process. Both internal and external stakeholders, including asset owners, investment consultants, and regulators, can benefit from this information. Internal stakeholders include portfolio managers, senior management, risk managers, compliance experts, and marketing and sales employees.

Why Evaluation of Investment Performance is Important?

Performance evaluation enables investment managers (and the portfolio managers they employ) to take corrective actions to enhance investment decision making and management processes by providing reliable data and analysis on investment decisions and their outcomes. Information from performance evaluations aids in comprehending and managing investment risk, which should result in more effective risk management.

Performance evaluation communicates portfolio managers' outcomes to asset owners and potential clients. In general, by giving pertinent information about performance and its determinants, it enables asset owners and potential clients to make better decisions (including selection, continuation, and dismissal) about investment managers.

For asset owners and potential clients, correct performance presentations are particularly crucial for facilitating proper analysis. Investment managers, asset owners, and other stakeholders may be significantly impacted by performance evaluation in its feedback role.

For investing professional's performance evaluation is effective monitoring of risk and return in relation to the investor's objectives and the designated benchmark; prompt attention to potential performance issues and unintended business or investment risks; an efficient internal management information system; efficient internal monitoring and oversight management/mechanisms.

For both asset owners and investment manager's performance evaluation aids in a thorough grasp of the many actions and choices made during the investment management process and how they affect performance. By using more objective and less subjective investment performance data



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during the performance assessment process, non-focused discussions can be reduced. Dialogue between stakeholders can also result in innovation, changes to practises, a strengthened brand and reputation, and new, appealing investment products for investors.

For asset owners the performance evaluation takes changes in investment strategy, style, or restrictions into account and informs them of these. The performance review accurately and objectively depicts the investments made, outcomes obtained, risks taken, and costs and taxes paid. Risk and return are both taken into account when evaluating performance. The performance evaluation offers comparisons, such as a suitable benchmark, to allow evaluation of the relative performance of the investment portfolio.

7.4 Measures of Portfolio Performance

A portfolio is a collection of financial assets such mutual funds, exchange-traded funds, closed-fund counterparts, stocks, FDs, bonds, and cash equivalents. A chance for risk diversification is provided by the portfolio. Risk diversification does not imply that risk will be eliminated. Diversifiable or unsystematic risk and undiversifiable or systematic risk are the two categories of risk that come with any asset. Even the ideal portfolio can only minimise or eliminate the diversifiable risk; it cannot completely remove market risk. Risk is inversely correlated with return variability.

The professional management of securities and other assets is referred to as portfolio management. Likewise known as “wealth management” and “asset management.” It is the art of choosing the best investment tools in the proper amounts to provide the best returns while maintaining a healthy balance of risk from the initial investment. The best portfolio management techniques operate under the premise of highest return with a minimum amount of risk over a certain period of time. Based on an investor’s income, investment budget, and risk tolerance while keeping in mind the anticipated rate of return, a portfolio is created.

In the current environment, people hire skilled and experienced portfolio managers who, based on the client’s risk tolerance, combine multiple investment products to create a tailored portfolio with long-term returns that are guaranteed. Every person needs to set aside a portion of their



money and invest it in something that will help them in the future. A portfolio is a collection of different financial goods into which a person spends their money.

Reasons for evaluating Portfolio performance

The essence of investing is measuring the performance of a portfolio. Anyone who manages their own portfolios or entrusts their money to others to handle wants to know how they are doing as investments. Additionally, people should be aware of what to look for when investment results are presented to them if they use others to handle their money or read investing newsletters.

The examination of a portfolio's performance is largely concerned with determining how well it has fared in contrast to some benchmark. If the portfolio has exceeded, underperformed, or performed on par with the benchmark, the evaluation can show how much.

The performance of a portfolio should be evaluated for a number of reasons. The investor, whose money has been placed in the portfolio, must first be aware of the portfolio's comparative performance. The performance review must produce and offer data that will enable the investor to determine whether rebalancing of his portfolio is necessary. Second, if the manager's compensation is linked to the success of the portfolio, the management of the portfolio needs this information to assess the manager's performance and decide that compensation.

For both investors and fund managers, evaluating an investment portfolio is a crucial duty. Particularly when that portfolio manager is appointed to run a mutual fund, pension fund or any other collective investment plan has a greater professional interest in reviewing a portfolio performance. Companies that manage funds and portfolios on behalf of their principals are required by regulatory organisations to submit to the capital market authorities the appraisal of their performance on a frequent basis, even if previous performance does not guarantee future success.

In terms of agency theory, portfolio management evaluation is equally crucial. Conflicts between the principals (*i.e.*, customers, investors) and the agent (portfolio manager) may arise during the examination of financial portfolios. There are numerous ways in which this might happen. A moral hazard issue would arise, for instance, if a portfolio manager suddenly decided to take a high-risk position against the wishes of her or his client.



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As another illustration, Financial illiteracy among investors is crucial because, the manager could present his or her performance in a way that misleads investors into picking him or her to handle their funds. Finally, a portfolio manager may perform worse than the benchmark and perform poorly in attribution analysis (*i.e.*, allocation and selection effects), which constitutes an adverse selection issue.

Techniques for evaluating Portfolio performance

The examination of portfolio performance involves determining how a managed portfolio has performed in contrast to some benchmark. Approaches for performance evaluation typically fall into one of two categories: traditional approaches or methods that account for risk. The two standard strategies that are most frequently employed are benchmark comparison and style comparison. In order to account for variations in risk levels between the managed portfolio and the benchmark portfolio, risk-adjusted approaches modify returns. The Sharpe ratio, Treynor ratio, Jensen's alpha and Modigliani and Modigliani (M^2) are the principal techniques. The risk-adjusted approaches are favoured above the traditional approaches.

The two main categories of performance evaluation techniques are:

Conventional Methods**1. Benchmark Comparison**

Comparing the performance of an investment portfolio to a larger market index is the most basic traditional approach. The Nifty 50 index, which represents the weighted average of 50 Indian equities listed on National stock exchange, is the most popular market index in the India. The portfolio is considered to have outperformed the benchmark index if its return, assessed over the same time periods, is higher than that of the benchmark index.

Even while this kind of comparison with a passive index is quite popular in the investment industry, it poses a unique issue. The investment portfolio's level of risk could differ from the benchmark index portfolio's level.

Long-term rewards should be higher when there is a higher risk involved. In other words, if the investment portfolio has outperformed the benchmark portfolio, it may be because it is riskier than the benchmark portfolio.



Therefore, comparing an investment portfolio's return to that of a benchmark portfolio may not yield accurate results.

2. Style Comparison

The return of a portfolio is compared to another portfolio with a similar investing style as part of the "style-comparison" method, a second traditional performance evaluation technique. Despite the fact that there are numerous investment types, one widely utilised method divides them into value and growth categories.

The "value style" portfolios make investments in businesses that are viewed as being undervalued using metrics like price-to-earnings and price-to-book value multiples. The "growth style" portfolios invest in businesses whose revenue and earnings are anticipated to expand more quickly than those of the typical corporation.

A value-oriented benchmark portfolio's return would be compared to that of a value-oriented benchmark portfolio in order to assess the performance of the latter. Similar comparisons are made between a growth style portfolio and a growth style benchmark index. This strategy also has the drawback of perhaps having varying risks between the two examined portfolios, even though their styles may appear to be comparable. Additionally, the benchmarks used could not be actually comparable in terms of style because two funds with identical styles can differ in a number of significant ways.

Risk-adjusted Methods

In order to account for the variations in risk levels between the managed portfolio and the benchmark portfolio, the risk-adjusted methods modify returns. Although there are other similar techniques, the Sharpe ratio (S), Treynor ratio (T), Jensen's alpha (α), Modigliani and Modigliani (M2) stand out as the most prominent ones. These measurements are detailed here, along with the applications for them.

◆ Treynor Ratio

Investors were first given a composite measure of portfolio performance that took risk into account by Jack L. Treynor. Finding a performance metric that could be used by all investors, regardless of their individual risk inclinations, was Treynor's goal.

According to Treynor, there are actually two parts to risk: the risk brought on by stock market fluctuations and the risk brought on by the



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fluctuations of specific assets. The risk premium per unit of systematic risk is calculated using the Treynor ratio. The Sharpe measure defines the risk premium. The way this method differs is that the risk parameter is the portfolio's systematic risk.

The systemic risk is the portion of an asset's overall risk that cannot be completely reduced by diversification. The "beta" parameter, which indicates the slope of the regression between the returns from the managed portfolio and the returns from the market portfolio, is used to measure it. The term "security market" was first used by Treynor to describe the relationship between portfolio returns and market rates of return; the slope of the line represents how volatile the portfolio is in comparison to the market (represented by beta).

The following equation provides the Treynor ratio:

Treynor ratio = return of portfolio – risk free rate/beta of portfolio

The portfolio risk is represented by the denominator, and the numerator represents the risk premium. The calculated figure is the portfolio's return on each unit of risk. The volatility of a stock portfolio in relation to the market is measured by the beta coefficient. The risk-return tradeoff improves with increasing line slope.

Illustration: The typical annual return for a portfolio manager is 10%. And the other details are as follows:

Risk-free rate- 4%

Portfolio's beta- 0.8

Return volatility- 20%.

The market index's standard deviation of returns is 25%, while its average annual return is 12%. Determine the portfolio's Treynor measure.

Solution: The formula to calculate Treynor measure is:

$$\begin{aligned}\text{Treynor ratio} &= \text{return of portfolio} - \text{risk free rate} / \text{beta of portfolio} \\ &= 10\% - 4\% / 0.8 \\ &= 7.5\end{aligned}$$

◆ **Sharpe Ratio**

The Treynor measure and the Sharpe ratio are nearly identical, with the exception that the risk metric used in the latter is the portfolio's standard



deviation rather than only beta's representation of systematic risk. Total risk is used to compare portfolios to the capital market line in this Bill Sharpe-created measure, which closely follows his work on the Capital Asset Pricing Model (CAPM).

The risk premium of an investment portfolio is calculated using the Sharpe ratio as one unit of total portfolio risk. The return on the portfolio less the risk-free rate of interest as determined by the yield of a Treasury asset is the risk premium, sometimes referred to as excess return.

Sharpe Ratio = return of portfolio – risk free rate/standard deviation of return of the portfolio

The standard deviation of the portfolio's returns represents overall risk. The numerator represents the benefit for investing in a hazardous portfolio of assets over the risk-free rate of interest, while the denominator represents the portfolio's return variability. The Sharpe measure is also known as the "reward to variability" ratio in this context.

Illustration: Three portfolio options are available to a client, each with the following features:

	Expected Return	Volatility	Beta
Portfolio X	17	14	11
Portfolio Y	20	16	12
Portfolio Z	14	11	6

The expected return on the efficient market portfolio is 22%, the standard deviation is 14%, and the risk-free rate of interest is 7%. The client should select which portfolio based Sharpe ratio?

Solution: The formula to calculate Sharpe ratio is:

Sharpe Ratio = return of portfolio – risk free rate/standard deviation of return of the portfolio

Therefore, Portfolio X's Sharpe ratio = $17\% - 7\% / 14\% = 0.714$

Portfolio Y's Sharpe ratio = $20\% - 7\% / 16\% = 0.812$

Portfolio Z's Sharpe ratio = $14\% - 7\% / 11\% = 0.636$

Given that portfolio Y has the highest Sharpe ratio *i.e.* 0.812, the client should select it. So, the decision rule is greater the slope or higher the Sharpe ratio the better the asset.



Notes

The Sharpe ratio, in contrast to the Treynor measure, assesses the portfolio manager based on both rate of return and diversification (it takes into account total portfolio risk as indicated by the standard deviation in its denominator). Because it more correctly accounts for the risks of the portfolio, the Sharpe ratio is therefore more suited for well-diversified portfolios.

Depending on the projections for the investments, the investor can use either Sharpe or Treynor method. Like, if the P is diversified, non-systematic risk is little, and Treynor's, which measures excess return to beta, is the right metric. Otherwise, use the Sharpe measure, which measures reward to risk, if P is not diversified.

◆ Jensen's Alpha

The Jensen measure, which bears the name of its inventor, Michael C. Jensen, determines the excess return that a portfolio achieves over its projected return. The Capital Asset Pricing Model (CAPM) of Sharpe (1964), Lintner (1965), and Mossin (1966) is the foundation for Jensen's alpha. The alpha measures the deviation between the portfolio's average return and the expected return predicted by the CAPM. In terms of the risk-free rate, systematic risk, and market risk premium, the CAPM specifies the expected return. The alpha can be higher, lower, or equal to zero. An alpha of larger than zero indicates that the portfolio's rate of return was higher than its expected return. The alpha is provided by Jensen.

Jensen's alpha = return of portfolio – {risk free rate + beta of portfolio (return of the market portfolio – risk free rate)}

The Jensen ratio calculates the percentage of the portfolio's rate of return that may be attributed to the manager's capacity for above-average returns after taking account of market risk. The better the risk-adjusted returns, the higher the ratio. A portfolio with an excess return that is constantly positive will have a positive alpha, whereas a portfolio with an excess return that is consistently negative will have a negative alpha.

Illustration: Two portfolios- X and Y have the following characteristics:

	Return	Beta
Portfolio X	10%	0.9
Portfolio Y	9%	1.5



Determine Jensen's Alpha for both portfolios with a market return of 12% and a risk-free rate of 5%. And also comment on which portfolio has fared better.

Solution: The formula to calculate Jensen's Alpha ratio is:

Jensen's alpha = return of portfolio – {risk free rate + beta of portfolio (return of the market portfolio – risk free rate)}

$$\begin{aligned} \text{Jensen's alpha for Portfolio X} &= 0.1 - \{0.05 + 0.9 (0.12 - 0.05)\} \\ &= 0.1 - \{0.05 + 0.9 (0.07)\} \\ &= 0.1 - 0.113 \\ &= -0.013 \end{aligned}$$

$$\begin{aligned} \text{Jensen's alpha for Portfolio Y} &= 0.09 - \{0.05 + 1.5 (0.12 - 0.05)\} \\ &= 0.09 - \{0.05 + 1.5 (0.07)\} \\ &= 0.09 - 0.155 \\ &= -0.065 \end{aligned}$$

For portfolios X and Y, Jensen's Alpha is -1.3% and -6.5% , respectively. A stronger portfolio performance is indicated by higher Jensen's Alpha. In this case, Jensen's alpha for Portfolio X (-1.3%) is higher than Jensen's alpha for Portfolio Y (-6.5%).

◆ Modigliani and Modigliani or M squared (M^2)

M squared (M^2) is another ratio, like the Treynor ratio, that assesses the portfolio's risk-adjusted return in comparison to the market benchmark. The idea of M squared refers to one of the most recent modern portfolio measuring techniques, Franco Modigliani and Leah Modigliani originally introduced M squared in 1997. They put forth Risk Adjusted Performance as an alternative performance measure that takes risk into account.

The idea behind risk adjusted performance is to use the market's opportunity cost of risk, or trade-off between risk and return, to adjust every portfolio to the unmanaged market benchmark's level of risk, matching each portfolio's risk to the market's risk, and then measuring the returns of this risk-matched portfolio.



Notes

The M squared formula is as follows:

$$M^2 = \left\{ \frac{\text{Return of portfolio} - \text{return of the benchmark}}{\text{portfolio risk}} \times \text{Benchmark risk} \right\} + \text{return of the benchmark}$$

When a portfolio has the same portfolio as the market, M^2 calculates the difference between its excess return over the market. In contrast to the Sharpe ratio, which measures return vs. risk in units, M^2 is expressed as a percentage return, making it simpler for investors to understand when examining a portfolio.

Illustration: Portfolio A offer return of 21% with a 28% standard deviation, while portfolio B offer returns of 22% with a 38% standard deviation. The market benchmark showed a 15% return with an 20% standard deviation. The return on the risk-free rate was 2.0%. Calculate the M squared for Portfolio A and Portfolio B.

Solution: The M squared formula is as follows:

$$M^2 = \left\{ \frac{\text{Return of portfolio} - \text{return of the benchmark}}{\text{portfolio risk}} \times \text{Benchmark risk} \right\} + \text{return of the benchmark}$$

M squared for Portfolio A:

$$M^2 = \left\{ \frac{21\% - 4\%}{28\%} \times 20\% \right\} + 4\%$$

$$= 12.14\% + 4\%$$

$$= 16.14\%$$

M squared for Portfolio B:

$$M^2 = \left\{ \frac{22\% - 4\%}{38\%} \times 20\% \right\} + 4\%$$

$$= 9.48\% + 4\%$$

$$= 13.48\%$$

From the above figures, we can infer that although while portfolio B's absolute return of 22.0% is higher than portfolio A's of 21%. But portfolio A's M^2 is actually 16.14% is higher than that of B's portfolio M^2 of 13.48%.



Measures of portfolio performance are important in making investment decisions. These tools give investors the knowledge they need to evaluate how well their money has been invested (or might be invested), as well as potential investments. Keep in mind that portfolio results only tell a portion of the tale. Investors cannot reasonably perceive the full investing picture without considering risk-adjusted returns, which may unintentionally result in confused decisions.

7.5 Return Attribution

A sophisticated tool for assessing a portfolio manager's or fund manager's performance is attribution analysis. It also known by the names "return attribution" or "performance attribution," and it aims to discover sources of excess returns, especially when compared to an index or other benchmark, by statistically analysing various aspects of an active fund manager's investment choices and decisions. Return attribution offers asset management companies quality control for the investment process by highlighting important strengths and weaknesses crucial to managing a complex business with many investment strategies.

Three elements are the subject of attribution analysis: the manager's investment choices and asset allocation, their investing approach, and the timing of their trades and decisions relative to the market. The process starts by determining the asset class that a fund management decides to invest in. An asset class, in general, specifies the kinds of investments that a manager selects; within that, it can also go more precise, specifying the region from which they come or the industry sector in which they operate.

Return attribution also offers data that is useful for analysing investment management ability, which is the focus of performance evaluation. Assume that a portfolio's return for the last year was 7% and that its benchmark return was 10% for the same time frame. In this instance, the portfolio generated a negative arithmetic return of 3% over the previous year ($7\% - 10\% = -3\%$). After this, return attribution can be used to find out the reason of deviation and how actual return fall short of 3%. Attribution analysis can be a useful technique for portfolio managers and investment firms to evaluate strategies. Attribution analysis can be used by investors



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to evaluate the efficacy of fund or money managers like – Was the return obtained by avoiding benchmark assets that performed comparatively poorly or by choosing securities that performed well in comparison to the benchmark (security selection)? Or was the return obtained through the choice to overinvest in a specific economic sector or asset category that underperformed the overall benchmark for that time period?

When performance is poor, return attribution analysis is especially crucial because portfolio managers must show that they understand their performance, justify their choices, and inspire confidence in their capacity to continue adding value in the future. The feedback mechanism of the portfolio management process includes return attribution, which quantifies the active decisions made by portfolio managers, monitors consistency, and informs senior management and clients. Return attribution can be considered a “backward-looking” or ex post feedback mechanism because it is used to assess investment choices made over a specific historical time horizon. By using return attribution, we may determine whether investment choices, in relation to the portfolio’s benchmark, have increased or decreased value over a given time horizon.

Importance of return attribution analysis

Return attribution analysis was initially created as a portfolio management tool, but it is equally beneficial for senior management, client relationship specialists, risk controllers, operations staff, sales and marketing professionals, as well as clients and potential clients.

For managers of portfolios it is a useful tool for evaluating strategies. It provides managers with the chance to evaluate every step of the investment decision-making process and identify areas for improvement. The tool that transforms performance measurement data from the back office into data that is helpful to the middle office control function is, in essence, return attribution analysis. A thorough understanding of the investment decision-making process is necessary for effective return attribution analysis, and return attribution must take the active decisions of the portfolio manager into account. Also at an asset management company, it is also used to assess staff performance. If an analyst or employee advised overweighting a certain industry or purchasing a specific stock, the profits might be ascribed to their efforts, which could be used to reward and inspire them further.



It is an efficient method for investors to evaluate the performance of fund managers. Attribution analysis is a crucial tool for investors and clients of portfolio managers to evaluate a manager's performance and determine whether their investment strategy and personal investing preferences have been followed. A portfolio manager may have underweighted the appropriate sector but chosen high-return stocks, demonstrating that selection rather than allocation is their stronger suit. In a similar vein, a portfolio manager might consent to create a portfolio with little risk. In order to promote transparency and reassure investors that the risk-averse strategy is being applied, the allocation and selection procedures should be examined.

Overall, it is the instrument that enables performance analysts to provide value and take part in the investment decision-making process by identifying the sources of excess return. A successful return attribution procedure must: reconcile to the overall portfolio return; reflect the investment choice process; quantify the active decisions made by the portfolio manager; and offer a thorough understanding of the excess return of the portfolio.

Any discrepancies found in the return attribution computation would unavoidably draw a lot of notice given its central position in the analysis of the investment decision process. To guarantee that the return attribution analysis accurately reflects the decision process and that the data is of acceptable quality, considerable work may be necessary. Naturally, residuals of any size will cast doubt on the reliability of the return attribution analysis. In order to give useful information, the return attribution analysis may need to be redesigned to account for a new decision-making step, instrument, or strategy.

IN-TEXT QUESTIONS

1. The best way to sum up return attribution is as a procedure that:
 - (a) Tracks the outcomes of an active portfolio manager's choices
 - (b) Aids in the creation of an investment plan by a portfolio manager
 - (c) Evaluates the adequacy of the allocation or selection choices made by the portfolio manager
 - (d) None of the above



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2. The optimal application of return attribution is to:
 - (a) Gauge portfolio volatility
 - (b) Evaluate the value that active investment choices offer
 - (c) Make performance returns account for outside cash flows
 - (d) All of these
3. Which of the following statements most accurately sums up the role that performance evaluation plays in asset management?
Performance assessment:
 - (a) Offers knowledge that significantly lowers risk
 - (b) Assists investment managers in aligning portfolios with the goals of asset owners by providing feedback
 - (c) The asset owner reporting function, which only happens at the end of the management process
 - (d) None of the above
4. The best way to define performance measurement is:
 - (a) An assessment of a manager's investment ability
 - (b) Identifying the causes of an excess return relative to a benchmark in a portfolio
 - (c) Assessing the risk and return measures for a portfolio
 - (d) None of the above

7.6 Return Decomposition

The seminal work by Campbell and Shiller (1988a, 1988b) suggests that unexpected asset returns can be decomposed into two components: news about discount rates (DRs) and news about cash flows (CFs). Many subsequent studies follow this route and examine the relative importance of the two components in determining returns. Among them, one popular approach is to directly model the DR news and back out the CF news as the residual component. As Campbell and Vuolteenaho (2004) argue, "This practice has an important advantage — one does not necessarily have to understand the short-run dynamics of dividends. Understanding the dynamics of expected returns is enough." Using this method, some important conclusions have been drawn:



- ◆ For the equity market portfolio, the variance of the DR news is larger than the variance of the CF news, and the magnitude of DR betas is larger than that of CF betas at portfolio level. The combined evidence has been cited to support the claim that equity return at the aggregate level is mainly driven by the time-varying risk premium.
- ◆ Campbell and Vuolteenaho (2004) find that, for the 1963-2001 period, value stocks have higher CF betas but lower DR betas than growth stocks do. They conclude that (i) value stocks have higher equity returns than growth stocks because they have higher CF betas, and (ii) to calculate the cost of equity, the more important measure of risk is not the market beta, but the CF beta.

7.7 Portfolio Revision

A portfolio management activity would be lacking without regular reviews. Investors must continuously evaluate their chosen portfolio after making their selection to make sure that it maintains its optimal status throughout time. The appealing securities could stop offering viable returns due to dynamic changes in the economy and financial markets. New securities that promise large returns at low risks are produced as a result of the market shifts. In these circumstances, the investor must make changes to their portfolio by selling their old stocks and purchasing new ones. The mix and proportion of securities in the portfolio vary as a result of portfolio adjustment.

Revision of a portfolio entails altering the current security mix. Altering the securities currently included in the portfolio or the percentage of cash invested in the securities can accomplish this. The portfolio may contain new securities as well as current securities that are removed or added in new quantities. As a result, stock purchases and sales result from portfolio adjustment.

The portfolio, once chosen, must be continuously reviewed over time and, if necessary, revised depending on the investor's objectives. Changing the asset allocation of a portfolio is what is meant by portfolio revision. The process of portfolio revision entails altering the mix of stocks or bonds in the portfolio based on performance, expectations, and strategy. Stocks should be updated if an investor's strategy changes from capital appreciation to earnings.



Notes

The goal of portfolio revision is to maximise return for a given level of risk or to minimise risk for a given level of return, which is the same goal as portfolio selection. The maximisation of returns and the reduction of risk are the ultimate goals of portfolio revision.

The frequency of review, however, depends on the size of the portfolio, the amount at stake, the type of securities held, and the investor's time constraints. The evaluation should be followed by appropriate and timely action and should involve a detailed examination of investment objectives, targets for portfolio performance, actual results obtained, and analysis of cause for variances.

Reasons for Revision of Portfolio

1. A person might feel the urge to invest more money at one point in time. When a person has some extra cash to invest, a portfolio adjustment is necessary.
2. A portfolio modification may also result from a change in investing objectives. Depending on the cash flow, a person might change his financial objective, which finally results in adjustments to the portfolio.
3. There are dangers and unpredictability in the financial market. A person may sell off some of his assets as a result of changes in the financial market.

Portfolio Review Techniques

An active revision strategy and a passive revision strategy are the two options available for portfolio revision. The objectives, expertise, money, and time of the investor would all play a role in the strategy's choosing. Portfolio Revision Strategies come in two different varieties.

◆ Active Revision Technique

For optimum returns and minimal risks, an active revision strategy entails making regular adjustments to an existing portfolio over a set period of time. A portfolio manager can revise their portfolio by regularly selling and buying assets with the aid of an active revision strategy. Investors that use active revision strategies think that markets for securities are not always efficient. They contend that mispriced securities occasionally present an opportunity for trading in them to generate excess returns. In addition, they think that many investors have varying or heterogeneous expectations about the risk and return of securities available on the market. Active revision strategists are certain that they will produce more accurate estimations of



the real risk and return of assets than the rest of the market. They intend to produce excess returns using their more accurate estimates. Therefore, the goal of an active revision strategy is to outperform the competition.

The portfolio managers adjust the cash position or beta of the equity element of the portfolio in accordance with market forecasts, which is holding securities based on future expectations. Reperforming portfolio analysis and portfolio selection is the essence of active portfolio revision. It is based on a consideration of both technical elements like demand and supply and fundamental issues impacting the economy, industry, and business. Therefore, the time, expertise, and resources needed for active revision plan implementation will be significantly higher. Under an active revision method, trading is expected to occur more frequently, which would raise transaction costs.

◆ Passive Revision Techniques

It involves using a buy-and-hold strategy to hold a well-diversified portfolio over an extended period of time. Additionally, it describes the investor's effort to put together a portfolio that closely resembles the overall market returns. A portfolio manager may only make adjustments to the portfolio in accordance with the formula plans, according to the passive revision approach. Under a passive revision method, changes to the portfolio are made in accordance with a set of predetermined guidelines known as formula plans. The investor can modify his portfolio in response to developments in the securities market with the use of these formula plans.

Rare modifications in the portfolio are permitted under the passive revision strategy's rules. In contrast to active revision technique, a passive revision technique over time simply makes small and infrequent adjustments to the portfolio. The advocates of the passive revision technique claim that the expectations of investors are uniform and the market is efficient. They see no reason to actively trade and regularly review their investments.

Both active and passive portfolio updating strategies are used by investors. The efficient market hypothesis is slowly but steadily gaining support, according to studies on portfolio revision techniques, and investors are revising their portfolios considerably less frequently than they were in the past due to their growing confidence in market efficiency.

It is necessary to buy and sell assets in order to make a portfolio modification or adjustment. There are several issues that arise from the practise of portfolio adjustment, which involves buying and selling securities, and



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which operate as limitations on portfolio revision. Here are a few of these: Firstly, there are charges associated with buying and selling stocks, such as commission and brokerage. The advantages from portfolio revision may be diminished if securities are often bought and sold for portfolio revision purposes. Therefore, the transaction costs associated with portfolio change may serve as a barrier to timely portfolio adjustment. Secondly, the institutional investors like investment firms and mutual funds company are typically subject to statutory/legal restrictions on their investment activities. These requirements frequently serve as restrictions on fast portfolio revision. Thirdly, revision of a portfolio is a challenging and time-consuming task. It is also unclear what process should be used for portfolio revision. Different strategies could be used to achieve the goal. Portfolio revision may be hampered by how difficult it is to actually carry it out. Lastly, capital gains from the selling of securities are subject to taxation. Short-term capital gains are often taxed at a higher rate than long-term capital gains. Securities must be owned by an investor for at least 12 months prior to selling in order for the sale to qualify as a long-term capital gain. Periodic portfolio revisions or adjustments that involve frequent sales of stocks will produce short-term capital gains, which are taxed more heavily than long-term capital gains. The increased tax rate on short-term capital gains could make it more difficult to make regular portfolio adjustments.

7.8 Summary

The measurement, analysis, interpretation, appraisal, and presentation of investment results are all parts of what is referred to as performance evaluation in the investment management sector. Performance evaluation in particular offers details on the return and risk of investment portfolios over predetermined time frames. A subject that is closely connected is the choice of investment managers. Monitoring targets versus actual results to determine how well the company and its personnel are performing both collectively and individually is very important. Longer-term goals (like customer happiness) and short-term goals (like cost containment) can both be related to performance assessments.

This unit also makes the point that to reach your financial objectives, it's imperative to evaluate your investment portfolio. You can rebalance your portfolio in accordance with your life goals and events with the aid of timely assessments and thorough feedback from a qualified professional.



Performance of an investment portfolio can take many forms, and no single strategy is ideal.

New techniques and research on evaluating investment performance have exploded in recent years. In order to account for variations in risk levels between the managed portfolio and the benchmark portfolio, risk-adjusted approaches modify returns. The Sharpe ratio, Treynor ratio, Jensen's alpha, Modigliani and Modigliani are the principal techniques. The risk-adjusted approaches are favoured above the traditional approaches.

Building a flawless portfolio that enables you to generate money over the short, medium, and long terms is ultimately the aim of portfolio review. We have learned in this unit that portfolio revision, which entails modifying the current mix of assets, is just as crucial to the portfolio management process as portfolio analysis and selection. Investors' portfolio revision techniques can be roughly divided into "active" and "passive" revision techniques. Those who believe in market efficiency or who lack the resources and expertise for portfolio analysis and selection will use both "active" and "passive" revision tactics.

All performance analysts need return attribution as a tool. Return attribution is a crucial tool for making sure portfolio returns are calculated accurately, facilitating communication between portfolio managers and clients, creating a true understanding of the sources of value added and subtracted from the portfolio, and enabling performance analysts to take part in the investment decision-making process and thereby add value.

7.9 Answers to In-Text Questions

1. (a) Tracks the outcomes of an active portfolio manager's choices
2. (b) Evaluate the value that active investment choices offer
3. (b) Assists investment managers in aligning portfolios with the goals of asset owners by providing feedback
4. (c) Assessing the risk and return measures for a portfolio

7.10 Self-Assessment Questions

1. Define optimal portfolio. How is it important in investment decisions?
2. What is Portfolio Revision?



Notes

3. List major reasons that could drive a review of portfolio.
4. What safety measures and cautions ought a financial manager to exercise when making investment-related decisions?
5. Differentiate between “active” and “passive” portfolio revision strategies.
6. What procedures do we follow in order to choose the finest portfolio?
7. What are risk-adjusted methodologies and portfolio performance?
8. Describe the constraints faced while making alterations in the portfolio.
9. What factors influence the performance of a portfolio?
10. Why is a portfolio revision necessary? What limitations apply to the updating of a portfolio?
11. Briefly describe the techniques for calculating portfolio returns.
12. Describe Treynor’s Measure, Jensen’s Differential Return, and Sharpe’s Ratio.
13. Below are three portfolios’ rates of return and standard deviations:

Portfolio	Rate of Return	Standard Deviation
Market	16%	1.95
A	15%	0.13
B	19%	0.17
C	18%	0.18

The risk-free rate is 0.10. The market’s (M) systematic risk is 1.5 and its (M) rate of return is 18%. Calculate the Sharpe ratio.

14. Information including return rate and beta on three funds, DEE, RNK, and PRI is available. 10% is the risk-free rate. Market (M) has an 16% rate of return and a risk of (1.5) per cent.

	Rate of Return	Beta
Market	16%	0.80
DEE	14%	0.70
RNK	18%	0.85
PRI	20%	1.00

Determine the value of three funds- DEE, RNK and PRI using the Treynor method.



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Glossary

Active Portfolio Management: In an effort to surpass a benchmark or generate greater returns than a passive investment strategy, active portfolio management is a method in which portfolio managers actively choose which investments to make. The goal of active portfolio management is to take advantage of market mis-pricings by continuously analysing, researching and trading.

Arbitrage: The practise of profiting risk-free from price differences between several marketplaces or securities. Arbitrageurs take advantage of price discrepancies by purchasing undervalued assets in one market and simultaneously selling them at higher prices in a different market, doing so until equilibrium is reached.

Arbitrage Pricing Theory (APT): An alternative asset pricing model that takes into account various risk factors and how they affect asset returns is called Arbitrage Pricing Theory (APT). Contrary to the CAPM, the APT does not presume that the market is efficient and allows for the possibility of arbitrage opportunities.

Asset Management: The management of collective investments is frequently referred to as asset management.

Asset Pricing: Stocks, bonds, and derivatives are just a few examples of financial assets that are valued according to their expected returns and risk in the area of finance known as asset pricing.

Benchmark: A benchmark is a standard or point of comparison used to assess how well an asset or investment portfolio has performed. Market indices or unique portfolios that represent a certain investment strategy or asset class can serve as benchmarks.

Benchmark Portfolio: A portfolio against which an investor can evaluate the overall performance of the investments made by him.

Beta: A measurement of how sensitive a stock is to changes in the market. The CAPM uses beta to calculate an asset's projected return in relation to the market as a whole. A beta value larger than 1 indicates greater market volatility, whereas a beta value less than 1 suggests reduced market volatility.

Capital Asset Pricing Model: CAPM is an extension of Capital Market Theory which is used to predict the expected return on a security or portfolio.

Capital Market: It is a financial market which brings buyers & sellers together to trade financial assets having a maturity period of more than one year.



Capital Market Line: The efficient portfolios are obtained by combining the optimal portfolio of risky assets with risk-free lending or borrowing.

Covariance: It is a statistical tool which measures the extent of interaction between two random variables.

Diversification: Spreading investments across several assets or asset classes in order to lower risk is known as diversification. By integrating assets with low or negative correlations, diversification tries to reduce the impact of individual asset performance on the total portfolio. It is a cornerstone idea of portfolio management.

Dividend Yield: Annual percentage of return earned by a share. The yield is determined by dividing the amount of the annual dividends per share by the current net asset value or public offering price.

Efficient Frontier: The set of efficient portfolios.

Efficient Market: A market that fully reflects all information is said to be efficient, making it impossible for investors to regularly generate anomalous or excessive returns. Rapid price changes in response to new information are a hallmark of efficient markets, making it difficult to identify assets that are being mispriced.

Equities: Shares issued by a company which represent ownership in it. Ownership of property, usually in the form of common stocks, as distinguished from fixed-income securities such as bonds or mortgages. Stock funds may vary depending on the fund's investment objective.

Equity Fund: A mutual fund/collective fund in which the money is invested primarily in common and/or preferred stock. Stock funds may vary, depending on the fund's investment objective.

Expected Return: The expected gain or return on an investment based on a number of variables, including past performance, risk, and upcoming market circumstances. The expected return is used to determine how appealing an investment offer is.

Extensions of Capital Asset Pricing Model: The traditional CAPM has undergone a number of changes and improvements to take into account new variables or complex asset pricing issues. In these extensions, elements like size, value, momentum, and other market oddities may be present.



Fixed Income Fund: A fund or portfolio where bonds are primarily purchased as investments. There is no fixed maturity date and no repayment guarantee.

Fund Performance: In the institutional setting, precise assessment is essential. Fund performance is the litmus test for fund management.

Fundamental Analysis: It is an attempt to determine the intrinsic value of a security and compare it with a current market price which helps in investment decision-making in terms of whether to buy or not to buy the securities at the current prevailing prices.

Idiosyncratic Risk: Idiosyncratic risk, sometimes referred to as unsystematic risk or diversifiable risk, is a type of risk that is unique to a particular business or asset and can be mitigated by diversification. Examples of factors that affect the performance of a specific asset include company-specific events, management choices or industry-specific factors.

Indifference Curve: It shows the utility score of an investor in terms of expected returns and risk. All the points on a particular IC represent different levels of risk and return with the same amount of satisfaction.

Investment: The phrase “investment” or “investing” has a number of closely related meanings in business management, finance, and economics that have to do with saving money or putting off buying things.

Investment Management: Is the professional management of a variety of assets (such as real estate) and securities (such as shares, bonds, etc.) to achieve certain investment objectives for the benefit of investors.

Market Efficiency: The extent to which market prices accurately and immediately reflect all available information. Strong form efficiency, semi-strong form efficiency, and weak form efficiency are the three types of market efficiency. For active portfolio managers looking to routinely outperform the market, efficient markets provide difficulties.

Mispricings: Situations where an asset’s market price differs from its true or inherent value. Various reasons, such as market inefficiencies, investor mood, or insufficient information, might lead to mispricings. To make money, traders and investors try to take advantage of mispricings.

Momentum Effect: A phenomena in which investments that have performed well in the past continue to do so in the future, whereas investments that



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have performed poorly in the past continue to underperform. The efficient market hypothesis is refuted by the momentum effect.

Optimal Portfolio: According to the optimal portfolio, investors will make rational decisions that always try to maximise their return for their tolerable level of risk.

Passive Investment Strategy: Investors who use a passive investment approach seek to mimic the performance of a market or a particular index rather than actively choosing individual investments. Exchange-traded funds (ETFs) or low-cost index funds are frequently used in passive investment techniques.

Portfolio: A portfolio is a collection of financial investments held by a person or an organisation, such as stocks, bonds and other securities. Portfolios are built to accomplish particular financial goals, such as capital growth, income production or risk reduction.

Portfolio Allocation: Amount of assets in a portfolio specifically designated for a certain type of investment.

Portfolio Analysis: Determining risk and return while identifying a variety of potential portfolios from a different set.

Portfolio Evaluation: Comparison between objective norms and relative performance in portfolio evaluation. provides a channel for feedback to help the portfolio management process as a whole.

Portfolio Holdings: Investments included in a portfolio.

Portfolio Manager: The person or entity responsible for making investment decisions of the portfolio to meet the specific investment objective or goal of the portfolio.

Portfolio Revision: Portfolio management is an ongoing process, that requires continuous monitoring of the portfolio to keep track of any changes that take place concerning risk and return profile and price levels of the individual securities with the change in the financial environment which in turn bring a change in the portfolio risk and return profile.

Portfolio Selection: An effective portfolio is found, and the best portfolio is chosen.

Risk-Averse: Investors that select lower-risk investments and are more focused on preserving capital than maximising returns are said to be



risk-averse. Investors that are risk-averse often look for assets with lower volatility or better-expected returns compared to risk.

Risk-Averse Investor: An investor who prefers a low degree of risk and hence, tends to avoid investment in relatively risky financial assets.

Risk-Free Asset: An asset whose returns are certain and known at the beginning of the holding period.

Risk Factors: Risk factors are variables or elements that influence an investment's performance or value. Economic indicators, market conditions, industry-specific factors, and company-specific factors are all examples of risk factors. Risk considerations are used in asset pricing models to calculate projected returns and assess risk.

Risk Premium: Risk premium is the additional return anticipated from an investment over and above the return on a risk-free investment. Investors are compensated by the risk premium for taking on greater asset-related risk. It is determined by elements like the volatility of the asset, market circumstances and investor risk preferences.

Security Analysis: Classification of securities (shares, debentures, bonds, etc.), examination of the risk-return characteristics of specific securities, fundamental analysis, and technical analysis are all parts of security analysis.

Security Market Line: Security market line is the graphical representation of the CAPM. It exhibits the expected return on security as a function of systematic risk or non-diversifiable risk.

Size Effect: The finding that, even when risk is taken into account, smaller businesses consistently outperform their larger counterparts over the long term. This result casts doubt on the CAPM's premise that projected returns are exclusively a function of market risk.

Standard Capital Asset Pricing Model (CAPM): A popular financial model that determines an asset's expected return based on its beta, or measure of market sensitivity. The CAPM makes the suppositions that the market is efficient and that investors are risk averse.

Systematic Risk: Systematic risk, sometimes referred to as market risk or non-diversifiable risk, is the term for risk elements that have an impact on the entire market or a particular industry. Individual investors



Notes

cannot manage these risks, and diversification cannot eliminate them. The projected returns on assets are impacted by systematic risk.

Value Effect: The propensity of equities with low price-to-book ratios or other value indicators to outperform those with high ratios is known as the “value effect.” The CAPM’s premise that market risk alone determines expected returns is in conflict with this effect.

Volatility: A measurement of how much an asset’s price fluctuates or varies. Greater volatility translates into wider price fluctuations and higher risk. Volatility affects projected returns and risk assessments, making it a key component in asset pricing models.

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