SREENARAYANAGURU
OPEN UNIVERSITY

INVESTMENT MANAGEMENT

COURSE CODE: M21CM09DC

Postgraduate Programme in Commerce
Discipline Core Course
Self Learning Material

SREENARAYANAGURU OPEN UNIVERSITY
The State University for Education, Training and Research in Blended Format, Kerala

SREENARAYANAGURU OPEN UNIVERSITY

Vision

To increase access of potential learners of all categories to higher education, research and training, and ensure equity through delivery of high quality processes and outcomes fostering inclusive educational empowerment for social advancement.

Mission

To be benchmarked as a model for conservation and dissemination of knowledge and skill on blended and virtual mode in education, training and research for normal, continuing, and adult learners.

Pathway

Access and Quality define Equity.

Investment Management

Course Code: M21CM09DC

Semester - III

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MESSAGE FROM VICE CHANCELLOR

Dear learner,

I extend my heartfelt greetings and profound enthusiasm as I warmly welcome you to Sreenarayanaguru Open University. Established in September 2020 as a state-led endeavour to promote higher education through open and distance learning modes, our institution was shaped by the guiding principle that access and quality are the cornerstones of equity. We have firmly resolved to uphold the highest standards of education, setting the benchmark and charting the course.

The courses offered by the Sreenarayanaguru Open University aim to strike a quality balance, ensuring students are equipped for both personal growth and professional excellence. The University embraces the widely acclaimed "blended format," a practical framework that harmoniously integrates Self-Learning Materials, Classroom Counseling, and Virtual modes, fostering a dynamic and enriching experience for both learners and instructors.

The university aims to offer you an engaging and thought-provoking educational journey. This learning material titled Business Policies and Strategic Management offered for MCom programme builds on the knowledge gained in undergraduate studies. It takes the basic understanding of business concepts and expands on them. The course combines theory and real-world practices to give learners a complete picture. We use case studies and examples to help explain complex ideas. Throughout the Blocks, learners will develop their analytical and decision-making skills, which are crucial for managing businesses effectively. The Self-Learning Material has been meticulously crafted, incorporating relevant examples to facilitate better comprehension.

Rest assured, the university's student support services will be at your disposal throughout your academic journey, readily available to address any concerns or grievances you may encounter. We encourage you to reach out to us freely regarding any matter about your academic programme. It is our sincere wish that you achieve the utmost success.

Warm regards.
Dr. Jagathy Raj V. P.

01-01-2025

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01 BLOCK

INVESTMENT MANAGEMENT

Block Content

Unit - 1	INVESTMENT
Unit - 2	INVESTOR BIASES
Unit - 3	ASSET ALLOCATION
Unit - 4	MEASUREMENT OF RISK AND RETURN

Unit 1

INVESTMENT

Learning Outcomes

After completing this unit, the learners will be able to:

- identify the primary motives for making investments and recognise their significance in the financial well-being of individuals.
- explain the relationship between risk and return in investments.
- describe the difference between investment, speculation, and gambling based on risk factors and potential returns.
- gain insights into the different types of speculators.

Background

Mr. Akhil, with an average monthly income of ₹1,00,000, struggled to make ends meet due to impulsive spending, bills, and unplanned expenses. Despite his substantial earnings, he consistently depleted his account balance, leaving nothing saved for retirement. On the other hand, Mr. Sunil, whose monthly income was ₹50,000, half of Mr. Akhil's, adopted a prudent approach to money management. He allocated his earnings sensibly, ensuring essential expenses were met while curbing unnecessary spending. Consequently, he not only comfortably paid his bills each month but also managed to save a portion of his income for retirement.

Following retirement, Mr. Sunil enjoyed a contented life supported by investments derived from his savings. In contrast, Mr Akhil faced financial difficulties due to his lack of savings and investment foresight. Mr. Sunil's financial literacy and adeptness in planning and managing finances underscore the importance of investment for achieving financial stability. These two scenarios bring light to the significance of investment in achieving financial well-being.

Keywords

Risk, Return, Speculation, Gambling

Discussion

1.1.1 Meaning

Investment is that part of savings from income, which are channelled into different sources for obtaining additional earnings. From the income received, people spent for consumption and save the remaining to meet any future contingency. Money can be directed towards avenues of income generation until it becomes necessary, allowing people to profit further from their savings until that time. Such sources from where savings are utilised to earn additional income are called investment. In Mr. Sunil's case, investing would be the process of depositing his savings into a bank's fixed deposit account until they are used for his retirement requirements, which is his intended use of the money. Investment means a commitment of funds with the hope that some benefits will accrue in future. Such benefits expected from investment are termed as 'return'. The amount received by Mr. Sunil in the form of interest on a fixed deposit is his return on investment. Investment is that amount of money that is utilised in an income generating source with the expectation of getting return. Person who makes an investment is called an 'investor'. In short, investment is an asset acquired or invested to build wealth and save money from the hard-earned money or appreciation. The wealth created through investment plans can be used for a variety of objectives such as loan repayment, children's higher education or marriage, acquiring movable or immovable assets, savings for retirement, etc.

- All investments are savings, but all savings are not investments

There is a possibility that investors would receive only a smaller return than they had anticipated. For instance, assume that Mr. Sunil had invested his money in fixed deposit with the expectation of getting a return of 8%. However, he was only able to produce 6% real returns. In this case, the actual returns fall less than the expected. This variation of actual returns from expected returns is termed as risk in investments. The benefit of investment is obtained only in the future, and the future is uncertain, which is why investment is said to have risks.

- Return and risk- elements of investment

Thus, return and risk are the two most important elements of investment.

The main objective of an investor will be to generate maximum return and minimise the level of risk. Investments should be in such a way that they must strike a balance between liquidity and profitability. Liquidity ensures that funds are invested in sources which can easily be converted into cash. While there is less danger when investing in liquid assets, there will also be less return. Profitability on generating maximum profit or returns from the money invested. When you focus on profitability, you have the possibility to obtain more returns however, there is more risk. Holding cash in hand guarantees liquidity, but idle cash does not yield returns. And if you invest in risky investments aiming for profit, sometimes you won't be able to use it when you require funds. So striking a balance between the two is essential. For instance, depositing funds as fixed deposits gives high liquidity since fixed deposits can be closed at any time, and funds can be withdrawn. Still, it gives only a return of 5-6%, which is very low, ultimately leading to low profitability. Thus, liquidity and profitability are inversely related.

- There is an inverse relationship between liquidity and profitability

Investments can be made in financial assets and physical assets. Purchasing a plot of land is an investment in physical assets. Purchasing shares of a company is an investment in financial assets. Almost all individuals own a portfolio of investments. A portfolio includes a mix of different investment avenues, such as mutual funds, purchasing shares of a company, or investing in real estate. All financial planners create their portfolios after careful planning. Risk can be reduced by diversifying the portfolio, i.e., adding more securities to it.

- Portfolio - a mix of different investment avenues

1.1.2 Objectives of Investment

The need for investment will grow as you move ahead in different stages of life. Growing responsibilities in life demand an increase in investment.

a. **Return-** Return is the reward for bearing the risks of investment. All investors invest with the expectation of obtaining maximum returns. For instance, if Mr. Sunil has ₹ ₹1,00,000 to invest and there are two investment options, say A and B, offering returns at the rate of 10% and 12%, respectively, at the same level of risk. He will choose option B since the rate of return is higher than that of option A.

b. **Safety of funds-** All investors aim to obtain the maximum possible returns at a minimum level of risk. Risk is the variation of actual return from the expected return. The

higher the risk, the lower the safety of funds invested and vice versa. Investors capable of tolerating higher levels of risk stand a better chance of attaining superior returns. For instance, investing funds in the form of fixed deposits ensures high safety and reduced risk. Still, it offers only lower returns when compared to investing in the stock market, where the risk is significantly higher, but the potential for higher returns is also greater. It also helps you keep your money safe from inflation effects. Inflation erodes the value of your money unless it is invested in a capital appreciation asset.

c. **Liquidity-** Liquidity facilitates the easy convertibility of investments into cash or cash-in equivalents without loss. Every investor requires a minimum liquidity in their investment to meet emergencies, which can be ensured by investing in readily saleable securities. Keeping funds in a bank account serves as an example of an investment that provides liquidity.

d. **Reducing tax liability-** One of the objectives of investment is to minimise tax liability. Investors may seek out tax-efficient investment strategies, such as investing in tax-deferred retirement accounts or utilising tax-advantaged investment vehicles, to reduce the amount of taxes owed on investment gains. Investing in life insurance schemes, such as the Public Provident Fund (PPF), National Pension Scheme (NPS), and Govt. Notified bonds allow you to claim deductions on your taxable income.

e. **Regular income-** Some investors invest with the aim of obtaining regular income, such as dividends, interest, etc., rather than focusing on capital gains. In the above example, Mr. Sunil invested a part of his income with the intention of obtaining a regular income following his retirement. This strategy was aimed at ensuring he could comfortably meet his living expenses without facing financial constraints.

1.1.3 Needs for Investment

a. **Grow your wealth-** The returns that can be generated by reinvesting the funds are called the power of compounding. For example, Mr. Sunil invested ₹10 lakhs in fixed deposit for an annual interest of 6% for 3 years. After one year, the amount of his fixed deposit, along with interest, turns out to be ₹10,60,000, where the interest that he gets is ₹60000. He gets ₹11,23,600 at the end of 2nd year, generating an interest of ₹63,600. After reinvesting, at the end of 3rd year, he will get ₹11,91,016 with interest of ₹67,416. If the interest were not reinvested, he would have obtained a total

interest of ₹1,80,000 (60,000+60,000+60,000) instead of ₹1,91,016 (60,000+63,600+67,416) at the end of 3 years. The difference ₹11,016 is the result of the power of compounding.

b. **Outpace inflation-** The rise in the economy's cost of goods and services is referred to as inflation. A normal coffee used to cost ₹ 5 a few years before, but as of right now, you have to spend at least ₹10 to purchase one. This is due to the decline in the value of money and the increase in the cost of goods and services. People find it difficult to make ends meet when they don't have solid financial planning, especially when their wage growth isn't keeping up with inflation.

c. **Increased capacity for risk-taking-** Investing when you are young has the potential to yield higher profits because young people have a higher risk tolerance than older people with more responsibilities. By the time you reach middle age, this early investment effort may have resulted in a sizeable savings account you can access.

d. **To meet financial goals-** Let us consider the example of Mr. Sunil once more. As part of his long-term economic plan to save for post-retirement needs, he places his money into fixed deposits. Like this, every person has their own short- and long-term objectives. The investment gives you the ability to fulfil your goals.

e. **To obtain financial security-** A strong financial plan protects you from unforeseen financial emergencies by acting as a safety net. The growing tendency of people to choose from different insurance policies, like health, life, and term insurance, as essential parts of their financial planning is a perfect example of this idea. In an emergency, this planning provides people and their families with a sense of security and comfort. Preparing for future demands requires financial planning, of which retirement plans are a prime example. The goal of financial planning is to guarantee a stable and secure future.

f. **Attain financial independence-** You should be able to fulfil your needs and wants with your own finance. Investment makes you capable of doing this. Saving a part of your income and investing it helps to make you financially independent. Saving money will help the younger generation in their future enabling them to be financially secure when they retire.

1.1.4 Return and Risk Policy Statement - Regarding Investment

- Actual and expected returns

As explained above, the two main elements of investment are return and risk. Return is the income earned from investments. It includes actual return and expected return. Actual return is the return an investor actually obtains from an investment. The expected return is the return that investors expect they would get from their investments. There arise situations where the actual returns deviate from that of the expected returns. The chance for such variation of actual returns from expected returns is called risk in investment.

- Yield and capital appreciation

The return includes yield and capital appreciation. Consider Mr. Sunil, who buys 1000 shares of ABC company for ₹1,00,000 and sells them for ₹1,75,000 after a 3-year holding period. In this scenario, the capital appreciation amounts to ₹75,000, reflecting the difference between the selling and purchasing prices. Any dividends received in this instance represent the yield component of the return. If Mr. Sunil had invested the funds with the expectation of selling the shares at ₹2,00,000, his actual return is said to be lower than that of the expected return.

- The direct relationship between risk and return

All investors aim to maximise their returns and minimise risk. Return is considered as the reward that the investor obtains for bearing the risk in investments. Hence, the higher the risk, the higher is the possibility of getting higher returns and vice versa. Investments are made to generate returns over a period of time in the future. The future is marked by uncertainty. There are occasions when investors fail to achieve their anticipated returns, underscoring the unpredictable nature of investment outcomes. This unpredictability in returns, where the actual outcome diverges from the expected, constitutes the risk inherent in investments

1.1.5 Investment, Speculation, and Gambling

- Expectation of getting returns

These days, buying lottery tickets is a common pastime for the general public. Is it an investment, gambling, or speculation? Buying lottery tickets is considered a form of gambling. When someone purchases a lottery ticket, they are essentially wagering a small amount of money in the hope of winning a much larger prize. The outcome of the lottery draw is based entirely on chance, with no skill or strategy involved in determining the winner. On the other hand, an individual buying stocks of a new tech company hoping that the value of such stock will skyrocket soon is speculated. Here, the individual is making a risky investment based on the hope of short-term price increases rather than a thorough analysis of the company's fundamentals or

long-term prospects. Thus, gambling, speculation, and investing are performed with the expectation of obtaining a return, and all seem to be surrounded by uncertainty. But these three terms are not the same. The following table compares these three terms.

Table 1.1.1 : Comparison of Investment, Speculation, and Gambling

Basis	Investment	Speculation	Gambling
Meaning	Commitment of funds with the expectation of generating returns	Buying and selling of securities for profit arising from short-term price fluctuations.	Employment of funds at high-risk prospects for earning high returns motivated by thrill and fun.
Purpose	Generating returns in the form of interest, capital appreciation, dividends, etc..	Profit is made out of short-term price fluctuations.	Trying luck for thrill and fun by risking money.
Nature	Planned and scientific.	Planned.	Unplanned and non-scientific and is based on tips and rumours.
Risk	Less risky when compared to speculation and gambling since risk can be reduced through diversification.	Moderate risk since it depends on short-term price movements.	High risk since it is a game of chance.
Period of commitment of funds	Long term.	Short term.	Short term.
Returns	Reasonable return over some time. In most cases, the investment will earn profit.	High returns, however, over a long period, speculators do not earn on their investment.	Very high but depends upon luck and odds.
Type of investors	Cautious and conservative.	Aggressive and high risk-taking.	Ready to lose original investment for fun.

- Careful planning is required to avoid loss of funds.

Investors can expect steady returns over the long run. However, in order to protect their hard-earned money and raise the possibility of wealth creation, they must invest carefully and thoroughly research companies. Given the increased danger of losing the initial investment in unfavourable circumstances, it is imperative for individuals involved in speculation to consider when to enter and depart the market carefully. For financial success, it is essential to stay away from gambling and to place a high value on making wise decisions.

1.1.6 Types of Speculators

Speculators are people engaged in speculation activities. Speculators differ in terms of the investment made and the pattern of purchasing or selling assets. Speculators can be classified into various types based on the activities they indulge in as part of speculation. The different types of speculators are explained below.

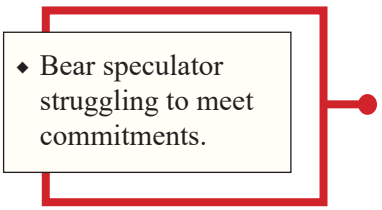
- Expect a rise in price.

a. Bull- A bull is a trader who expects a rise in the price of securities. Such traders can be considered as optimistic as they always expect a rise in price. They are also called 'tejiwala'. They acquire securities with the belief that their value will ascend over time, aiming to profit from the margin between purchase and sale prices. They will suffer losses if prices fall as against their expectation. For example, if a share costing ₹100 is purchased by Mr. Sunil with the expectation that the price of the share will rise. After a few days of holding, he sold it at ₹120. In this case, ₹20 is the profit he obtains through the transaction. The market is said to be in a bullish phase when there is a rise in the prices of securities in the market.

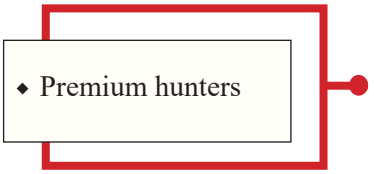
- Expect a fall in price.

b. Bear- A bear is a trader who expects a fall in the price of securities. Such traders typically maintain a pessimistic outlook, consistently foreseeing downward movements in prices. They are also called 'mandiwala'. They acquire securities with the belief that their value will descend over time, aiming to profit from the margin between purchase and sale prices. They will suffer loss if prices rise as against their expectation. For example, Mr. Sunil enters into a transaction to sell shares for ₹100 without actually holding the share with the expectation that the price will fall. When the price drops to ₹90, he sells the share. The difference of ₹10 is his profit from the transaction. The market is said to be in a bearish phase when there is a fall in the prices of securities in the market.

c. Lame duck- In the above example of bear traders, where Mr. Sunil entered into a transaction to sell securities for



₹100 with the hope that he can buy the same when the price of such security falls and thereby fulfil his obligation. But, if no such securities are available to buy, he fails to fulfil his obligation to sell and thus becomes a lame duck. Therefore, when a bear finds it difficult to fulfil his commitment to the counterparty, he is said to be a 'lame duck'.



d. Stags- Stags are optimistic traders, similar to bulls, who apply for shares of newly listed companies with the expectation of a rise in the price of shares they have applied for. They then sell such shares at a premium in the market if they get allotment. Hence, they are also called 'premium hunters'. They are cautious speculators opting for companies with strong market demand and potential for premium valuation.

Summarised Overview

Investment is that part of savings that is diverted into different channels so as to generate returns from the funds invested. The main objective behind the investment is to gain maximum returns at a given level of risk or to reduce risk to the maximum to obtain a given level of return. There is a direct relationship between risk and return with regard to investment. The higher the risk an investor is ready to bear, the higher the return associated with such investments and vice-versa. Investment, speculation, and gambling are distinct concepts, distinguished by the underlying rationale driving each process. Investment involves carefully planning and investing the funds so as to gain a return. The speculation involves channelling funds to gain maximum profit within a short period from short–term price fluctuations. Speculation activities are undertaken by different types of speculators, such as bull, bear, lame duck, and stag. Gambling involves the employment of funds at high-risk prospects for earning high returns motivated by thrill and fun. Investors seeking steady long-term returns should invest cautiously after thorough company research, while those involved in speculation must carefully time market entry and exit to mitigate risks. Avoiding gambling and prioritising wise decision-making is essential for achieving financial success.

Self-Assessment Questions

1. Elucidate on the different types of speculators.
2. Explain investment.
3. Compare and contrast investment with speculation.
4. What are the key elements of investment?
5. Distinguish between speculation and gambling.
6. How does a bull trader differ from a bear trader?

7. Briefly explain the objectives of investment.
8. Why is investment important?

Assignments

1. Compare and contrast investment, gambling, and speculation, providing examples of each.
2. Analyse two investment options with different risk-return profiles and justify which one would be more suitable for a risk-averse investor.
3. Evaluate the importance of regularly reviewing and updating an investment policy statement.
4. Analyse the potential risks and rewards associated with both investment and speculation strategies.

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Suggested Reading

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Space for Learner Engagement for Objective Questions

Learners are encouraged to develop objective questions based on the content in the paragraph as a sign of their comprehension of the content. The Learners may reflect on the recap bullets and relate their understanding with the narrative in order to frame objective questions from the given text. The University expects that 1 - 2 questions are developed for each paragraph. The space given below can be used for listing the questions.

Unit 2

INVESTOR BIASES

Learning Outcomes

After completing this unit, the learners will be able to:

- know why investors take financial decisions irrationally at times
- differentiate between traditional finance and behavioural finance
- gain awareness of the various heuristics and biases in behavioural finance

Background

Bias is an irrational assumption or belief that affects the ability to make a decision based on facts and evidence. Investors make irrational investment decisions backed by prejudices and biases. A bias can be a conscious or subconscious mindset. Smart investors avoid two types of bias: emotional and cognitive. Statistics indicate a significant rise in gold prices over the years, with various factors contributing to this trend. For example, some investors may decide to allocate a portion of their portfolio to gold specifically as a hedge against inflation or economic downturns. This thought of investors can increase demand for gold and drive up prices. Similarly, when a significant number of investors start buying gold, others tend to follow suit, believing that the collective wisdom of the crowd must be correct. This can create a self-reinforcing cycle of increasing demand and rising prices. Such decisions are not taken rationally through logical and systematic reasoning. This is due to the irrational influences that affect financial decision-making. The present unit deals with the various psychological emotions and biases that affect financial decision-making.

Keywords

Behavioural finance, Heuristics, Bias, Herding, Mental Accounting, Framing

Discussion

1.2.1 Behavioural Finance

- Based on the psychology of investors
- Origin of Behavioural Finance
- Traditional v/s Behavioural finance
- Heuristics and Biases

Investors aim to be rational while taking financial decisions, meaning that they take financial decisions based on logical and systematic reasoning and analysis, thereby trying to maximise their gains and minimise the risk of loss. But sometimes, financial decisions are affected by the psychology of investors. For instance, there might be a tendency to spend the income received as a bonus for entertainment purposes. Whereas, if the same is received as a salary, people are more likely to save and invest it rather than spend it for entertainment. This differentiation is due to the emotions and psychology of investors, which affects their financial decision-making.

Daniel Kahneman, Amos Tversky, and Richard Thaler are the three main psychologists who contributed to the development of the concept of behavioural finance. Richard Thaler received the Nobel Prize in Economics in 2017 for his contributions to behavioural economics. Behavioural finance studies how psychological influences and biases affect the financial behaviours of investors and markets.

Behavioural finance differs from traditional finance in the basic assumption that investors are rational. Traditional finance assumes that people are guided by reason, logic and independent judgment. At the same time, behavioural finance assumes that people suffer from cognitive and emotional bias, which makes them act irrationally.

Behavioural finance includes two key concepts- Heuristics and biases. The mental shortcuts based on personal beliefs used by investors to simplify the process involved in making financial decisions are called heuristics. Cognitive biases are the beliefs that the decision-maker obtains from his personal experiences. These biases often result from the use of heuristics and can lead to suboptimal financial decisions.

The following are some of the heuristics related to behavioural finance:

Heuristics simplifies the decision-making process, which

means heuristics streamlines it. Relying on heuristics without careful analysis of different investment options may often lead to incorrect or irrational decisions.

i. Representativeness

There is a general tendency to predict the academic performance of students in college based on their academic performance in school. This prediction is due to the similarity between the items taken for comparison. However, establishing such a relationship will not help in all situations, especially when making financial decisions.

Representativeness refers to the tendency to estimate a future event by comparing it to an existing stereotype. Taking financial decisions by comparing them with an existing prototype does not always yield fruitful results since such decisions are based on a rule of thumb and are not scientifically taken. Estimation of the future performance of a company based on its past performance is also an example of representativeness. Since past and future performance will be affected by different factors, the decisions taken based on representativeness may turn out to be wrong.

- Judgements based on stereotype

ii. Anchoring

Let us assume Rohan, a customer planning to purchase sports shoes, encountered a pair priced at ₹2,500in one store. This price tag established a benchmark in his mind, leading him to perceive ₹2,500 as the standard price for sports shoes. Consequently, if he finds a similar pair priced at ₹3,500 in another store, he might consider it overpriced despite its superior quality, brand value, comfort, and support. Conversely, any shoe priced below ₹2,500 may be deemed cheap due to the pre-conceived benchmark.

Instead of relying on this initial benchmark, Rohan could have compared prices and features across different brands to make a more rational decision. This behaviour, where an investor takes a decision based on an already created benchmark, is called anchoring. Anchoring is an irrational bias in which an investor depends on some information and considers it as a dependable benchmark facilitating decision-making.

- Decisions based on benchmarks

iii. Framing

Information can be presented in different ways. For instance, consider two statements-

"A portfolio with a good degree of diversification and an 80% likelihood of success."

"A portfolio that is well-diversified and has a 20% risk of losing money."

Here, the meaning of both the statements is the same. But,

the first statement gives us a positive impression of the company, whereas the second statement is a negative one. This difference is due to framing bias, which means the difference in how the statements are framed. This shows how decision-making is influenced by the way in which data is presented. Data presented on a positive note is likely to lead to a positive decision. At the same time, data presented on a negative note is expected to lead to a negative decision. This mental shortcut used to simplify the decision-making process is called the 'framing effect'.

- Presenting data in different ways

The framing effect usually occurs when inadequate information is considered while making decisions. To overcome framing bias, it is essential to collect and analyse all available information before making a decision, ensuring that the focus is not solely on how the data is presented.

iv. Herding

You might have seen that sheep tend to follow each other without fail, sticking closely to the herd. Similarly, there is a general tendency among some investors to follow the practices of others in the market while taking decisions. This heuristic of following others is called 'herding'. Many investors engage in herding because it relieves them of the burden of conducting their investment analysis. By following the actions of others, they avoid the effort and stress associated with evaluating investment opportunities independently.

- Tendency to follow others' decisions

The major disadvantage of this phenomenon is that it leads to incorrect decisions if the decision taken by the group is wrong. The key assumption behind this heuristic is that the decision taken by the majority is right.

v. Availability Heuristic

In Kerala, you can see a large number of people taking lottery tickets, especially during the festive seasons. Do you have any idea why this number increased recently when compared to previous years? This is because people tend to overestimate their chances of winning the lottery. After all, they frequently hear about the big winners in the news or see advertisements highlighting jackpot winners. People tend to feel that winning is more often than it actually is since these stories are vivid and easy to recall.

- Decision-making based on recallable information

Decision making, which is influenced by such easily recallable information, is termed as 'availability bias'. It is also called 'recency bias' since the information that people can recall is the ones which they have heard recently. The term was coined by Amos Tversky and Daniel Kahneman. This bias is significant in financial markets because recent market news or events can

cause investors to irrationally believe that similar events are more likely to reoccur than they objectively are. Consequently, investors might decide to sell during bear markets or buy during bubbles, as these events are prominent in their minds when they occur.

The following are some of the biases related to behavioural finance:

i. Overconfidence

Some people have a feeling that they are superior to others in terms of their skills and abilities. Such individuals tend to make decisions based on their perceptions, often disregarding the advice of others. Hence, they would end up making the wrong decisions due to false assessments of their abilities.

This phenomenon, known as 'overconfidence bias', is also prevalent among investors. Investors who rely solely on their financial knowledge and skills to make decisions about selecting suitable investment avenues, assessing associated risks, and projecting expected returns may fall victim to this bias. This over-dependence on one's financial knowledge and skills is called over-confidence bias. It can lead an investor to take faulty investment decisions since such investors will have a tendency to be less cautious and are likely to ignore negative information that might heavily impact the selection of portfolios.

- Overestimation of one's financial knowledge

ii. Loss Aversion Bias

Assume a situation where you are given an option to choose between gaining ₹25,000 or losing ₹25,000. Which one will you choose? A normal investor will choose not to lose ₹25,000 rather than gain ₹25,000. This is due to the aversion towards loss.

Loss aversion bias was developed by Amos Tversky and Daniel Kahneman. They state that the pain of losing money is more intense than the joy of gaining money. This bias can influence financial decisions, often leading individuals to make choices that are not entirely rational, such as holding onto losing investments for too long or being overly cautious in risk-taking to avoid potential losses.

- Avoiding losses rather than acquiring equivalent gains

iii. Mental Accounting

Ms. Renuka, a private employee, earns a monthly income of ₹50,000. She is financially literate; hence, she plans how to meet all the expenses from the income, such as ₹10,000 for rent, ₹5,000 for entertainment, ₹5,000 for travelling expenses, and ₹10,000 for meeting household expenses. She also keeps aside ₹20,000 a portion for savings also. This process of treating

the same amount of money differently for different purposes is called mental accounting.

Mental accounting is the tendency to use money differently depending on where it comes from or what it is used for. It helps people manage their finances, but it can also lead to irrational decisions, like not using money efficiently across different purposes. For example, if Ms. Renuka has a surplus in her travel budget, she could transfer the excess to her savings. However, failing to reallocate such surplus funds can lead to irrational financial decisions. The concept of mental accounting was published in the Journal of Behavioral Decision-Making by Richard Thaler. Thaler advised that people should consider money as fungible and treat all money equally, regardless of its source or intended purpose.

- Allocating money for different purposes

Thus, a general understanding of the most common heuristics and biases related to behavioural finance is essential. Gaining awareness of the concepts of the various heuristics and biases helps investors to prevent cognitive errors led by heuristics and cognitive bias.

Summarised Overview

Behavioural finance examines the impact of psychological factors on financial decision-making, revealing that investors often act irrationally due to cognitive biases and heuristics. Despite their goal to make logical, systematic choices to maximise gains and minimise risks, investors' decisions can be influenced by emotions. Behavioural finance diverges from traditional finance, which assumes rationality in investors, by demonstrating how cognitive biases and heuristics lead to irrational behaviours. Key concepts include representativeness, where investors judge probabilities based on stereotypes; anchoring, where decisions are influenced by initial information; framing, where the presentation of information affects choices; herding, where investors follow the majority; availability heuristic, where recent or memorable events skew perceptions of likelihood; overconfidence, where investors overestimate their knowledge and abilities; loss aversion, where the fear of losses outweighs the desire for gains; and mental accounting, where money is treated differently based on its source or intended use. These biases can lead to suboptimal financial decisions, such as excessive risk-taking or inefficient financial management. By understanding these psychological influences, behavioural finance provides insights into market anomalies and helps develop strategies for better investment decisions, contrasting with the rational assumptions of traditional finance.

Self-Assessment Questions

1. What is mental accounting?
2. How does framing differ from representativeness?
3. Explain briefly the various biases in behavioural finance.
4. What do you mean by overconfidence bias?
5. Explain loss aversion bias with the help of an example.
6. What is availability bias?
7. How does the presentation of data impact decision-making?
8. What is herding?

Assignments

1. Select a stock that has shown significant growth in the past five years. Evaluate the reasons behind its past performance and predict its future performance based on market conditions and other fundamental factors. Compare your prediction with the past performance to see if the representativeness heuristic influenced your initial prediction.
2. Provide an example of how framing can influence investment decisions. What strategies can investors use to mitigate the effects of framing bias?
3. Explain how herding behaviour can lead to market bubbles. Provide a historical example to support your explanation.
4. Ask participants to categorise their monthly income and expenses into different mental accounts (e.g., necessities, savings, entertainment). Then, present an unexpected financial situation (like an emergency expense) and observe how they reallocate their funds. Discuss the efficiency of their decisions and how mental accounting influenced their financial management.

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Suggested Reading

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Space for Learner Engagement for Objective Questions

Learners are encouraged to develop objective questions based on the content in the paragraph as a sign of their comprehension of the content. The Learners may reflect on the recap bullets and relate their understanding with the narrative in order to frame objective questions from the given text. The University expects that 1 - 2 questions are developed for each paragraph. The space given below can be used for listing the questions.

Unit 3

ASSET ALLOCATION

Learning Outcomes

After completing this unit, the learners will be able to:

- gain insights on the various traditional investment avenues.
- identify innovative financial products and services.
- construct a diversified portfolio by incorporating various traditional and innovative financial products, considering individual risk tolerance and financial goals.

Background

Investors are exploring diverse financial products beyond traditional options like bank deposits, life insurance, and post office savings due to the latter's often insufficient returns. Each individual has unique investment goals and preferences. Some seek long-term benefits from a lump sum investment, while others prefer a flexible monthly plan for a secure future. Some desire higher periodic returns and capital appreciation, while others focus on generating a steady retirement income. Some aim for maximum returns with life security, while others prefer moderate growth with lower risk. Additionally, some are interested in gold investments without high making charges, and others are willing to take high risks for early-stage innovative ventures. These diverse financial products promise higher profits but also come with questions regarding their nature, pros and cons, risks, expected returns, lock-in periods, and tax implications. Understanding these aspects will help investors choose the best product based on their financial capacity, risk tolerance, expected returns, and tax considerations. This unit aims to shed light on various traditional and innovative investment avenues, helping investors make informed decisions that align with their individual needs and goals.

Keywords

Financial asset, Physical asset, Systematic Investment Plan, Strategic Withdrawal plan, Crowdfunding

Discussion

1.3.1 Asset Allocation Decisions

- Dividing investment into different avenues

Suppose that you have ₹1,00,000 for investment. Where will you invest this amount? Will you invest the whole amount in one particular investment avenue, or will you divide the amount and invest it in multiple sources? The answer to such questions depends on your asset allocation decisions. Asset allocation decisions are those decisions determining how investment funds are divided and allocated across different investment avenues such as bank deposits, bonds, mutual funds, stocks, and so forth.

- Varies among investors

The asset allocation decisions vary from one person to another. The decision appropriate to one investor will not be suitable for another investor. It is affected by various factors such as the return expected by investors, the risk tolerance level of investors, the period of investment, and the purpose behind investing, etc.. The asset allocation decision taken today might not be appropriate in future due to potential changes, such as variations in an investor's income or shifting investment preferences. Therefore, asset allocation decisions must remain flexible to adapt to these evolving circumstances.

- Diversification

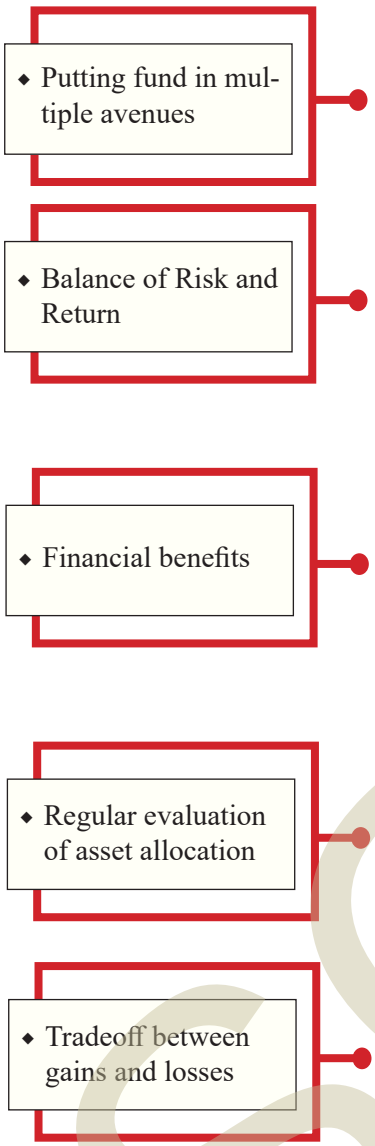
People usually prefer to split the total amount they have to invest so as to channel their funds into different investment avenues. The main objective behind this division is to benefit from the diversification of funds. Diversification involves spreading investments across various asset classes or investment types. It helps to reduce risk since the gains in others might offset losses in one or more investment avenues.

Importance of Asset Allocation

Asset allocation refers to allocating your hard-earned money across multiple asset classes, uch as equity shares, mutual funds, fixed income, debt cash and others. The primary object of asset allocation is to mitigate the risk associated with your investment. Hence, by investing in multiple asset classes, one can reduce risk, lower the probability of losses and improve the possibility of earning fair returns. As mentioned earlier, instead of putting all the eggs in onebasket, investors should develop a

plan to channel their funds into different sources so as to maximise returns for a given level of risk.

The following are some of the reasons why asset allocation decisions are important.



- **Diversification**- The main requirement of making asset allocation decisions is diversification. Through diversifying the funds, investors can earn fairly good returns for a given level of risk.
- **Establishing a risk**-return trade-off- Diversification of investments includes investment in stocks, which offer higher returns for bearing higher risk and also provides investment in low-risk investments, such as government bonds, which offer low returns. This combination of different types of investment avenues helps to bring a balance between risk and return.
- **Achievement of financial goals**- Investors might have different financial goals, such as meeting the expenses for building a house, providing for retirement, providing children's education, etc. Asset allocation decisions should be taken in such a way as to achieve the financial goals of investors.
- **Rebalancing**- Asset allocation decisions taken today might not be appropriate in future due to potential changes, such as variations in an investor's income or shifting investment preferences. Regularly reviewing and rebalancing the portfolio ensures it remains aligned with the investor's goals and risk tolerance. This might involve selling overperforming assets and buying underperforming ones to maintain the desired allocation.
- **Offsetting of gains and losses**- This strategy helps to reduce risk because gains in others can offset potential losses in one or more investment avenues.

1.3.2 Investment Avenues

The various sources where individuals and institutions invest their funds are called investment avenues. Different investment avenues come up with varying levels of risk and returns. There are numerous sources where people can invest their funds. Such avenues can be classified into two broad heads: traditional investment avenues and innovative investment avenues.

A. Traditional Investment Avenue

The objectives of investment differ from investor to investor. For instance, when pensioner invests, their primary motive is regular return. Their risk tolerance will also be lower.

- Objectives of investment vary among people.

Meanwhile, multi-billionaires expect a higher return with a reasonable appreciation of the value of their investments. They will be able to take higher risks in this regard. From the above discussion, you might have understood that the investor has to choose the right investment based on his investment objectives- nature of return (fixed vs varying), safety of investment (risk), easiness of converting the investment back into cash (liquidity) and the tax implication on income (income tax payable). Traditional investment avenues have been the mainstay of investment portfolios for many individuals and institutions over the years. These avenues typically offer a balance of risk and return, and they include a variety of asset classes.

I. Fixed investment avenues

- Fixed amount of return

Let us begin the discussion with fixed-income investment options. Here, the issuer is obliged to make payments of a fixed amount on a fixed schedule. For example, the borrower may have to pay interest at a fixed rate once a year or half-yearly. The repayment of the principal amount on maturity (terminal value) is also known with certainty.

A detailed discussion about fixed-income investments is appended below.

i. Debentures

- Fixed-rate of return

Debentures are issued by private companies which offer a fixed rate of return in the form of interest. Based on the face value of the debentures, interest is paid at a predefined rate. As an illustration, if a business issues an 8% debenture for ₹100, the investor will receive ₹ eight annually as interest. Additionally, the interest payment date is predetermined. It could occur half yearly, half-yearly or annually.

- Convertible and Redeemable debentures

Debentures are referred to as redeemable debentures, or 'redeemable debentures' if the company returns the full amount after a predetermined amount of time. However, the investor can sell the debentures through the stock market at the going rate if he wishes to cash them in before they mature. Convertible debentures are types of debentures in which the company, rather than repaying the investor, converts the debenture into equity shares after a predetermined amount of time.

- High-risk investment

Private companies issue debentures and are not backed by any physical asset of the company. Therefore, the holders of debentures may find themselves in a situation where they may not get payment for the principal amount if the firm is in a debt trap or is heading towards liquidation.

ii. Bonds

- Issued by government organisations

Bonds are issued by large businesses, financial institutions, and governmental organisations to meet their long-term capital needs. Each bond has an interest rate, also known as the coupon rate, that represents the annual yield that the bondholder will receive and is fixed for the duration of the instrument. Hence, the investors are not affected by changes in market interest rates. However, the market value of bonds will appreciate when the market interest rate is lowered, and the market value of bonds will decline in tune with the appreciation of the market interest rate. Bonds are more secure than debentures even though their interest rates are slightly lower because the company's real assets entirely back them.

iii. Government Securities (G-Sec)

The securities issued by the Central, State Government and Quasi-Government agencies are known as Government securities or 'gilt-edged securities. These securities carry a minimum amount of default risk as the RBI guarantees it on behalf of the Central Government. The minimum investment of G-Sec is ₹10000/- ₹ 10,000 (100 units of securities), which enables small investors to park their funds.

- Gilt-edged securities with low risk

The Reserve Bank of India conducts auctions for government securities in the primary market. You can participate in these auctions directly by submitting the bids or by approaching banks and primary dealers who are authorised to purchase for G-Sec. Once the bidding process is complete, the G-Sec are listed on the exchange. This allows the investor to sell off his holding and thus ensures liquidity.

- Major G-Secs

The major G-sec includes Dated G-securities, Fixed G-securities, Sovereign Gold bond schemes, State Development Loans, and Treasury bills. Dated G-Secs are securities that carry a fixed or floating coupon (interest) rate and are paid at face value on a half-yearly basis. Fixed Rate Bonds are bonds on which the coupon rate is fixed for the entire life (i.e. till maturity) of the bond. Under the Sovereign Gold Bond (SGB) Scheme, people who want to invest in gold instead of buying physical gold can purchase the bond. RBI will declare the rate of SGB before every new tranche by issuing a Press Release. The Government of India launched the Sovereign Gold Bond Scheme in November 2015 under the Gold Monetization Scheme. The loans raised by the state governments from the market are known as state development loans (SDLs). SDLs have a half-yearly interest payment schedule, and the principal is paid back on the maturity date. Ten years is the typical duration for SDLs. A treasury bill is basically an instrument of short-term borrowing

by the government of India, issued through an auction bidding process by RBI, and occurs at regular intervals.

iv. Commercial Paper (CP)

- Unsecured short-term debt instrument

Commercial paper is an unsecured, short-term debt instrument issued by corporations to finance their immediate working capital needs. Corporates whose tangible net worth is not less than four crores and the All-India Financial Institutions (FIs) are eligible to issue a CP. The issuer should obtain a credit rating of at least A-2 from either CRISIL, ICRA, CARE, FITCH or any other credit rating agency specified by the RBI for this purpose. A CP can be issued in denominations of 5 lakhs or multiples thereof, and its maturity period varies between 7 days and one year.

v. Deposits offered by Commercial Banks

- Bank interest is taxable.

Bank deposits are highly liquid and guaranteed. Deposits up to ₹5,00,000 is guaranteed by the Deposit Insurance and Credit Guarantee Corporation (DICGC). The interest earned from the different bank deposits is subject to Income Tax. However, an interest income up to ₹10,000 from a savings account can be claimed as a deduction under Section 80TTA of the Income Tax Act.

Commercial banks offer four types of deposits, namely:

- Flexibility to deposit and withdrawals

a. Savings Bank Deposit (SB) - As the name suggests, a savings account is designed to park your savings, which are meant for immediate use with greater flexibility with respect to deposit and withdrawal. Even though the savings account is more liquid and convenient to handle, the rate of savings deposits is lower. The Reserve Bank of India announced the deregulation of the interest rate on savings bank deposits, effective April 1, 2010. Now, the bank can fix them on a daily basis. The rate of interest varies from bank to bank. However, on average, the rate of interest on SB deposits is 4 per cent.

- Investment of money in regular intervals

b. Recurring Deposit (RD) – It is a method by which an investor may deposit a fixed sum of money in a bank at regular intervals. This amount is to be paid for a stated number of years at the termination, of which the investor receives the principal sum with interest. The recurring deposits are usually for a period ranging from 12 months to 120 months.

c. Fixed Deposit (FD) - An FD account is intended to park your fund for a longer duration with a higher rate of return compared to SB and RD accounts. Though the rate of interest varies from banker to banker, the average interest rate offered is between 5-8 % per annum. The investor

can receive the interest either at the date of maturity along with the principal amount, or he can choose to have the interest deposited into his SB account monthly. Bankers will revise the interest rate from time to time based on the monetary policy of the RBI. However, once you have invested money in your FD account, you will get the promised interest irrespective of changes in the market interest rate. Though the investor parks his fund for a fixed period, he can withdraw the money before the tenure expires. This is called pre-mature withdrawal. But in that case, the banker will reduce a fixed percentage as a penalty, and you will get a lower rate than the rate promised before.

- Investment for longtime and higher interest

vi. Post Office Deposits

Post offices offer many schemes to small investors that can be opened and operated through a wide network of post offices. The popular small saving schemes offered by post offices are:

National Savings Certificate (NSC) - It is a fixed-income investment scheme that you can open with any post office branch. You can make a minimum investment of ₹1,000/- which carries an interest rate of 7.6% p.a. An NSC cannot be withdrawn before its maturity, i.e., five years from the date of investment. The principal investment of NSC qualifies for tax savings under Section 80C of the Income Tax Act (up to ₹1.5 lakhs annually). The interest earned annually is deemed to be reinvested, and hence, the interest is not subject to tax each year. Tax on the earned interest is payable on maturity at the time of withdrawal.

- Fixed investment scheme of post office

Kisan Vikas Patrawas - The scheme was introduced as a small saving certificate scheme in 1988. At the end of the tenure of the scheme (9 years and 5 months), you will get back double the amount. The minimum investment amount is ₹1,000, and there is no upper limit. Initially, it was meant for farmers to enable them to save for the long term, hence the name. Now, the scheme is available for all.

- Small investment with double amount return

Sukanya Samriddhi Yojana – It is a savings scheme designed for female children in a family. It can be opened by the parent or legal guardian of a girl child before she reaches ten years of age. The minimum and maximum deposit to this account per year is ₹250 and ₹1.5 lakhs, respectively. The deposit currently carries an interest rate of 8.2% p.a. The account can be kept active for 21 years from the date of opening the account. You can also withdraw the money from the account when the girl's child gets married after the age of 18. Deposits qualify for deduction under section 80 C, and interest earned from the account is exempted under section 10 of the Income Tax Act.

- Scheme for girl child

Apart from this, Post offices also maintain:

Post Office Savings Bank Account – The account can be opened with a minimum amount of ₹500. Core banking and ATM facilities is attached to the account.

Post Office Recurring Deposit- Every person who has reached the age of 10 years can start this account with a minimum amount of ₹100. The minimum period of deposit is 5 years.

- Focused on small investors

Post Office Time (Fixed) Deposit account- It is available for different periods ranging from 1 year to 5 years. Interest is compounded quarterly, and you can receive it yearly.

II. Variable Income Investments

- Volatility in returns

The term variable-income security refers to investments that offer volatile returns that are directly linked to market forces. Though variable-income securities can give a higher return in comparison to fixed-income investments, they have greater risks associated because the yield and maturity value are not known with certainty. It is even possible for these returns to be negative.

Various investment options under variable income investment options are:

i. Equity Shares

- Ownership capital of companies

The holders of equity shares are not guaranteed a fixed dividend. But over the long run, equity shares are more rewarding and can outperform every other asset class. The investors can benefit from investing in the ownership capital of companies with a high growth potential. However, selecting the right company at the right time (entry and exit strategy) is important since the performance of equity shares is more market-driven.

Based on the nature of income and growth, equity shares can be classified as:

- Shares of companies having high growth

- **Growth Shares-** Shares of companies having a high potential for growth. When the economy and market are on a boom, growth stocks provide maximum returns on investment. Growth stocks also carry higher risks due to the uncertainty of future earnings

- Stable return offering shares

- **Income Shares-** Such shares offer regular and steady income, usually in the form of dividends, over a period of time with low exposure to risk. For example, companies belonging to the Fast-Moving Consumer Goods (FMCG) sector have comparatively regular demand and stable operations, which, in turn, lead to stable profits and dividends.

- Regular return irrespective of market fluctuations

- Shares highly affected by market movements

- **Defensive Shares-** The shares which offer regular dividends irrespective of market movements are called defensive shares. They are relatively unaffected by market movements. These shares usually outperform the market during the recession.

- **Cyclical Shares-** The market price of these shares is highly affected by the upward and downward movements of the economy. Cyclical shares are those shares that follow the economic cycle of expansion, peak, recession, and recovery. If you can predict economic cycles seamlessly, then you can earn substantial returns by investing in cyclical stocks. Though cyclical shares can offer higher returns, they are more volatile.

ii. Preference shares

- Given priority over equity holders

The characteristics of preference shares resemble fixed income security because the rate of dividends is specified in the instrument, and they are given priority in the payment of dividends and repayment of capital over equity holders. However, due to the insufficiency of profit, companies can decide not to distribute dividends to preference holders, which makes variation in return. There are different types of preference shares: cumulative, non-cumulative, redeemable, irredeemable, participating, non-non-participating, convertible, and non-convertible.

iii. Insurance Schemes

- Coverage for risk

Since life insurance provides financial security to your family, life coverage may be viewed as an investment. Apart from life coverage, there are many insurance policies which can pay an assured return after a fixed period or during the post-retirement period.

The important types of insurance policies in India are:

- **Endowment assurance policy-** A lumpsum amount is received after a specific term (maturity) or on death, whichever occurs earlier.

- **Money back policy-** In such policies, maturity benefits are paid in instalments by way of survival benefits every 5 years.

- **Whole life policy-** In addition to providing a death benefit, whole life policy also contains a savings component where cash value may accumulate.

- **Unit Linked Insurance Plans-** It offer both investment and insurance benefits under a single policy contract. A portion

of the premium that you pay towards a Unit Linked Insurance Plan is allocated to a variety of market-linked equity and debt instruments. The remaining premium contributes towards providing life coverage throughout the policy tenure.

- **Child insurance plan-** It combines the benefits of both long-term investment options and life insurance. You need to invest a fixed amount in periodic intervals. On maturity, you will get back a lumpsum amount that can be used to meet the child's future needs. In case of your untimely demise, the insurance company will pay a premium on your behalf, and you will get the maturity amount back as originally agreed.

- Safeguarding your future

- Tax implications of insurance products

The premium paid towards term insurance plans can be claimed as a deduction while calculating your taxable income under section 80C, thus reducing your tax liability. The maturity benefits and bonuses received from your life policy are also exempted under section 10(10D) of the Income Tax Act.

iv. Retirement Benefits Scheme

A retirement plan is designed to take care of your post-retirement days and help you lead a stress-free life.

- Provided by EPFO

Employee Pension Scheme - It is a social security scheme provided by the Employees' Provident Fund Organisation (EPFO). The member of the schemes working in the organised sector is eligible for a pension after their retirement at the age of 58 years. Both the employer and employee contribute 12% of each employee's pay towards EPF. The return from the Employee Pension Scheme is almost guaranteed since over 85% of its corpus is invested in debt instruments.

- Market-linked scheme

National Pension Scheme (NPS) - This pension programme is open to employees from the public, private and even the unorganised sectors, except those from the armed forces. NPS is a market-linked scheme with a probability of high returns in the long run. Subscribers in the scheme can choose the proportion of allocation to different asset classes like equity, corporate debt, government securities and alternative assets. The scheme is regulated by the Pension Fund Regulatory and Development Authority (PFRDA). Presently, a person can withdraw up to 60% of the total corpus as a lump sum amount at the age of 60, with the remaining 40% going into an annuity plan for periodic payment of pension. NPS allocate the funds between equities, government bonds and corporate bonds. This allows you to earn higher returns with a probability of variation in return.

Contributions towards Employee Pension Scheme and NPS

- Tax implication

both qualify for reduction (up to ₹150000) under section 80 C of the Income Tax Act. In addition to that, contributions to Tier I accounts of NPS qualify for an additional deduction of ₹50000 ₹50,000 under section 80CCD (1B).

Apart from this, there are various retirement benefit plans offered by banks and financial institutions that suit the requirements of employees in the unorganised sector. However, in these cases, the employees need to make the entire contribution towards the fund. If you are an employee outside the preview of the pension scheme, it is always better to start a pension scheme on the basis of your disposable income.

III. Investment in Physical Assets

- Invest in tangible asset

The discussions made so far relate to investment in financial assets - the assets that are not visible and the value of assets derived from the value of an underlying asset. Investment options in physical assets, which can be seen or felt, are also available. Let us look over the investment avenues in physical assets.

i. Gold

Gold has been considered the best investment avenue to protect investors, especially during stock market declines and inflation. This is a favourite form of investment amongst the rural and semi-urban population. People have used gold to show their social standing, wealth, and power, and hence, they feel an emotional attachment to it. However, the price of gold also has its highs and lows. But on average, the performance of gold shows an increasing trend. Look at the figure to see how gold prices have moved over the last 20 years.

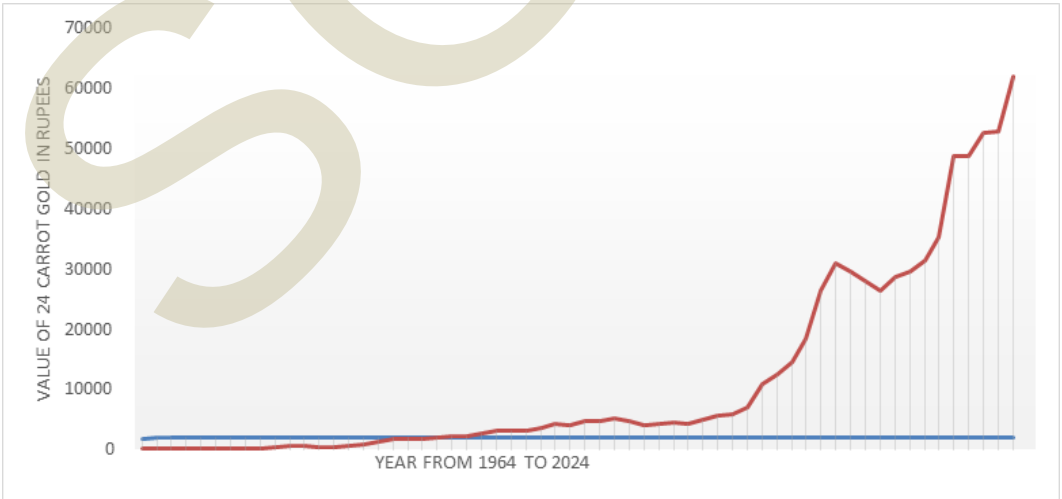


Figure 1.3.1 Gold Price Movement from 1964 - 2024

Source:www.goldprice.org

- Rise in the price of gold

When the economic condition is not progressive, the stock market is under stress, and the value of international currency declines, investment in gold is seen as the best alternative. There are various options available for investment in jewellery, coins, bullions, ETFs, and sovereign gold bonds. At any time, you can sell off your gold holdings, which makes the investment attractive, though holding physical gold creates the problem of physical storage and safety.

ii. Real Estate Investments

- Investment in land and buildings

The real estate market offers a high return to the investors. The word real estate means land and buildings. The population growth and the exodus of people towards urban cities have made prices increase manifoldly. Real estate investing is the purchase, lease, or sale of land and any structures on it for the purpose of earning money. Real estate investments can be classified into three categories: residential, commercial, and industrial.

- Eligible for tax deduction

The volume of investment in real estate is higher than gold, i.e., you can purchase even one gram of gold. The growth potential of real estate investment is higher, particularly in urban areas than gold. The returns from gold fluctuate according to market conditions in comparison to real estate investments. Investing in gold is not going to provide you with any tax advantage. However, both interest and principal repayment of housing loans are eligible for deduction under the Income Tax Act, which in turn reduces investors' tax liability.

B. Innovative Investment Avenues

- Dynamic investment opportunities

In today's rapidly evolving financial landscape, innovative financial products play a pivotal role in providing individuals with diverse and dynamic investment opportunities. Traditional options, such as bank deposits, have their merits. Still, investors seeking to optimise their portfolios for specific goals—like retirement planning, home construction, future car purchases, children's education, future business formulations, or any other purposes are increasingly turning to innovative financial instruments. These innovative products offer unique features and benefits that go beyond the conventional avenues of saving and investing.

- Higher returns through diversified-portfolios

The need for innovative financial products arises from the desire for better returns, increased flexibility, and tailored solutions to meet individual financial goals. Traditional bank deposits often provide stable but relatively low returns. On the other hand, innovative products such as Mutual Funds, SIPs, and ETFs offer the potential for higher returns through diversified portfolios and market exposure. The flexibility in investment patterns, including options like SIPs, allows investors to contribute regularly

and systematically, promoting disciplined wealth accumulation over time. The unit is designed to address these intricacies and empower learners with the skills needed to identify and evaluate innovative financial products effectively.

i. Mutual fund

Akash has a lumpsum of ₹100,000 ₹ 1,00,000. He decides to use the entire amount to buy shares of a company in the pharmaceutical industry. Unfortunately, due to challenges in the external environment, the pharmaceutical industry faces a sudden decline, posing a high risk for Akash to lose his money. This is because he invested all his money in just one sector. Now, consider an alternative scenario. Akash decides to diversify his investment by allocating ₹10,000 each in shares of 10 different companies spanning various industries. While this reduces the potential risk, managing 10 individual shares can be quite challenging for an average person. This is where mutual funds come into play.

A mutual fund acts like a collective effort where numerous investors pool their money. This collective pool is invested in a variety of securities, such as stocks, bonds, and short-term debt. The combined investments constitute the mutual fund's portfolio. Investors, including Akash, purchase shares in the mutual fund, with each share representing a fractional ownership in the fund and its generated income. What sets mutual funds apart is their professional management. Skilled fund managers conduct the necessary research, select securities, and monitor performance. This professional oversight allows investors like Akash to enjoy the benefits of diversification without the hassle of personally managing multiple individual shares.

- Collective pool of money

A mutual fund constitutes a collection of stocks, bonds, or other securities collectively owned by hundreds or thousands of investors and overseen by a professional investment company. These investors, who share similar investment objectives, become shareholders in the fund. The combined funds from investors form the mutual fund's 'corpus', representing a consolidated pool of money. A dedicated fund manager, with a team of analysts, researches and selects a mix of investments based on the fund's objective (growth, income, etc.). They constantly monitor and adjust the portfolio to optimise returns. Mutual funds hold a diverse portfolio of hundreds of securities. Consequently, the fund's success is not contingent on the performance of a single or a few companies, mitigating risk and enhancing the potential for sustained returns.

- Corpus representing consolidated pool of money

When investors purchase a mutual fund, they own a piece of an investment portfolio. They share in the gains, losses, and expenses in proportion to the amount they have invested in the

fund. At the close of every trading day, a mutual fund company tallies the value of all the securities in its portfolio. It deducts its expenses (e.g., management fees, administrative expenses, advertising costs). The balance is divided by the number of shares owned by shareholders to arrive at the value of one share of the mutual fund. Investments in securities are spread across a wide cross-section of industries and sectors, and thus, the risk is reduced. Diversification reduces the risk because all stocks may not move in the same direction in the same proportion at the same time. Mutual funds are not risk-free. The value of your investment can go up or down depending on market movements. Mutual fund issues units to the investors in accordance with the quantum of money invested by them. Investors of mutual funds are known as unit holders.

- Subject to market risk

The price of each unit is called the Net Asset Value (NAV), which reflects the total value of all the assets in the fund divided by the number of outstanding units. The fund's performance is reflected in the NAV. If the value of the underlying assets increases, the NAV rises, and so does your unit's value. You can earn returns in two ways:

- ***Capital appreciation:*** When you sell your units at a higher price than you bought them.
- ***Dividends:*** Some funds may distribute a portion of the income earned from the investments (like rent from properties) to the unit holders.

- Returns and distributions

Benefits of Investing in Mutual Funds

i. Diversification

Investing in mutual funds allows individuals to benefit from diversification by spreading their investments across a wide range of assets. This reduces the impact of poor performance in any single investment on the overall portfolio. For example, a mutual fund may hold stocks from different sectors, bonds with varying maturities, and other securities, providing a balanced approach to risk.

- Spreading investment to multiple avenues

ii. Professional management

Mutual funds are overseen by experienced fund managers who conduct in-depth research and make informed investment decisions on behalf of investors. This professional management is particularly advantageous for investors who may not have the time, knowledge, or resources to manage their investments actively.

- Experienced decision making in investment

iii. Liquidity

- Easily enter or exist provisions

Mutual funds offer liquidity as investors can buy or sell fund units at the end of each trading day at the current Net Asset Value (NAV). This liquidity ensures that investors can easily enter or exit positions without the challenges of finding buyers or sellers for individual securities. It provides a level of convenience, especially in dynamic market conditions.

iv. Affordability

- Small investment amount needed

Mutual funds provide an affordable entry point for investors to access a diversified portfolio. Unlike purchasing individual stocks or bonds, investors can buy mutual fund units with a relatively small investment amount. This affordability democratises access to a broad range of investment opportunities, making it accessible to a wide spectrum of investors with varying financial capacities.

Limitations of Investing in Mutual Funds

Investing in mutual funds offers several advantages, but it also comes with certain limitations and risks that investors should be aware of:

i. Market risks

- Affected by market fluctuations

Mutual funds are subject to market risks, and the value of their portfolios can fluctuate based on the changes in the financial markets. Economic downturns or adverse market conditions can lead to losses for investors.

ii. Fees and expenses

- Charges fees

Mutual funds typically charge fees and expenses, including management fees, operating expenses, and possibly sales charges (loads). These costs can impact the overall returns for investors, especially if not closely monitored.

iii. Lack of control

- Investor lacks control over investment

Investors in mutual funds relinquish control over specific investment decisions to professional fund managers. Individual investors have limited say in the day-to-day management of the fund's portfolio.

iv. Dilution of returns

- Gain distributed among all shareholders

As mutual funds pool money from numerous investors, any gains generated by the fund are distributed among all shareholders. This can result in the dilution of returns, particularly in large funds with many investors.

v. Tax implications

Mutual fund investors may face tax implications due to capital gains distributions. Even if an investor does not sell their fund

shares, they may be liable for taxes on capital gains realised by the fund, potentially resulting in unexpected tax liabilities.

vi. Style drift

- Fund managers deviate from the investment objectives

Fund managers may deviate from the stated investment objectives or style over time, a phenomenon known as "style drift." This can impact the fund's performance and may not align with the expectations of investors who initially chose the fund for its specific characteristics.

vii. Over diversification

- Excessive diversification

While diversification is a key advantage, excessive diversification within a mutual fund can lead to over-diversification. This may result in the fund mirroring the overall market performance without providing the potential for outperformance.

viii. Market Timing

- Subject to market timing risk

Investors entering or exiting a mutual fund may be subject to market timing risks. Rapid inflows or outflows can affect the fund's performance and may result in unfavourable transactions for investors trying to time the market.

ii. Systematic Investment Plan

- Investment portion of monthly income for future

Vikas is a person who cannot invest a lump sum amount, but he is capable of setting aside a portion of his monthly income for the future. What kind of innovative product is suitable for someone with this investment approach? Is this strategy a good alternative to traditional investment avenues?

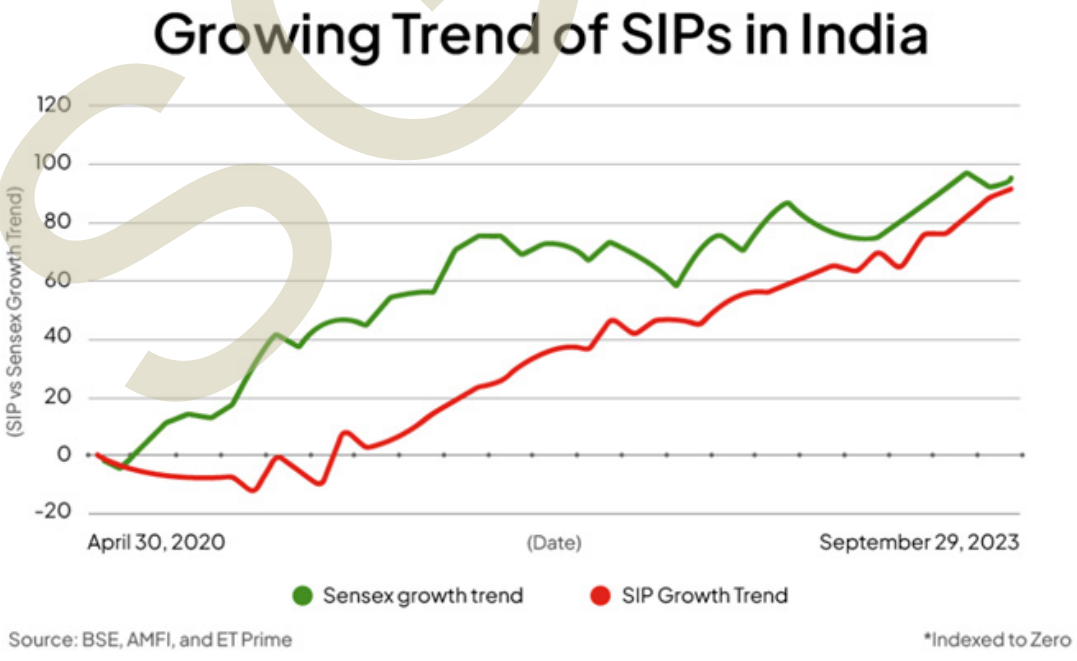


Figure 1.3.2 Growing trend of SIPs in India

- Investing fixed amount at regular intervals

A Systematic Investment Plan (SIP) is a method of investing that allows investors to contribute a fixed amount of money at regular intervals (typically monthly or quarterly) into a chosen investment scheme. Majority of investors use SIPs for investing in mutual funds, but SIPs can also be used for investing a fixed amount of money at regular intervals in other securities. It's like setting up an automatic savings plan for your investments, fostering discipline and potentially building wealth over time. SIP is a disciplined and systematic approach to investing and offers several advantages to investors.

- SIPs in mutual funds

To start an SIP to invest in mutual funds, an investor needs to select a mutual fund scheme and provide instructions to invest a fixed amount regularly. The chosen amount is then automatically debited from the investor's bank account and used to purchase units of the mutual fund at the prevailing Net Asset Value (NAV). SIPs are a popular investment strategy due to their simplicity, flexibility, and ability to promote disciplined investing habits. They cater to both experienced investors and those new to the investment landscape.

Features of Systematic Investment Plan

- Fixed amount from time to time

- ***Fixed amount:*** You decide how much you want to invest each time, and that amount is automatically deducted from your bank account and invested in the chosen mutual fund scheme.

Example: You decide to invest ₹500 every month through an SIP in a mutual fund scheme. This amount will be automatically deducted from your bank account on a chosen date each month and invested in the fund.

- Invest in regular intervals

- ***Regular intervals:*** You can choose to invest monthly, quarterly, half-yearly, or even annually. The key is to be consistent.

Example: You choose to invest monthly through your SIP. This means your ₹500 will be invested in the mutual fund scheme every month on the same date.

- Match for long term objectives

- ***Long-term investment:*** SIPs are best suited for long-term goals, such as retirement planning, children's education, or buying a house.

Example: You start a SIP when you're 25 years old, aiming to accumulate a corpus for your retirement at 60. This means you'll be investing regularly for 35 years, allowing your money to grow significantly through compounding.

- Averaging out the cost per unit

- ***Rupee-cost averaging:*** By investing at regular intervals, you buy mutual fund units at different price points, averaging out the cost per unit. This helps you mitigate market volatility.

Example: The mutual fund units cost ₹10 per unit in your first month of investing, ₹12 per unit in your second month, and ₹8 per unit in your third month. By investing ₹500 each month, you'll buy more units when the price is low and fewer units when the price is high, averaging out your cost per unit.

- Returns are also reinvested

- ***Compounding:*** This is the magic of SIPs. When you invest regularly, your money earns returns, and those returns are also reinvested. Over time, this compounding effect can significantly boost your investment.

Example: Let's say your SIP earns an annual return of 10%. In your first year, your ₹500 monthly investments will grow to ₹6,335 (including returns). In your second year, the returns will be calculated on both your initial investment and the previous year's returns, leading to a higher amount. Over the long term, this compounding effect can significantly increase your investment value.

- Allows spread investment

- ***Diversification***

SIPs allow investors to spread their investments across different market conditions as they buy units at various price points over time. This helps in reducing risk through diversification.

How it operates

- **Select your plan**

Choose the amount you intend to invest and the frequency of investment; opting for a mutual fund based on your goals, you have the option to select large-cap, mid-cap, small-cap, Hybrid, tax saver or debt schemes.

- **Unit Allocation**

Mutual fund units are allocated to the investor on the basis of Net Asset Value (NAV) . In the case of New fund offers (N F O s), the unit price will usually be Rs10. From the subsequent month onwards, additional units will be allocated on the basis of Prevailing NAV.

- **Automatic Investment**

As per your standing instruction, your banker will debit your account automatically and transfer it to the fund manager on the stipulated date, who will credit your account with units based on N A V. So, the investor will have to maintain a sufficient amount in the designated account.

iii. Systematic Withdrawal Plan

Erfan is an employee working in an unorganised sector. However, he was worried about his retirement life, as he knows that employees in the unorganised sector will not receive a pension apart from a nominal amount provided by the government as

part of social security measures. However, he is aware that this amount is much smaller compared to employees working in the organised sector. How can we assist people like Erfan in securing a substantial and regular income?

SWP stands for Systematic Withdrawal Plan. It is an investment strategy offered by mutual funds where investors can withdraw a predetermined amount of money from their mutual fund investments at regular intervals. This plan is designed to provide a steady stream of income to investors. The risk related to SWP is that if the market performs poorly, the value of mutual fund units may fall. Withdrawing a fixed amount from SWP during a bear market may result in the investment depleting faster, posing the risk of running out of funds. If the withdrawal amount is not carefully planned, the capital may erode over time. This is especially noticeable if the withdrawal rate is excessively high and the investment returns are insufficient to cover it.

- To provide for future

Features of Systematic Withdrawal Plan

Here are the key features of SWP:

- **Regular withdrawals**

SWP allows investors to receive a fixed amount or a percentage of their investment regularly, typically on a monthly, quarterly, or annual basis. This provides a source of income for investors.

- **Flexibility**

Investors have the flexibility to choose the frequency and the amount of withdrawals based on their financial needs. They can customise the SWP according to their income requirements.

- **Automated process**

Similar to Systematic Investment Plans (SIPs), SWPs can be set up as an automated process. The predetermined withdrawal amount is automatically transferred from the mutual fund scheme to the investor's bank account.

- **Capital appreciation**

SWP can be a strategy for investors who want to derive a regular income from their investments while allowing the remaining capital to stay invested in the market. This approach can be beneficial for retirees or individuals looking for a steady income stream.

- **Tax implications**

The tax implications of SWP depend on the type of mutual fund and the holding period. In some cases, the gains from the redemption of units may be subject to capital gains tax.

- **Redemption of units**

When an investor opts for an SWP, mutual fund units are redeemed to meet the withdrawal amount. The redemption amount is then credited to the investor's bank account.

iv. Unit Linked Insurance Plans

- Dual benefit of life cover and investment objectives

Suppose you need an insurance plan to cover the risks in your life while also desiring an investment opportunity. What will you do? Will you purchase an insurance policy and start investing in various avenues? If yes, then you must know that there is one new innovative scheme that covers your life and assures an investment. This is called a Unit Linked Insurance Plan (ULIP).

A Unit Linked Insurance Plan (ULIP) is an insurance product that offers the dual benefit of investment to fulfil long-term goals and a life cover to financially protect one's family in case of an unfortunate event. The premium paid towards a ULIP is divided into two parts: a portion is allocated to the life cover, and the remainder is invested in a fund of the policyholder's choice. They can choose to invest in equity, debt, or a combination of both funds based on their risk appetite and goals. This makes ULIPs an ideal investment option for individuals and their families to achieve long-term financial objectives. Examples: SBI Life - eWealth Unit-linked insurance plan, SBI Life - Smart InsureWealth Plus, ICICI Pru LifeTime Classic.

- High cost

In comparison to alternative insurance plans like term insurance or whole life insurance, ULIPs can be more expensive. This higher cost may pose challenges for individuals on a budget, making it less suitable for those seeking more economical insurance options.

Features of ULIPs

- ***Market-linked returns***

A pivotal feature of Unit-Linked Insurance Plans (ULIPs) is market-linked returns, providing the opportunity to build long-term wealth with favourable returns on investments. ULIPs allow you to choose from a diverse array of market-linked funds, including equities, bonds, debt, and hybrid options. Your investments in these funds make you eligible for market returns based on their performance.

- ***Tax saving***

ULIPs offer substantial tax benefits based on your income. By investing in a ULIP, you can reduce your taxable income (up to ₹1.5 Lakhs) under Section 80C of the Income Tax Act.

Notably, as your ULIP investment grows, any money received—whether as a maturity amount or death benefit—is tax-

free up to a certain limit under Section 10(10D), provided the sum assured is at least 10 times the annual premium paid.

In essence, ULIPs not only help you save on taxes during investment but also enable you to retain all profits without any tax deductions upon withdrawal, making it a prudent choice for your financial well-being.

- ***Insurance component***

Integral to ULIPs is the insurance component, ensuring the financial protection of your family in the event of an unfortunate incident during the policy period.

The payout in case of the life assured's demise serves as a vital financial backup, covering family needs and debts and securing their future.

- ***Investment component***

When you invest in a ULIP, a portion of your money is allocated to various investment funds. The growth of your investment depends on the performance of these funds over time. Before opting for a ULIP, it's crucial to assess the risks, associated charges, and potential returns to make an informed decision.

- ***Partial withdrawal***

A key benefit of ULIPs is partial withdrawal, allowing you to access funds for immediate financial needs before the policy matures without cancelling the entire policy. While there is a lock-in period (typically five years) and a minimum amount that must remain in the policy after withdrawal, the maximum limit for the amount or percentage that can be withdrawn is determined by the insurance company.

- ***Flexibility in Fund Switching***

ULIPs provide flexibility by allowing you to switch between funds multiple times. This feature ensures that your money is positioned for optimal growth, adapting to changing financial circumstances.

v. Real Estate Investment Trusts (REITs)

REITs can be described as a company that owns and operates real estate to generate income. They manage the portfolios of high-value real estate properties and mortgages. They lease properties and collect thereon. The rent acquired is later distributed among shareholders as income and dividends. Both big and small investors can park their funds into this investment option and reap benefits accordingly.

Erfan is aware that the real estate business is one of India's high-return investment strategies. However, he knows that a substantial amount is required to invest in real estate, whether

for purchasing land, buildings, apartments, etc. Unfortunately, his current income does not meet this requirement. In this situation, what can he do to benefit from the real estate business? Real Estate Investment Trusts (REITs) offer a helpful and suitable solution for individuals like Erfan in this predicament.

- Investments in income-generating real estate assets

Real estate investment, a cornerstone of wealth creation, involves acquiring and managing properties to generate returns. People who invest in real estate often encounter challenges such as the need for substantial capital, property management responsibilities, and the potential lack of diversification. Recognising these challenges, investors turn to innovative financial instruments like Real Estate Investment Trusts (REITs). A REIT is a unique investment vehicle that pools funds from various investors to directly invest in a diversified portfolio of income-generating real estate assets. This structure provides individual investors with an opportunity to participate in the real estate market without the burden of property ownership and management.

- REIT vs Mutual funds

REIT is somewhat like a mutual fund that invests in real estate, but there are significant differences between the two. Essentially, it is a trust that pools money from people to invest in commercial real estate. REITs are similar to mutual funds in that they pool the capital of many investors. However, unlike mutual funds, REITs are required to distribute at least 90% of their taxable income to shareholders in the form of dividends. This makes REITs an attractive investment for those seeking income. Investors in REITs own a share of the real estate and hence receive an appropriate share of its income after the deduction of expenses. SEBI regulates REITs. REITs are meant to primarily invest in finished and rented out commercial properties-80% of the investment must be in such assets. So, real estate under development is ruled out. Examples are Embassy Office Park, Mindspace Business Park, Brookfield India, and Nexus Select Trust.

- Offers dividend

As investors seek stable income streams, REITs distribute a significant portion of their earnings as dividends, making them an attractive option for income-oriented portfolios. Moreover, the transparency and regulatory requirements imposed on REITs contribute to a level of investor confidence that is not always present in direct real estate investments. In the ever-evolving landscape of financial markets, the emergence and growth of REITs address the needs of investors by providing a more accessible, liquid, and diversified approach to real estate investment. Whether an individual is looking for income, capital appreciation, or a combination of both, REITs have become a vital component in modern investment portfolios. Rising interest rates can make it more expensive for REITs to finance their properties,

which can lead to lower dividends or share prices.

Features of Real Estate Investment Trusts

- ***Income focus***

REITs are designed to generate consistent income for investors through rent payments or mortgage interest. They achieve this by owning and operating income-producing real estate assets like apartments, offices, warehouses, and hotels or investing in real estate loans.

- ***High dividend payout***

By law, REITs must distribute at least 90% of their taxable income to shareholders as dividends. This makes them attractive to investors seeking regular income streams, similar to bonds but with higher potential returns. In addition to dividends, REITs can also appreciate over time.

- ***Liquidity and Traceability***

Unlike physical real estate, most REITs are publicly traded on stock exchanges. This translates to high liquidity, allowing investors to easily buy and sell their shares, unlike the often lengthy and complicated process of selling a physical property.

- ***Diversification***

REITs offer diversification benefits within the real estate sector. By investing in a variety of property types across different geographic locations, REITs spread the risk associated with any single property or market downturn.

- ***Professional management***

REITs are typically managed by experienced professionals who handle property selection, tenant relations, maintenance, and financial oversight. This frees investors from the burden of property management, allowing them to reap the benefits of real estate ownership without the hands-on responsibilities.

- ***Accessibility***

Compared to the high upfront costs of purchasing individual properties, REITs offer lower entry barriers, allowing smaller investors to participate in the real estate market with smaller investments.

vi. Exchange Traded Funds (ETF)

ETF is a stock market investment that tracks indexes like CNX NIFTY or BSE SENSEX, as well as commodities bonds or a mix of assets. In return for their investment, shareholders receive a proportionate interest in the fund's holdings. Registered investment advisors professionally manage the majority of ETFs.

Thomas is an individual who lacks the risk tolerance for high-risk investments. Consequently, he is not inclined to invest in shares, mutual funds, and similar instruments. However, he is aware that the stock exchange indices in developing countries like India are growing upward. Rather than seeking returns from individual stocks or commodities, Thomas desires returns aligned with the overall market indices. He believes that by doing so, he can diversify his risk exposure while still achieving moderately high returns. Is this approach feasible? If so, what is it called, and how does it work?

- Traded on the stock exchange

An exchange-traded fund (ETF) is a type of investment fund and exchange-traded product that owns underlying assets such as stocks, bonds, or commodities. ETFs are traded on stock exchanges, similar to individual stocks, and their shares can be bought and sold throughout the trading day at market prices.

Traded on stock exchanges throughout the day, ETFs offer flexibility, enabling investors to buy and sell shares at any time during market hours. This contrasts with mutual funds, which only trade once a day after the market closes. The prices of ETFs continuously fluctuate based on supply and demand, reflecting real-time market dynamics. Compared to actively managed mutual funds, ETFs often have lower expense ratios, meaning you pay less in management fees. These funds can encompass a diverse range of assets, including stocks, bonds, commodities, or a blend of different asset classes. This built-in diversification helps spread risk and provides investors with broader exposure to the overall market. Various types of ETFs cater to specific preferences, tracking indices (e.g., the S&P 500), sectors (e.g., technology), commodities (e.g., gold), or even employing complex investment strategies.

- Diversification leads to risk reduction.

Features of Exchange Traded Funds

i. Traded on exchanges

ETFs trade throughout the day, such as individual stocks, offering flexibility and real-time price adjustments.

ii. Basket of assets

ETFs hold a diversified portfolio of assets like stocks, bonds, commodities, or a mix, reducing risk compared to single-asset investments.

iii. Track various indices

Different ETFs track various index like S&P 500, specific sectors, or even complex investment strategies.

iv. Low expense ratios

Compared to actively managed funds, ETFs generally have

lower fees, leading to higher returns for investors.

v. High transparency

Holdings and investment strategies are readily available, offering clear insight into what you're buying.

Distinction between Exchange Traded Funds and Mutual Funds

The Difference between Mutual Funds and Exchange Traded Funds are as follows:

Table 1.3.1 Difference between Mutual Funds and exchange-traded funds

Feature	ETF	Mutual Fund
Trading	Traded on stock exchanges throughout the day, similar to individual stocks.	Traded only once a day at the NAV (net asset value) after the market closes.
Pricing	The price fluctuates throughout the day based on supply and demand.	The price set once a day based on the NAV, which considers the underlying assets' value.
Liquidity	Highly liquid, easy to buy and sell at any time during market hours.	Less liquid, you can only buy and sell after the market closes, based on the next day's NAV.
Transparency	Holdings and investment strategies are readily available and updated often.	Holdings and investment strategies may be less transparent, updated once a day or quarterly.
Fees	Generally lower expense ratios compared to actively managed mutual funds.	Expense ratios vary; some actively managed funds may have higher fees than ETFs.
Minimum investment	No minimum investment requirement; you can buy fractional shares.	Some mutual funds may have minimum investment requirements.
Control	No direct control over individual holdings within the ETF.	No direct control over individual holdings unless choosing specific share classes.

Sovereign Gold Bond

Figure 1.3.3 History of gold price/gram since 2005
Source: goldprice.org

- Substitute for physical gold

Buying physical gold for investment may not be a good strategy. Extra charges, such as making charges and GST, are incurred at the time of purchasing physical gold. If kept in a locker, there are additional locker charges, and if kept at home, the fear of theft becomes another obstacle. Therefore, this is not a recommended strategy. This is where Sovereign Gold Bonds (SGBs) come in. SGBs are government securities denominated in grams of gold, acting as substitutes for holding physical gold. Investors pay the issue price in cash, and the bonds are redeemed in cash upon maturity. Issued by the Reserve Bank on behalf of the Government of India, SGBs provide a government-backed investment scheme where investors pay the issue price in cash and receive the market value of gold at maturity, typically 5-8 years later, along with periodic interest payments.

- Benefits of SGBs

Investing in SGBs offers multiple benefits. One of the primary advantages of SGBs is that they can be used as collateral to obtain a loan from any of the scheduled financial institutions, as per the Reserve Bank of India's Loan-to-Value (LTV) guidelines. LTV is the ratio of loan size to bond value against which the loan is secured. For instance, if your SGB holding is worth ₹1 lakh, you can obtain a loan of up to ₹75,000. There are no making charges for virtual gold, no worries about loss due to theft, and no maintenance charges, and investors enjoy capital appreciation similar to physical gold. Additionally, they receive an annual interest of 2.5%. The bonds bear interest at a fixed rate of 2.5% per annum on the initial investment, credited semi-annually to the investor's bank account, with the last interest payable on maturity along with the principal.

The government of India launched the Sovereign Gold Bond

- Investment procedure

(SGB) scheme in 2015. Since then, it has continued to launch different tranches of this scheme at regular intervals. Bonds are sold through offices or branches of Nationalized Banks, Scheduled Private Banks, Scheduled Foreign Banks, designated Post Offices, Stock Holding Corporation of India Ltd. (SHCIL), and authorised stock exchanges, either directly or through their agents. Investors receive a Certificate of Holding on the issuance date, which can be collected from the issuing banks, SHCIL offices, post offices, designated stock exchanges, or agents or obtained directly from the RBI via email if the email address is provided in the application form.

- Redemption

Upon maturity, the Gold Bonds are redeemed in Indian Rupees, with the redemption price based on the simple average of the closing price of gold of 999 purity over the previous three business days from the repayment date, published by the India Bullion and Jewellers Association Limited. Although the bond has an 8-year tenor, early encashment or redemption is allowed after the fifth year from the date of issue on coupon payment dates. The bond is tradable on exchanges if held in demat form and can be transferred to any other eligible investor.

Features of Sovereign Gold Bonds

i. Denomination in grams of gold

SGBs are government securities denominated in grams of gold. Investors can choose the quantity of gold they want to invest in.

ii. Government backing

These bonds are issued by the Reserve Bank of India (RBI) on behalf of the Government of India, providing a high level of security and credibility.

iii. Fixed tenor tenure

SGBs typically have a tenure of 5-8 years, providing a specific time frame for investment.

iv. Interest rate

The bonds bear interest at a fixed rate, providing investors with an additional income stream. The interest is credited semi-annually to the investor's bank account.

v. Redemption in cash

Investors receive the maturity amount in money, which is based on the prevailing market value of gold at the time. While the tenor is fixed, early redemption is allowed after the fifth year on coupon payment dates.

vi. Tradability

SGBs can be traded on exchanges if held in dematerialised (demat) form. They can also be transferred to other eligible investors.

Comparison between Gold ETF and SGB

The following table gives a comparison between Gold ETF and SGB:

Table 1.3.2 Difference between Gold ETF and SGB

Features	Gold ETF	Sovereign Gold Bond (SGB)
Issuer	Mutual Fund	Government of India
Investment Unit	Grams of gold	Grams of gold
Investment type	Market-traded fund	Government bond
Physical Gold	No	No
Interest	No	Fixed interest rate (currently 2.5%)
Lock-in Period	No	5 years (except early exit under specific conditions)
Liquidity	High (traded on stock exchanges)	Moderate (traded on stock exchanges after 5 years)

viii. Crowdfunding

- Collecting small amount from contributors

Crowdfunding is a method of raising money for a project or venture by collecting small amounts of capital from a large number of people, typically through online platforms. It leverages the power of the internet and community to gather financial support for various initiatives, ranging from creative projects and startups to charitable causes and personal expenses.

How it works:

Fund-raisers: Individuals, organisations, or businesses present their project or cause on a crowd funding platform like Kickstarter, Indiegogo, or GoFundMe.

Contributors: People browse through various projects and can donate any amount they wish, often receiving rewards or perks in return, such as early access to the product, exclusive merchandise, or a shout-out.

Platforms: Crowdfunding platforms host campaigns, facilitate online payments, and provide communication tools for creators and contributors. Crowdfunding for investors offers a

unique blend of high-potential returns, diverse opportunities, and direct involvement in projects. However, it also comes with inherent risks and uncertainties.

Features of crowdfunding

i. Potential for outsized returns

Early access to promising ventures can yield significantly higher returns compared to established companies or traditional investments.

ii. Reduced risk

Invest smaller amounts across multiple projects, spreading risk and mitigating potential losses in case some fail.

iii. Early access to innovative ideas

Be among the first to support pioneering projects shaping the future, gaining early insights and potential benefits.

iv. Active participation

Engage directly with creators and project teams, influencing decisions and feeling part of the journey.

v. Community building

Connect with like-minded individuals passionate about similar causes or ventures, fostering collaboration and networking opportunities.

ix. Cryptocurrency

- Virtual currency

Niyas wants to invest in the fastest-growing financial instruments, regardless of the associated risks. He is prepared to endure any level of risk, even if it means losing his capital, as his sole focus is on achieving a substantial return. What type of financial product would be suitable for someone willing to take on any level of risk for a significant return? Cryptocurrency is a digital or virtual currency secured by cryptography, making it difficult to counterfeit. It operates independently of central banks and governments, relying on decentralised systems like blockchain technology for their creation and transaction verification. Some popular examples include Bitcoin, Ethereum, and Dogecoin.

- Legal recognition of cryptocurrency in India

The legal status of cryptocurrency in India is currently ambiguous. It's neither explicitly banned nor fully recognised. The Supreme Court struck down the RBI's 2018 ban on cryptocurrency trading in 2020. Individuals are free to hold, invest in, and trade cryptocurrencies. However, cryptocurrencies are not recognised as legal tender in India, meaning they cannot be used for official payments or settling debts. Income from crypto transactions is subject to a 30% capital gains tax and a 1% TDS (Tax Deducted

at Source)

Features of cryptocurrency

- No single entity controls the currency's issue or supply

- ***Decentralization***

Unlike traditional currencies controlled by central banks, cryptocurrencies operate on decentralised networks such as blockchains. This means that no single entity controls the currency's issuance or supply, lowering the risk of manipulation and increasing users' financial autonomy.

- Use cryptography to secure

- ***Security***

Cryptocurrencies use cryptography to secure transactions and prevent counterfeiting. Complex algorithms and distributed ledger technology make it extremely difficult to hack or double-spend currency.

- Increased privacy

- ***Pseudonymity***

Transactions are recorded on the blockchain, but user identities are kept anonymous, increasing privacy and protecting users from financial surveillance. However, complete anonymity is not guaranteed, and authorities may be able to track transactions in some cases.

- Ensure transparency

- ***Immutability***

Transactions that are recorded on the blockchain are permanent and tamper-proof. This ensures transparency and prevents fraudulent manipulations of financial records. All transactions are publicly viewable on the blockchain, increasing transparency and accountability in the system.

- Predetermined supply limit

- ***Limited supply***

Many cryptocurrencies, like Bitcoin, have a pre-determined maximum supply designed to control inflation and maintain the value of the currency over time.

- ***Borderless transactions***

Cryptocurrencies can be sent and received anywhere in the world without intermediaries, enabling faster and cheaper international transactions compared to traditional banking systems.

Summarised Overview

Asset allocation decision explains how investment funds are apportioned across diverse avenues such as bank deposits, bonds, mutual funds, stocks, and others. These decisions vary among individuals, contingent upon factors like expected returns, risk tolerance, investment horizon, and purpose. The rationale behind splitting investments into various avenues is to leverage diversification, thereby mitigating risk through po-

tential gains offsetting losses. Traditional investment avenues, like fixed-income options, offer stable returns with varying degrees of risk, encompassing instruments such as debentures, bonds, government securities, commercial paper, and bank deposits. Conversely, variable income investments, typified by equities and insurance schemes, offer potentially higher returns but entail greater volatility. Moreover, investment in physical assets like gold and real estate holds historical significance for wealth preservation and appreciation. Innovative investment avenues, including mutual funds, Exchange-Traded Funds (ETFs), Sovereign Gold Bonds (SGBs), crowdfunding, and cryptocurrencies, offer novel opportunities for tailored investment strategies. For instance, mutual funds provide professional management and diversification, while SGBs offer a government-backed alternative to physical gold ownership. Cryptocurrencies, operating on decentralised systems like blockchain, present opportunities for potentially high returns but also pose regulatory and volatility risks. Ultimately, investors choose among these avenues to optimise portfolios for specific goals, whether retirement planning, wealth accumulation, or funding ventures, emphasising adaptability to evolving circumstances and risk-reward dynamics.

Self-Assessment Questions

1. Compare and contrast debentures and bonds as fixed-income investment options.
2. Explain the concept of asset allocation and why it is important in investment management.
3. Compare the risk-return profiles of Mutual Funds and ULIPs. Provide examples of situations where each might be more suitable.
4. How are withdrawals typically managed in SWP?
5. What are the different types of guilt-edged securities?
6. Examine the features and benefits of investing in Sovereign Gold Bonds
7. Compare ETFs with individual stocks in terms of risk and return.
8. What do you mean by crowdfunding? Who are the parties involved in crowd funding?

Assignments

1. Describe the benefits of diversification and how it helps in reducing investment risk.
2. Evaluate the role of insurance schemes and retirement benefits plans as variable income investments.
3. Analyze the potential returns and risks associated with investing in cryptocurrencies and crowdfunding projects.
4. Discuss the benefits and risks of investing in Unit Linked Insurance Plans (ULIPs) compared to traditional insurance policies.

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Unit 4

MEASUREMENT OF RISK AND RETURN

Learning Outcomes

After completing this unit, the learners will be able to:

- gain insights into the various types of risks
- know how to measure systematic risk
- acquaint with the concept of Value at Risk analysis

Background

Imagine a scenario where Mr. Sunil invested ₹10,00,000 in shares of ABC Limited for 10 years, expecting a 15% return. However, various factors, including environmental disasters, inflationary pressures, geopolitical conflicts, strikes on the part of employees, internal mismanagement within ABC Limited, and intensified competition collectively undermined the company's performance, resulting in a lower-than-expected return of 12% after the stipulated period. Some issues, like mismanagement, strikes from employees, etc., affected ABC Limited company only and were within ABC Limited's control; hence, the company could have managed them better. Others, such as environmental disasters, outbreaks of pandemic, war, etc., were beyond the control of the company and affected all companies in the industry simultaneously. Understanding these risks is crucial for investors like Mr. Sunil. By gaining insights into the factors leading to risks, he can make smarter investment decisions. Thus, gaining insights on such risks is a prerequisite to investment. This unit deals with such risks and returns related to investment.

Keywords

Systematic risk, Unsystematic risk, Actual return, Expected return

Discussion

1.4.1 Meaning of Risk

- Uncertainty of returns

Risk is the chance of deviation of actual returns from the expected returns. Investors make investments with the aim of earning returns in the future. However, the future is uncertain, and sometimes investors don't get the returns they expect. This discrepancy between expected and actual returns highlights the unpredictable nature of investment results. This unpredictability, where actual outcomes differ from expectations, represents the inherent risk in investments. Each investment avenue differs from one another in terms of risk. For instance, investment in government bonds or fixed deposits in banks offers a lower rate of return when compared to investments made in mutual funds, shares, debentures and so forth.

1.4.2 Types of Risks

- Total risk = Systematic + Unsystematic risks

Various factors can impact the returns offered by a company, as explained in the example of Mr. Sunil. Some of such factors are internal to the company and come under the control of the company to an extent. Such factors affect those companies only. On the other hand, others are external and beyond the company's control, which involves a large number of companies in the market simultaneously. Risks related to investments can be classified into two, namely, systematic risk and unsystematic risk.

1.4.2.1 Systematic risk

- undiversifiable risks risk

The COVID-19 pandemic had an impact on nearly every industry in the market. The prices of shares of many companies in various sectors fell badly. Another example is the outbreak of a war between countries, which can also lead to a downfall in the price of shares of many companies in different industries. Such risks that are caused by system-wide factors, which affect all companies in the market, are called systematic risks. Such risks are impossible for businesses to avoid. Channelling funds into different investment avenues will not help to reduce or prevent systematic risks since such risks will simultaneously hit

all companies in the market. It is inherent to the whole market and cannot be diversified or avoided. Hence, it is also called undiversifiable risk.

The following is the classification of systematic risk:

a. **Interest rate risk-** The variation in the price of debt securities emerging due to a change in the interest rate is called interest rate risk. It affects particularly the debt securities like bonds and debentures that offer a fixed coupon rate of interest. If there is an increase in the rate of interest, the price of the bond or debenture will fall and vice versa.

b. **Market risk-** The variation in the returns caused by stock market volatility is called market risk. Market risks particularly affect the shares of companies.

c. **Purchasing power risk-** The risk arising due to inflation is called the purchasing power risk. Inflation refers to the rise in the price of goods and services over a period of time. As inflation increases, the purchasing power of money decreases and vice versa.

1.4.2.2 Unsystematic risk

- Diversifiable risk

You might have heard the saying, "Do not put all your eggs into one basket". This means that once something happens to the basket, all the eggs will be lost, whereas if it was put in different baskets, you could save the remaining ones if one or two baskets are lost. The same applies to investments. Rather than investing all your money in one particular source, if you diversify your investments by channelling the funds to various investment avenues, the total risks can be reduced. The profit in the others will offset losses from one or two investment avenues. Here, risk is reduced through diversification. The risks that can be eliminated through diversification are called unsystematic risks. Unlike systematic risks, unsystematic risks will not affect the market as a whole; they affect companies specifically. Hence, it can also be called a diversifiable risk, company-specific risk, specific risk, etc.

The following are the classifications of unsystematic risk:

a. **Business risk-** A situation where a slight decline in sales results in a more than proportionate decline in the operating profits of a business can be termed a business risk. It occurs due to the presence of fixed operating costs, which results in poor business performance.

b. **Financial risk-** The risk in return to shareholders that occurs as a result of the use of debt in the capital structure of a

company is termed financial risk. The use of debt results in the payment of fixed interest charges. If the operating profit of a business is found to be inadequate to meet such fixed payment obligation, it results in lower returns to shareholders.

1.4.3 Measurement of Risk

All investments come with a certain amount of risk. The risk tolerance of investors varies from one to another. Hence, measurement of risk associated with various investment avenues is essential for investors before investing. All investments are made with the expectation of obtaining returns. In the example of Mr. Sunil, the return expected from his investment in shares of ABC Limited is 15%. There is no certainty that Mr. Sunil will get a return of 15% in the future, as he had expected. It can either be more, say 20%, or less than expected, say 12%, due to the uncertainty of the future. Hence, the investor has to assign the probability of occurrence of these possible alternative returns. For example, the following table gives you the probability distribution of potential returns to Mr. Sunil from the purchase of shares of ABC Limited based on studying past data. By using the table below, investors can determine the expected return and risk of investments.

- Expected return and risk

Possible returns	Probability of occurrence
10%	0.10
12%	0.30
15%	0.40
18%	0.10
20%	0.10

The expected return on investment is the probability-weighted average of all possible returns.

$$\bar{X} = \sum_{i=1}^{n} X_i p(X_i)$$

Where,

$\bar{X}$ is the expected return

X_i is the possible returns

pX_i is the related probabilities

Calculation of expected returns

Possible returns (in %)	Probability of occurrence	X_i pX_i
10%	0.10	1
12%	0.30	3.6
15%	0.40	6
18%	0.10	1.8
20%	0.10	2

$$\bar{x} = \sum_{i=1}^{n} X_i p(X_i) = 14.4$$

The expected return to Mr. Sunil is 14.4%.

After measuring the expected return, the next important item to be measured for taking investment decisions is risk in investments. Variance or standard deviation of the probability distribution of possible returns is the measure of risk.

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

Possible return X_i (in %)	Probability pX_i	Deviation $X_i - \bar{X}$	Deviation squared $(X_i - \bar{X})^2$	Product $(X_i - \bar{X})^2 pX_i$
10%	0.10	-4.4	19.36	1.936
12%	0.30	-2.4	5.76	1.728
15%	0.40	0.6	0.36	0.144
18%	0.10	3.6	12.96	1.296
20%	0.10	5.6	31.36	3.136

$$Sigma\sigma^2 = 8.24$$

Standard deviation is the square root of the variance. Therefore,

$\sigma = \sqrt{8.24} = 2.87$ Per cent

Risk measurement involves measuring unsystematic and sys-

- Measurement of unsystematic and systematic risks

tematic risks. Since unsystematic risk can be reduced through diversification of investments, keen focus should be given to the measurement of systematic risks. The variability of security in relation to the variability in the stock market index is the measure of systematic risk. Hence, there exists a direct relationship between security variability and variability in the stock market.

The statistical measure that represents systematic risk is Beta (β), which measures the volatility of a security's return relative to the market. There exists a direct relationship between beta and volatility of security's returns. The value of beta, which is the index of systematic risk of an asset, can be positive, negative, or zero. The security having an average risk will have a beta of 1. If the beta of a security is greater than 1, it indicates that the security has more than average risk. This means the return from the security will change more than proportionately with the change in market returns. When there is a slight decrease in market returns, the stock having a beta greater than one will have a more than proportionate decrease in its return and vice versa. On the other hand, a security with a beta of less than 1 indicates that the security has a below-average risk.

β - Index of systematic risk

The formula to compute systematic risk under the correlation method is as follows:

$$\beta_i = \frac{r_{im}\sigma_i\sigma_m}{\sigma_m^2}$$

where,

r_{im} = correlation coefficient between the returns of stock I and the returns of the market index

σ_i = standard deviation of returns of stock i

σ_m = standard deviation of returns of a market index

σ_m^2 = variance of the market returns

The formula to compute systematic risk under the regression method is as follows:

$$R_i = \alpha + \beta R_m$$

where,

R_i is the return of individual security

R_m is the return on a market index

α is the estimated return of security when the market is stationary

β_i is the measure of systematic risk, i.e., change in return of individual security in response to a unit change in the return of the market index

1.4.4 Value at Risk (VaR) Analysis

- Maximum possible loss

Before investing, rational investors determine the maximum possible losses that they are likely to incur from their investment before investing. To answer the question, "What is the most I can lose on this investment?" Value at Risk (VaR) analysis is employed as it quantifies the probability of a worst-case scenario. Value at Risk (VaR) analysis is a new concept in risk management that determines the maximum possible losses from an investment portfolio over a specific period of time.

- Origin

The origin of VaR analysis can be traced back to the 1990s when JP Morgan offered a Risk Metrics service that enabled users to perform risk assessments. Banks and financial institutions utilise VaR analysis to gauge the potential losses in their portfolios. It considers the risk of a decline in the value of securities and risk related to uncertainty of returns in future. Loss amount, confidence level, and time frame are the three parameters used in VaR analysis.

To illustrate the concept of VaR in rupee terms, consider an investment portfolio managed by a mutual fund in India that has calculated its 1-day VaR as ₹10 crores with a 99 per cent confidence level. This means that the maximum loss the portfolio is expected to incur in a single day is limited to (or will be less than) ₹10 crores in 99 out of 100 trading days. In other words, the loss is likely to exceed ₹10 crores on only 1 out of 100 trading days. This signifies that there is a 99 per cent confidence level that the portfolio's value will decrease by less than ₹10 crores on any given trading day. In comparison, there is a 1 per cent probability that the portfolio may decline by more than ₹10 crores on a single trading day.

Methods for Calculating Value at Risk

The following are the methods for calculating VaR:

a. **Historical method-** Under the historical process of calculating Value at Risk, the future risk is predicted using the actual past data. The historical returns of the company in which you would like to invest will be arranged in ascending order from worst to best and will be plotted on a histogram. This histogram shows you the distribution of returns. In the case of Mr. Sunil, he takes the historical returns of ABC Limited for 5 years or 10 years and plots the data points in the histogram. Then, the confidence level can be set at 95% or 99% confidence. This means you want to find the point where only 5% or 1% of the worst returns lie. By looking at the worst 5% (in the case of 95% confidence level) or 1% (in the case of 99% confidence level) of these

historical returns, you get a sense of the worst-case scenario you might face, with the assumption that future returns will resemble past returns.

b. **Parametric method-** This method is used to understand the potential risk of investments, particularly stocks. It assumes that stock returns (how much a stock's price changes) follow a pattern called the "normal distribution," which looks like a bell curve. The expected return and standard deviation are the two key factors required to calculate Value at Risk using this method. The normal distribution (bell curve) shows us where most of the stock returns will fall. It helps us see the extremes, like the worst-case scenarios, based on the curve's shape.

c. **Monte Carlo simulation method-** The historical method relies on historical investment return data to estimate Value at Risk (VaR). In contrast, the Monte Carlo simulation technique models future investment returns by conducting numerous hypothetical trials based on historical data. The worst 5% or 1% of outcomes from these simulations provide the respective VaR metrics.

Each person has a different perception of risk. Some investors would be willing to take on more risk in exchange for larger returns. On the other hand, some people would be risk averse and rely on smaller returns since they can't take on risk. As a result, the measurement of risk plays an important role in investors' choice of investment avenues.

Summarised Overview

Risk in investments refers to the chance that actual returns will deviate from expected returns, highlighting the unpredictability of future outcomes. Investments vary in risk levels, with government bonds being safer than stocks or mutual funds. Risks are categorised into systematic risks, affecting the entire market and unverifiable and unsystematic risks, which are company-specific and can be mitigated through diversification. Measuring risk involves calculating variance or standard deviation of returns, with systematic risk measured by a security's beta (β), indicating its market volatility. Value at Risk (VaR) analysis, introduced in the 1990s by JP Morgan's RiskMetrics, is a key tool in risk management, estimating the potential maximum loss of an investment over a specific period with a given confidence level. VaR is calculated using methods such as the historical method, parametric method, and Monte Carlo simulations, enabling investors to make informed decisions and manage potential losses.

Self-Assessment Questions

1. Distinguish between risk and uncertainty.
2. What do you mean by risk in investment?
3. What are the components of total risk?
4. How does systematic risk differ from unsystematic risk?
5. Explain the concept of Value at Risk analysis.
6. What are the various methods to calculate VaR?
7. Briefly explain the measurement of systematic risk.
8. Explain how the Beta score is used to predict the volatility of security returns?

Assignments

1. List and describe three examples of systematic risks that could impact a wide range of industries. How can these risks affect investment portfolios?
2. Illustrate with an example how diversification can reduce unsystematic risk. What is the principle behind the saying, "Do not put all your eggs in one basket"?
3. Given the probability distribution of possible returns for an investment, calculate the expected return. Use the following data Possible returns: -25%, 10%, 0%, 15%, 20%, 30%, 35% Probability of occurrence: 0.05, 0.10, 0.10, 0.15, 0.25, 0.20, 0.15 (Ans-16.25%)
4. Compare and contrast the risks associated with government bonds and mutual funds. Why do government bonds typically offer lower returns compared to mutual funds?

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02 BLOCK

PORTFOLIO ANALYSIS

Block Content

Unit - 1 Fundamental Analysis

Unit - 2 Technical Analysis

Unit 1

FUNDAMENTAL ANALYSIS

Learning Outcomes

After completing this unit, the learners will be able to:

- gain insights into the economy, industry, and company framework through fundamental analysis.
- describe the fundamental macroeconomic factors that affect the future dividend and share prices of companies.
- comprehend the role of industry life cycle in industry analysis.
- analyse the performance of companies based on their financial statements.

Background

In the previous block, the measurement of the expected return and risk of securities was explained in detail. Mr. Rohit is interested in investing in the shares of company ABC Ltd.., but is uncertain whether the returns will meet his expectations. To make an informed decision, he might be interested in knowing the dividend that the company might offer him and also about the probable future prices of the shares of the company. How can he estimate such values? There are a number of factors that affect the performance of ABC Ltd., including the price of the company's shares. Fundamental analysis deals with the study of such essential factors which affect a company's performance. The present unit explains the concept of fundamental analysis with a focus on the EIC framework.

Keywords

Economy analysis, Industry analysis, Industry life cycle, Company Analysis

Discussion

2.1.1 Fundamental Analysis

- Fundamental factors

Fundamental analysis is a method of assessing the intrinsic value of a stock. It combines financial statements, external factors, events and industry trends. Consistent profitability, as reflected in financial statements, often leads to an increase in share prices. For instance, companies like TCS and HDFC Bank have experienced rising share prices due to their sustained profitability. Various factors influence these price movements, including economy-wise, industry-wise, and company-specific factors. The systematic analysis of these fundamental factors to estimate future share prices and dividends is known as fundamental analysis. This approach helps investors understand the underlying value of a company and make informed investment decisions.

- Comparison of intrinsic value with market price

Decisions of investors to buy, sell, or hold securities depend on whether the securities are underpriced, overpriced or correctly priced. Fundamental analysis helps investors identify underpriced, overpriced, or correctly priced securities by comparing the current market price of the security with its essential value. The fundamental value of a share, otherwise known as real value or intrinsic value, refers to its estimated true worth based on a company's current and future earning capacity and not just its current market price. If the current market price is more than the intrinsic value of the share, such a share is said to be overpriced. A share is said to be underpriced when its current market price is less than its intrinsic value. Investors tend to sell the overpriced shares with the expectation of a fall in their market price in the future and buy the underpriced shares with the expectation of a rise in the market price of such shares in future.

- EIC framework

Fundamental analysis helps investors to make informed decisions with the help of the Economy-Industry-Company analysis framework (EIC framework). Fundamental analysts insist that investment decisions should be made after considering economy-wide factors, industry-wide factors,and company-wide factors rather than by tips and rumours. The following section explains the concept of the EIC framework in detail.

Approaches of Fundamental Analysis

Usually, there are two approaches in fundamental analysis, namely, the top-down approach and the bottom-up approach.

TOP-DOWN APPROACH

It is otherwise known as EIC (Economy, Industry and Company) because it starts with the global economy and travels downwards to the economic conditions of various countries or geo-

graphic regions.

2.1.1.1 Economy-Industry-Company Analysis Framework

- Three-tier analysis

The Economy-Industry-Company analysis framework is a three-tier analysis that states that a company's performance is affected by economy-wide, industry-wide, and company-wide factors

The framework is explained in detail as follows:

A. Economic Analysis

- Macroeconomic factors

Economic analysis involves examining macroeconomic factors that influence investment decisions. At the macroeconomic level, fundamental analysis centres on financial data to evaluate current and future economic growth. Economy analysis is a crucial part of the top-down approach in fundamental analysis. When the economy demonstrates sustainable development, industry groups are likely to benefit and experience accelerated growth. Analysing the macroeconomic environment is essential for understanding stock market behaviour. The following are the key variables related to economic analysis:

- Measures of inflation- WPI and CPI

i. **Price - level and inflation-** Inflation refers to the increase in the economy's prices of products and services. Earlier, small candies were available at 50 paise per candy, but now you cannot buy such candies until you spend at least ₹1. This is because of the rise in the price of products and services and the fall in the value of money. Inflation in the economy can be analysed by the price level prevailing in the economy. The price level helps analysts understand how much of the growth in nominal GDP is due to real economic expansion versus inflation. Inflation in terms of the wholesale price is measured using the wholesale price index (WPI), and inflation in terms of retail price is calculated using the consumer price index (CPI). Fundamental analysts should measure the current and future inflation rate likely to prevail before investing. Investments should be made in such a way that the return expected from such investments should outpace inflation. Investors should buy shares of those companies where the expected returns exceed the rate of inflation.

ii. **Economic growth rate-** The growth rate of the economy is reflected by variables such as Gross National Product (GNP), Net National Product (NNP), and Gross Domestic Product (GDP). GDP is the total value of everything produced by people and businesses in a country, including taxes on products but subtracting any subsidies. The growth rate is affected by different phases of the economy,

such as depression, recovery, boom, and recession. The GDP increased from 7.2 per cent in the year 2023 to 8.4 per cent in the third quarter of the year 2024. Whereas, when you compare the GDP of 2021 and 2022, you will notice a sudden decline in the GDP rate from 9.05 per cent to 7 per cent, which was the result of the COVID-19 pandemic that has caused a depression in the economy of the country.

During the depression, demand is low and continues to decline. Inflation and interest rates are often high, forcing companies to cut down production, shut down plants, and lay off workers. In the recovery stage, the economy starts to revive from the depression. Demand increases, leading to more investments. Production, employment, and profits begin to rise. The boom phase of the economic cycle is marked by high demand, with investments and production maintained at elevated levels to meet this demand. Companies typically see higher profits during this phase. However, the boom phase eventually slows down as the economy begins to experience a downturn in demand, production, and employment. Consequently, company profits start to decline, leading to the recession stage of the business cycle. When analysing the growth rate of the economy, an investor must identify the current stage of the economic cycle and assess its impact on investment decisions.

- Economic growth rate during different phases of the economy

iii. **Monsoon and agriculture-** Agriculture is a cornerstone of the Indian economy, significantly influencing both directly and indirectly related industries. Companies that rely on agricultural raw materials or supply inputs to the farm sector are directly impacted by fluctuations in agricultural production. Other businesses are indirectly affected due to these linkages. Increased agricultural income leads to increased demand for industrial goods and services, thereby linking the performance of agriculture to the performance of various industries and companies. The success of agricultural activities in India is heavily dependent on the monsoon, with adequate rainfall being crucial for agricultural success. Consequently, the progress and adequacy of the monsoon are of great concern to investors in India, as they directly influence the farm sector and, by extension, the broader economy.

- Direct and indirect linkage with industries

iv. **Exchange rate-** The exchange rate is the rate at which one country's currency is exchanged for another. The exchange rate affects the performance of companies that deal with exports and imports. Exchange rate sometimes

results in devaluation of home currency in terms of a foreign currency. Devaluation is the fall in the value of the home currency in relation to another country's currency. For example, at the beginning of 2022, the exchange rate between the Indian Rupee and the U.S. Dollar was ₹74.44. By 2023, this rate had increased to above ₹80. This means that to obtain one U.S. Dollar, it required ₹74.44 in 2022 but ₹80 in 2023. In such a scenario, companies that rely heavily on imports will suffer because they need to spend more on importing goods and services. Conversely, companies focusing on exports will benefit as their goods become cheaper for foreign buyers. Therefore, investors must consider the impact of the exchange rate on the performance of companies before investing.

- Affects companies dealing with exports and imports

v. **Interest rate-** Companies give returns to investors who invest in their shares and debentures in the form of interest and dividends. The period of maturity, inflation rate, default risk, etc., affects the rate of interest. A lower rate of interest offers companies high profitability since it lowers the cost of finance. Hence, it is positive for companies if the interest rate is low and vice - versa. Since interest rates affect the performance of companies, investors need to evaluate the impact of interest rates on their performance before investing

- Low interest rate improves corporate profitability.

vi. **Economic and political stability-** Economic and political stability are vital for company's performance as they provide a predictable environment for planning and investment. A stable political environment is essential for achieving steady and balanced growth. Political turmoil impedes the growth and prosperity of industries and companies alike. Long-term economic policies that are stable are crucial for fostering industrial development, and such stability can only arise from politically stable systems. Political stability ensures consistent and predictable policies affecting taxation, regulation, and trade, enabling informed strategic decisions. It also enhances investor confidence, attracts more investment, and reduces risks of disruptions from conflicts or civil unrest. Stability creates a favourable business climate, which is essential for sustained growth and performance.

- Consistent and predictable policies

vii. **Infrastructure-** In the Union Budget 2023, infrastructure and investment were prioritised as key sectors funded by the government. Despite the increase in capital expenditure for infrastructure development, the government continues to focus on this area with the intention of achieving long-term benefits. Companies operating in an

- Investments made in power, transportation, and communication facilities

environment with robust rail, road, and air transportation facilities are likely to see improved performance. Recognising this, the government allocated a portion of the budget specifically for infrastructural development. Thus, assessing the infrastructural facilities is essential for an investor before investing.

- Government revenue, expenditure and deficits

viii. Government budget and deficits- The government budget and deficit impact companies through various mechanisms, including interest rates, inflation, and taxation. High deficits can lead to increased government borrowing, raising interest rates and borrowing costs for businesses while also potentially fueling inflation that erodes purchasing power and increases input costs. Tax hikes to address deficits can reduce corporate profits and consumer spending. Government spending influences economic activity; for instance, a reduction in government spending could potentially reduce business opportunities. Deficits can also affect business and consumer confidence, foreign investment, and currency stability. Additionally, changes in subsidies and incentives tied to fiscal policies can directly impact industry performance. Thus, the budget and deficit shape the economic environment in which companies operate, affecting their overall performance.

These are some of the key variables under economic analysis that a fundamental analyst should consider while investing.

BOTTOM–UP APPROACH

It is the reverse of the top-down approach. It starts with the analysis of the prospects of the companies and then builds the estimates of the scope and prospects of the industries and, ultimately, for the economy.

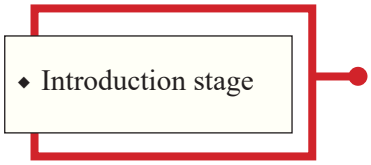
B. Industry Analysis

- Industry-A group of companies

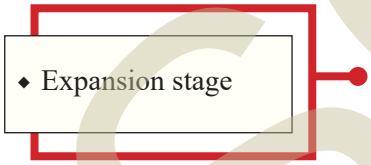
Industry analysis helps to identify both the opportunities and threats of the industry and the future of the industry as a whole. It identifies the present stage of the industry in the life cycle. From the perspective of industry analysis, the classification of the industry can be made either according to their reactions to the different phases of the business cycle, which is discussed below or based on the operating ability of the industry in relation to the economy as a whole. An industry includes a group of companies that produce similar goods or deliver related services. These companies typically cater to the same customer base. Examples include the cement industry (Ramco, Ultratech, etc.) and the automobile industry (Hyundai, Maruti Suzuki, etc.). Every company belongs to a specific industry.

The performances of companies are affected by the various factors that affect the performance of industries. For instance, during the COVID-19 pandemic, the tourism industry was severely impacted due to lockdowns, causing companies within the sector to struggle and enter a depression phase. In contrast, the pharmaceutical industry was less affected, resulting in more stable performance for companies within that industry. Therefore, investors must conduct a thorough evaluation of the industry in which the company they plan to invest operates.

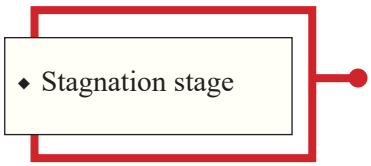
The life cycle of an industry affects the functioning of the companies within the industry. The industry life cycle is the stage of growth through which the industry is passing. The industry life cycle can be classified as follows:



i. **Pioneering stage-**This initial stage is characterised by novel technology and innovative products. Many entrepreneurs are drawn in by the chance to make high profits and shake up the market. This leads to intense and sometimes unstructured competition. Many companies find it hard to stand out, and only a few with strong ideas and efficient operations manage to survive this stage. For example, the telehealth industry, which makes use of digital communication technologies to provide healthcare services, is pioneering. Practo, Apollo Telehealth, and 1mg are some of the companies that are serving in this industry.



ii. **Growth stage-**After the chaos of the pioneering stage, the industry moves into a period of rapid growth. The companies that survived the initial competition see big increases in sales and profits because the market becomes more stable. This stage is very appealing to investors. Demand is higher than supply, leading to high returns with lower risk. Companies enjoy increasing profits, enabling them to distribute attractive dividends to shareholders. The electric vehicle industry can be said to be in the growth stage. The government offers various subsidies and incentives to the companies operating in this industry for its promotion.



iii. **Maturity stage-**After the rapid growth stage, the industry reaches a point of maturity and stabilisation. Growth slows down and matches the overall economy as the market becomes full. However, new technology or innovative products can boost growth again, starting a new life cycle. This shows why it's important for investors and analysts to keep a close watch on the industry. Noticing when the industry shifts from growth to stagnation is the key, as this often comes before a decline. Investors should think

about selling their investments in these industries to avoid losses from potential decline. An example of a sector that is in the maturity stage is the telecommunication industry, which has reached maturity in many markets with established players and technologies.

iv. **Decline stage-**Eventually, the industry enters a decline stage where demand stops growing and may even fall due to new products and changing consumer preferences. Growth slows down or reverses, following broader economic trends. Even though there may be brief recoveries during good times, decline is common during recessions. This highlights the need for investors to have an early exit strategy. When it looks like an industry is about to decline, it's smart to sell investments to avoid the financial losses that usually follow. For instance, the shift towards digital news consumption has led to a decline in printed newspapers. Revenue streams from advertising and subscriptions have shrunk dramatically. While some newspapers maintain a digital presence, the industry as a whole is experiencing a steady decline.

- Decay stage

Understanding the industry life cycle is crucial for investors and analysts, as it influences company performance and investment decisions. From the chaotic beginnings of the pioneering stage to the stability of maturity and the eventual decline, each phase presents unique challenges and opportunities. By recognising and adapting to these stages, investors can make informed decisions, strategically entering and exiting investments to maximise returns and minimise risks.

Characteristics of industry

An investor should study the characteristics of the industry in which the company they tend to invest. Some of the important factors are discussed below.

i. **Demand-supply gap-** Investors should analyse the demand-supply gap of the company's products to determine the short-term or medium-term prospects. Equilibrium is said to be achieved when the demand for a product equals its supply. If the demand for a company's products exceeds its supply, the company could sell its product at a higher price. Through higher unit price realisation, the profitability of the company increases. On the other hand, an oversupply of products results in lower profitability due to a reduction in unit price realisation.

ii. **Competition-** The level of competition among various companies in an industry affects the profit potential

of such companies. There are some competitive forces which determine the profit potential of companies, such as threats of new entrants (How easy is it for new companies to enter the market?), rivalry among existing firms (How intense is the competition between established players?), pressure from substitute products (Are there readily available alternatives that could steal market share?), bargaining power of buyers (How much leverage do customers have in negotiating prices?), and bargaining power of sellers (Can suppliers influence pricing due to limited options?). It is wise to conduct a thorough analysis of these competitive forces before making investments. Investors should invest in industries where these forces create a favourable environment for company performance.

iii. **Permanence-** Investors must ensure that the industry in which they tend to invest will have long-term demand from customers. Investing funds in a sector that faces technological obsolescence or has only short-term demand will lead to a loss of money.

iv. **Attitude of labour-** Employee morale and working conditions are crucial factors in our economy, especially with strong labour unions. Industries with a history of frequent strikes due to low employee satisfaction are unlikely to thrive.

v. **Government support-** The government offers various subsidies and incentives to the companies operating in the electric vehicle industry for its promotion. At the same time, the government is less supportive and restrictive towards some sectors, such as tobacco, plastic manufacturing, alcohol and so forth. It might be advantageous for investors if they invest in companies that fall under the industries that the government favours.

vi. **Raw material availability-** Raw materials are essential for maintaining a smooth production process. Investing in an industry where raw materials are scarce is risky because production halts due to material shortages, which can impact profitability. This, in turn, can reduce returns for investors.

vii. **Cost structure-** The cost structure within an industry is a significant consideration. Some businesses incur high fixed costs, such as rent and salaries, which must be paid regardless of production levels. Others face costs that fluctuate with production, such as material expenses. Industries with lower fixed costs relative to variable costs are generally viewed more favourably because they can

achieve profitability even with lower sales volumes. Analysts typically prefer industries where companies can attain profitability more rapidly.

By carefully considering these industry characteristics, investors can make informed decisions related to the selection of the most rewarding industries. A strong industry fosters a company's success, impacting factors like profitability and long-term viability. By understanding the dynamics at play, investors can position themselves for better returns.

C. Company Analysis

- Financial statements

After selecting an industry for investment through industry analysis, investors may face uncertainty about which specific companies within that industry to invest in. Company analysis helps resolve this dilemma. The decision of investors to invest in a company's share depends upon the profitability and financial soundness of the company, which is revealed in the company's financial statements.

- Components of financial statements

The profit and loss account and the balance sheet represent the key components of financial statements. The profit and loss statement or the income statement depicts the profit or loss obtained by a company during a particular period, while the balance sheet showcases the financial position of a company on a specific date. Investors can gather facts and figures from these financial statements, but analysing them is essential for making an informed decision about which company to invest in.

Analysis of Financial Statements

- Ratio and time series analysis

Investors can analyse the financial performance of a company through its financial statements. An analysis and interpretation of the various facts and figures obtained through such financial statements is vital for investors to make informed decisions. Ratio analysis is an important tool used for analysing financial statements. The ratio of various items given within the profit and loss account and the ratio of items in between the profit and loss account and balance sheet could be fetched through ratio analysis. Ratio analysis could be used for intra-firm comparison and inter-firm comparison. Another important tool for analysing financial statements is time series analysis. It can be used to compare the current performance of the company with its past.

The various types of ratios in ratio analysis can be grouped into four heads as follows:

i. **Liquidity ratio-** Liquidity ratios are those which measure the short-term solvency of companies. It depicts whether the company is financially sound in terms of meeting its short-term financial obligations. The following are the

key liquidity ratios:

a. **Current ratio** = $\frac{Current\ asset}{Current\ liability}$

b. **Acid test ratio or Quick ratio =**

$$\frac{Current\ asset - Inventory - Prepaid\ expenses}{Current\ liability}$$

ii. **Leverage ratio or Capital structure ratio-** Leverage ratios measure the long-term solvency of a company. It depicts whether the company is financially sound in terms of meeting its long-term financial obligations. The following are the key leverage ratios:

c. **Debt-equity ratio** = $\frac{Long - term\ Debt}{Shareholders'\ Equity}$

d. **Proprietary ratio** = $\frac{Shareholders'\ Equity}{Total\ assets}$

e. **Debt to total assets ratio** = $\frac{Total\ debt}{Total\ assets}$

f. **Interest coverage ratio =**

$$\frac{Earnings\ before\ interest\ and\ taxes\ (EBIT)}{Interest}$$

iii. Profitability ratio- Profitability ratios measure the profits earned by a company in relation to other variables such as sales, investment, or equity shares. The following are the key profitability ratios:

a. **Gross profit ratio =**

$$\frac{Gross\ profit(Sales - Cost\ of\ goods\ sold)}{Sales}$$

b. **Net profit ratio** = $\frac{Profit\ after\ tax}{Sales}$

c. **Operating profit ratio =**

$$\frac{Earnings\ before\ interest\ and\ taxes(EBIT)}{Sales}$$

d. Administrative expenses ratio = $\frac{Administrative\ expenses}{Sales}$

e. Selling expenses ratio = $\frac{Selling\ expenses}{Sales}$

f. Operating expenses ratio = $\frac{Administrative\ expenses + Selling\ expenses}{Sales}$

g. Operating ratio = $\frac{Cost\ of\ goods\ sold + Operating\ expenses}{Sales}$

h. Return on assets = $\frac{Earnings\ after\ tax}{Total\ assets}$

i. Return on capital employed = $\frac{Earnings\ before\ interest\ and\ taxes(EBIT)}{Total\ capital\ employed}$

j. Return on equity = $\frac{Earnings\ after\ tax}{Shareholders'equity}$

k. Return on investment = $\frac{Profit\ after\ interest, tax\ and\ dividend}{Number\ of\ equity\ shares}$

l. Earnings yield = $\frac{Earnings\ per\ share}{Market\ price\ per\ share}$

m. Dividend yield = $\frac{Dividend\ per\ share}{Market\ price\ per\ share}$

n. **Dividend payout ratio** = $\frac{Dividend\ per\ share}{Earnings\ per\ share}$

o. **Price earnings ratio(P/E ratio)** =

$$\frac{Market\ price\ per\ share}{Earnings\ per\ share}$$

p. **Return on investment** = $\frac{Net\ profit}{Total\ investment}\ x\ 100$

iv. **Efficiency ratio or Activity ratio or Turnover ratio-** Efficiency ratio measures the speed at which assets are converted into sales. It includes-

a. **Inventory turnover** = $\frac{Sales}{Average\ Inventory}$

b. **Total assets turnover** = $\frac{Sales}{Total\ assets}$

c. **Debtors turnover** = $\frac{Sales}{Average\ debtors}$

Apart from estimating the profitability and financial position of companies, investors must also consider the risk involved in making investments in such companies. The variation of actual returns from expected returns from a company is termed a risk in investments. The benefit of investment is obtained only in future, and the future is uncertain, which is the reason why investment is said to have risk.

Thus, a rational and scientific investor must thoroughly evaluate extensive information regarding the historical performance and anticipated future performance of companies, industries, and the overall economy before making investment decisions.

Summarised Overview

Fundamental analysis, as discussed earlier, is a method of measuring a security's intrinsic value through the examination of related economic, industrial and financial factors. Fundamental analysis involves evaluating a company's financial health to predict its future share prices and dividends. It examines key factors affecting share prices, including economic, industry, and company-specific elements. Investors use fundamental analysis to compare a security's current market price with its intrinsic value, determining if it is underpriced, overpriced, or fairly priced.

The Economy-Industry-Company (EIC) framework guides this analysis. Economic factors include inflation, economic growth rates, monsoon impacts, exchange rates, interest rates, and political stability. Industry analysis involves understanding the industry's life cycle and characteristics, such as demand-supply gaps, competition, and government support. Company analysis focuses on financial statements, with ratio analysis (liquidity, leverage, profitability, efficiency) and time series analysis helping investors assess a company's performance and financial stability. By integrating these insights, investors can make informed decisions and manage investment risks effectively.

Self-Assessment Questions

1. What is fundamental analysis?
2. Differentiate between the intrinsic value of a share and its market price.
3. Explain the EIC framework.
4. Briefly explain the macroeconomic factors that must be considered in fundamental analysis.
5. What are the key characteristics of an industry that investors should analyse before making investment decisions?
6. Describe the differences between the pioneering, growth, maturity, and decline stages of an industry lifecycle.
7. What are the main components of financial statements, and why are they important for investors?
8. List and explain the key liquidity ratios used in financial analysis.
9. What is the purpose of leverage ratios, and how do they inform investors about a company's long-term solvency?
10. How can the availability of raw materials impact an industry's profitability?

Assignments

1. Using the fundamental analysis approach, explain how you would determine if a company's stock is underpriced, overpriced, or fairly priced.
2. How would you evaluate the impact of inflation on investment decisions? Provide an example of how inflation affects stock prices.
3. Choose an industry of your choice and identify its current stage in the industry lifecycle. Discuss the implications of this stage for investors.
4. Calculate and interpret at least three liquidity ratios and three profitability ratios for a selected company. How do these ratios provide insight into the company's financial health?
5. Discuss how different phases of the economic cycle (e.g., recession, recovery) can influence investment choices.

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Suggested Reading

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Space for Learner Engagement for Objective Questions

Learners are encouraged to develop objective questions based on the content in the paragraph as a sign of their comprehension of the content. The Learners may reflect on the recap bullets and relate their understanding with the narrative in order to frame objective questions from the given text. The University expects that 1 - 2 questions are developed for each paragraph. The space given below can be used for listing the questions.

Unit 2

TECHNICAL ANALYSIS

Learning Outcomes

After completing this unit, the learners will be able to:

- understand how to use historical price data and chart patterns to make trading decisions based on past market behaviour.
- gain insights into the concept of different cyclical movements in the stock market and how they reflect market sentiment and cycles.
- learn the concept of market efficiency and how it affects stock price behaviour and investment strategies.

Background

In the previous unit, we have seen how fundamental analysis concentrates on analysing the economy, industry and company-related information while taking long-term investment decisions. Fundamental analysis helps an investor to decide what to buy, but it won't explain when to buy. On the other hand, technical analysis focuses more on past price movement as analysts believe that past price behaviour has a direct impact on future prices of stock. They won't care about the value of a company or the intrinsic value of a share.

You might have obtained an idea of analysing the movement of share prices using fundamental analysis from the previous unit. Now, imagine that Ms. Radhika is interested in investing in the shares of company ABC Ltd. but is uncertain whether the timing of her investment will yield the desired returns. To make an informed decision, she might be interested in understanding the price trends and patterns that could indicate future movements in the company's share price. Unlike fundamental analysis, which focuses on intrinsic company factors, technical analysis examines past market behaviour to predict future price movements. This approach involves analysing historical price charts, volume data, and other market indicators to identify patterns and trends. The present unit explains the concept of technical analysis with a focus on how it can help investors like Ms. Radhika to make informed decisions based on market dynamics.

Keywords

Charts and patterns, Dow theory, Elliot wave theory, Efficient market hypothesis

Discussion

2.2.1 Meaning

- Use of past share price data

In fundamental analysis, analysts make investment decisions by computing the intrinsic value of a company's share (based on fundamental factors) and comparing it with the market price so as to determine whether the company's share was underpriced, overpriced, or rightly priced. Apart from this approach of estimating the future price of shares, there is another approach which focuses on past share prices to estimate the future price. This approach is termed as technical analysis. Technical analysis forecasts future share prices by estimating historical share price movements. The core idea of technical analysis is that share price behaviour tends to repeat over time, allowing analysts to develop methods for predicting these patterns. The fundamental premise of technical analysis is that prices move in trends or waves, which can be upward or downward. It is believed that past trends influence current trends, and future trends can be projected by analysing historical price patterns. Therefore, a technical analyst studies the price and volume movements of individual securities and the overall market index to predict future stock price behaviour.

Imagine you're looking at a five-year graph of ITC's stock price. You might see times when the price went up, down, or stayed the same. For example, the stock might have steadily increased over several months a couple of years ago and might change depending on the demand and supply of such shares in the market. These demand and supply factors in the market are, in turn, caused by various rational and irrational factors.

The direction of movement of share prices in the market is called a trend. If the share prices rise over a period of time, it is called an uptrend or rising trend, whereas if the price of shares decreases over a period, it is referred to as a downtrend or falling trend. The upward-moving market is also called the bull market, and the downward-moving market is also called the bear market. The uptrend or downtrend is the main trend, which will sometimes be interrupted by short-term fluctuations that move in the opposite direction from the main trend. If there is an uptrend in

the price of a company's share, it is characterised by higher tops and higher bottoms. When you notice ITC's share price, you can see that there has been an increasing trend from ₹220 in January 2022 to ₹335 by December 2022. This consistent rise is an uptrend. During this period, the share price shows higher tops and higher bottoms. In July 2022, the price has reached around ₹300. By October 2022, it peaks at around ₹330, which is higher than the July price, which indicates a higher top. The lowest price in January 2022 was around ₹215. In August 2022, even though there might have been a temporary dip, the lowest point was higher at around ₹310 compared to the January low, which indicates a higher bottom. A falling trend is just the opposite, which is characterised by lower tops and lower bottoms. When the direction of a trend changes, it is known as a trend reversal. A trend analyst aims to spot these reversals early to make profitable trades. If the trend starts going down, it is a signal to sell and vice versa. If the trend is flat, it is usually best for investors to stay out of the market.

- Trends and trend reversals

2.2.2 Price Charts

Technical analysts make use of different patterns and charts to determine the movement of share prices and to estimate the future price of shares through graphical representation. Different types of charts can be prepared by using the one day's opening price, closing price, highest price, and lowest price of a share. An XY graph is used to depict these prices, where the trading days are shown on the X-axis, and prices are displayed on the Y-axis.

- Graphical representation

The most commonly used types of charts are:

- Simplest form

a. Line chart- In a line chart, the closing price of each day is plotted, where the days are shown on the X-axis and the price of each day is shown on the Y-axis. After plotting the closing prices, the points will be connected using straight lines. It is a simple chart where these lines represent the trend of the market.

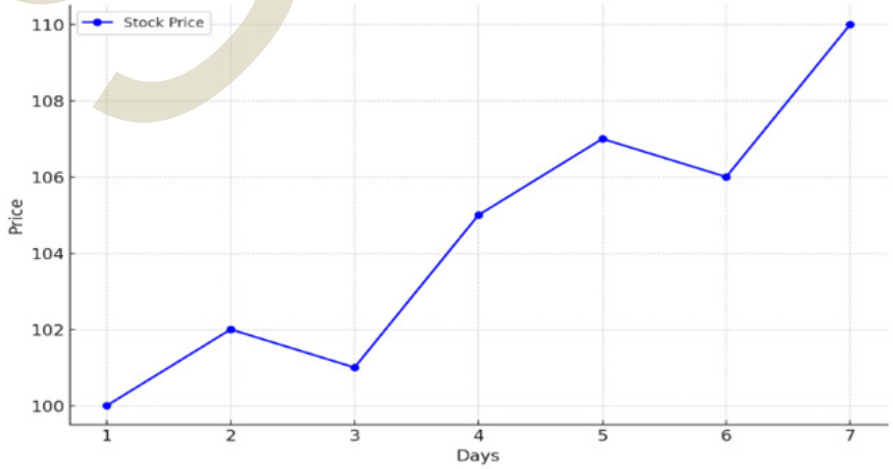

Figure 2.2.1 Line chart

- Popular chart

b. Bar chart- A bar chart is the most popular chart which is drawn using the highest price, lowest price, closing price, and the opening price of a share on a day. A line is drawn by connecting the highest price which will be plotted on top and lowest price of a day which will be plotted on bottom. The closing price is represented by a small horizontal hash on the right side of the bar and opening price is represented using a small horizontal hash on the left side of the bar.

Figure 2.2.2 Bars in a bar chart for technical analysis

- Black, white and doji candlesticks

c. Japanese Candlestick charts- Similar to a bar chart, the Japanese candlestick chart is also drawn using the highest price, lowest price, opening price, and the closing price. Each day's trading activity is represented by a candlestick. The highest and lowest prices of the day are connected by a vertical line. Between these, the opening and closing prices are shown as a rectangle. This forms a candlestick shape, with the rectangle filled or outlined to indicate whether the closing price was higher or lower than the opening price. If the closing price of the share on a day is higher than the opening price, it is called as white candlestick. A black candlestick represents a situation where the closing price is lower than the opening price. If both prices are same, it can be called as a dojicandlestick.

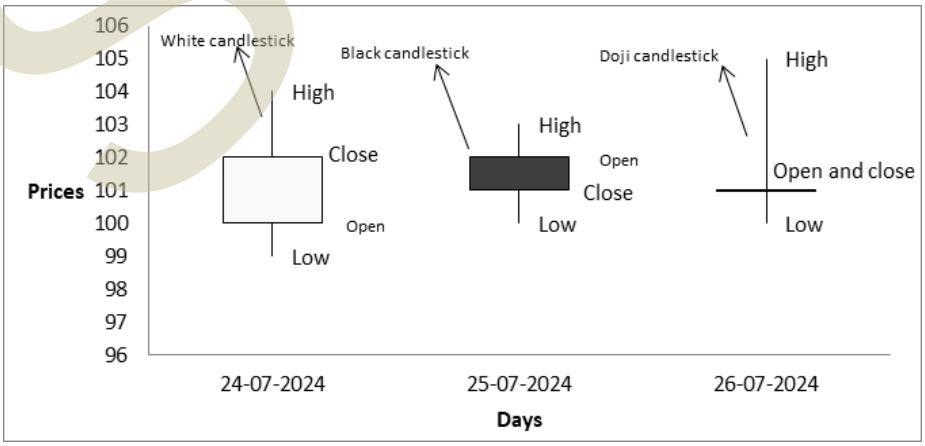

Figure 2.2.3 Japanese candlesticks

2.2.3 Chart Patterns

As mentioned before, identifying trend reversal is essential in order for an investor to take decision to buy or sell shares. Technical analysts can develop various chart patterns by examining several days' price bar charts. The following are the different types of chart patterns:

a. **Support and resistance-** Support occurs when the price of a share falls but rises back and reverses direction when it reaches a specific level. When these low points are connected with a horizontal line, they form a support line. This support line represents the price level where there is enough buying interest to prevent further price drops. Let us consider a company ABC Ltd., the stock price of which fluctuates between ₹200 and ₹300 during the year 2021-22. Each time the price approached ₹200, buying interest of investor increases, causing the price to rebound. A further fall in the share price is indicated when a company's share breaks the support line.

- Caused by buying pressure

Conversely, resistance occurs when the price of the share increases but falls and reverses direction when the price reaches a specific level. For instance, when the price of ABC Ltd. neared ₹300, selling pressure increased, causing the price to decline. A further rise in the share price is indicated when a company's share breaks the resistance line.

- Caused by selling pressure

Suppose in 2023, ABC Ltd's stock price managed to break through ₹300 resistance level, reaching ₹350. This breakout might have been accompanied by higher trading volume, indicating strong investor interest and confirming the move. Once the resistance is broken, it can become a new support level. After breaking the resistance, if the stock pulls back to around ₹300 but doesn't fall below it, this former resistance level now acts as support, reinforcing the new upward trend. This indicates that the roles of support and resistance will be reversed once if the support or the resistance lines are broken.

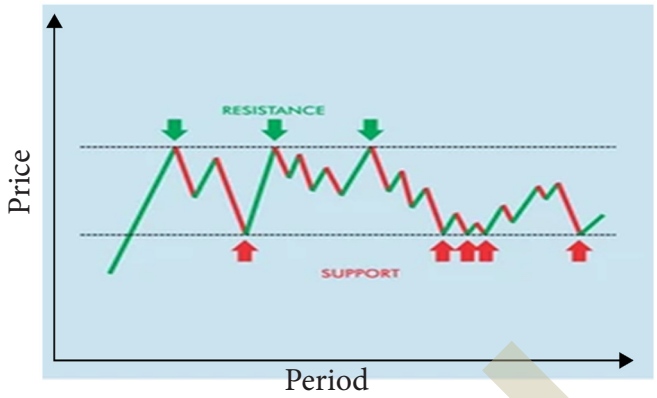

Figure 2.2.4 Support and Resistance levels

b. Reversal patterns- When the direction of a trend changes, it is known as a trend reversal. A trend reversal occurs when a share which depicted an uptrend will fall and vice-versa. These trend reversals can be represented using chart formations through reversal patterns. The following are some of the important reversal patterns used in technical analysis:

- **Head and shoulder formation-** The head and shoulders reversal pattern is a chart formation that typically appears at the end of a prolonged uptrend, resembling a person's head and shoulders. The first rise, known as the left shoulder, results from investors' enthusiastic buying, pushing the share price to a peak. The next and highest peak forms the head. The left shoulder and the head form the higher highs, indicating the existing upward trend. The right shoulder ending below the head holds the downtrend. A neckline is drawn connecting the two bottoms that occur in between the heads and shoulders. When the price of the share breaks the neckline, it indicates a change in the trend to downward.

- Occurs at the end of an uptrend

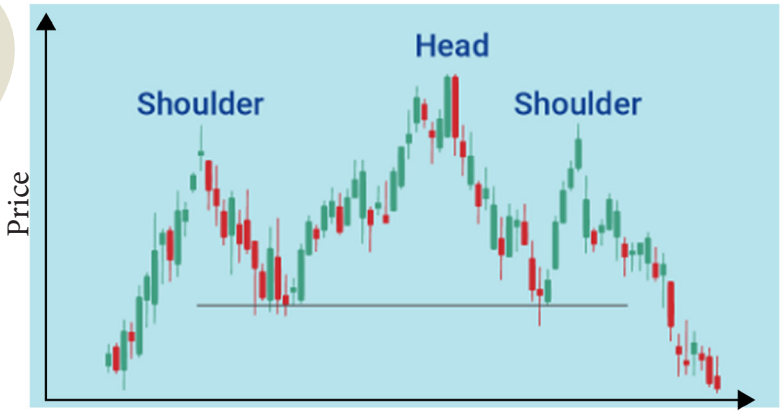

Figure 2.2.5 Head and Shoulder Formation

- Occurs at the end of a downtrend

- **Inverse head and shoulder formation-** The inverted head and shoulders pattern is a chart formation that typically signals the reversal of a downtrend, resembling an upside-down head and shoulders. The first dip, known as the left shoulder, results from a wave of selling pressure that pushes the share price to a low. Following this, the price recovers slightly before dropping again to form the head, which is the lowest point of the pattern. This head is bordered by two troughs (shoulders) and represents the bottom of the downtrend. The right shoulder forms as another dip that doesn't reach the depth of the head, indicating diminishing selling pressure. A neckline is drawn by connecting the two peaks between the head and shoulders. When the share price breaks above this neckline, it signals a reversal to an upward trend.

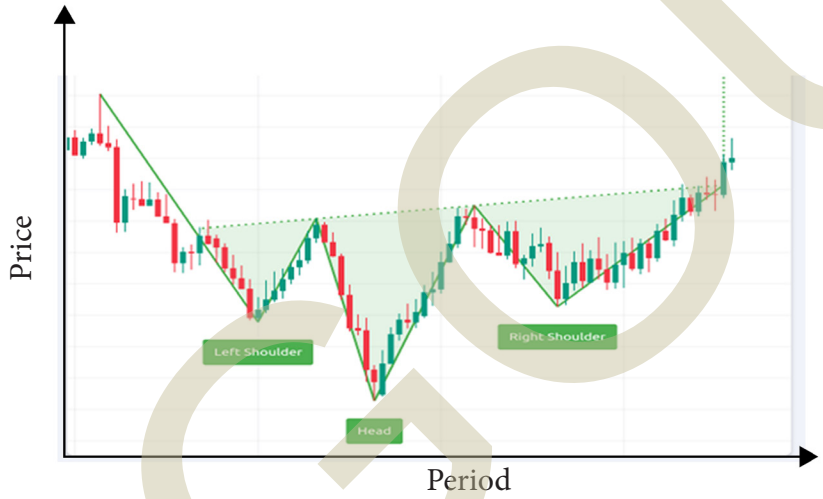

Figure 2.2.6 Inverse head and shoulder pattern

C. **Continuation patterns-** Continuation patterns are those patterns that occur when the price takes a temporary pause before resuming the prevailing trend, whether upward or downward. Traders use continuation patterns to identify opportunities to enter a trade in the direction of the trend once the pattern is completed. The following are the commonly used continuation patterns used by technical analysts:

- **Flags-** The flag formation resembles a parallelogram, where two trend lines run parallel to each other. During the formation of the flag, trading volume typically decreases and then increases again when the pattern breaks. These patterns are small rectangles that slope against the dominant trend and appear after a significant price movement. The flagpole represents the initial surge, while the flag signifies a period of consolidation. Consider a stock that has been rising steadily

- Resembles a parallelogram

in price in the initial trend. Suddenly, it experiences a sharp and rapid increase, creating a steep upward line on the chart. This line is known as the flagpole, indicating strong buying momentum or positive news. After the sharp rise in the consolidated phase, the stock price starts to move sideways or slightly downward, forming a small rectangular shape. This is the flag, representing a consolidation period where the market takes a pause. During this phase, traders evaluate whether to continue buying or if the stock might be overvalued. The next phase will be the continuation of the trend. If the stock breaks out of the flag in the same direction as the original trend (upward in this case) after the consolidation phase, it suggests that the upward trend is likely to resume. This breakout often results in another sharp increase in the stock's price, mirroring the initial movement.

- Series of descending tops and ascending bottoms

- **Triangle-** Triangles are created when price movements produce a series of descending highs and ascending lows. These patterns become visible on a chart when the descending highs are connected by a straight line and the ascending lows by another straight line. The lines formed are known as the upper trend line and the lower trend line, respectively. Triangles can represent a consolidation phase before a price breakout.

- Resembles a symmetrical triangle

- **Pennants-** The pennant formation resembles a symmetrical triangle and forms after a strong price movement. The upper trendline, which connects the peaks, slopes downward, while the lower trendline, connecting the troughs, slopes upward. This pattern usually appears during a strong upward or downward trend and suggests that the existing trend is likely to continue. The price breakout from the pennant is often accompanied by increased trading volume.

Using these charts and patterns, various theories have been formulated to study the behaviour of the stock market and thereby indulge in informed decision-making.

2.2.4 Dow Theory

- Stock market movements are non-random

The Dow theory was formulated by Charles. H. Dow during 1900-1902 which argues that the movements in the stock market are not random. The theory states that the direction of the stock market is regulated by three cyclical movements, which are simultaneous in nature. Dow's theory is based on certain assumptions. A single individual or institution cannot influence the main trend in the market. They can only influence short–term movements. The theory also assumes that all the available information is already reflected in the price of shares.

The following are the cyclical movements according to Charles Dow:

i. **Primary movements-** The primary movements are the most important long–term movements that can be compared to the tides in the ocean.

ii. **Secondary reactions-** The secondary reactions are short-term movements which restraints the primary movements. These movements go against the primary movements. Such movements are hence called corrections and are compared to that of waves in the ocean.

- Distinct cyclical trends

iii. **Minor movements-** The minor movements are of very short duration and are compared to ripples in the ocean. They represent the daily fluctuations in the market.

The direction of stock market movements is different in a bull market and bear market. A line chart can be used to graphically represent these movements by plotting the closing prices of shares or closing values of the market index against the corresponding trading days.

Figure 2.2.7 Primary and secondary movements in the bull and bear market

The line chart from figure 2.2.7 shows the primary and secondary reactions in the bull market and the bear market. A bull market is an upward moving market which comprises of optimistic investors who buys the securities with the expectation that the prices of securities will rise in future. The main characteristic of a bull market is that each successive peak and trough in the price chart is higher than the previous ones. In the above figure, the lines which move upwards in phase 1, phase 2, and phase 3 depict the primary movements under the bull market. In the first phase, the primary movements arise due to investors' confidence in the future prospects of the business. In the second phase, the broader public starts to notice the trend and follows it, causing a further rise in price. In the third phase, the market reaches a point where informed investors start selling shares for profit, thinking

- Upward moving market

that the shares are overvalued and anticipating the end of the bull market. These primary movements of each phase are followed by secondary reactions, which move in the opposite direction of the main trend. These corrections could occur as a result of profit booking by investors, changing risk perception of investors, speculation, changes in the economic policies etc..

A bear market is the downward moving market which comprises of pessimistic investors who expects a future fall in the prices of securities. The main characteristic of a bear market is indeed that each successive peak and trough in the price chart is lower than the previous ones. In the above figure, the lines which move downwards in phase 1, phase 2, and phase 3 depicts the primary movements under the bear market. In the first phase, the primary movements arise as a result of the sale of shares by investors due to loss of confidence. In the second phase, the broader public starts selling the shares further as a result of negative news, such as poor earnings reports or economic downturns, causing further fall in price. And in the third phase, panic selling or distress selling occurs as investors expect further declines. Fear dominates, leading to sharp price drops. In the bearish market also, the primary movements of each phase are followed by secondary reactions which move in the opposite direction of the main trend. These reactions can result from short-term optimism, technical factors, or temporary improvements in market conditions but do not reverse the overall bearish trend.

- Downward moving market

Dow Theory provides a framework for understanding market trends, emphasising the importance of identifying primary trends, supported by secondary movements and minor fluctuations, to guide investment decisions.

2.2.5 Elliot Wave Theory

The Elliot Wave Theory is developed by Ralph Elliot in 1934 to study the stock market behaviour. The theory stated that the stock market movement follow specific predictable pattern of waves based on investor psychology. These patterns reflect shifts in market sentiment from bullish to bearish and back again. A wave describes the price movement in the market induced by demand and supply in the market. The following figure depicts the waves suggested in Elliot wave theory.

- Pattern of waves

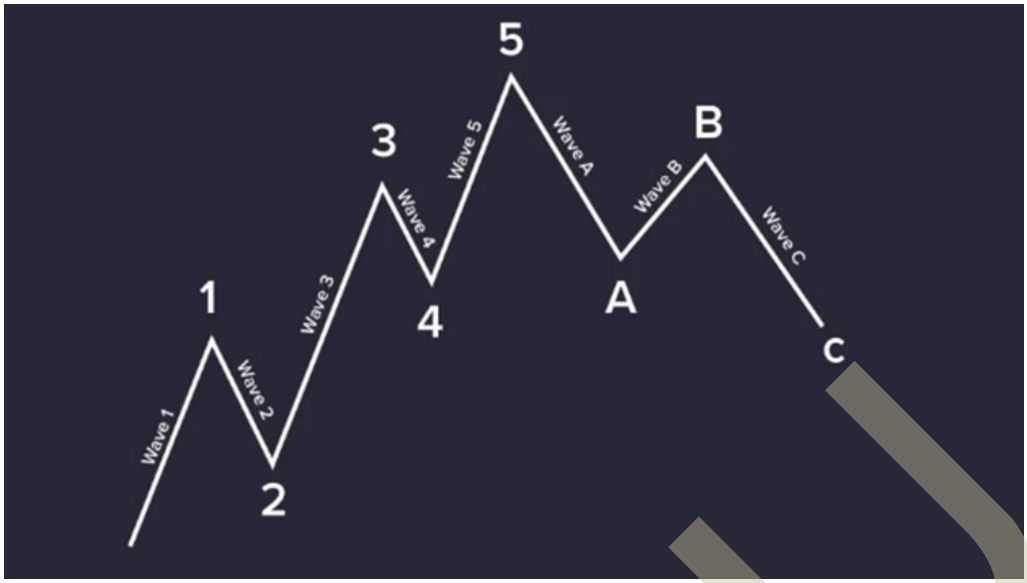

Figure 2.2.8 Elliot wave theory

As shown in the above figure, the theory postulates that there are three waves called the impulse waves which moves in the direction of the main trend. In the above figure, wave 1, wave 3, and wave 5 are impulse waves. In a bullish phase, wave 1, 3, and 5 moves upwards while in a bearish phase, wave 1, 3 and 5 moves downwards. The next sets of waves are called the corrective waves (Wave 2 and wave 4 in the figure) which move in the opposite direction to that of wave 1, 3 and 5. The wave 5 is followed by corrective waves ABC in which A and C moves in a direction opposite to the impulse waves with a greater degree of correction than wave 2 and wave 4, and B in the direction of the main trend. After the eight-wave cycle is completed, a new cycle begins with similar impulses emerging from market trading.

- Impulse and corrective waves

The Elliot Wave Theory thus, helps in understanding and predicting stock market behaviour by analysing patterns of waves that reflect shifts in investor sentiment. By identifying impulse and corrective waves within these cycles, traders can better anticipate market trends and potential reversals.

2.2.6 Technical trading rules and indicators

Stock prices fluctuate rapidly, making it difficult to recognise the underlying trend. To overcome this, analysts employ some mathematical indicators and market indicators, which smooth out price fluctuations, providing a clearer picture of a stock's overall direction.

Some of the mathematical indicators include:

i. **Moving averages-** Moving averages are a fundamental tool in technical analysis used to smooth out price fluctuations and identify the underlying trend of a stock. It

- Simple and exponential

helps to identify whether the trend in the stock market is upward, downward, or sideways. Simple moving average and exponential moving average are the two types of moving averages. A simple moving average (SMA) is calculated by taking the average of a set of prices over a certain number of past days. An exponential moving average (EMA), on the other hand, is a weighted average that places more emphasis on recent prices, allowing it to respond more quickly to new information.

- Move across a reference point

ii. **Oscillators-** Oscillators are mathematical indicators which fluctuate around a reference point. They are based on closing price data which helps to spot when a stock might be overbought or oversold and to predict potential trend reversals. Rate of Change Indicator(ROC), Relative Strength Index(RSI), Moving Average Convergence and Divergence(MACD) are some oscillators.

Individual stock analysis relies on mathematical indicators to understand a stock's specific behaviour, including trends, momentum, and potential turning points. On the other hand, market indicators offer a broader perspective by examining the overall health and direction of the market. These tools analyse the collective behaviour of multiple stocks to identify prevailing trends, investor sentiment, and potential market turning points. Some of the market indicators are:

- Comparison of advances and declines

i. **Breadth of the market-** The breadth of the market makes comparison between the number of stocks making new highs versus new lows or the ratio of advancing to declining stocks. They provide insight into the strength or weakness of the market. Each day's difference between the number of shares which advanced and declined will be calculated and summed up. The index thus obtained can be plotted on a line graph to be compared with the market index which depicts the direction of the market.

- Measure of investor optimism or pessimism

ii. **Market sentiment -** It is a measure of investor optimism or pessimism about the future of stock market. It is measured through various methods such as investor surveys (directly ask participants about their market outlook), and option sentiment (analyses the behaviour of options traders).

- Number of shares traded within a specific timeframe

iii. **Volume indicators-** Volume represents the number of shares traded within a specific time frame. To measure market strength and potential trend changes, analysts employ volume indicators like the On-Balance Volume (OBV). High volume on up days can indicate strong buying interest, while high volume on down days can indicate strong selling pressure.

Apart from these market indicators, short selling, odd-lot index, and mutual fund cash ratio are some of the other types of market indicators providing knowledge about market sentiment and potential future stock market movements.

2.2.7 Efficient Market Hypothesis

- Random Walk Theory

The Efficient Market Theory, also called Random Walk Theory, Efficient Market Hypothesis, or Efficient Market Model, states that all the available information are already reflected in the prices of securities in the stock market. The availability of any new information can only lead to a change in the stock price. Each change in stock prices is like a reaction to this new information. For example, if a company announces higher-than-expected profits, its stock price might go up. If another company reports losses, its stock prices might go down. These changes are independent since they are based on different pieces of news that have no direct connection to each other.

- Contradicts fundamental and technical analysis

As the name suggests, the theory assumes the efficiency of the stock market in immediately reflecting all new information in the stock prices. Since the information that affects stock prices is random and unpredictable, stock price changes are also random and unpredictable. The theory states that there are no chances of under-pricing and over-pricing of securities since the security prices equal their intrinsic values at all times. It also suggests that no person can obtain higher returns by analysing the past trends in share price movements since the price of each day is independent to that of previous days price and that the impact of all the available information has already been reflected in the stock prices. The efficient market hypothesis thereby contradicts fundamental and technical analysis.

- Repudiates technical analysis

The theory explains three forms of market efficiency. The following are the three forms:

i. **Weak form-** The weak form of market efficiency directly contradicts the technical analysis by emphasising that stock prices cannot be predicted by studying the past share price movements. The argument that is put in favour of this statement is that the stock prices can only be influenced by new piece of information since all the existing information is already reflected in the stock prices. Serial correlation test, run test, filter test, and distribution pattern can be used to test the weak form of market efficiency.

ii. **Semi-strong form-** The semi-strong form of market efficiency directly contradicts the fundamental analysis by stating that all the publicly available information, such as press releases, annual reports, announcements and so

- Repudiates fundamental analysis

forth has already been reflected in the prices of securities in the stock market. Hence, the fundamental analysts cannot make excess returns since the current stock price will be same as the intrinsic value of securities. Residual analysis is a tool to test the semi-strong form of market efficiency.

- Insider information

iii. **Strong form-** The strong form of market efficiency states that the market is so efficient that not only the past and the publicly available information, but also the private or the inside information about the company is also reflected in the stock prices. Private or inside information are that information that is not available to the public. Instead, such information can be accessed only by the directors, or the key managerial positions, or mutual funds agencies or other professional analysts. Even investors with insider information cannot achieve consistently higher returns, as prices already incorporate all possible information.

These forms of efficiency illustrate different degrees to which information is believed to impact stock prices, with each form suggesting varying levels of difficulty for investors to outperform the market based on the available information.

Summarised Overview

Technical analysis and fundamental analysis are two main approaches to evaluating stocks. While fundamental analysis focuses on a company's intrinsic value based on financial factors, technical analysis predicts future stock prices by examining past price movements and trends. In technical analysis, key concepts include trends (uptrends and downtrends), trend reversals, and the use of charts like line, bar, and candlestick charts to visualise price data.

Chart patterns, such as support and resistance levels, head and shoulders, flags, and triangles, help identify potential price movements and reversals. Dow Theory and Elliot Wave Theory are notable frameworks in technical analysis. Dow Theory categorises market movements into primary, secondary, and minor trends, while Elliot Wave Theory identifies predictable wave patterns based on investor psychology.

Technical trading rules rely on mathematical indicators like moving averages and oscillators to smooth out price fluctuations. Market indicators, such as market breadth, sentiment, and volume, offer insights into overall market conditions. In contrast, the Efficient Market Theory posits that all available information is already reflected in stock prices, making it impossible to consistently achieve higher returns through analysis. This theory, in its weak, semi-strong, and strong forms, challenges the validity of both technical and fundamental analysis.

Self-Assessment Questions

1. Differentiate between fundamental and technical analysis.
2. Explain Dow Theory.
3. Write a short note on the technical trading indicators.
4. How does efficient market theory repudiate fundamental analysis and technical analysis?
5. Explain Elliot wave theory.
6. What are the different types of chart patterns used in technical analysis? Explain.
7. What is a line chart?
8. How does a white candlestick differ from black candlestick?

Assignments

1. Evaluate the semi-strong form of market efficiency using publicly available financial information for a company. Discuss whether this information can lead to excess returns and the implications for fundamental analysis.
2. Examine a situation where a stock price breaks through a resistance level and later finds support at this level. Describe the significance of this role reversal and its potential impact on future price movements.
3. Review a recent case study of a stock that experienced a significant price movement. Apply relevant technical and fundamental analysis tools to analyse the stock's behaviour and provide recommendations for future trading.
4. Analyse the impact of insider information on stock prices. Discuss whether the strong form of market efficiency is realistic and how it affects investment strategies for individual investors.

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Suggested Reading

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Space for Learner Engagement for Objective Questions

Learners are encouraged to develop objective questions based on the content in the paragraph as a sign of their comprehension of the content. The Learners may reflect on the recap bullets and relate their understanding with the narrative in order to frame objective questions from the given text. The University expects that 1 - 2 questions are developed for each paragraph. The space given below can be used for listing the questions.

03 BLOCK

PORTFOLIO CONSTRUCTION

Block Content

Unit - 1 Portfolio Approach

Unit - 2 Portfolio Models

Unit 1

PORTFOLIO APPROACH

Learning Outcomes

After the completion of this unit, the learner will be able to:

- familiarise with the term portfolio
- understand the significance of portfolios for risk diversification
- gain an idea of different types of portfolios on the basis of risk and return
- identify the optimal portfolio for investment
- evaluate the role of the Markowitz model in portfolio selection

Background

Gopika, a business analyst, decided to invest a portion of her income for future benefits. She chose to invest it in the shares of ABC Limited. Every month, she invests a portion of her monthly salary in this company. She does not invest in any other securities, as she solely depends on ABC Limited.

After a few years, she heard the news that the income tax authority conducted a raid on ABC Limited and found some wrongful acts by the company. Consequently, the share price fell, and investors suffered huge losses. Gopika also suffered a loss; her capital was almost lost due to this sudden fall. Her years of investment vanished in seconds.

Why did this happen? This happened because she invested all her savings in a single company. Have you heard of the saying 'Don't put all your eggs in one basket'? This is exactly what happened to Gopika. If she had invested her savings in multiple companies, she wouldn't have suffered such a heavy loss because her risk could have been diversified. In this unit, we are going to discuss how investors can minimise their risk through investment in portfolios and how to select an optimal portfolio.

Keywords

Portfolio, Optimal portfolio, Risk, Return, Diversification, Markowitz model

Discussion

3.1.1 Portfolio

Portfolio management involves building and overseeing a selection of assets such as stocks, bonds, commodities, currencies and cash equivalents, real estate and private investments. Portfolio management requires the ability to analyse the strengths and weaknesses, opportunities and threats of a spectrum of investment opportunities. Portfolios are held directly by investors or managed by financial professionals and money managers.

In the case mentioned in the background of the study, Gopika invested all her savings into a single company. This is indeed risky, as her return depends entirely on the performance of that particular company. There is no diversification in her investment. If she had invested in multiple investment avenues such as shares, debentures, gold, real estate, and fixed deposits, her risk could have been diversified, thereby reducing the chance of losing her capital. Here, the importance of the concept of 'portfolio' lies.

- Absence of diversification

A portfolio represents a strategic collection of investments designed to achieve a balanced approach to risk and return. It is crafted according to the individual's financial goals, time horizon, and risk tolerance. The dynamic nature of markets necessitates continual assessment and adjustment of the portfolio to optimise the investor's economic outcomes. The purpose of a portfolio is to create a balanced mix of investments that generate returns and manage risk.

- Collection of investments

A portfolio typically includes a mix of different types of assets, such as:

- **Stocks:** Shares of ownership in companies that can potentially provide dividend income and capital gains.
- **Bonds:** Debt instruments issued by governments or corporations that pay interest over time, providing a steady income stream.
- **Funds:** Including mutual funds, exchange-traded funds (ETFs), and others that pool money from many investors to invest in a diversified set of assets.
- **Derivatives:** Financial instruments like options and futures whose value is derived from the performance of other underlying assets.
- **Real Estate:** Physical property that can generate rental income and appreciation.
- **Gold and Other Precious Metals:** Often used as a hedge

against inflation and economic uncertainty.

- **Cash Equivalents:** Such as money market funds, treasury bills, and other highly liquid, low-risk investments.

Figure 3.1.1 Portfolio

3.1.2 Portfolio analysis

- Mitigation of risk
- Variability in return
- Maximise return with minimising risk
- Decisions on the allocation of investments among various securities

Investors typically do not invest all their funds into a single security because of the inherent risk associated with such a strategy. By diversifying, i.e., investing in multiple investment options- investors aim to reduce the overall risk of their portfolio. Diversification can help mitigate the effect of poor performance of a single security on the entire portfolio, as losses in one investment might be offset by gains in another.

Each security within a portfolio has its own expected return and associated risk. The expected return is the anticipated profit from an investment, which can vary significantly, adding to the risk. Risk, in the context of individual securities and portfolios, refers to the variability of returns. This variability is crucial because it defines the uncertainty investors face regarding the returns they expect from their investments.

Portfolio analysis is a critical phase in the broader discipline of portfolio management, where various combinations of securities are evaluated to determine the most efficient mix for investment. The main aim of portfolio analysis is to maximise returns while minimising risk through diversification.

Portfolio analysis is an essential practice in financial management, enabling investors to make informed decisions about how to allocate their investments among various securities to achieve optimal returns for acceptable levels of risk. It integrates financial theory with statistical tools to evaluate and optimise the composition of investment portfolios, creating a balance between risk aversion and the pursuit of return through diversified investment strategies.

3.1.2.1 Objectives of Portfolio Analysis

The objectives of portfolio analysis consist of various aspects of investment management and risk mitigation. Here are the key objectives:

i. **Maximizing Returns:** The primary objective of portfolio analysis is to maximise the returns on investment by considering the level of risk acceptable to the investor. It aims to identify the combination of investments that offer the highest potential returns for a given level of risk.

ii. **Risk Management:** Portfolio analysis seeks to manage and mitigate the overall risk associated with an investment portfolio. By diversifying investments across different asset classes, industries, and geographic regions, portfolio analysis aims to reduce the impact of adverse events on the portfolio's performance.

iii. **Capital Preservation:** Another objective is to preserve the capital invested. Portfolio analysis evaluates the risk-return trade-off of different investment options to ensure that the invested capital is protected from significant losses with opportunities for growth.

iv. **Optimizing Asset Allocation:** Portfolio analysis helps determine the optimal allocation of assets within the portfolio. By considering factors such as the investor's risk tolerance, investment goals, time horizon, and market conditions, portfolio analysis aims to allocate assets in a way that balances risk and return effectively.

v. **Diversification:** Diversification is a key objective of portfolio analysis. By spreading investments across various asset classes, sectors, and geographic regions, portfolio analysis aims to reduce the risk associated with holding a single asset or asset class. Diversification helps to minimise the impact of adverse events on the overall portfolio performance.

vi. **Liquidity Management:** Portfolio analysis considers the liquidity needs of the investor and aims to ensure that the portfolio maintains adequate liquidity to meet short-term monetary requirements. By maintaining a balance of investments in liquid and illiquid assets, portfolio analysis helps to manage liquidity risk effectively.

vii. **Monitoring and Rebalancing:** Portfolio analysis involves regular monitoring of the portfolio's performance and periodic rebalancing to maintain the desired asset allocation. The objective is to ensure that the portfolio remains aligned with the investor's goals and risk tolerance over time and also to adjust the asset mix to the changes in market conditions and investment objectives.

3.1.3 Return of a Portfolio

The return of a portfolio refers to the gain or loss realised by an investor from holding a combination of securities within the portfolio over a specific period. It is a measure of the performance of the portfolio and is generally expressed in percentages.

The return of a portfolio can be calculated using the weighted average return of the individual securities within the portfolio. The formula for calculating the return of a portfolio is as follows:

Portfolio Return ($\bar{r}_p$) = Weight × Return

$$\sum_{i=1}^{n} x_i \bar{r}_i$$

Where:

- Portfolio Return = Portfolio Return is the return of the portfolio.
- n = Number of securities in the portfolio.
- x_i = Weight of the i^{th} security in the portfolio, representing the proportion of the total investment allocated to the i^{th} security.
- $\bar{r}_i$ =Expected return of the i^{th} security in the portfolio.

In this formula, the return of each security is multiplied by its respective weight in the portfolio, and the sum of the results is the overall return of the portfolio.

For example, let's consider a portfolio consisting of two securities, A and B, with respective weights of 30% and 70%. If the returns of securities A and B are 9% and 11%, respectively, the portfolio return would be calculated as follows:

Portfolio Return= (0.30×0.09) + (0.70×0.11)

Portfolio Return = 0.027+0.077

Portfolio Return =0.104

Portfolio Return =10.4%

So, the return of the portfolio in this example is 10.4%. This calculation shows how the return of a portfolio is determined by the return of individual securities and their respective weights in the portfolio.

Illustration 3.1.1

A portfolio consisting of three securities: Stock X, Stock Y, and Stock Z, with respective weights of 30%, 40%, and 30%. If the returns of these securities are 12%, 8%, and 10%, respectively, Calculate the portfolio return.

Solution

Security	Returns (%)	Proportion of investment (%)
X	12 (0.12)	0.30 (30%)
Y	8 (0.08)	0.40 (40%)
Z	10 (0.10)	0.30 (30%)

$$\text{Portfolio return} = \sum_{i=1}^{n} x_i \bar{r}_i$$

Portfolio Return = (0.30×0.12) + (0.40×0.08) + (0.30×0.10)

= 0.036+0.032+0.030

= 0.098

Portfolio Return = 9.8%

Illustration 3.1.2

A portfolio with two securities, Stock A and Stock B, with weights of 60% and 40% respectively. If Stock A has a return of 4% and Stock B has a return of -2%, calculate the portfolio return.

Solution

Security	Returns (%)	Proportion of investment
A	4 (0.04)	0.60 (60%)
B	-2 (0.02)	0.40 (40%)

$$\text{Portfolio return} = \sum_{i=1}^{n} x_i \bar{r}_i$$

Portfolio Return = (0.60×0.04) + (0.40× (−0.02))

=0.024−0.008

=0.016

Portfolio Return =1.6%

Illustration 3.1.3

Consider an equal-weighted portfolio with four securities, each weighing 25%. If the returns of these securities are 6%, 8%, 10%, and 12% respectively, calculate portfolio return.

Solution

Security	Returns (%)	Proportion of investment
A	6 (0.06)	0.25 (25%)
B	8 (0.08)	0.25 (25%)
C	10 (0.10)	0.25 (25%)
D	12 (0.12)	0.25 (25%)

Portfolio return $= \sum_{i=1}^{n} x_i \bar{r}_i$

Portfolio Return = (0.25×0.06) + (0.25×0.08) + (0.25×0.10) + (0.25×0.12)

= 0.015+0.020+0.025+0.030

= 0.090

Portfolio Return = 9.0%

3.1.4 Risk of a portfolio

- Covariance for risk measurement

The risk of a portfolio is inevitable. It can be measured using statistical measures such as the variance and standard deviation of returns. These measures calculated the extent to which the expected return varies from the actual return. Portfolio risk is considered the riskiness of every security in the portfolio. This depends on their interactive risk, i.e., how the return of one security moves with the return of another security in the portfolio and its contribution to the overall risk of the portfolio. A statistical measure called covariance is used to measure the interactive risk.

The covariance between two securities, X and Y, may be calculated using the following formula:

$$Cov_{xy} = \frac{\sum_{i=1}^{n}[R_x - \bar{R}_x]\,[R_y - \bar{R}_y]}{N}$$

Where

Cov_{xy} = Covariance between x and y.

R_x = Return of security x.

R_y = Return of security y.

$\bar{R}_x$ = Expected or mean return of security x.

$\bar{R}_y$ = Expected or mean return of security y.

N = Number of observations

- Movement of return of two securities

The result of the covariance can be positive, negative, or zero. If the return of two securities moves in the same direction, the covariance would be positive. If the return of the two securities moves in opposite directions, the covariance would be negative. If the movements of returns are independent of each other, the covariance would be zero. In this way, covariance shows the direction of movement of return between two securities.

Illustration 3.1.4

The returns of securities 'X' and 'Y' are given below. Calculate the covariance.

Year	Return of Security X	Return of Security Y
1.	12	19
2.	15	16
3.	18	14
4.	21	11
5.	22	9

Solution

Year	Return of Security X	Return of Security Y	$(R_x-\bar{R}_x)$	$(R_y-\bar{R}_y)$	$(R_x-\bar{R}_x)(R_y-\bar{R}_y)$
1.	12	19	-5.6	5.2	-29.12
2.	15	16	-2.6	2.2	-5.72
3.	18	14	0.4	0.2	0.08
4.	21	11	3.4	-2.8	-9.52
5.	22	9	4.4	-4.8	-21.12
	88	**69**			**-65.56**

$$\text{Mean of security X} = \frac{Total\ return\ X}{Number\ of\ Years}$$

$$\bar{R}_x = \frac{88}{5} = 17.6$$

$$\text{Mean of security Y} = \frac{Total\ return\ Y}{Number\ of\ years}$$

$$\bar{R}_y = \frac{69}{5} = 13.8$$

$$Cov_{xy} = \frac{\sum_{i=1}^{n}[R_x - \bar{R}_x][R_y - \bar{R}_y]}{N}$$

$$= \frac{-65.56}{5}$$

$$= -13.112$$

The negative covariance of -13.08 between securities X and Y suggests that their returns tend to move in opposite directions: when one security's return increases, the other tends to decrease. This indicates a potential diversification benefit, as their movements may offset each other's impact on a portfolio's overall risk.

- Co-efficient of correlation

Covariance quantifies the level of interactive risk between two securities (absolute measure). For ease of comparison, this measure can be standardised, and this standardised covariance is known as the coefficient of correlation.

$$r_{xy} = \frac{Cov_{xy}}{\sigma_x \sigma_y}$$

Where

r_{xy} = Coefficient of correlation between x and y.

Cov_{xy} =Covariance between x and y

σ_x = Standard deviation of x

σ_y = Standard deviation of y

It may be noted from the above formula that covariance can be expressed as the product of the correlation between the securities and the standard deviation of each of the securities. Thus,

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

- Correlation and return of the portfolio

The correlation value lies between -1 and +1. A correlation value of -1 indicates a perfect negative correlation between the returns of the two securities. A correlation value of +1 indicates a perfect positive correlation between the returns of the two securities. A correlation value of zero indicates that the returns of securities were independent of each other.

Similarly, the variance (risk) of the portfolio is not simply the weighted average of all the securities, but the covariance of return measures the interdependence between each security.

The variance of a portfolio with two securities may be calculated using the following formula:

$$\sigma_p^2 = x_1^2\sigma_1^2 + x_2^2\sigma_2^2 + 2x_1x_2(r_{12}\sigma_1\sigma_2)$$

Where

σ_p^2 = Portfolio variance.

x_1 =Proportion of funds invested in the first security.

x_2 =The proportion of funds invested in the second security.

σ_1^2=Variance of first security.

σ_1^2=Variance of second security.

σ_1=Standard deviation of first security.

σ_2=Standard deviation of second security.

r_{12}=Correlation coefficient between the returns of first and second security.

Portfolio standard deviation can be measured by taking the square root of portfolio variance.

Illustration 3.1.5

Two securities, A and B generate the following sets of expected returns, standard deviations and correlation coefficients. Find out the portfolio variance and portfolio standard deviation.

	Security A	Security B
Expected Return (mean)	15	20
Standard deviation (σ)	50	30
Correlation of security A and B (r_{ab})	-0.60	

This portfolio is constructed with 45 per cent of funds invested in A and the remaining 55 per cent of funds in B.

Solution

Expected return of the portfolio ($\bar{r}_p$) = $\sum_{i=1}^{n} x_i \bar{r}_i$

= (0.45 x 15) + (0.55 x 20)

= 17.75

The variance of the portfolio =

$$(\sigma_p^2) = x_1^2\sigma_1^2 + x_2^2\sigma_2^2 + 2x_1x_2(r_{12}\sigma_1\sigma_2)$$

$$= (0.45)^2(50)^2 + (0.55)^2(30)^2 + 2(0.45)(0.55)(-0.60)(50)(30)$$

= 506.25 + 272.25 - 445.5

= 333

The standard deviation of the portfolio is

$$\sigma_p = \sqrt{333}$$

=18.248 percent

- Controllable and uncontrollable factors

Return and risk of the individual securities, covariance between the securities, and proportion of investment in each security are the factors that determine the risk and return of the portfolio. The first three factors (return, risk, and covariance) are parametric to the investor in the sense that they have no control over them. However, the remaining factor, i.e., the proportion of investment in each security, is the choice of the investor and is therefore called a choice variable.

3.1.5 Risk Reduction Through Diversification

- Relation between correlation and portfolio risk

Diversification in investments mitigates risk by investing in different financial instruments, industries and other categories. Unsystematic risk can be mitigated through diversification, while systematic or market risk is unavoidable. The process of combining securities in a portfolio is called diversification. The purpose of diversification is to reduce unsystematic risk without sacrificing return. As we know, the risk of the portfolio depends on the standard deviation of the securities and their combination in the portfolio. To understand this mechanism, it is necessary to consider the covariance or correlation of the portfolio. Consider the following three cases:

a. When security returns are perfectly positively correlated $(r_{12} = +1)$

b. When security returns are perfectly negatively correlated $(r_{12} = -1)$

c. When security returns are not correlated $(r_{12} = 0)$

Let us examine these three cases in detail.

- Securities moves in the same direction

a. When security returns are perfectly positively correlated: When the security returns are perfectly positively correlated, the correlation coefficient between the two securities will be +1, which indicates that the returns of the securities move in the same direction. Moreover, the percentage increase or decrease in the first security is the same for the second security.

In this situation, the portfolio variance can be calculated using the following formula:

$$\sigma_p^2 = x_1^2\sigma_1^2 + x_2^2\sigma_2^2 + 2x_1x_2(r_{12}\sigma_1\sigma_2)$$

Since $(r_{12} = +1)$,the equation can be written as

$$\sigma_p^2 = x_1^2\sigma_1^2 + x_2^2\sigma_2^2 + 2x_1x_2\sigma_1\sigma_2$$

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

$$\sigma_p^2 = (x_1\sigma_1 + x_2\sigma_2)^2$$

The standard deviation then becomes

$$\sigma_p = (x_1\sigma_1 + x_2\sigma_2)$$

When the returns of the two securities are perfectly positively correlated, the portfolio standard deviation will be the simple weighted average of the standard deviations of the individual securities. Here, the portfolio standard deviation lies between the standard deviations of the individual securities. Therefore, it can be concluded that when the securities are perfectly positively correlated, diversification provides only risk averaging, not risk reduction, because the portfolio risk cannot be reduced below the individual security risk. Hence, diversification is not a productive activity when security returns are perfectly positively correlated. See Illustration 3.1.6 for a clearer understanding.

- Risk averaging, not risk reduction

b. When security returns are perfectly negatively correlated: When the security returns are perfectly negatively correlated, the correlation coefficient between the two securities will be -1, which indicates that the returns of the securities move in opposite directions. Moreover, the percentage increase or decrease in the first security is just opposite to that of the second security.

In this situation, the portfolio variance can be calculated using the following formula:

$$\sigma_p^2 = x_1^2\sigma_1^2 + x_2^2\sigma_2^2 + 2x_1x_2(r_{12}\sigma_1\sigma_2)$$

Since $(r_{12} = -1)$,the equation can be written as

$$\sigma_p^2 = x_1^2\sigma_1^2 + x_2^2\sigma_2^2 - 2x_1x_2\sigma_1\sigma_2$$

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

$$\sigma_p^2 = (x_1\sigma_1 - x_2\sigma_2)^2$$

The standard deviation then becomes

$$\sigma_p = (x_1\sigma_1 - x_2\sigma_2)$$

When the returns of the securities are perfectly negatively

- Portfolio risk is reduced and sometimes even eliminated.

correlated, the portfolio risk will be very low and may even be reduced to zero. This indicates that even if the portfolio contains two risky assets, it has no risk at all. Thus, the portfolio can become entirely risk-free when security returns are perfectly negatively correlated. Hence, diversification becomes productive, and portfolio risk is reduced and sometimes even eliminated. See Illustration 3.1.6 for a detailed understanding.

c. **When security returns are not correlated:** When the security returns are not correlated, the correlation coefficient between the two securities will be zero. This indicates that the return of the security's first security is not related to the return of the second security.

In this situation, the portfolio variance can be calculated using the following formula.

$$\sigma_p^2 = x_1^2\sigma_1^2 + x_2^2\sigma_2^2 + 2x_1x_2(r_{12}\sigma_1\sigma_2)$$

Since $(r_{12} = 0)$, the equation can be written as

$$\sigma_p^2 = x_1^2\sigma_1^2 + x_2^2\sigma_2^2$$

The standard deviation then becomes

$$\sigma_p = \sqrt{x_1^2\sigma_1^2 + x_2^2\sigma_2^2}$$

- Portfolio risk is reduced.

When the securities are not correlated, the portfolio standard deviation will be less than the standard deviation of the individual securities in the portfolio. Thus, when the returns of the two securities are uncorrelated, the risk of the portfolio is reduced, making diversification a productive activity. See Illustration 3.1.6 for a clearer understanding.

The effects of correlation on portfolio risk and diversification are as follows:

Correlation of returns of the two securities	**Portfolio Risk**	**Productivity of Diversification**
Perfect Positive	Portfolio risk remains high (Only risk averaging)	Diversification less effective
Perfect Negative	Portfolio risk decreases	Diversification highly effective
No	Portfolio risk decreases	Diversification effective

Illustration 3.1.6

The standard deviation of two securities, A and B, and the proportion of these securities in the portfolio are given below:

The standard deviation of Security A: 55

The standard deviation of Security B: 28

Proportion of investment in A: 0.35

Proportion of investment in B: 0.65

Calculate the portfolio standard deviation and interpret how the risk of the portfolio changes under the following circumstances:

a. If the correlation coefficient is +1
b. If the correlation coefficient is -1
c. If the correlation coefficient is 0

Solution

a. If the correlation coefficient is +1

$$\sigma_p = (x_1\sigma_1 + x_2\sigma_2)$$

$$= (0.35\ x\ 55) + 0.65\ x\ 28)$$

= 19.25 + 18.2

= 37.45

b. If the correlation coefficient is -1

$$\sigma_p = (x_1\sigma_1 + x_2\sigma_2)$$

$$= (0.35\ x\ 55) + 0.65\ x\ 28)$$

= 19.25 - 18.2

= 1.05

c. If the correlation coefficient is 0

$$\sigma_p = \sqrt{x_1^2\sigma_1^2 + x_2^2\sigma_2^2}$$

$$= \sqrt{(0.35)^2(55)^2 + (0.65)^2(28)^2}$$

$$=26.49$$

The portfolio risk changes significantly depending on the cor-

relation between the securities. A correlation of +1 leads to high risk, -1 leads to minimal risk, and 0 provides a balanced risk level due to diversification benefits.

3.1.6 Portfolio selection

- Optimal portfolio

Diversification is key to reducing portfolio risk. This process involves constructing a portfolio aimed at minimising risk without sacrificing returns, striving to achieve the highest possible return. Such a portfolio is known as an optimal portfolio.

- Markowitz model

Harry Markowitz developed the conceptual framework and analytical tools for determining the optimal portfolio. His method of portfolio selection has come to be known as the Markowitz model. In fact, Markowitz's work marks the beginning of what is known today as modern portfolio theory.

3.1.6.1 Feasible set of portfolios

- Portfolio opportunity set

An investor can create a number of portfolios by combining a limited number of securities. These combinations are called the feasible set of portfolios, which represent all the possible portfolios in which the investor can invest. This is known as the portfolio opportunity set.

Each set in the portfolio is characterised by its expected return and measurable risk, such as variance or standard deviation of return. Investors may not be interested in every set within the portfolio opportunity set. For example, a portfolio can dominate another if it has a lower standard deviation with the same expected return or a higher expected return with the same standard deviation. Portfolios that are dominated by others are called inefficient portfolios, while portfolios that dominate others are called efficient portfolios. An investor always looks for efficient portfolios.

- Efficient and inefficient portfolios

3.1.6.2 Efficient set of portfolios

Consider the following portfolios with expected return and standard deviation (Risk)

Portfolio Number	Expected return	Standard deviation
1	6	3.7
2	6.5	4.1
3	7.5	4.5
4	10	5.4
5	11.5	5.4
6	12	6.8
7	15	7.9
8	16.5	9.5
9	16.5	10.4
10	18	12.1

Let's compare portfolio number 4 and portfolio number 5. Both have the same standard deviation of 5.4, but portfolio number 5 has a higher expected return of 11.5, making it more efficient than portfolio number 4. Similarly, when comparing portfolio numbers 8 and 9, both have the same expected return of 16.5 per cent, but portfolio number 8 has a lower standard deviation, making it more efficient than portfolio number 9. Thus, the selection of portfolios by the investor will be guided by two criteria:

1. Given two portfolios with the same expected return, the investor would prefer the one with the lowest risk.
2. Given two portfolios with the same risk, the investor would prefer the one with the higher return.

These criteria are based on the assumption that the investors are risk-averse. They are looking for a portfolio with a higher return and lower risk, and vice versa. Consider Graph 3.1.1 for further understanding. Here, the X-axis represents the standard deviation of return, and the Y-axis represents the expected return.

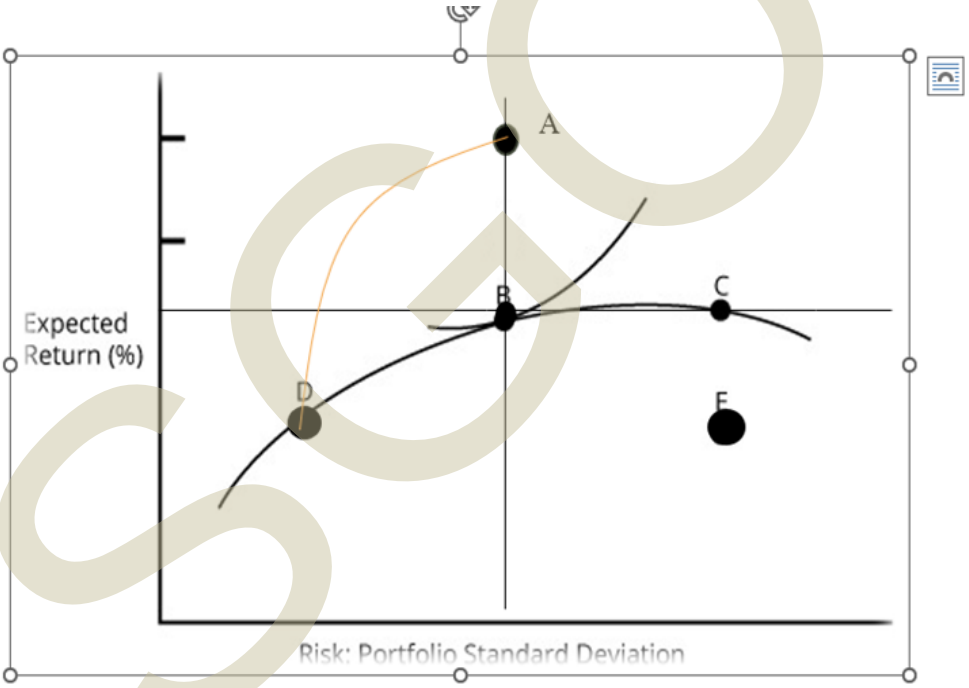

Figure 3.1.1 Feasible set of portfolios

Consider portfolios C and B. Both have the same expected return, but Portfolio C has a higher risk than Portfolio B. Hence, portfolio B would be preferred to portfolio C. Now consider portfolios A and B. Both have the same risk, but portfolio A has a higher return than portfolio B. Here, portfolio A would be preferred to portfolio B.

Now consider portfolios D and E. Both give the same expect-

- Global minimum variance portfolio

ed return, but portfolio E has a higher risk. Hence, an investor would prefer Portfolio D to Portfolio E. When considering all the opportunities in the diagram, portfolio D has the lowest portfolio standard deviation compared to all other portfolios in this diagram. Hence, portfolio D in the diagram represents the global minimum variance portfolio.

Based on Figure 3.1.1, it can be inferred that portfolio A has the highest expected return compared to all portfolios in the diagram. Thus, we can conclude that portfolios lying on the northwest boundary in this graph are more efficient than all the portfolios in the remaining area. This northwest boundary is called the efficient frontier because it contains all the efficient portfolios in the opportunity set. The set of portfolios lying between the global minimum variance portfolio and the maximum return portfolio on the efficient frontier represents the efficient set of portfolios. The efficient frontier is shown in the same graph 3.1.1 as a concave curve in the risk-return space that extends from the minimum variance portfolio (D) to the maximum return portfolio (A).

- Efficient Frontier

3.1.6.3 Selection of optimal portfolio

Based on Figure 3.1.1, it can be identified that all the efficient portfolios in the feasible set of portfolios lie on the efficient frontier. A rational investor always prefers efficient portfolios. Portfolio selection from the efficient frontier depends on the risk-taking capacity of the rational investor. A highly risk-averse investor prefers portfolios from the lower left-hand portion of the efficient frontier. At the same time, an investor who is not too risk-averse will hold portfolios from the upper portion of the efficient frontier. Investors aim to choose a portfolio on this frontier because any portfolio below it would offer lower returns for the same level of risk, and any portfolio above it is unattainable given the current investment opportunities. Thus, the selection of the optimal portfolio depends on the investor's risk aversion or, conversely, on their risk tolerance. This can be graphically represented through a series of risk-return utility curves or indifference curves (See Figure 3.1.2).

- Determinants of the optimal portfolio

Indifference curves, on the other hand, represent an investor's preferences for risk and return. Each curve shows combinations of risk and return that provide the investor with the same level of utility or satisfaction. These curves are typically upward-sloping, indicating that higher returns are required to compensate for higher risk. The optimal portfolio is found at the tangency point between the efficient frontier and the highest possible indifference curve (see Figure 3.1.2). This tangency point represents the portfolio that provides the maximum utility to the investor, balancing their risk tolerance with the best possible return available on the efficient frontier.

- Tangent point

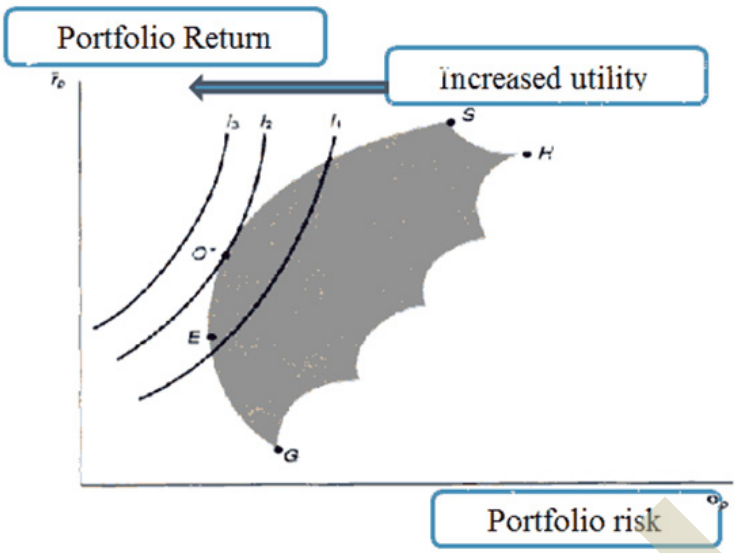

Figure 3.1.2 Optimal portfolio

3.1.6.4 Markowitz model of portfolio selection

- Portfolio selection by Markowitz

The Markowitz portfolio theory, also known as Modern Portfolio Theory (MPT), works by optimising the trade-off between risk and return to construct the most efficient portfolio. According to this theory, investors should aim to select portfolios that lie on the efficient frontier. The efficient frontier represents a set of optimal portfolios that offer the highest expected return for a given level of risk. By combining different assets, an investor can create a portfolio that minimises risk for a given return or maximises return for a given level of risk. This is achieved through diversification, which reduces the overall portfolio risk by spreading investments across various assets that do not perfectly correlate with each other.

Summarised Overview

Investing the whole amount in individual security is considered risky, so people invest in multiple securities to diversify the risk. This combination of multiple securities is called a portfolio. However, a close examination of the individual securities in the portfolio is highly essential. For example, if the correlation between the securities in the portfolio is +1, there will be no risk reduction but risk averaging. When the correlation between securities is perfectly negative, with a value of -1, the risk can be reduced or even eliminated. When the securities in the portfolio are uncorrelated, the risk of the portfolio will be less than the risk of individual securities.

Similarly, the selection of the portfolio depends on the expected return and the risk of the portfolio. A rational investor always looks for the portfolio with the highest return and minimum risk. If we arrange the portfolios based on the risk (on the X-axis) and the

expected return (on the Y-axis), the efficient portfolios lie in the northwest area. Specifically, the portfolio begins from the global minimum variance to the maximum expected return point, forming the efficient frontier. This area is considered the area of efficient portfolios. When we consider the indifference curve along with this graph, we can easily find the optimal portfolios. Each indifference curve represents different levels of utility or satisfaction for the investor, with higher curves indicating greater utility. The optimal portfolio is found at the tangency point between the efficient frontier and the highest indifference curve an investor can reach. This tangency point represents the best possible balance between risk and return, providing the maximum utility to the investor. Thus, the Markowitz portfolio theory combines the efficient frontier and indifference curves to help investors make rational investment decisions that align with their risk preferences and return expectations.

Self-Assessment Questions

1. What is an efficient frontier?
2. Distinguish between an efficient portfolio and an inefficient portfolio.
3. How does the correlation between securities impact the risk of the portfolio?
4. What is an indifference curve?
5. What is diversification?
6. What is the purpose of diversification?
7. Explain the concept of modern portfolio theory.
8. How do you select an optimal portfolio?
9. What is global minimum variance?

Assignments

1. Explain the scenario of using standard deviation of the portfolio calculated?
2. Explain the significance of covariance in the estimation of the risk of the portfolio.
3. Imagine the situation: there are three portfolios with two securities each. The correlation between securities in the first portfolio is +1, The correlation between securities in the second portfolio is -1, and the correlation between securities in the third portfolio is 0. Now, what is your opinion on the risk diversification of these three portfolios?
4. A portfolio consists of two stocks: Stock X and Stock Y. The weight of Stock X in the portfolio is 70%, while the weight of Stock Y is 30%. If Stock X has a return of

5% and Stock Y has a return of -3%, calculate the portfolio return.

(Ans: 2.6%)

5. Consider a portfolio with three securities: Stock M, Stock N, and Stock O. The weights of the stocks in the portfolio are 50%, 30%, and 20% respectively. If the returns of these stocks are 7%, -5%, and 12%, calculate the portfolio return.

(Ans:4.4%)

6. The returns of securities 'A' and 'B' over the past five years are given below. Calculate the covariance between the returns of Security A and Security B

Year	Return of Security A (%)	Return of Security B (%)
1	10	15
2	12	18
3	14	14
4	16	12
5	20	10

(Ans:-7.92)

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6. Jane Cowdell (2002), *Investment*, CIB publishing (5th ed.)

Suggested Reading

1. John C.Hull (2005) *Options, Futures, and Other Derivatives*, Pearson Education
2. N.K Gupta and Monica Chopra (2008), *Financial Markets, Institutions & Services*, Ane Book India

Space for Learner Engagement for Objective Questions

Learners are encouraged to develop objective questions based on the content in the paragraph as a sign of their comprehension of the content. The Learners may reflect on the recap bullets and relate their understanding with the narrative in order to frame objective questions from the given text. The University expects that 1 - 2 questions are developed for each paragraph. The space given below can be used for listing the questions.

Unit 2

PORTFOLIO MODELS

Learning Outcomes

After the completion of this unit, the learner will be able to:

- gain an understanding of various models for portfolio selection.
- familiarize themselves with the single-index model.
- identify the usage of asset pricing models.
- gain an understanding of the Capital Asset Pricing Model (CAPM).
- know the circumstances in which the Fama-French three-factor model is used

Background

In the previous unit, we discussed the Markowitz model for portfolio analysis. It requires numerous input data, such as the return of the portfolio, the variation in return of the portfolio, and the covariance of returns of each pair of securities in the portfolio. For example, analysing 100 securities would require 100 return estimates, 100 variance estimates, and 4950 covariance estimates($\frac{N(N-1)}{2}$), totalling 5150 estimates. As the number of securities increases, so does the required number of estimates.

Similarly, the computation of the Markowitz model is complex. With a given number of securities, an infinite number of portfolios can be constructed. The expected return and variance of return for each possible portfolio must be computed. Identifying efficient portfolios requires the use of quadratic programming, which is a complex procedure.

Due to the difficulties associated with the Markowitz model, little practical application has been found in portfolio analysis. Much simplification is needed before the theory can be applied practically. This simplification is achieved through index models. In this unit, we will discuss index models, such as the simple index model and multi-index models, as well as various portfolio selection models.

Keywords

Single index model, Multi index model, Asset pricing models, Capital Asset Pricing Model (CAPM), Arbitrage Pricing Theory (APT), Fama and French three-factor model

Discussion

3.2.1 Single index model

- Co-movement of stocks price with the market index

Willaim Sharpe develops the single index model to simplify the data input and tabulation required for the Markowitz model of portfolio analysis. Let's check how it works. Have you ever noticed the price movement of securities alongside the movement of a market index (such as the Sensex or Nifty 50)? When the market index moves up, the prices of most shares also move up. Similarly, when the market goes down, the prices of most shares tend to decline. This co-movement of stocks with the market index can be studied with the help of simple linear regression analysis, taking the return of individual securities as the dependent variable (R_i) and the return of the market index(R_m) as the independent variable.

The basic notion underlying the single index model is that all stocks are affected by movements in the stock market. Thus, the return on the individual security may be expressed as:

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

Where

α_i= Component of security i's return that is independent of the market's performance.

R_m = Rate of return on the market index.

β_i=Constant that measures the expected change in R_i given a change in R_m.

e_i= Error term representing the random or residual return

- Relation of stock return to market return

This equation breaks down the portfolio's return into two components: the first part relates to market movement, while the second part is independent of the market. The beta parameter (β_i) in the equation indicates how sensitive a stock's return is to the market index's return. For instance, if a security has a β_i Of 2.5, its return is expected to rise by 25 per cent when the market return increases by 10 per cent. Conversely, if the market return decreases by 10 per cent, the stock's return will fall by 25 per cent. A beta coefficient greater than one implies that the

stock's performance is more responsive to market changes and vice versa.

The alpha parameter represents the return of a security when the market return is zero (α_i). For example, if α_i is +5, it indicates that the stock will yield a 5 per cent return when the market return is zero. Additionally, it would generate an extra 5 per cent return at all levels of market return. Conversely, if α_i is -5, it signifies that the stock's return will decrease by 5 per cent when the market return is zero and will earn 5 per cent less at all levels of the market return. A positive alpha component represents a bonus return, while a negative alpha component signifies a penalty to the investor and is an undesirable aspect of security.

- Security return when the market return is zero

The e_i In the equation represents the random or residual return. This is the unexpected return resulting from influences not identified by the model. It may take on any value, but over a large number of observations, it will average out to zero.

- Random or residual return

Now, consider how William Sharpe simplifies the input data required for the Markowitz model. In the Markowitz model, the covariance of each security with every other security is required, leading to numerous calculations. For example, analysing 300 securities in the Markowitz model would require 300 return estimates, 300 variance estimates, and 44,850 covariance estimates, totalling 45,450 estimates. Sharpe abandoned the covariances of each security with each other's securities and substituted the relationship of each security with a market index. Thus, instead of needing 44,850 covariances when analysing 300 securities, only 300 beta coefficients are required. This is known as the single index model or the Sharpe index model.

- Replaced $\frac{N(N-1)}{2}$ number of covariance with N number of beta coefficient

3.2.1.1 Measuring Security Return and Risk under Single Index Model

Using the single index model, the expected return of an individual security may be expressed as:

$$\bar{R}_i = \alpha_i + \beta_i \bar{R}_m$$

The return of a security consists of two main components: (a) a specific return component, represented by the security's alpha, and (b) a market-related return component, represented by the term $\beta_i \bar{R}_m$. The residual return is not included in the expression because its average value is zero, meaning it has an expected value of zero.

Correspondingly, the risk of a security σ_i^2 becomes the sum of a market related component and a component that is specific to the security. Thus,

Total risk = Market related risk + Specific risk

$$\sigma_i^2 = \beta_i^2 \sigma_m^2 + \sigma_{ei}^2$$

Where

σ_i^2 = Variance of individual security.

σ_m^2= Variance of market index returns.

σ_{ei}^2= Variance of residual returns of individual security.

β_i = Beta coefficient of individual security.

- Unsystematic risk can be mitigated

The market-related component of risk is known as systematic risk, as it impacts all securities. The specific risk component, also called unique or unsystematic risk, can be mitigated through diversification and is also referred to as diversifiable risk.

The estimates of α_i , β_i and σ_{ei}^2 of a security are often obtained from regression analysis of historical data of returns of the security as well as returns of a market index. For any given or expected value of R_m, the expected return and risk of the security can be calculated.

Illustration 3.2.1

The estimated values of α_i , β_i and σ_{ei}^2 of a security are 3 per cent, 2.5 and 250 respectively and the market index is expected to provide a return of 18 per cent, with variance of 110. Calculate the expected return and risk of the security.

Solution

Expected return

$$\bar{R}_i = \alpha_i + \beta_i \bar{R}_m$$

$$= 3+2.5(18) = 48 \text{ per cent}$$

Risk

$$\sigma_i^2 = \beta_i^2 \sigma_m^2 + \sigma_{ei}^2$$

$$= (2.5)^2(110) + 250$$

$$= 937.5$$

3.2.1.2 Measuring Portfolio Return and Risk under Single Index Model

Portfolio analysis and selection require the expected return and risk for all possible portfolios that can be created from a given set of securities. These return and risk metrics can be calculated using the single index model.

The expected return of a portfolio may be taken as portfolio alpha plus portfolio beta times expected market return. Thus,

$$\bar{R}_p = \alpha_p + \beta_p \bar{R}_m$$

The portfolio alpha is the weighted average of the specific

returns (alphas) of the individual securities. Thus,

$$\alpha_p = \sum_{i=1}^{n} w_i \alpha_i$$

w_i = Proportion of investment in an individual security.

α_i = Specific return of an individual security.

The portfolio beta is the weighted average of the Beta coefficients of the individual securities. Thus,

$$\beta_p = \sum_{i=1}^{n} w_i \beta_i$$

w_i = Proportion of investment in an individual security.

β_i = Beta coefficient of an individual security.

The expected return of a portfolio is the sum of the weighted averages of the specific returns and the market-related returns of the individual securities. Portfolio risk is measured by the variance of its returns. It is calculated as the weighted average of the market-related risks of the individual securities, plus the weighted average of their specific risks. The portfolio risk may be expressed as:

$$\sigma_p^2 = \beta_p^2 \sigma_m^2 + \sum_{i=1}^{n} w_i^2 \sigma_{ei}^2$$

- Systematic risk and unsystematic risk

The first term constitutes the variance of the market index multiplied by the square of portfolio beta and represents the market related risk (or systematic risk) of the portfolio. The second term is the weighted average of the variances of residual returns of individual securities and represents the specific risk (or unsystematic risk) of the portfolio.

Unsystematic risk becomes smaller when the number of securities increased in the portfolio

As more and more securities are added to the portfolio, the unsystematic risk of the portfolio becomes smaller and is negligible for a moderately sized portfolio. Thus, for a large portfolio, the residual risk or unsystematic risk approaches zero and the portfolio risk becomes equal to $\beta_p^2 \sigma_m^2$. Hence, the effective measure of portfolio risk is β_p.

Illustration 3.2.2

An investor holds a portfolio with the market model estimated as:

$$R_p = 2.7 + 0.82R_m + e_p$$

If the expected return on the market index is 20.25 per cent,

what is the expected return on the investor's portfolio?

Solution

Assuming that $e_p = 0$

$$R_p = 2.7 + 0.82(20.25)$$

$$= 2.7 + 16.605$$

$$=19.305 \text{ per cent}$$

Illustration 3.2.3

The details of a portfolio consisting of 6 securities are provided below. Given that the standard deviation of the market index is 25%, calculate the total risk of the portfolio.

Security	Beta	Random error term Standard deviation (per cent)	Proportion
1	1.45	6	0.20
2	1.10	10	0.10
3	1.85	7	0.10
4	0.98	3	0.20
5	1.17	7	0.30
6	1.83	11	0.10

Solution

The portfolio risk may be expressed as:

$$\sigma_p^2 = \beta_p^2 \sigma_m^2 + \sum_{i=1}^{n} w_i^2 \sigma_{ei}^2$$

Where

β_p = Portfolio beta

σ_m^2 = variance of the market index

w_i = proportion of investment in each security

σ_{ei}^2=Residual variance (random error) of individual securities.

β_p or Portfolio beta has to be calculated using the formula

$$\beta_p = \sum_{i=1}^{n} w_i \beta_i$$

= (0.20) (1.45) + (0.10) (1.10) + (0.10) (1.85) + (0.20) (0.98) + (0.30) (1.17) + (0.10) (1.83)

= 0.29 + 0.11 + 0.185 + 0.196 + 0.351 + 0.183

= 1.315

Portfolio residual variance $\sum_{i=1}^{n} w_i^2 \sigma_{ei}^2$ can be calculated as:

= $(0.20)^2$ $(6)^2$ + $(0.10)^2$ $(10)^2$ + $(0.10)^2$ $(7)^2$ + $(0.20)^2$ $(3)^2$ + $(0.30)^2$ $(7)^2$ + $(0.10)^2$ $(11)^2$

= 1.44 + 1 + 0.49 + 0.36+4.41+1.21

= 8.91

Portfolio total risk can now be calculated as:

$$\sigma_p^2 = \beta_p^2 \sigma_m^2 + \sum_{i=1}^{n} w_i^2 \sigma_{ei}^2$$

$$= 1.315^2 (25)^2 + 8.91$$

$$= (1.73 \text{ X } 625) + 8.91$$

$$= 1081.25 + 8.91$$

$$= 1090.16$$

3.2.2 Asset Pricing Model

- Consider multiple factors influence the return of an asset

An asset pricing model is a framework used to determine the expected return on an investment and to assess its risk. These models are crucial for understanding how various factors influence the price and return of financial assets. The primary purpose of an asset pricing model is to quantify the relationship between risk and expected return. This helps investors make informed decisions about which assets to include in their portfolios to achieve desired risk-return profiles. Asset pricing models typically consider multiple factors that can affect the return of an asset. These factors can be broad market influences or specific characteristics related to the asset itself.

Common Asset Pricing models are Multi-Factor Models, Capital Asset Pricing Model (CAPM), Arbitrage Pricing Theory (APT), and Fama-French Three-Factor Model

3.2.3 Multi-Factor Model

- Limitations of single index model

The single-index model is a helpful tool for portfolio selection, but it has limitations. It assumes that all asset returns are driven by a single common factor, called the market index. This means it overlooks other factors that can influence asset prices, such as industry trends or interest rates.

- Considering additional factors

The multi-factor model addresses this limitations. It incorporates additional factors (inflation, interest rate, exchange rate. Economic growth etc.) beyond the market index to better capture the relationships between different stocks. This allows for a more accurate analysis of portfolio risk and return. By considering these extra influences, the multi-index model can help investors to construct more efficient portfolios that optimize risk and return according to their preferences.

A multi-factor model augments the single index model by incorporating these extra market factors as additional independent variables. For example, a multi-factor model incorporating the market effect and three extra market effects takes the following form:

$$R_i = \alpha_i + \beta_m R_m + \beta_1 R_1 + \beta_2 R_2 + \beta_3 R_3$$

- Similarities in calculations

Calculation of return and risk of individual security and portfolio follows the same pattern as in the single index model. these values can then be used as inputs for portfolio analysis and selection. The model states that the return of an individual security is a function of four factors: the general market factor R_m and three extra-market factors R_1, R_2 *and* R_3. The beta coefficients attached to these factors have the same meaning as in the single index model, measuring the sensitivity of the stock return to these factors. Similarly, the alpha parameter α_i and the residual term e_i retain their interpretations from the single index model. The calculation of return and risk for individual securities and portfolios follows the same pattern as in the single index model, and these values can then be used as inputs for portfolio analysis and selection.

3.2.4 Capital Asset Pricing Model (CAPM)

- Extension of Markowitz portfolio theory

The Capital Asset Pricing Model (CAPM) was developed in the early 1960s by economists William F. Sharpe, John Lintner, and Jan Mossin. Hence, the model often referred to as Sharpe-Linter-Mossin Capital Asset Pricing Model. The model builds on earlier work by Harry Markowitz on portfolio theory. The CAPM is concerned with two key questions:

- What is the relationship between risk and return for an efficient portfolio?
- What is the relationship between risk and return for an individual security?

We are aware that the risk of a stock can be reduced through diversification by constructing a portfolio. However, even when portfolios are created using the efficient frontier with efficient portfolios, some elements of risk remain. Including all the stocks

- Systematic risk can't be eliminated

in the economy in a portfolio makes it diversified, but some risk still persists. This type of risk is known as market risk or systematic risk. The true risk of a security is market risk, which cannot be eliminated through diversification. This is indicated by the sensitivity of a security to the movement of the market and is measured by the beta coefficient of the security.

- Relationship between systematic risk and expected return

The Capital Asset Pricing Model is a financial model that describes the relationship between systematic risk and expected return for assets, particularly stocks. It is widely used for the pricing of risky securities, calculating the expected return of an asset given its risk, and estimating the cost of capital.

Assumptions of CAPM

The CAPM is based on the following assumptions

i. : Individuals are risk-averse

ii. Individuals seek to maximise the expected utility of their portfolio over a single period planned portfolio.

iii. Investors have homogeneous expectations, means they have the same perceptions regarding the expected return, standard deviations and covariances of securities.

iv. Individuals can borrow and lend freely at a riskless rate of interest.

v. The market is perfect: there are no taxes, no transaction costs, securities are completely divisible, and the market is competitive.

vi. The investors can sell short any amount of shares.

vii. The quantity of risky securities in the market is given.

- Validity of the conclusions

Considering these assumptions, one might think that the CAPM is unrealistic. However, the value of a model depends not on the realism of its assumptions but on the validity of its conclusions. Extensive empirical analysis suggests that there is some merit in the CAPM.

Riskless lending and borrowing

- Riskless assets

Portfolio theory deals with portfolios comprising risky assets. According to this theory, an investor encounters an efficient frontier, which represents the set of optimal portfolios of risky assets. Introducing a riskless asset whose return is certain—such as a government security—changes the scenario. The riskless asset has zero variability in return, meaning no risk.

- Investment using the borrowed fund

An investor can allocate a portion of their funds to this riskless asset, effectively lending at the risk-free rate of return, denoted as R_f. This creates a mix of risk-free and risky assets in their portfolio. Conversely, an investor can also borrow at the risk-free rate to invest more in risky assets, thus combining their

own funds with borrowed money for investment purposes.

Capital Market Line

- Combination of risk-free assets and a market portfolio

The Capital Market Line represents the risk-return trade-off in the market for efficient portfolios that combine a risk-free asset and a market portfolio of all available risky assets. It is a straight line that originates from the risk-free rate (R_f) on the vertical axis (representing return) and is tangent to the efficient frontier of risky assets.

- Measure using total risk

The CML provides a risk-return relationship and measure of risk for efficient portfolios. The appropriate measure of risk for an efficient portfolio is the standard deviation of the return of the portfolio. There is a linear relationship between the risk as measured by the standard deviation and the expected return for these efficient portfolios.

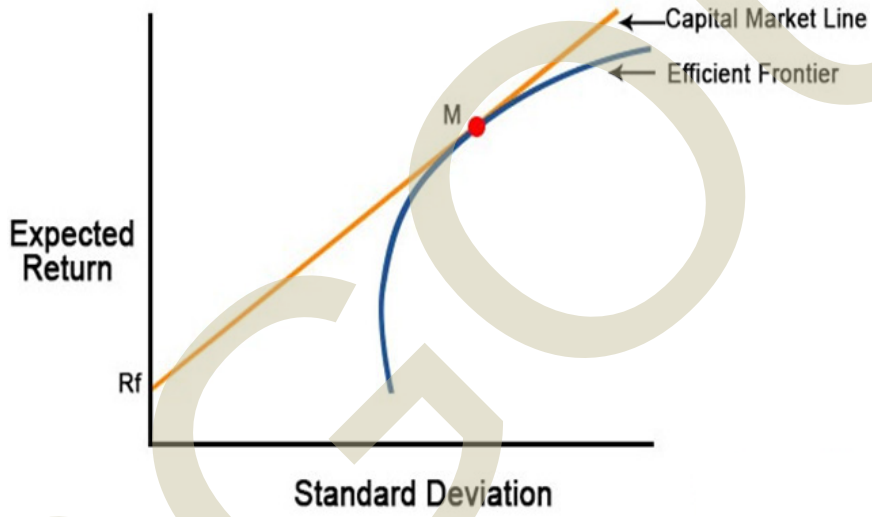

Figure 3.2.1 Capital Market Line

Security Market Line

- Inefficient portfolios lie below the CML

The Capital Market Line (CML) illustrates the risk-return relationship for all efficient portfolios which lie along the CML. Portfolios that are not efficient will lie below the CML. The CML does not represent the risk-return relationship of inefficient portfolios or individual securities. The Capital Asset Pricing Model (CAPM), however, specifies the relationship between expected return and risk for all securities and all portfolios, whether efficient or inefficient.

- Beta is the real risk

As previously discussed, the total risk of a security, measured by standard deviation, consists of two components: systematic risk and unsystematic (or diversifiable) risk. As an investment portfolio becomes more diversified, with more securities added, the unsystematic risk decreases. In a well-diversified portfolio,

unsystematic risk approaches zero, leaving only systematic risk, which is measured by beta (β). Therefore, beta is considered the correct measure of a security's risk.

- Measurement of changes using beta

The expected return of a security or portfolio should be related to its risk, as measured by beta. Beta indicates a security's sensitivity to changes in market returns. A beta greater than one signifies higher sensitivity to market changes, while a beta less than one indicates lower sensitivity. A beta of one means the security moves at the same rate and in the same direction as the market. The market's beta is typically considered to be one.

Graphical representation of expected return and beta

The relationship between expected return and beta can be represented graphically. On an XY graph, with expected returns on the Y-axis and beta coefficients on the X-axis, a risk-free asset has an expected return equivalent to R_f and a beta of zero. The market portfolio, represented by 'M', has a beta of one and an expected return of $\bar{R}_m$. A straight line connecting these two points is known as the Security Market Line (SML).

Graphical Representation of CAPM

The Security Market Line (SML) is a graphical representation of the Capital Asset Pricing Model (CAPM), illustrating the relationship between the expected return of an individual security and its systemic risk as measured by beta (β).

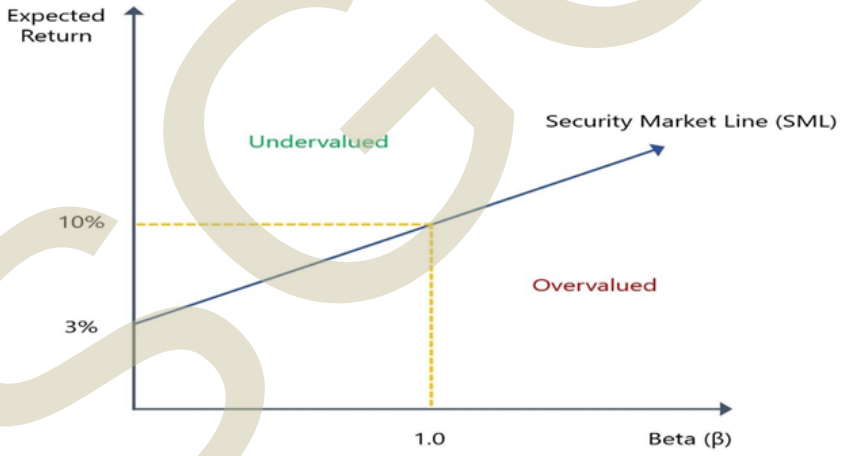

Figure 3.2.2 Security Market Line

Measuring over valued and undervalued portfolios

If the expected return of a portfolio is above the return indicated by the SML, it is considered undervalued. This means investors are receiving a higher return than expected for the level of risk, indicating a good buying opportunity. Conversely, if the portfolio's expected return is below the return predicted by the SML, it is considered overvalued. In this case, investors are receiving a lower return than expected for the level of risk, suggesting it may be a poor investment choice and potentially a candidate for selling.

- CML consider total risk and SML consider systematic risk

It is essential to differentiate between the Security Market Line (SML) and the Capital Market Line (CML). Both concepts suggest a linear relationship between risk and return. However, in the CML, risk is defined as total risk and is measured by standard deviation. Total risk means both systematic and unsystematic risk.Conversely, in the SML, risk is defined as systematic risk and is measured by beta (β).

- Coverage

The CML applies exclusively to efficient portfolios, whereas the SML is applicable to all portfolios and individual securities. Furthermore, the CML underpins capital market theory, while the SML forms the foundation of the capital asset pricing model (CAPM).

3.2.5 Arbitrage Pricing Theory

- Explained in terms of macroeconomic factors

Arbitrage Pricing Theory (APT) is a financial model that explains the expected return on a portfolio or asset in terms of various macroeconomic factors. It was developed by economist Stephen Ross in 1976 as an alternative to the Capital Asset Pricing Model (CAPM).

- Multiple factors

APT assumes that the return on an asset is influenced by several macroeconomic factors, and the sensitivity of the asset to these factors can explain its expected return. Unlike CAPM, which focuses on a single market risk factor, APT considers multiple factors that can affect asset returns.

- Types of factors

The factors in APT are typically chosen based on their ability to capture systematic risks that affect many stocks. These factors could include inflation rates, interest rates, Gross Domestic Product (GDP), exchange rates, market indices etc.

The theory assumes that asset returns are generated by a random process which can be expressed as a linear function of a set of K risk factors (or indices). The APT postulates that the return on any stock is linearly related to a set of indices. This linear function can be expressed as:

$$R = a + b_1F_1 + b_2F_2 + \cdots + b_kF_k + e$$

Where

R= return on stock

a = the expected return on stock if all factors have zero value

F_1, F_2, F_k= factors affecting stock return

$b_1, b_1 b_k$= the sernsitivity of stock return to the respective factors

e = random error with mean equal to zero

- Multi-index model

The APT is thus an estimation of the return that can be expected when returns are generated by a multi-index model, where sensitivity to changes in each factor in the model is represented

by a factor specific beta coefficient.

- Find mispriced securities

The APT model is based on the idea that, there are no arbitrage opportunities in an efficient market. This means that two equivalent assets should have the same price in an efficient market. The APT model helps to find mispriced securities, allowing for arbitrage that eventually corrects their prices.

- Factors are uncertain and unspecified

As an alternative to CAPM, the APT model uses multiple factors to explain security returns and pricing. However, it doesn't specify which factors to use, makes it challenging to apply practically. The stability of these factors over time is also uncertain. Research and empirical tests are needed to confirm if the same factors consistently explain security returns and prices.

Similarities and Dissimilarities of APT and CAPM

Aspect	CAPM (Capital Asset Pricing Model)	APT (Arbitrage Pricing Theory)
Purpose	Establish a relationship between risk and expected return	Establish a relationship between multiple risk factors and expected return
Function	Linear	Linear
Expected Return Calculation	The sum of risk-free return and risk premium	The sum of risk-free return and risk premium
Risk Factors	Single risk factor	Multiple factors (unspecified, determined empirically)
Risk Measurement	Sensitivity to Beta	Sensitivity to multiple risk factors
Risk Premium	Excess of Market portfolio return over risk-free return	Depends on various macroeconomic factors
Model Type	A statistical model with well-defined parameters	Explanatory model with undefined parameters
Flexibility	Limited to a single risk factor	Flexible, incorporates multiple risk factors
Complexity	Simpler may not fully explain security pricing	More complex, can account for diverse factors in security pricing
Practical Issues	Difficulty in identifying and calculating Market portfolio return	Challenges in identifying relevant risk factors and their stability

3.2.6 Fama and French three-factor model

- Adding 2 additional factors to CAPM

- Difference between the expected return of the market and the risk-free rate

The difference in the return between small-cap and large-cap companies

- The difference in returns between value stocks and growth stocks

- Explain up to 95% of the returns

- Construction of portfolios

The model was developed by Nobel laureates Eugene Fama and his colleague Kenneth French in the 1990s. The Fama-French three-factor model is a way to assess expected returns on investments, particularly stocks. It extends the Capital Asset Pricing Model (CAPM) by adding two additional factors to better capture variations in stock returns. The three factors are size risk and value risk factors, as well as the market risk factors.

Following is a detailed explanation of the factors considered by Fama French's three-factor model:

i. ***Market Risk:*** This is the same factor as CAPM. It reflects how an individual stock's performance moves with the overall market.

ii. ***Size Factor (SMB):*** This factor captures the difference between the returns of small companies (small-cap) and large companies (large-cap). Historically, small companies have tended to outperform large companies in the long run.

iii. ***Value Factor (HML):*** This factor focuses on the difference in returns between value stocks and growth stocks. Value stocks are those with a high book-to-market ratio, meaning their book value (assets minus liabilities) is high relative to their market price. Growth stocks are typically priced higher relative to their book value because investors expect their future earnings to grow quickly. The Fama-French model suggests that value stocks tend to outperform growth stocks in the long run.

Fama and French emphasised that investors need to handle the increased volatility and occasional underperformance that can occur in the short term. However, investors with a long-term investment horizon of 15 years or more are likely to be compensated for short-term losses. By analysing thousands of random stock portfolios, Fama and French demonstrated that incorporating size and value factors with the market beta can explain up to 95% of the returns in a diversified stock portfolio.

This explanatory power of 95% of the portfolio's return relative to the market allows investors to construct portfolios that yield an average expected return based on the risks they take. The key factors influencing expected returns are market sensitivity, size sensitivity, and value sensitivity, as indicated by the book-to-market ratio. Any additional average expected return may be due to unpriced or unsystematic risk.

Summarised Overview

This unit explores different models for building investment portfolios. The first concept is the Single-Index Model, which simplifies calculations for the Markowitz Model, a cornerstone of Modern Portfolio Theory. Instead of considering the complex web of interactions between individual investments, it uses a single market index to estimate how a portfolio will perform. This reduces complexity but may miss out on subtle risk-return relationships.

For a more comprehensive view, we can consider the Multi-Index Model. This approach incorporates multiple factors that influence returns, such as economic indicators or industry performance, to create a clearer picture of risk.

The Capital Asset Pricing Model (CAPM) explains the relationship between an asset's systematic risk and its expected return. It suggests that investors are compensated for taking on market risk, with higher risk leading to potentially higher returns.

Both CAPM and the Single-Index Model rely heavily on market movements. The Arbitrage Pricing Theory (APT) offers an alternative perspective. APT proposes that a broader range of macroeconomic factors, beyond just market risk, influences expected returns. This model suggests that investors are compensated for various risks they take on, and by analysing these factors, we can gain a deeper understanding of why certain investments outperform others.

Finally, the Fama-French Three-Factor model refines CAPM by considering additional factors beyond just market risk. It incorporates size (difference between small and large companies' returns) and value (difference between value and growth stocks' returns) factors to explain variations in stock returns better.

Self-Assessment Questions

1. How does the multi-index model differ from the single-index model in explaining asset returns?
2. What are some common factors used in multi-index models to account for multiple sources of market risk?
3. What is market risk, and how does it affect investment portfolios?
4. Can diversification eliminate market risk? Why or why not?
5. What is the significance of the risk-free return in financial models?
6. Which financial instrument is commonly used to represent the risk-free return?
7. How is systematic risk different from unsystematic risk?
8. Why can't systematic risk be eliminated through diversification?

9. How does the CAPM calculate the expected return of an asset?
10. What additional factors does the Fama-French Three-Factor Model include beyond the market risk factor?

Assignments

1. Explain how investor can use the SML to assess whether a security is fairly priced?
2. Analyse the inclusion of size and value factors improve the explanatory power of the Fama-French Three-Factor Model?
3. What does the Capital Market Line represent in the context of portfolio theory?
4. What does the Security Market Line depict in the CAPM framework?
5. Analyse the nature of systematic risk and its sources. Why is it considered unavoidable for investors, and how does it impact asset pricing?
6. Explain the Security Market Line and its role in the CAPM. How does it help investors assess the expected return of individual securities relative to their risk?
7. Compare and contrast the Arbitrage Pricing Theory with the CAPM. How does APT provide a different approach to understanding asset returns?
8. Discuss the practical challenges of implementing the Arbitrage Pricing Theory in investment analysis. What are the key factors that investors need to consider?
9. Evaluate the empirical evidence supporting the size and value premiums in the Fama-French Three-Factor Model. How have these factors been observed to impact stock returns historically?

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Suggested Reading

1. John C.Hull (2005) *Options, Futures, and Other Derivatives*, Pearson Education
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Space for Learner Engagement for Objective Questions

Learners are encouraged to develop objective questions based on the content in the paragraph as a sign of their comprehension of the content. The Learners may reflect on the recap bullets and relate their understanding with the narrative in order to frame objective questions from the given text. The University expects that 1 - 2 questions are developed for each paragraph. The space given below can be used for listing the questions.

04 BLOCK

PORTFOLIO REVISION AND EVALUATION

Block Content

Unit - 1 Portfolio Revision Strategies

Unit - 2 Evaluation of Portfolio Performance

Unit 1

Portfolio Revision Strategies

Learning Outcomes

Upon completion of this unit, the learner will be able to;

- get an awareness of the concept of portfolio revision
- learn the need for portfolio revision for investors
- identify the various performance evaluation ratios
- analyse various portfolio revision strategies

Background

An individual or institution's holdings of stocks, bonds, commodities, and other financial assets are collectively referred to as their portfolio. After the construction of a portfolio, many changes may happen to the company, industry and economy as a whole. Choosing, maintaining, and optimising these assets in accordance with the investor's financial objectives and risk tolerance constitute portfolio management. A broad investment mix that can adjust to market conditions is ensured by effective portfolio management, which strikes a balance between risk and possible returns.

Reviewing and modifying an investment portfolio's asset allocation to maintain alignment with the investor's objectives and market circumstances is known as portfolio revision. It could entail switching out underperforming assets, rebalancing to maintain target risk levels, or seizing fresh possibilities. Consistent portfolio revision guarantees the best possible asset allocation, optimising rewards while gradually controlling risks. When market trends, economic conditions, or an investor's financial objectives change, portfolio revision becomes essential. Periodic revisions ensure that portfolios reflect the state of the economy since shifts in inflation or interest rates can affect the performance of assets. To maintain risk tolerance, life events like retirement or income changes may call for portfolio adjustments. Rebalancing to modify asset allocation guarantees the right proportion of fixed income, equities, and other investments while limiting risk to a sustainable level. A change in assets can maximise gains and reduce losses if a portfolio investment regularly underperforms or a better opportunity presents itself. For example, investors may shift their holdings to safer, more stable assets during economic down-

turns. In contrast, during periods of economic expansion, they may increase their exposure to equities in order to benefit from higher returns. Tax implications may also come into play because realising losses to balance profits might lower the overall tax burden. With portfolio revision, investors can maintain flexibility, maximising returns while avoiding excessive risk and adjusting to their own situation as well as the state of the economy at large.

Keywords

Portfolio revision, Active revision strategies, Passive revision strategies, Formula plans, Constant Rupee value plan, Dollar cost averaging

Discussion

4.1.1 Portfolio revision

Portfolio revision involves revising the existing mix of securities. This may be effected either by changing the securities currently included in the portfolio or by altering the proportion of the funds invested in the securities; new securities may be added to the existing portfolio, or some of the existing securities may be removed from the Portfolio. Portfolio revision is the process of altering the mix of securities in a portfolio to better fit with an investor's goals, such as increasing returns or reducing risk. This process might entail a variety of measures, such as adding new assets, adjusting the ratio of funds to various investments, or changing the types of securities in the portfolio. Portfolio revision entails buying and selling securities to optimise portfolio performance based on the investor's objectives and evolving market conditions. Only an investor with competence and skill can effectively revise the portfolio,

- Changing/altering the existing mix of securities

There are two main ways that portfolio revision can be carried out. Initially, the stocks that are presently in the portfolio will need to be changed. This could entail selling some assets that have underperformed or no longer suit the investor's strategy and swapping them out for other securities that should perform better or better meet the investor's goals. Changing the percentage of money invested in the current securities is the second approach. This can entail shifting the allocation away from assets that are

underperforming or excessively risky and towards those that have demonstrated great performance or growth prospects. Depending on the needs of the investor and the state of the market, portfolio revision may occasionally entail both the addition of new securities and the removal of existing ones.

The dynamic and ever-changing nature of financial markets necessitates portfolio revision. Over time, changes in market conditions, economic projections, or changes in an investor's personal circumstances or financial objectives may render the initial composition of a portfolio suboptimal. For instance, the portfolio may need to be changed to incorporate more conservative investments if an investor's risk tolerance declines as retirement draws near. In the same way, the portfolio could need to be adjusted to incorporate new money in a way that is consistent with the investor's overall investment strategy if they receive additional capital in the form of a bonus or inheritance. The efficacy of the portfolio may need to be adjusted in response to changes in the economy, inflation, interest rate movements, or geopolitical events, which can affect the performance of various asset classes.

- Circumstances necessitating portfolio revision

Even while portfolio revision is crucial, most investors spend more time choosing and purchasing assets than they do revising or selling them. This neglect of portfolio management may result in reduced opportunities to increase returns or lower risks. The beginning stages of portfolio research and selection are equally as important as portfolio revision. An investor chooses a combination of assets for their portfolio depending on their risk-return goals and the available investment possibilities. A portfolio that was once well-structured and in line with an investor's objectives, however, might not perform as intended due to the constantly shifting nature of financial markets and economic conditions. Opportunities may present themselves that render the existing composition of the portfolio less than ideal or that estimates of risk and return for particular assets will evolve. A comprehensive portfolio revision is necessary under these circumstances.

- Dynamic nature of financial markets and changes in economic conditions affects. The performance of the portfolio necessitating portfolio revision

Portfolio revision seeks to maximise returns for a given level of risk or minimise risk for a given level of return, much like portfolio selection. The process of revision often entails re-evaluating the allocation of funds across different asset classes, such as stocks and bonds, through detailed economic analysis. In order to decide whether to buy or sell stocks within particular sectors, it could also be necessary to reallocate capital among various industries in accordance with industry trends and performance as well as to carry out thorough company research. Portfolio revision serves to guarantee that the portfolio stays in line with the investor's goals and adjusts to shifting market conditions in this manner.

- Aims to maximise returns for a given risk level or minimise risk for a given level of return

Revision of the portfolio is essential to efficient portfolio management. It ensures that an investor's investment portfolio stays in line with their objectives, adjusts to shifting market conditions, and seizes fresh possibilities, all while controlling risk. Over time, an investment portfolio's performance and resilience can be greatly improved by realising the need for portfolio revision and putting an organised plan in place to make the necessary changes.

4.1.2 Need for Portfolio Revision

Investing is a continual process that needs ongoing supervision and modification; it is not a one-time event. Long-term success depends on having an investment portfolio that is well-structured and in line with an investor's financial objectives and risk tolerance. It becomes clear that a portfolio revision is necessary when one's circumstances, the market, or the economy change. The act of examining and modifying an investment portfolio to make sure it stays in line with an investor's goals, risk tolerance, and market circumstances is known as portfolio revision.

- Changing Life Circumstances

Life is dynamic, and financial goals can shift over time. As investors advance through life phases, their financial needs, aspirations, and risk tolerance change. For example, a young professional may prioritise aggressive development to increase wealth, whereas someone approaching retirement may adjust their focus to capital preservation and income generation. Regular portfolio revision ensures that an investment plan remains aligned with changing conditions, offering the flexibility needed to achieve shifting financial goals.

- Shifts in Risk Tolerance

An investor's risk tolerance is affected by their financial status, life stage, and market experiences. Market volatility, economic downturns, and personal financial misfortunes can all have an impact on an investor's risk tolerance. For example, following a market crash, an investor may become more risk-averse and desire a more conservative strategy. A strong financial position and an expanding economy, on the other hand, may support a more aggressive attitude. Portfolio revision allows investors to alter their asset allocation to reflect their current risk tolerance better, assisting in maintaining a balance of risk and return that matches their comfort level.

- Market Fluctuations and Volatility

Because of their inherent volatility, financial markets see asset prices fluctuate in response to a wide range of factors, such as investor emotion, geopolitical events, and economic data. These changes in the market have the potential to affect a portfolio's composition and value greatly. Investors can adjust to these changes by regularly rebalancing their portfolios to retain the risk-return profile they have chosen.

- Changes in Economic Environment

The economic climate fluctuates between periods of growth, recession, inflation, and deflation, all of which can have an impact on investment success. Economic variables like interest rates, inflation, and employment data all have an impact on the performance of various asset classes. A portfolio revision method enables investors to alter their holdings based on current economic conditions and future outlooks, optimising their investments to capitalise on new opportunities or prevent prospective hazards.

- Ensuring Proper Diversification

Spreading assets over several asset classes, industries, and geographical areas is known as diversification, and it is a basic investing strategy. An imbalanced portfolio can occur over time when certain assets perform differently than others, making some underweight and others over-represented. Frequent portfolio adjustment helps to protect against the negative effects of underperformance in any one asset class or industry and improves total risk-adjusted return by keeping the portfolio diverse.

- Managing Investment Costs and Taxes

Investment costs can have a big impact on portfolio results. These costs include taxes, transaction fees, and management costs. A revision of the portfolio offers a chance to control these expenses efficiently. Investors can reduce expenses and increase their after-tax profits by routinely assessing and optimising the portfolio.

- Introduction of New Investment Products

The financial sector is always changing, with new investing techniques and products hitting the market on a regular basis. These developments may open up new avenues for portfolio diversification, access to a wider range of asset classes, and the use of unconventional tactics for investors. Investors can include these new items in their portfolios through portfolio revision, which could increase returns or lower risk.

- Overcoming Emotional Decision-Making

Investors are typically swayed by emotions such as fear, greed, and overconfidence, leading to suboptimal decisions. Frequent portfolio adjustment offers investors a methodical way to make decisions, assisting them in avoiding emotional responses and staying true to their long-term plans. Investors can make logical modifications based on data and research rather than feelings by evaluating the portfolio objectively.

- Avoiding Herd Mentality

Herd mentality, or the inclination to follow the activities of the majority, is a prevalent psychological bias that can lead to poor financial decisions. A disciplined portfolio revision process enables investors to avoid these influences by focusing on their particular goals and risk tolerance rather than market movements. This method encourages a long-term view, which promotes sustainable investing success.

To efficiently manage a portfolio, investors should create a

- Setting a Regular Review Schedule

review schedule. While the frequency of reviews varies based on particular circumstances and market conditions, it is standard practice to perform a full assessment at least once a year. During periods of high market volatility or when an investor's life or financial goals change dramatically, more regular assessments may be required. A scheduled review ensures that the portfolio continues to fit with the investor's objectives and enables timely modifications in reaction to changes.

- Monitoring Performance and Making Adjustments

Monitoring portfolio performance entails comparing individual investments and the whole portfolio to applicable benchmarks. This technique assists in identifying underperforming assets that may need to be replaced or areas that require rebalancing. Returns, risk, and asset correlation should all be considered when evaluating performance to provide a complete picture of the portfolio's effectiveness. Based on this information, investors may make informed decisions about which investments to keep, sell, or add, ensuring the portfolio remains optimised for their aims.

Constraints in Portfolio Revision

While revising the portfolio, the investor aims to maximise profit and minimise risk, but here, he will have to face so many problems. Some of the problems are enumerated here

- Involves costs like brokerage and commission

1. Transaction Cost

Buying and selling involve transaction costs like brokerage and commission; frequent revision will push up transaction costs, which may affect the expected gains from Portfolio revision. This acts as a constraint in revision.

- Invites high income tax rates on short term capital gain

2. Taxes

Tax is payable on capital gains arising from the sale of securities; usually, long-term capital gains are taxed at a lower rate than that of short-term capital. For timely portfolio revision, frequent buying and selling of securities are required, which will invite a high rate of income tax on short-term capital gain, which also acts as a hindrance.

3. Statutory /regulatory compliance

- Regulatory compliance affects flexibility in revision

The largest portfolios in every country are managed by investment companies and mutual funds All the players in the security market, especially mutual funds, investment companies and institutional investors, are regulated by regulatory authorities like SEBI, RBI, etc. This also affects flexibility in revision while adjusting the portfolio. These regulations are designed to protect investors and ensure that portfolio managers operate within legal and ethical boundaries.

4. Intrinsic difficulty

- Difficult and time-consuming exercise

Portfolio revision is a difficult and time-consuming exercise. There are different approaches to portfolio revision. Analysing the market and revising the portfolio to earn profit from the market is a cumbersome procedure. Therefore, doing an appropriate revision of the portfolio itself may be a great concern and constraint.

4.1.3 Portfolio revision strategies

- Techniques for portfolio revision

Portfolio revision is an important part of investment management that entails modifying a portfolio's asset allocation on a regular basis to ensure that it is in line with an investor's financial objectives, risk tolerance, and market conditions. There are two main techniques for portfolio revision: active and passive strategies. Both offer distinct techniques and benefits, and the choice between them frequently hinges on an investor's objectives, investment style, and market outlook.

Active Portfolio Revision Strategy

- Making regular and substantial portfolio revisions

An active portfolio revision strategy is an investment technique that involves constantly reviewing and changing a portfolio based on market trends, economic conditions, and individual asset performance. The active portfolio revision technique entails regular and sometimes significant portfolio revisions. Investors who pursue an active revision approach believe that security markets are not always efficient. They believe that securities might be mispriced at times, creating an opportunity to make extra returns by trading them. Active strategies aim to outperform the market by making tactical adjustments. This entails regular trading and rebalancing to capitalise on short-term opportunities and market inefficiencies, as well as meticulous market timing based on extensive research and analysis of economic data and market patterns. Active managers seek to buy inexpensive assets or sell overvalued ones in order to increase returns and reduce risks while responding flexibly to changing conditions and new possibilities.

- Increased transaction costs, time consuming

While active portfolio adjustment has the potential to boost returns and increase flexibility to market fluctuations, it also has substantial drawbacks. Frequent trading can result in increased transaction fees and taxes, potentially lowering total returns. Active management is time-consuming and requires extensive expertise to analyse markets and make timely choices. There is also the possibility of underperformance if market projections are inaccurate or trading costs outweigh the rewards. This strategy is best suited for individuals who are willing to manage their investments actively, have a thorough awareness of market cir-

cumstances, and are prepared to accept the accompanying risks and costs. Active portfolio revision entails repeating the portfolio analysis and portfolio selection processes. It is based on a consideration of the fundamental variables influencing the economy, industry, and company, as well as technical elements such as demand and supply. As a result, employing an active revision plan will need significantly more time, talent, and money. The frequency of trading is expected to be substantially higher under the active revision technique, resulting in increased transaction costs.

Passive Portfolio Revision Strategy

- Maintains stable asset allocation over time

A passive portfolio revision strategy is an investment approach that prioritises low trading and long-term stability by maintaining a stable asset allocation over time. Passive strategies aim to keep a portfolio consistent with a predefined asset mix, such as a set percentage of stocks, bonds, or other asset classes. This strategy is based on the notion that markets are generally efficient, making it impossible to outperform the market through regular active trading. Passive investors often utilise index funds or exchange-traded funds (ETFs) to replicate the performance of a given market index.

- Simple and cost effective, low transaction costs and capital gains taxes

The main benefit of a passive portfolio revision strategy is its simplicity and cost-effectiveness. Because this technique requires minimal trading, transaction costs and capital gains taxes are greatly reduced, allowing the investor to keep more of the investment returns. By adhering to a predetermined asset allocation, passive investors avoid the emotional decision-making that often accompanies market volatility, lowering the danger of making rash changes that could affect long-term results. Passive portfolios may miss out on short-term opportunities or fail to hedge against market decline. Investors taking a passive approach in portfolio revision may follow either a buy-and-hold strategy or Portfolio indexing.

Buy and hold Strategy.

- Maintaing stable portfolio regardless of short term fluctuation

Buy and hold is a long-term passive strategy where investors keep a relatively stable portfolio over time, regardless of short-term fluctuations. Buy and hold investors tend to outperform active management, on average, over longer time horizons. Instead of trading shares based on stock market timing, investors buy and hold onto them despite any market fluctuation.

Portfolio Index

- Buying every stock in exact proportion of stock in the index

Under this approach, the investors may attempt to construct a portfolio that resembles the overall market returns. Here, the fund manager buys every stock in the index like BSE –Sensex or NSE- Nifty in exact proportion of the stocks in the index.

The passive revision technique involves adjusting the portfolio in accordance with pre-set rules and procedures known as formula plans. These formula plans allow investors to adapt their portfolios in response to changes in the securities market.

4.1.4 Formula Plans

- Techniques or procedures to let investors profit from price swings

Securities are subject to price fluctuations in the market. Investors should ideally purchase low and sell high at the same time. Investors could profit from the price swings in the securities market if portfolio revision is carried out in line with this theory. However, when prices are low, investors are reluctant to purchase because they either believe that prices will drop much further or they are afraid that prices won't rise again. In the same way, investors hold off on selling when prices are high because they believe that prices will continue to climb and they could make more money. Thus, if left to their own devices, investors would not act in the manner necessary to profit from price swings. As a result, various mechanical revision techniques or procedures have been devised to let investors profit from market price swings by purchasing stocks when they are cheap and selling them when they are expensive. These strategies are known as formula plans.

- Automates the timing of decisions related to purchase and sales of stocks

Formula plans are attempts to capitalise on market price volatility and turn them into a source of profit for investors. They automate the timing decisions for purchasing and selling stocks, eliminating the emotions associated with these decisions. Formula plans are made up of established rules that require specific actions to be taken when the securities market changes. Formula plans require investors to divide their investment capital between two portfolios, one aggressive and the other conservative or defensive. The aggressive portfolio often contains equities shares, whereas the defensive portfolio contains bonds and debentures. The formula plans defines established rules for transferring funds from the aggressive to the defensive portfolio and vice versa. These guidelines allow investors to sell shares when their prices rise automatically and buy shares when they fall.

4.1.5 Rupee Cost Averaging Plan

- Utilises the cyclic movement in shares to construct portfolio at low cost

This formula plan is a passive portfolio revision strategy. It utilises the cyclic movement in shares to construct a Portfolio at a low cost. Here, an investor keeps on investing a fixed amount at regular intervals in a particular security or Portfolio without considering the market price or other happenings in the securities market.

The advantages of the Rupee cost-averaging plan are;

a. It reduces the average cost per share and brings profit to the investors over a long period.

b. It avoids the pressure of timing the stock purchase from Investors.

c. In a declining Market, it is highly beneficial

There are also some disadvantages such as:

1. Frequent purchase leads to higher transaction costs
2. It is only a buying strategy. It does not indicate when to sell the securities
3. If stock prices show a downward trend, this plan won't be beneficial to the investor
4. if the stock prices do not follow a cyclical pattern, the plan won't give the desired results.

4.1.6 Constant Rupee Value Plan

- Creates two portfolios-aggressive portfolio and defensive portfolio

This formula plan is one among the most widely utilised or well-liked ones. The investors create two portfolios under this plan: an aggressive portfolio made up of equity shares and a defensive portfolio made up of bonds and debentures. This strategy seeks to maintain the aggressive portfolio's value at its initial level or a constant value.

- Sale of shares when share values are rising and sale proceeds used to purchase bonds and debentures

The value of the aggressive portfolio varies as share prices do. The aggressive portfolio's overall value rises in tandem with the rising share prices. To reduce the aggressive portfolio's overall worth to the amount of his initial investment, the investor must sell a portion of his shares. Bonds and debentures will be purchased with the proceeds from the sale to add to the defensive portfolio.

- Purchase of shares when share values are declining by using funds from liquidation of defensive portfolio

Conversely, the overall value of the aggressive portfolio would decrease in a scenario when share values are declining. The investor must purchase shares from the market to add to his aggressive portfolio in order to maintain the portfolio's overall value at its initial level. To raise the funds required to purchase more shares, a portion of the defensive portfolio will be liquidated. By using this strategy, investors are essentially moving money from their aggressive to their defensive portfolios, booking profits as the share price rises. When share prices are low, money is transferred from the defensive portfolio to the aggressive portfolio. Consequently, the strategy assists investors in purchasing shares at a discount to market value and selling them at a premium.

4.1.7 Constant Ratio Plan

This is an alternative to the constant rupee value plan. Once more, the investor would build two portfolios using his investment capital, one aggressive and the other defensive. When share prices fluctuate, this method aims to maintain a steady ratio by periodically readjusting the two portfolios. The aggressive port-

- Ratio between investments in aggressive portfolio and defensive portfolio remains constant

folio's value relative to the cautious portfolio's value will remain constant at the predefined ratio, according to the constant-ratio plan. With this approach, the investor is automatically forced to sell stocks as their prices rise in order to maintain a consistent ratio between the value of their aggressive portfolio and the value of their conservative portfolio. Similarly, as stock prices decline, the investor is compelled to move money from a cautious to an aggressive portfolio.

4.1.10 Variable Ratio Plan

- Variation in ratio of investment in aggressive portfolio and defensive portfolio

Under the Variable ratio plan, he is not particular in following the constant ratio between the aggressive and defensive portfolio throughout investment; rather this ratio will vary according to the fluctuations in the stock market. If there is a rise in the stock market, stocks are sold, and a new ratio is constructed by increasing the proportion of the defensive portfolio; on the contrary, if there is a fall in market prices of shares, investors will buy more shares and will increase the proportion of aggressive portfolio. Accurate forecasting of future market prices is essential for the working of this plan. This is suitable for a widely fluctuating market.

4.1.11 Dollar Cost Averaging

- Periodical investments made at regular intervals in defined share or portfolio of shares

Dollar-cost averaging is another passive portfolio modification technique. This is not the same as the two formula plans that were previously discussed. All formula plans are predicated on the idea that stock prices move in cycles, rising and falling. By utilising this share price cycle movement, dollar cost averaging can help build a portfolio at a minimal cost. Regardless of the price of the shares at the time of investment, the plan requires the investor to routinely make periodical investments at regular intervals in a defined share or portfolio of shares. In order to cover the full cycle of share price swings, this periodic investment must be made over a sizable amount of time.

- Building a portfolio over a period of time

The investors will receive their shares at a lower average cost per share than the average price that has prevailed in the market over the period if the plan is carried out throughout a full cycle of stock prices. This happens as a result of more shares being bought at reduced prices as opposed to higher prices. Dollar cost averaging is basically a way of building up a portfolio over time. The plan does not call for taking money out of the portfolio periodically. When a sizable portfolio has amassed throughout a whole share price cycle, when it is revised later, the investor can move to another formula plan. The dollar cost averaging is uniquely suited to individuals who have recurring quantities to invest.

Through a variety of formula plans, investors can automatically acquire shares at low prices and sell them at high prices,

attempting to make portfolio renovation a straightforward and nearly mechanical exercise. However, formula programs are not without restrictions. Their very nature makes them rigid. Furthermore, it is not stated in these plans which stocks from the portfolio should be sold and which should be added to the portfolio. Answers to these questions can only come from active portfolio revision.

Summarised Overview

The process of changing an investment portfolio's asset allocation to better align it with an investor's financial objectives, risk tolerance, and market circumstances is known as portfolio revision. Consistent portfolio revision aids in optimising returns and skilfully managing risks over time, preserving an ideal asset mix as circumstances change. A number of things, including changes in the economy, market volatility, or an investor's risk tolerance and personal circumstances, can necessitate a revision of their portfolio. Asset values may be impacted by market conditions, necessitating a rebalancing to preserve the intended asset allocation. Portfolio revision guarantees that investments continue to be appropriate for the investor's changing financial goals, whether those goals are capital preservation or taking advantage of growth opportunities. There are two general categories of revision strategies: active and passive. Active revision methods seek to maximise returns by making tactical portfolio revisions on a regular basis in response to short-term market developments. On the other side, passive revision strategies adopt a more detached approach, conducting recurring portfolio evaluations and making adjustments mainly in reaction to individual circumstances or long-term shifts rather than rapid market fluctuations. Formula plans establish predefined guidelines for preserving asset class balance, offering a methodical approach to portfolio updating. The Constant Rupee Value Plan maintains a stable value invested in particular asset classes, modifying holdings in response to fluctuations in price. The Constant Ratio Plan, on the other hand, adjusts when values fluctuate to maintain the appropriate percentage and keeps a steady ratio between various asset classes despite market volatility. Another structured strategy is dollar-cost averaging, in which an investor makes regular fixed-amount investments, purchasing more units during periods of low price and less during periods of high price. Every one of these methods offers a different approach to portfolio revision, allowing it to adjust to changes in the market and match investor objectives.

Self-Assessment Questions

1. What are some common reasons that might necessitate portfolio revision?
2. What is the primary difference between active and passive revision strategies?
3. How do active revision strategies attempt to optimise portfolio performance?
4. What are the main characteristics of passive revision strategies?
5. Why might an investor choose a passive revision strategy over an active one?

6. What are formula plans, and how do they help in portfolio management?
7. What is the Constant Ratio Plan, and how does it maintain portfolio balance?
8. How does the Constant Ratio Plan differ from the Constant Rupee Value Plan?
9. How can an investor determine which portfolio revision strategy is best suited to their financial goals and risk tolerance?

Assignments

1. Describe the concept of portfolio revision. Include its meaning, purpose, and the circumstances that make portfolio revision necessary for investors.
2. Compare and contrast the Constant Rupee Value Plan and the Constant Ratio Plan. Explain the situations in which each strategy might be preferable and why.
3. Explain how economic indicators can influence the need for portfolio revision. Discuss how investors should adjust portfolios in response to specific economic changes.
4. Discuss portfolio revision strategies and evaluate how they have evolved in response to technological advancements and changes in market dynamics.

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Unit 2

Evaluation of Portfolio Performance

Learning Outcomes

Upon the completion of this unit, the learner will be able to;

- get an awareness of the concept of portfolio evaluation
- comprehend the need for portfolio evaluation
- analyse various performance evaluation ratios

Background

Portfolio evaluation is the process of assessing an investment portfolio's returns and risk levels to determine its efficacy in meeting financial goals. It is the final phase in portfolio management. Portfolio evaluation is the step at which investors assess the extent to which the objective has been met. Through portfolio evaluation, investors attempt to determine how well the portfolio has performed. Portfolio evaluation is essentially a study of the impact of investing decisions. Portfolio performance evaluation is often carried out under specified situations, such as at regular intervals during big economic shifts or following significant portfolio adjustments, such as rebalancing or introducing new assets. Evaluating performance allows investors to determine whether the portfolio aligns with their risk tolerance and investment objectives. Portfolio evaluation is important because it can provide a clear picture of the effectiveness of investment strategies, as well as insights into areas where adjustments may be required. Understanding both the returns gained and the risks faced allows investors to make more informed decisions on asset allocation, risk management, and strategy revisions.

Keywords

Risk adjusted returns, Sharpe ratio, Treynor ratio, Jensen ratio

Discussion

4.2.1 Portfolio evaluation

- Entails assessment of performance,risk,alignment of portfolio with investor's financial goals

Portfolio evaluation is an important step in investment management that assesses the performance, risk, and alignment of an investment portfolio with the investor's financial goals. As investors aim to maximise returns while controlling risk, evaluating their portfolio becomes a critical activity in ensuring that their investment plan is effective. This method entails a systematic examination of many components, such as performance measurements, risk considerations, asset allocation, diversification, and adherence to financial objectives. Portfolio evaluation, whether for individual investors, institutional funds, or corporate portfolios, is vital in directing decision-making processes and assisting investors attain a balanced and sustainable approach to investment.

- Comparing actual performance with predetermined standards/objectives

The fundamental process of evaluating a portfolio is comparing its actual performance to pre-established standards or objectives. Calculating metrics such as total return, compound annual growth rate (CAGR), and the risk-adjusted return-measurement Sharpe ratio may be part of this process. Understanding the risk associated with the portfolio is vital, as investors need to comprehend the volatility and exposure to market uncertainty. Value at Risk (VaR), beta, and standard deviation are examples of common risk measurements. Investors can decide whether to hold, purchase, or sell assets within the portfolio and whether it is in line with their long-term objectives and risk tolerance by routinely evaluating these factors.

- In-depth analysis of diversification and structure of investment mix

Portfolio evaluation entails more than just tracking performance; it also includes an in-depth analysis of the investment mix's diversification and structure. A well-diversified portfolio spreads risk across asset classes, industries, and geographies, minimising the impact of poor performance in a particular area. Evaluating portfolio diversity assists investors in identifying risk concentrations that may jeopardise their financial objectives. For example, over-concentration on a single sector, such as technology, may expose the portfolio to significant volatility if that industry experiences a slump. As a result, a portfolio review guarantees that the portfolio remains resilient to market swings and can continue consistent growth over time.

Portfolio evaluation aids in determining the need for rebalancing, which is critical to preserving the desired asset allocation. A portfolio's initial allocation may shift over time as a result of market movements. For example, if equities do exceptionally well, the portfolio may become overly concentrated in stocks,

- Selling outperforming assets and reinvesting in lagging ones

raising risk. Regular portfolio evaluation allows investors to rebalance their portfolios by selling outperforming assets and reinvesting in lagging ones, restoring the original proportion. This disciplined strategy can boost long-term performance and better align the portfolio with the investor's changing risk profile and investment horizons. Furthermore, taking into account issues like tax efficiency, liquidity requirements, and evolving market conditions improves the effectiveness of portfolio review, making it a cornerstone of successful investment management.

4.2.2 Need for portfolio evaluation

Portfolio evaluation is required due to the dynamic nature of financial markets and investors' constantly changing situations. In a world where economic conditions, interest rates, market sentiment, and individual financial goals change, assessing a portfolio is critical to ensuring that assets remain consistent with the investor's objectives and risk tolerance. Regular portfolio evaluation allows investors to track performance, ensuring that the portfolio is delivering projected returns relative to benchmarks and adapting to changing market conditions. Without frequent evaluation, an investor may unwittingly hold underperforming or excessively risky investments, jeopardising long-term goals. Portfolio evaluation also indicates the need for rebalancing, which is the act of adjusting assets to retain the original or targeted asset allocation while managing for excess exposure to specific sectors, regions, or asset classes that may skew risk. For instance, during a market rally, the proportion of shares in a portfolio may increase, raising overall portfolio risk. Rebalancing keeps this risk in check and ensures that the portfolio aligns with the investor's risk profile. Also, portfolio evaluation aids in assessing diversification by ensuring that risk is dispersed across multiple investments rather than concentrated in one sector, hence minimising exposure to market-specific shocks. Another important reason for portfolio evaluation is to consider tax efficiency, particularly for investors subject to capital gains taxes. Investors can deliberately sell or hold assets to reduce tax liabilities by analysing their portfolios, especially in markets where different asset classes have varied tax regimes. Another critical issue is determining liquidity needs, as certain investments may need to be liquidated to pay short-term financial obligations. To summarise, portfolio evaluation is essential for preserving an investment portfolio's health, shielding it from excessive risks, ensuring that it achieves financial objectives and optimising returns in changing market conditions. Without it, investors risk deviating from their initial strategy, which could lead to large financial losses or lost possibilities for growth.

- Helps in tracking performance, adapting to changing market conditions, assessing diversification, ensuring portfolio delivers projected returns

4.2.3 Portfolio Performance Evaluation Perspectives

- Three perspectives-Transaction view, Security view, Portfolio view

Portfolio evaluation is a complete process that involves analysing an investment portfolio to ensure that it meets the investor's financial objectives, risk tolerance, and overall strategy. This review determines if the portfolio is performing as intended, managing risk effectively, and maintaining diversification. Investors can maximise returns while minimising risk by examining a portfolio from several perspectives. Portfolio evaluation is not simply about assessing individual investments; it takes into account wider issues such as asset allocation, market circumstances, and rebalancing requirements. The process allows investors to find inefficiencies, areas for improvement, and potential hazards that may occur over time. As a result, it assists in determining whether to hold, buy, or sell assets. The evaluation can be approached from three different perspectives: transaction, security, and portfolio, each of which provides a unique lens for determining how well the portfolio is performing. Together, these viewpoints constitute a strong foundation for making educated investment decisions and ensuring that the portfolio stays on pace to accomplish long-term financial objectives.

4.2.4 Transaction View

- Evaluates specific transactions within the portfolio-purchase,sell and hold

The transaction perspective of portfolio evaluation looks at specific transactions within the portfolio, such as purchase, sell, and hold choices. This approach emphasises the time, cost, and impact of each trade, assisting investors in ensuring that their transactions are conducted efficiently and contribute positively to the portfolio's overall performance. One of the most important components of this perspective is reducing transaction expenses, including broker fees, commissions, and spreads, which can have a major impact on returns if not carefully managed. By carefully monitoring these costs, investors can avoid excessive trading or poorly timed transactions that degrade the portfolio's value.

The transaction view emphasises the necessity of liquidity. Certain assets may have lesser liquidity, making it difficult to sell without affecting the price. Evaluating liquidity allows investors to plan their deals better and prevent situations where they may have to sell at a loss. Furthermore, this approach takes into account the tax consequences of transactions, such as capital gains taxes, particularly in portfolios where frequent buying and selling may result in increased tax liabilities. Overall, the transaction view helps guarantee that every deal is done with precision and minimal friction, increasing the portfolio's overall efficiency and long-term performance.

4.2.5 Security View

The security view of portfolio evaluation focuses on individual securities held within the portfolio, such as stocks, bonds, or mutual funds, to evaluate their performance, risk, and position in the portfolio. This perspective entails a thorough examination of each security's risk-return profile, historical performance, volatility, and growth potential. Investors utilise this approach to analyse whether a particular security is contributing to the portfolio's goals, offering the proper mix of risk and reward and fitting within the broader strategy.

- Focuses on individual securities held within the portfolio

Diversification is one of the most important security issues. Investors determine whether they are too exposed to specific securities, sectors, or asset classes, which may increase risk if market conditions change. This view also includes recognising the correlation between stocks in the portfolio; if they are too tightly related, the portfolio may not be as diverse as anticipated, making it subject to market volatility. Furthermore, the security perspective enables investors to find chances to rebalance their portfolios, such as selling underperforming securities or acquiring new assets with higher growth potential. This viewpoint helps refine the portfolio's composition, ensuring that each security is well-linked with the investor's financial goals and risk tolerance.

4.2.6 Portfolio View

By concentrating on the overall structure, performance, and risk characteristics of the entire portfolio, the portfolio view provides a comprehensive method for evaluating portfolios. The asset allocation of the portfolio—the distribution of investments among different asset classes like stocks, bonds, cash, and alternative investments—is examined from this angle. Investors can determine whether their asset allocation is in line with their risk tolerance and long-term financial goals by using the portfolio view. For stability's sake, a conservative investor could allocate more to bonds, whereas an ambitious investor might prefer shares for growth.

- Comprehensive method of evaluating the structure, performance and risk characteristics of the entire portfolio

Performance measurements, including the Sharpe ratio, which calculates risk-adjusted returns, and the portfolio's standard deviation, which represents total volatility, are also taken into consideration by the portfolio view. These indicators aid in assessing if the portfolio is yielding enough returns given the amount of risk assumed. Diversification is another important component of the portfolio view since it helps lower risk by preventing the portfolio from being unduly dependent on any one asset or industry. Regular rebalancing, in which the portfolio is modified to put it back in line with the intended asset allocation, is another

- Different aspects of portfolio view

aspect of this perspective. For example, if stocks beat bonds over time, the portfolio might get overly stock-heavy, and rebalancing would be necessary to keep the risk level at the desired level. In the end, the portfolio view aids investors in controlling the overall risk and return profile of the portfolio, guaranteeing that it stays in line with long-term goals and market circumstances.

Evaluation of Portfolio Performance

4.2.7 Risk-Adjusted Returns

Examining the return per unit of risk is a straightforward way to account for risk. Buying shares carries a risk. An investor can earn a risk-free rate of interest on a security that carries no risk, meaning they can invest without taking any financial risk. The risk premium, or return obtained over the risk-free rate, is what one receives in exchange for taking on risk. We may calculate the risk premium per unit of risk by dividing this risk premium by a risk measure. As a result, it is possible to compute the return per unit of risk for various mutual fund portfolios or portfolios and then rank the funds according to descending ratios. A higher ratio indicates superior performance.

4.2.8 Sharpe Ratio/ Reward to Variability Ratio

One important statistic for evaluating the risk-adjusted return of an investment or portfolio is the Sharpe ratio. It offers a means of assessing the degree to which rewards match the risks assumed. This ratio, which Nobel laureate William F. Sharpe created, contrasts the excess return of the portfolio—that is, the return above the risk-free rate—with the standard deviation of the portfolio's returns. This comparison provides information about whether the portfolio is generating higher returns by employing successful investment strategies or by taking on more risk.

The formula for the Sharpe ratio is:

Sharpe ratio (SR)= Portfolio return- Risk free rate / Standard deviation of portfolio return

In this equation, the Portfolio Return is the average return of the investment over a period, the Risk-Free Rate represents the return on a theoretically risk-free asset (often government bonds), and the Standard Deviation reflects the volatility of the portfolio's returns.

- A greater sharpe ratio indicates higher return for each unit of risk in the portfolio

Higher returns for each unit of risk in the portfolio are indicated by a greater Sharpe ratio, which suggests more effective risk management. On the other hand, a lower Sharpe ratio indicates that the excess returns in the portfolio might not outweigh the risk taken. A Sharpe ratio of one or more, for example, is usually regarded as desirable, meaning that the portfolio is providing strong returns in relation to its risk; on the other hand, a ratio

of less than one suggests that the portfolio's risk-adjusted performance might not be ideal. When evaluating portfolios with varying risk profiles, this ratio is particularly helpful in assisting investors in selecting those that provide the optimum trade-off between risk and return, guaranteeing that they are rewarded for the risk they incur.

4.2.9 Treynor Ratio/ Reward to Volatility Ratio

- Compares an investment portfolio's excess return to its systematic risk

The Treynor ratio is a risk-adjusted return metric that compares an investment portfolio's excess return to its systematic risk, denoted by beta, in order to assess portfolio performance. This ratio, which Jack Treynor created, enables investors to comprehend how much return they are receiving for each unit of risk they take in connection to market fluctuations. The Treynor ratio is especially helpful for diversified portfolios that aim to reduce unsystematic risk because it only takes systematic risk into account, as opposed to the Sharpe ratio's consideration of total risk.

Tryenor ratio (TR) = realised return on the portfolio – risk-free rate of return/portfolio beta

4.2.10 Jensen's Performance Index

- CAPM model is used to calculate the expected return on a portfolio

The Jensen's Performance Index measure or ratio is another kind of risk-adjusted performance metric that Michel Jensen created. This ratio makes an effort to quantify the difference between a portfolio's actual return and the return that would be anticipated, given its degree of risk. The expected return on a portfolio is calculated using the CAPM model.

- Shows expected return on a portfolio for a specified degree of risk

It shows the amount of return that a portfolio has. It shows the expected return on a portfolio for the specified degree of risk. The differential or excess return that has been earned over and above what is required for a portfolio's level of systematic risk is measured by the difference between the return that the portfolio actually earned and the return that was projected to be earned. The differential return is an indication of the portfolio manager's forecasting ability or managerial skill.

Fama's Decomposition Model

Eugene Fama provides an analytical framework that enables a detailed analysis of portfolio performance, popularly known as Fama's Decomposition of Total Return. It is a framework for assessing a fund's overall performance in terms of risk and stock selection. The framework is based on the idea that a fund's overall performance is made up of two parts.

- Selectivity

The ability of a fund manager to choose the best securities at a given level of risk

- Risk

Fund managers make decisions to take on a positive amount of risk.

Under this model, a detailed breakup of the total return from the portfolio refers to various performance sources. The total return from the portfolio can be divided into risk-free return and excess return. Excess return from portfolio over risk-free return is a reward for shouldering the extra risk borne by the investor and also for his correct stock selection.

Summarised Overview

Portfolio evaluation assesses a portfolio's performance in terms of returns relative to risks taken, helping investors gauge alignment with their financial objectives and compare results against benchmarks. Risk-adjusted returns provide insights into how effectively a portfolio balances reward with risk, offering a more meaningful measure of success than returns alone. Performance evaluation ratios, such as the Sharpe ratio, Treynor ratio, and Jensen's alpha, further quantify risk-adjusted returns to facilitate comparisons. The Sharpe ratio examines return per unit of total risk, while the Treynor ratio focuses on systematic risk, assessing return per unit of market risk. Jensen's alpha measures a portfolio's ability to outperform expected returns given its risk level, capturing the manager's skill. Fama's decomposition of total returns goes further by breaking returns into components like risk-free rate, systematic market return, and unique asset contributions, offering a comprehensive view of the sources of portfolio performance. Together, these metrics provide essential insights for understanding and optimising portfolio effectiveness.

Self-Assessment Questions

1. What is portfolio evaluation, and why is it important for investors?
2. How do risk-adjusted returns differ from absolute returns, and why are they significant in portfolio evaluation?
3. How does the Sharpe ratio measure a portfolio's risk-adjusted return, and what does it indicate about the portfolio's volatility?
4. What is the Treynor ratio, and how does it differ from the Sharpe ratio in evaluating portfolio performance?
5. In what way does Jensen's alpha provide insights into the portfolio manager's performance relative to expected returns?
6. How does Fama's decomposition of total returns break down a portfolio's performance, and what are the key components it considers?
7. How can portfolio evaluation help investors make decisions about asset reallocation or strategy adjustments?

Assignments

1. Compare and contrast various portfolio evaluation techniques, with a focus on risk-adjusted returns, and discuss their advantages and limitations in assessing performance.
2. Explore how performance evaluation ratios like the Treynor ratio and Jensen's alpha can be used to assess the effectiveness of portfolio management strategies.
3. Conduct a case study to evaluate the performance of a portfolio manager using Jensen's alpha, analysing whether they have consistently added value above the market expectation.
4. Calculate risk-adjusted returns for multiple portfolios and make recommendations based on comparative results.

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സർവ്വകലാശാലാഗീതം

വിദ്യയാൽ സ്വതന്ത്രരാകണം
വിശ്വപൗരരായി മാറണം
ഗ്രഹപ്രസാദമായ് വിളങ്ങണം
ഗുരുപ്രകാശമേ നയിക്കണേ

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ജ്ഞാനകേന്ദ്രമേ ജ്വലിക്കണേ

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SREENARAYANAGURU OPEN UNIVERSITY

Regional Centres

Kozhikode
Govt. Arts and Science College
Meenchantha, Kozhikode,
Kerala, Pin: 673002
Ph: 04952920228
email: rckdirector@sgou.ac.in

Thalassery
Govt. Brennen College
Dharmadam, Thalassery,
Kannur, Pin: 670106
Ph: 04902990494
email: rctdirector@sgou.ac.in

Tripunithura
Govt. College
Tripunithura, Ernakulam,
Kerala, Pin: 682301
Ph: 04842927436
email: rcedirector@sgou.ac.in

Pattambi
Sree Neelakanta Govt. Sanskrit College
Pattambi, Palakkad,
Kerala, Pin: 679303
Ph: 04662912009
email: rcpdirector@sgou.ac.in

Investment Management

COURSE CODE: M21CM09DC

Sreenarayanaguru Open University
Kollam, Kerala Pin- 691601, email: info@sgou.ac.in, www.sgou.ac.in Ph: +91 474 2966841

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