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(FINANCIAL INVESTMENT ANALYSIS)**

**INVESTMENT ANALYSIS  
AND  
PORTFOLIO MANAGEMENT**

**DISCIPLINE SPECIFIC CORE COURSE (DSC-11)  
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**(FOR LIMITED CIRCULATION ONLY)**



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UNIVERSITY OF DELHI**

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INVESTMENT ANALYSIS AND PORTFOLIO MANAGEMENT

[FOR LIMITED CIRCULATION ONLY]

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# Basics of Risk and Return

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## STRUCTURE

- 1.1 Learning Objectives**
- 1.2 Introduction**
- 1.3 Concept of Risk**
- 1.4 Concept of Return**
- 1.5 Risk and Return Trade Off**
- 1.6 Application of Standard Deviation in Risk and Return**
- 1.7 Concept of Alpha and Beta in Risk and Return**
- 1.8 Summary**
- 1.9 Answers to In-Text Questions**
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### 1.1 Learning Objectives

- ◆ To understand the concept of risk.
- ◆ To understand the various types of risks.
- ◆ To understand the concept of return and its types.
- ◆ To understand the concept of risk-return trade-off.
- ◆ To understand the applications of standard deviation in risk and return.
- ◆ To understand the concept of alpha and beta in risk and return.



## 1.2 Introduction

The trade-off between risk and return is at the heart of every financial decision-making. Any decision-making process has both advantages and disadvantages. A farmer works the soil and plants seeds in the hopes of obtaining a higher crop. He seldom knows whether his hopes have been fulfilled until the crop is mature and he has the opportunity to enjoy the harvest. A multitude of elements interact between expectation and actuality. Using the farmer as an example, important factors like the climate, seeds, fertilizer, and farm management practices are what allow expectations to become a reality. There is a chance that any of the factors will deteriorate, which would increase the difference between expectations and reality. An investment manager, a business, and any other person or organization that must make a decision can all relate to the uncertainty.

### 1.2.1 Definition

An investment's risk is the unpredictability or fluctuation of its returns. It is the potential for an investment's real returns to deviate from those projected.

## 1.3 Concept of Risk

### 1.3.1 Meaning

One way to conceptualize risk is as a potential for something bad to happen. If there are more significant departures from the expected, we view those circumstances as dangerous. Whether or not a certain situation is risky relies on how accurately we can predict the likelihood that a specific event will occur. The following three possible states are raised by this:

- (a) Confidence
- (b) Unpredictability
- (c) Danger

A state of certainty is one in which there is no variation from the predicted outcome of a specific occurrence. When it comes to some "all truths,"

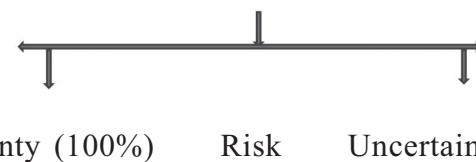


there won't be any exceptions, similar to how the sun rises in the east and how death is inevitable. In a similar vein, "near certainty" might be included in some commercial scenarios; supposing that, as a monopolist, you will sell a specific quantity of bags of rice in a community where rice is the main crop grown there.

Prediction is challenging when there is uncertainty. It's possible that one cannot precisely predict when a given event will occur. People frequently find it challenging to forecast the weather. Occasionally, the meteorological department is also involved. It is very difficult and dangerous to attempt to describe uncertainty with any degree of rigor in conceptual and mathematical terms. Since nothing can be predicted in practice, dealing with unknown situations can also be challenging.

A circumstance that falls between the first two levels of certainty and uncertainty is referred to as the third state of possibility, or risk. The easiest way to conceptualize this is as a continuum with risk occupying the middle ground, and confidence and uncertainty on each end.

Continuum reflecting the possibility of occurrence of an event



In the language of statistics, a scenario that involves known future events and the probability that go along with them is referred to as risk. Stated differently, it can be thought of as a subjective probability distribution's dispersion. In actuality, a businessman can only confront a risky scenario with confidence.

Making decisions in a position of certainty won't be tough, and in an uncertain circumstance, he won't be exact no matter how sophisticated the tools are. As a result, a manager can only act reasonably in risky situations. As a result, the theory of finance acknowledges the importance of risk in making final decisions.

**Ex ante and ex post risk:** The concept of risk can be understood in two ways: ex ante and ex post.

Ex ante risk is a decision variable that shows the likelihood that a choice taken today may result in unfavorable outcomes down the road. Ex post risk



## Notes

is the term used to describe observable variance in past periods' results. This danger has a past. The most challenging task in financial decision-making is estimating and evaluating future outcomes based on available data. Since a finance manager deals with the former, the *ex ante* idea of risk is deemed to be more valuable in the financial literature than the *ex post* version.

### 1.3.2 Types of Risk

There is always some risk involved in investing, and being aware of the many kinds of hazards is essential to making wise choices. The following are some typical categories of hazards connected to investments:

- (a) **Systematic Risk/Market Risk:** Often known as market risk, it is associated with the general movement of the market. A number of variables can have an effect on the value of investments and the market as a whole, including interest rates, the state of the economy, political developments, and market mood.
- (b) **Interest Rate Risk:** Variations in interest rates may have an impact on how much particular investments are worth. For instance, a rise in interest rates may result in a decline in the value of current bonds and an increase in the cost of borrowing for businesses.
- (c) **Risk of Inflation/Purchasing Power Risk:** Over time, inflation reduces the purchasing power of money. The real worth of an investment may decline if the rate of return on it does not exceed inflation.
- (d) **Credit Risk:** This risk results from the potential for a debt security's issuer to fail to make payments as agreed. It is especially important when investing in bonds because the creditworthiness of the issuer is crucial.
- The ease with which an investment can be acquired or sold on the market without significantly altering its price is referred to as liquidity risk. Less liquid assets could be more difficult to sell rapidly, which could result in increased transaction costs or price swings.
- (e) **Currency Risk:** Often known as exchange rate risk, it is the possibility that returns on foreign investments will be impacted by exchange rate movements. Lower returns may occur if the currency used to denominate an investment depreciates in relation to the investor's home currency.



- (f) **Political and Regulatory Risk:** The value of investments may be impacted by modifications to laws, rules, or political unrest. This risk is especially important in developing economies.
- (g) **Business or Firm Risk:** This risk relates specifically to a stock's performance and stability as issued by the firm issuing it. The company's financial health can be impacted by variables like industry trends, competition, and management choices.
- (h) **Reinvestment Risk:** It is the possibility that investment cash flows won't be able to be reinvested at the same rate of return. For instance, future cash flows could need to be reinvested at lower rates if interest rates decrease.
- (i) **Event Risk:** Unpredicted events that affect the value of investments include natural catastrophes, geopolitical crises, and other unforeseen occurrences.

To build a diverse portfolio that fits their unique circumstances and preferences, investors frequently need to evaluate their risk tolerance, time horizon, and investing goals. Partially offset by diversification among various asset classes and geographical areas is the potential for risk mitigation.

## 1.4 Concept of Return

### 1.4.1 Meaning

In the context of investing, returns are the monetary gains or losses that an investor experiences over a given time frame. Returns are a crucial indicator used to evaluate the success of an investment. They can be stated as a percentage or as a monetary value.

### 1.4.2 Types of Returns

Returns can take many different forms and metrics, such as:

- (a) **Total Refund:** The term “total return” refers to the increase in the investment's value as well as any income (interest or dividends) that may be received. It offers a thorough evaluation of the performance of investments overall.



- (b) Gain in Capital:** The rise in an investment's value over its acquisition price is known as a capital gain. It is computed by deducting the current market value from the purchase price at the outset.
- (c) Yield on Dividends:** The annual dividend income produced by an investment expressed as a percentage of the current market price is known as dividend yield. It is computed by dividing the share price at current market value by the annual dividend per share.
- (d) Interest Earnings:** The money received as interest on fixed-income assets, like bonds, is referred to as interest income. It increases the investment's overall return.
- (e) Payments with Coupons:** Bond issuers pay bondholders interest on a periodic basis through coupons. The overall return on bond investments is influenced by these payments.
- (f) Gains and Losses, Realized and Unrealized:** When an investment is sold and the true profit or loss is realized, realized gains or losses take place. Changes in the value of an investment that has not been sold are represented by unrealized profits or losses.
- (g) Calculated Annualized Return:** The average rate of return per year over a given time period is known as the annualized return. Comparing the performance of assets with varying holding periods might be helpful.
- (h) Adjusted Return for Risk:** The amount of risk connected with an investment is taken into account in risk-adjusted return. Well-liked metrics that modify returns according to the volatility or systematic risk of an investment are the Treynor and Sharpe ratios.
- (i) Comparing Money-Weighted with Time-Weighted Returns:** Time-weighted returns are frequently used to assess how well investment portfolios are performing because they take time into account. Money-weighted returns provide an indication of the real experience of the investor by taking into account the timing and volume of cash flows into and out of an investment.
- (j) Benchmark Returns:** When evaluating an investment's performance, benchmark returns are utilized to compare it to a certain market index or other pertinent benchmarks.



Investors must comprehend the numerous components and return measurements in order to assess the performance of their portfolios and make wise decisions. It's crucial to remember that past performance does not guarantee future outcomes. When evaluating returns, investors should take their time horizon, risk tolerance, and investing goals into account.

However, the word "return" has multiple meanings, including the following:

- (a) Return on book versus return on market
- (b) Return on single period versus return on multi period
- (c) Expected versus actualized ex ante return
- (d) Portfolio return compared to security

**Return on Book versus Return on Market:** Book return is the amount of return determined by taking the company's assets and profits from its books. The Return on Assets (ROA) is typically used as a book return indicator. Different factors such as capital employed, net-worth, capital invested, earnings per share, and dividends per share can also be used to calculate several different returns. These returns are entirely a reflection of past performance.

On the other hand, market return is determined by the asset's market value. Assuming that X purchases Rs. 100 worth of ABC firm stock at face value of Rs. 10, with the firm earning Rs. 1 per share, X's book return is 10% and his market return is 1%.

**Return on Single Period versus Return on Multi Period:** The computation of return is contingent upon a specific time frame. The rate of return is 3% if a Rs. 100 investment generates an income of Rs. 3 over a period of 3 months. The return is also 3% if an additional investment generates revenue of Rs. 3 during a 12-month period. However, unless the measures pertain to a particular time frame, they seem nonsensical. Rates of return are typically calculated annually. As a result, the two investments mentioned above would have respective rates of return of 12% and 3%.

The calendar period during which the return on investment is earned may or may not coincide with the time period utilized to determine the rate of return. Regardless of whether they made the investment within the calendar period or not, investors would typically be interested in seeing what rate of return they were able to achieve. To calculate the return on an asset for a certain holding period, one can use the following analogy.



## Notes

**Expected versus Actualized ex ante Return:** Before the fact is referred to as ex ante, and after the fact as ex post. In terms of security returns, these two differ significantly from one another. The return an investor intends to receive on his investment is known as the ex ante return. There is no assurance that an investor's dreams will materialize. The real or realized return is what is meant to be returned ex post. The predicted return and actual return can differ significantly depending on whether the markets are in a bullish or bearish state. The straightforward formulas for calculating both returns are as follows.

Ex ante return = Anticipated dividend + Anticipated end price/Initial investment

Ex post return = Actual dividend received + Actual end price/Initial investment

#### *Security versus Portfolio Return*

This is in relation to investing in one asset or security as opposed to a collection of assets or securities. Any type of instrument, including stocks, preference shares, and debentures, can have a standard valuation process. However, when it comes to the appraisal of stocks, financial writers have put forth certain models that rely on either earnings or dividends.

#### *Historical Returns for a Single Period*

Rate of Return ( $R_s$ ) = Dividend Yield + Capital Gain

Where Dividend Yield =  $D_j/P_o$

Capital Gain =  $P_1 - P_o$

so  $R_s = (D_j/P_o) + (P_1 - P_o)/P_o$

or  $R_s = (D_j + P_1 - P_o)/P_o$

Here,  $D_j$  = Dividend paid during the year

$P_1$  = Price at the end of the period

$P_o$  = Price at the beginning of the year

Let's consider the following information about a certain equity share:

$P_o$  = Rs 600

$D_j$  = Rs 24

$P_1$  = Rs 660

The rate of return =  $24 + (660 - 600)/600 = 14\%$



### *Return of a Security for More than One Period*

The return of a single security for more than one period can be calculated by taking the arithmetic mean of the returns of different periods for a particular security. The formula is as under:

$$Ra = (R_1 + R_2 + \dots + R_n)/n$$

Where  $R_a$  = the arithmetic average mean

$R_{ik}$  = the security return in period  $k$ , where  $k$  is from 1 to  $n$

$N$  = number of periods for which return is calculated

## 1.5 Risk and Return Trade Off

Risk and returns always go hand in hand. These are inseparable, so the investment process must be considered in terms of both risk and return. All types of investment have some form of risk attached to it. Even ‘safe’ investments (such as bank deposits) are not without some element of risk. Moreover, the relationship between risk and return is positive, that is, higher the risk, the higher is the possibility of earning a good return and vice versa. Thus, there is need to achieve a risk-return trade-off. The risk-return trade-off is the balance an investor must decide on between the desires for the lowest possible risk for the highest possible returns. The overall idea is that investments with reduced risk often have lower potential returns, whereas investments with higher risk typically have larger potential returns. When making investing selections, investors need to consider these aspects in order to match their risk tolerance and financial goals.

The following are important details about the risk-return trade-off:

- (a) Return and Risk Have a Positive Correlation:** Higher degrees of risk are typically associated with investments that have the potential for larger returns. On the other hand, lesser risk investments usually have smaller potential profits.
- (b) Tolerance for Risk:** People differ in how much risk they can tolerate depending on their goals, comfort level with uncertainty, and financial status. Comprehending one’s level of risk tolerance is essential to assembling an investing strategy that suits personal tastes.



- (c) **Asset Classes and Profiles of Risk and Return:** The risk-return profiles of various asset classes (such as stocks, bonds, and real estate) differ. For instance, while historically providing larger long-term returns than bonds, stocks are typically regarded as riskier.
- (d) **Increasing Variety:** Investing in a variety of assets helps to diversify a portfolio and lower overall risk. Because diversified portfolios contain assets with different levels of sensitivity to market conditions, they can aid in the balance between risk and return.
- (e) **Horizon in Time:** The time horizon of an investor, or the amount of time they intend to hold investments, affects their capacity to withstand brief swings in portfolio value. Given that they have more time to recover from market downturns, investors with longer time horizons may be able to assume greater risk.
- (f) **Risk Assessment Tools:** Statistical metrics like beta, standard deviation, and other measurements are frequently used to quantify risk. These metrics offer information about an investment's historical volatility and correlation with respect to a benchmark.
- (g) **Juggling Return and Risk:** Achieving a balance between managing associated risks and pursuing bigger returns is crucial for investors. Investors can build a portfolio more intelligently by evaluating an investment's possible risk and reward.
- (h) **Personal Investment Objectives:** Personal financial goals and aspirations, including retirement savings, college finance, or wealth preservation, are important factors in figuring out how risky an investment portfolio should be.

In the end, investors use the risk-return trade-off as a compass to navigate the financial markets. Through a thorough comprehension and evaluation of this correlation, investors can make well-informed choices that correspond with their financial goals and risk appetite.

## 1.6 Application of Standard Deviation in Risk and Return

A statistical tool used to quantify the degree of variation or dispersion in a collection of data points is the standard deviation. Standard deviation is frequently used in the context of investing to evaluate the risk and



volatility connected to a particular investment or portfolio. The standard deviation is used in the following ways to assess risk and return:

- (a) Volatility Calculation:** The standard deviation is a crucial factor in determining volatility. It is frequently used in finance to calculate a financial instrument's return volatility. Greater volatility is indicated by a higher standard deviation, which suggests higher risk.
- (b) Modeling Risk:** A key component of many risk models, such as those that calculate Value at Risk (VaR), is standard deviation. VaR accounts for the past volatility of an investment to determine the greatest possible loss within a certain time horizon and confidence level.
- (c) Risk to Portfolio:** The use of standard deviation in portfolio analysis can aid in determining the overall risk of a collection of assets. By combining assets with lower or negatively linked returns, diversification can be utilized to lower portfolio risk by influencing the entire portfolio's standard deviation.
- (d) Risk-Adjusted Return:** Risk-adjusted return measures like the Sharpe ratio are computed using standard deviation. The excess return on an investment per unit of risk (standard deviation) is measured by the Sharpe ratio. Better risk-adjusted performance is indicated by a greater Sharpe ratio.
- (e) Construction of a Diversified Portfolio:** An essential tool for evaluating the advantages of portfolio diversification is the standard deviation. A more favorable risk-return profile can be achieved by an investor by reducing the overall standard deviation of the portfolio by combining assets with lower or negatively correlated returns.
- (f) Evaluation of Risk Tolerance:** Investors that are evaluating their risk tolerance frequently take standard deviation into account. Having a solid understanding of the standard deviation, which represents possible volatility, enables investors to better match their investing decisions to their risk tolerance.
- (g) Comparative Evaluation of Risk:** Investors can compare the risk profiles of various investments or portfolios using standard deviation. Higher standard deviations are often regarded as riskier than smaller standard deviations, which indicate that investments with lower standard deviations are generally less risky.



**(h) Investor Communication:** Disclosure of Risk: The standard deviation is frequently used to convey the historical volatility of an investment in financial reports and investment disclosures. It gives investors a numerical representation of the possible range of returns.

In conclusion, standard deviation is a useful instrument in the finance industry that is essential for risk assessment and management, portfolio construction, and well-informed investment choices. It provides to a more thorough understanding of the risk-return trade-off and aids investors in quantifying the uncertainty surrounding returns.

## 1.7 Concept of Alpha and Beta in Risk and Return

In the framework of risk and return analysis, the ideas of alpha and beta are especially important in the field of finance. They are frequently employed in the assessment of investment performance and the Capital Asset Pricing Model (CAPM). Let us explore each of these ideas:

### 1.7.1 Concept of Alpha

The performance of an investment in relation to a benchmark is measured by alpha. It shows the excess return (or underperformance) of an investment over what one would anticipate given the risk involved, as indicated by the beta coefficient.

Important Points:

**(a) Alpha Positive:** Given its degree of risk, an investment that has a positive alpha has surpassed its expected return. It implies that the investment manager has produced returns higher than those that the market or the selected benchmark would have projected.

**(b) Alpha Negative:** Underperformance in relation to the anticipated return for the degree of risk is indicated by a negative alpha. It implies that the results on the investment have not been in line with the amount of risk assumed.

**(c) Compute:** The capital asset pricing model's expected return is subtracted from the investment's actual return to determine alpha.

Alpha is equal to Actual Return – Expected Return.

Return Actual – Return Expected = Alpha



### 1.7.2 Concept of Beta

The sensitivity of an investment's returns to shifts in the benchmark or the market as a whole is measured by beta. It shows the level of market risk, also known as systematic risk that is present in an investment.

Important Points:

- (a) **Beta = 1:** An investment with a beta of 1 is said to have a tendency to move in tandem with the market. It is anticipated that the investment's returns will resemble those of the entire market.
- (b) **Beta > 1:** Higher volatility in relation to the market is indicated by a beta value larger than 1. It is anticipated that the investment will move more than the market does.
- (c) **Beta < 1:** In comparison to the market, reduced volatility is indicated by a beta of less than 1. It is anticipated that the investment will move more subtly in relation to the market.
- (d) **Compute:** Regressing the investment's historical returns against the returns of the market or a selected benchmark yields the beta value.

Beta = Covariance (Return of Investment, Return of Market)/Variance (Return of Market)

### 1.7.3 Relationship between Alpha and Beta

When evaluating the risk and return characteristics of an investment,

- ◆ Alpha and Beta are frequently utilized in tandem.
- ◆ An investment may have surpassed its expected return if its alpha is positive; underperformance is indicated by a negative alpha.
- ◆ A measure of an investment's systemic risk, or how closely its returns are correlated with those of the market as a whole, is called beta.
- ◆ A combination of a high alpha, which denotes adept management, and a suitable beta, which corresponds to their investment goals and risk tolerance, may be sought after by investors.

To sum up, alpha and beta are useful tools that help investors and portfolio managers assess the performance of their investments, comprehend the risks associated with them, and decide how best to allocate their assets and build their portfolios.



## IN-TEXT QUESTIONS

1. What does the word “risk” mean when it comes to investing?
  - (a) Returns that are certain and assured
  - (b) The unpredictability of possible
  - (c) Only favorable results
  - (d) Transient variations
2. Which kind of risk is linked to the movement of the market as a whole and cannot be removed by diversification?
  - (a) Market risk (systematic risk)
  - (b) Credit risk
  - (c) Risk to liquidity
  - (d) Risk to business
3. What does the performance of an investment look like when the alpha is positive?
  - (a) The return has fallen short of expectations.
  - (b) The return has exceeded expectations.
  - (c) Its beta value is 1.
  - (d) There is no danger involved.
4. A portfolio’s diversification among several asset types primarily aims to:
  - (a) Return maximization
  - (b) Risk minimization
  - (c) Market risk elimination
  - (d) Liquidity enhancement
5. What does a reduced investment standard deviation mean in the risk-return trade-off?
  - (a) Increased risk
  - (b) Decreased risk
  - (c) No risk
  - (d) Predictable returns
  - (e) There is no danger involved.



## 1.8 Summary

A return is offered by all securities, although most of them carry some risk or uncertainty. The profit or gain that an investment generates is known as return. It consists of two parts: capital appreciation and consistent income in the form of dividends or interest (current yield). When investment returns are less than anticipated, there is a risk. It is the return that deviates from the average. Typically, the standard deviation of historical returns or the average returns on a particular investment are used to measure it.

Systematic and unsystematic risks are the two types of risk. Systematic (market) risk is the variation in a security's total returns that is directly linked to overall changes in the economy or market. Unsystematic (non-market) risk is the variation in a security's total returns that is unrelated to general market volatility. Returns and risk are constantly correlated. Because of their inseparability, risk and return must be taken into account while making investments.

## 1.9 Answers to In-Text Questions

1. (b) The unpredictability of possible
2. (a) Market risk (systematic risk)
3. (b) The return has exceeded expectations
4. (b) Risk minimization
5. (b) Decreased risk

## 1.10 Self-Assessment Questions

1. “No investment is risk-free.” In view of statement write the meaning and types of investment risk. Can this risk be eliminated or minimized?
2. Can risk and return be quantified? Explain how they can be measured using statistical techniques.
3. What do you mean by risk? Discuss in detail various types of risk.



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# Fixed-Income Securities

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## STRUCTURE

- 2.1 Learning Objectives**
- 2.2 Introduction**
- 2.3 Fixed-Income Securities: Corporate**
- 2.4 Other Fixed-Income Securities**
- 2.5 Bond Yields**
- 2.6 Valuation of Bonds**
- 2.7 Risks in Bonds**
- 2.8 Summary**
- 2.9 Answers to In-Text Questions**
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### 2.1 Learning Objectives

- ◆ Describe the features of fixed-income securities.
- ◆ List the types of corporate and other securities in which investors desirous of regular and assured return can invest.
- ◆ Explain the ideas of basic yield, yield to maturity, yield to call, etc. and their role in investment decisions.
- ◆ Distinguish between (i) annual and semi-annual interest rate and required rate vis-à-vis the coupon rate and (ii) time to maturity and resultant valuation.
- ◆ Discuss the sources of risk in fixed-income securities.



## 2.2 Introduction

The aim of that unit was to give you some tools to understand how returns on financial instruments work, especially those where a stream of returns accrues. You also learnt about the basics of investing (say in a bank account to park your savings, or in capital assets). In this unit, you will learn about the features and qualities of various types of fixed-income financial securities. Two major types of securities available in the capital market are:

1. Fixed-income or fixed-cost securities like debentures and government securities; and
2. Variable income or variable cost securities like equity shares.

## 2.3 Fixed-Income Securities: Corporate

You studied interest rates, internal rate of return, time value of money, and other topics in the previous unit. That unit was intended to provide you with some set income securities provide investors with a set cash flow stream in the form of regular interest payments and repayment upon maturity. All investment kinds have some risk; however, fixed-income assets are comparatively low risk.

Investing in them is preferred by conservative investors, who are typically risk averse and interested in consistent income from their assets.

Features: Two categories of fixed-income/cost-securities exist in the corporate world:

- ◆ Bonds and debentures, also called debt instruments; and
- ◆ Preference shares.

The main features of bonds and debentures are as follows:

1. Another name for bonds and debentures is creditor-ship securities. Its holders are the company's creditors and are referred to as debt holders. These securities' holders are not eligible to vote within the company. As a result, they are not involved in making decisions.
2. Interest is paid to debt holders at a nominal rate, often known as a coupon rate. This rate is determined by taking the face value of the security and fixing it in accordance with the terms of the debt



- instrument. The zero coupon bonds, on which the bearer receives no monthly interest, are an exception to this rule.
3. Both the face value and the redemption value of bonds and debentures are stated on the document itself. These two could be the same or dissimilar. The bond may be redeemed by conversion into equity shares if the debentures are convertible debentures.
  4. Debt holders receive paid at the firm's liquidation before equity owners and other unsecured creditors, such as preference shareholders.

### 2.3.1 *Types of Bonds and Debentures*

As we noted above, bonds and debentures are two of the three types of corporate securities (the other one being preference shares). Of these three, bonds and debentures represent the most important types of fixed-income securities serving as investment vehicles for persons dependent on fixed regular income. Let us first note the various types of debentures. There are three types of debentures classified as follows:

- 1. Secured and Unsecured Debentures:** Secured debentures are linked to the company's assets. This means, in case of default by the company, these assets can be used to pay off the dues or debts. Unsecured debentures do not have any such link over the assets of the company. They are issued on the strength of general creditworthiness of the issuer.
- 2. Convertible and Nonconvertible Debentures:** A convertible debenture is one that is converted into the equity shares of the issuing company. The conversion is done on or before the maturity date and it is done as per the terms of issue. These debentures may be either compulsorily convertible or optionally convertible. In case of optionally convertible debentures, the holder has the option to exercise the option, if considered worthwhile, or to continue the investment in the form of debentures itself. In case of compulsorily convertible debentures, the investor has no such choice.

Besides, the convertible debentures may be fully or partially convertible. In case of partially convertible debentures, a part of the face value is converted into equity shares. The rest of the investment remains in the form of debentures. Convertible debentures are considered



a more attractive form of investment. Usually, firms offer a lower nominal rate of interest as compared to nonconvertible debentures.

**3. Redeemable and Irredeemable Debentures:** Almost all debentures are redeemable with a fixed period of maturity. This period is mentioned on the face of the instrument. Irredeemable, also called perpetual debentures, are issued without any maturity date. Investors will keep receiving the periodical interest throughout, that is, perpetually as long as the issuing company is alive. Let us now turn to bonds. There are five types of bonds as outlined below.

- (a) Zero Coupon Fully Convertible Bonds:** These bonds do not carry any fixed rate of interest. They are fully and compulsorily convertible on a specified date from the date of issue. Till conversion, no interest is paid to the debenture holders. Such issues require credit rating by an approved credit rating agency.
- (b) Deep Discount Bonds:** It is a variant of zero coupon bonds. In this, there is an issue price, a maturity period, and a prespecified maturity amount. There is no coupon rate of interest and no interest is payable during the tenure of the bond. An enlightened investor will calculate the implicit rate of interest, compare it with the return available on other investment avenues, and will invest if the rate of return on such bonds is at least equal to other securities as per his consideration.
- (c) Callable Bonds:** In case of callable bonds, the company reserves the right to retire the bond at any time after a stipulated period. The investor will have to accept the redemption value when the company decides to retire it. The company may exercise this option if it has excess capital at any stage or if the rate of interest in the market has fallen and cheaper funds are available.
- (d) Putable Bonds:** In case of putable bonds, the holder has an option to redeem the bonds with the company any time after an initial lock-in period. The investor may exercise this right if the coupon rate being offered by the company has fallen lower than the market rate. The bondholder will redeem the bond with the company and may reinvest his money at a higher rate of interest.



(e) **Floating Rate Bonds:** As against the common connotation of fixed-income securities, the coupon rate in case of floating rate bonds is not fixed. It is tied to some other interest rate called a benchmark. The rate at which the company will pay interest will vary with variation in this benchmark. Such bonds are not popular in India.

### 2.3.2 *Preference Shares*

In case of preference shares, dividend is payable at a fixed rate as appropriation of profits. However, the company may not pay preference dividend if it does not have divisible profits or enough liquidity. Investors, on the other hand, expect dividends and there are adverse implications if this dividend is not paid. The reputation of the company will be affected and it may not be able to raise capital in future. Besides the preference, shareholders under this acquire voting rights at par with the equity shareholders. This will be as per the provisions of the Companies Act. As a result of this, control over the firm may get diluted.

## 2.4 Other Fixed-Income Securities

Now let us consider some other types of fixed-income securities.

### 2.4.1 *Fixed Deposits*

For fixed returns, these are the most popular and regarded as the safest options. These could be fixed deposits made with postal services or commercial banks. Depending on the needs and requirements of the depositor, the investor deposits a specific amount of money for a predetermined period of time and earns interest that is payable on a regular basis or at maturity.

Fixed deposits, often known as term deposits, come in a variety of forms, including flexi-recurrent deposits (RDs) and recurrent deposits. For a predetermined period of time, the deposit must be kept (e.g., one year). A penalty can apply if you withdraw early. The majority of banks offer the option to automatically renew deposits as they mature.



### 2.4.2 Treasury Bonds or Government Securities

These are also called sovereign bonds. Treasury bonds are issued by the government of a country. These may involve a periodic payment of interest at a defined rate with repayment on maturity. Or, it may be in the form of zero coupon bonds or as deep discount bonds. The proceeds are usually used by the government to finance its developmental projects. These are risk-free bonds as the governments do not default in meeting the commitments.

### 2.4.3 Municipal Bonds

They are issued to fund infrastructure projects, such as building schools, hospitals, bridges, and highways. These were initially implemented in India in 1997. Investors had not been very fond of these bonds in the beginning. In 2015, SEBI released guidelines pertaining to these bonds.

### 2.4.4 Tax-Free Bonds

These bonds are issued by the government, its departments or entities owned by it (like NTPC, Power Finance Corporation, etc.). Interest proceeds are exempt from income tax and, thus, provide an attractive investment avenue for investors falling in high-income bracket. These bonds have long-term maturity up to 20 years and bear very low or almost zero risk of default.

## 2.5 Bond Yields

The percentage return that an investor receives on his bond investment is referred to as the bond yield. It might not be the same as the needed rate of return or the market rate of interest. Yield gives the bond's actual return and facilitates reasoned decision-making. Yields are consistently stated annually.

The following are some examples of yield types that are helpful in the investment process:



### 2.5.1 Current Yield

Another name for this is basic yield. It is computed by dividing the bond's current market price by the annual interest (as determined by the coupon rate).

**Method:** Interest/BO × 100 equals current yield, where BO is the bond's current market price.

The market price of the bond affects the current yield. The following picture demonstrates how yield falls as market price rises and vice versa.

*Example 1*

For Rs. 90, Mr. A bought a bond from the market that had a 10% yield on its face value of Rs. 100. What is the yield currently? What is the current yield if it is bought for Rs. 120? By looking at the market price and the par value, one can conclude about the current yield vis-à-vis the coupon rate.

- (a) If bond is selling at a discount, current yield will be more than the coupon rate.
- (b) If the bond is selling at a premium, current yield will be less than the coupon rate.
- (c) If market price is equal to par value, current yield and the coupon rate will be the same.

### 2.5.2 Yield to Maturity (YTM)

The yield to maturity (YTM) is the rate of return that can be obtained by buying a bond at the present market price and holding it until it matures. There are two ways to find the YTM:

- (a) **A trial-and-error Method:** In this, we find out the rate of discount that equates the present value of cash flows (interest) and the current market price. It may require interpolation to arrive at the accurate YTM.
- (b) **Short-cut Method:** This gives the approximate YTM.



### 2.5.3 Yield to Call (YTC)

For callable bonds, the maturity period ( $n$ ) is not relevant as the company may retire it before maturity. Hence, in case of callable bonds, need to calculate YTM does not arise. For such bonds, yield to call (YTC) is calculated for the period up to the date the bond can first be called and redeemed.

For example, a bond has a maturity of 10 years but the bond can be retired any time after June 30th, 2021. Mr. A purchased this bond on July 1st, 2018. The company can exercise this option on July 1st, 2021. So YTC, that is, YTC will be calculated for three years.

YTC is calculated the same way as YTM is calculated by trial-and-error method with interpolation or through the short-cut method. The period, however, will be up to the date on which the call can first be exercised.

### 2.5.4 Holding Period Return

An investor may not hold bond till the maturity and offload it anytime for a variety of reasons. YTM will not be relevant for such investors since (i) his holding period is less than the total maturity period and (ii) YTM does not consider the market value before maturity. The investor would be interested in knowing the return over his actual holding period. For holding period return, the interest and capital gain (or loss) will be expressed as a percentage of the purchase price.

## 2.6 Valuation of Bonds

Valuation refers to the real worth of the financial asset. It represents its intrinsic value. In this context, some important concepts of valuation are as follows:

- 1. Book Value:** Book value of an asset can be found from the balance sheet of the firm. For example, book value of debenture is the face value stated in the balance sheet. For book value of equity share, net worth is divided by the number of equity shares outstanding.



- 2. Market Value:** This refers to the price for which the asset is traded. For listed securities, market value is available from the stock exchange quotes. For unlisted securities, market value is not so readily available.
- 3. Liquidating Value:** This is the difference between the realizable value of the assets less the total value of external liabilities.
- 4. Capitalized Value:** This is the most realistic concept of valuation. It is arrived at by considering the cash flows that the assets are capable of generating. It is the sum of present value of the cash flows generated by the security. It requires to be applied a discount rate which is the minimum required rate of return of the investors. This rate depends on the risk tolerance of the investor and the premium for the risk. This rate therefore varies from investor to investor. It is the rate that will prompt the investor to acquire the security.

#### *Annual Versus Semi-Annual Interest*

Given a choice between annual and semi-annual interest, what should be the decision of the investor? The following clues should be used by an investor: If the required rate of return is greater than the coupon rate then: bond value in case of annual interest should be greater than the bond value in case of semi-annual interest, and if the required rate of return is less than the coupon rate, then bond value in case of annual interest should be less than the bond value in case of semi-annual interest.

#### *Time to Maturity and Valuation of Bond*

If the required rate of return and coupon rate are different, the remaining time to maturity also becomes relevant for the valuation of the bond. In such cases, the value of bond will behave as follows:

- ◆ When the required rate of return is less than the coupon rate, the bond value will be higher than the par value but will decline and converge to the par value on maturity.
- ◆ When the required rate of return is equal to the coupon rate, the bond value will remain equal to the par value throughout.
- ◆ When required rate of return is more than the coupon rate, the bond value will be less than the par value but will increase and will



be equal to the par value on maturity. The investors are therefore advised to:

- ◆ Not buy the bond at a high premium near the maturity as the value of the bond will keep declining as the maturity approaches; and
- ◆ Not sell the bond at a discounted price near the maturity as the value of the bond will be increasing as the maturity approaches.

## 2.7 Risks in Bonds

Against the common belief, investment in bonds is also subject to risks. However, investment in bonds has less risk as compared to equity shares. Some major sources of risk in bonds are as follows:

**1. Interest Rate Risk:** It is the most important source of risk in bonds as also in other fixed-income securities. If interest rates change, there will be a change in the market price of the bonds. For example, a rise in interest rate will depress the market price of the bonds as there is an inverse relationship between bond price and interest rate. On the other hand, as the interest rate declines, bond price will increase.

When interest rate rises in the market (say from 10% to 12%), the bond carrying a fixed coupon rate (of say, 10%) becomes unattractive for the investors as new bonds in the market are available at a higher rate (12%). The reverse will be the case when the rate of interest in the market declines.

The current investment in bond will become attractive as it will provide a higher interest income.

**2. Reinvestment Rate Risk:** Bonds pay periodic interest which the investor may reinvest. If the interest rates in the market fall, there is a risk that the investor will have to reinvest their interest at a lower rate. Investors having bonds with longer maturity and in which the company is paying regular and higher interest will be more exposed to this risk. On the other hand, if the rate of interest in the market increases, the investor will benefit with an opportunity to invest interest at a higher rate.

Combining interest rate risk and the reinvestment rate risk, the investor is exposed to two types of risks that work in opposite directions. Thus, when interest rate rises, bond price will fall. The



bondholder will get an opportunity to earn a higher return on reinvestment of interest. The gain will reduce the amount of loss due to fall in bond price.

When interest rate declines, bond price will increase. Bondholder will be able to earn a lower return on reinvestment of interest. This loss will reduce his gain due to increase in bond price.

- 3. Inflation Risk:** Interest rates on bonds are defined in nominal terms, whereas what is more relevant is the real rate of interest. Since the purchasing power of money declines due to inflation, real income from the bond will not be the same as its nominal income. The longer the maturity period, the greater is the inflation risk.
- 4. Default Risk:** The issuer of the bond may lose his capacity to pay interest and the principal amount on time. One can get an idea of the default risk by seeing its credit rating. Bonds with high default risk will have a low credit rating and vice versa.
- 5. Call Risk:** When the interest rate declines, the issuer may exercise the call option in case of callable bonds. The investor will have to accept the premature redemption and will have to reinvest at a lower rate.
- 6. Liquidity Risk:** Most debt instruments do not have a very liquid market. This makes it difficult for investors to offload their investment in debt instruments. They may have to accept a discount over the quoted price.
- 7. Event Risk:** Sometimes, for reasons like natural calamities, a government change, takeover, or restructuring, etc., there might be a change in the firm's ability to pay interest and the principal payments.

#### IN-TEXT QUESTIONS

1. Which of the following securities has the most possible risk as well as the highest potential return?
  - (a) Preferred stocks
  - (b) Commercial paper
  - (c) Derivative securities
  - (d) Bonds



Notes

2. The ability to convert an asset rapidly and without influencing its price is referred to as \_\_\_\_\_.
  - (a) Scalability
  - (b) Liquidity
  - (c) Marketability
  - (d) Minimal risk
3. Horse racing, card games, and the lottery are all instances of \_\_\_\_\_.
  - (a) Investing
  - (b) Gambling
  - (c) Speculating
  - (d) Arbitrage
4. \_\_\_\_\_ is associated with buying low and selling high, resulting in a significant capital gain.
  - (a) Speculation
  - (b) Gambling
  - (c) Investing
  - (d) Arbitrage
5. Amount of money paid to a company's shareholders on a regular basis.
  - (a) Bonds
  - (b) Profit
  - (c) Cashback
  - (d) Dividends

## 2.8 Summary

The section focused on bonds and debentures while outlining some key characteristics of fixed-income instruments. It clarified how bonds, other securities, and corporate fixed-income securities were categorized.



The idea of yield and the different kinds of it that provide crucial guidelines for wise investment choices were described. Numerous illustrations are provided to further clarify each subject.

It becomes crucial for an investor to value bonds using the required rate of return in order to make wise investment choices. The capitalized value is the finest valuation model among them all. The unit uses the balance time to maturity to illustrate when it makes no sense to sell at a discount or to acquire at a premium.

## 2.9 Answers to In-Text Questions

1. (c) Derivative securities
2. (c) Marketability
3. (b) Gambling
4. (a) Speculation
5. (d) Dividends

## 2.10 Self-Assessment Questions

1. What are the important features of fixed-income securities?
2. What does yield to maturity (YTM) mean? What distinguishes it from holding period return (HPR) and yield-to-call (YTC)?
3. Explain bond yield. In the event that the bond is selling at a premium, what is the projected bond yield in relation to the coupon rate?
4. What does the term “financial asset valuation” mean to you? What does “capitalized value” mean? Why is it regarded as a practical approach to valuation?

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# Fundamental Analysis

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## STRUCTURE

- 3.1 Learning Objectives**
- 3.2 Introduction**
- 3.3 Economic Analysis**
- 3.4 Industry Analysis**
- 3.5 Company Analysis**
- 3.6 Summary**
- 3.7 Answers to In-Text Questions**
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### 3.1 Learning Objectives

- ◆ To understand fundamental analysis.
- ◆ To understand economic analysis.
- ◆ To understand industry analysis.
- ◆ To understand company analysis.



### 3.2 Introduction

The fundamental analysis is the examination of the factors that determine a security's fair value. The "top-down approach" is a more comprehensive framework for fundamental analysis, though. The Economic-Industry-Company Approach (EIC) is another name for this strategy, which aims to investigate the industry position, company expectations, and economic conditions. The investor in the EIC approach begins with the market and economy as a whole before moving on to industry prospects. The investor proceeds to a specific company analysis based on the encouraging signals provided by the economic analysis and the particular sectors/industries noted by the industry analysis. Fundamental analysis at the corporate level looks at financial variables. The forces of supply and demand for the offered product would be examined at the industry level.

### 3.3 Economic Analysis

The top-down approach prioritizes the comprehensive assessment of the overall economy. The study of the factors influencing the economy as a whole is the focus of economic analysis. The anticipated path of the economy must be investigated in the security analysis since business profits and investor expectations are influenced by general economic conditions and economic activity, which in turn affects capital market security prices. Making investment decisions involves considering the effects of economic analysis. Investors who see a robust and dynamic economy in the economic analysis will purchase shares with the hope of realizing capital gains in the future. The economic analysis aids in determining whether or not the general state of the economy is favorable to the expansion of businesses. It is crucial to remember that all industries are supposed to prosper when the economy expands. Weak economies make it difficult for industries to thrive. Important factors to consider when examining the national economy include: (a) GDP; (b) inflation; (c) interest rates; (d) fiscal policy; (e) monetary policy; (f) business cycles; and so on. It is a challenging task to forecast and analyze these variables, and it takes a lot of information and experience.



### 3.3.1 Variables and Techniques for Economic Analysis

Businesses function within the nation's overall economic environment. Numerous social, political, and economic developments occurring in the economy influence and shape the economic environment. In most cases, a firm has no control over these changes. It must, however, make an effort to adapt to these forces, some of which are as follows:

- (a) A rise in consumption.
- (b) An increased competition in free markets.
- (c) A growing trend towards privatization.
- (d) A rise in population migration to cities.
- (e) An increase in globalization and international trade.
- (f) An increase in the employment of women and their presence in other fields, and so on.

The status of the economy can be determined using a number of indicators. Knowing these factors will help in estimating the expected performance of the economy, which will therefore have an impact. An understanding of these variables will help to make an idea as to how economy is expected to perform which in turn will affect the future earnings and financial position of the companies. Some of the variables are discussed hereunder.

**Gross Domestic Product (GDP):** GDP stands for gross domestic product, which is the market value of the goods and services generated in an economy over a given time period, usually one year. The market values of all the finished goods and services produced during the time can be added to determine it. The GDP is a crucial indicator of economic activity. GDP is regarded as a suitable indicator of a nation's economic growth. Change in GDP is caused by:

- (a) A shift in resource availability.
- (b) A shift in how these resources are used.
- (c) An adjustment in how effectively production factors are employed.

GDP provides information about how the economy performed during that time. An increasing trend in GDP tells about an expanding economy which provides a lot of opportunities to the firms to increase the level of activities and to increase the earnings. There are two other measures,



## Notes

gross national product and net national product which are also indicators of economic activity.

**Business Cycles:** The phrase “business cycle” refers to the cyclical variations in a country’s total economic activity. Every stage that a developing economy goes through is referred to as a business cycle component. The terms recession, boom, recovery, and depression are frequently used to describe these phases. The great depression is the lowest point in economic activity. The economy is experiencing very little demand. There is a high rate of interest rates and inflation. These affect the overall profitability of the corporate sector. Economic crises are affecting businesses in different ways. Dividend payments and reinvestment activities are declining because their profitability is severely strained. Companies might even have to shut down a few of their plants.

The recession’s later stages are when the economy starts to rebound. The degree of demand starts to rise. In general, the state of the economy is improving. Rising demand leads to growing production, which is reflected in the improved income statement bottom lines of business firms. There is an increasing trend in new investment from corporate entities. This stage is known as “recovery.” The economy shows indications of a boom, which is characterized by high levels of demand, production, and profits, after several years of steady recovery. Overall economic growth is occurring, and corporate entities are increasing their investments. Generally, the boom phase cannot continue for very long it slows down, bringing about the recession. Nearly every economy experiences phases of expansion and contraction, or the various stages of a business cycle. These cycles could be irregular, and the length and depth could vary.

The points at which cycles change are categorized as peaks (P) and troughs (T). They are designated as P and T. “T” denotes the bottom of the depression and a sign of recovery towards growth, while “P” denotes the change from the growing phase to the beginning of the recession. It should be mentioned that different industries exhibit distinct response patterns. Certain industries have the potential to exhibit superior performance compared to the overall economy. These include sectors that produce capital goods like consumer durables.

During a recession, there is typically a delay in the demand for these goods. However, the demand pattern beats the overall level of demand



during the recovery. On the other hand, sectors that deal with necessities like food are less responsive during that time. However, during a recession, these sectors would typically perform better than the overall market. An investor will benefit greatly from having a solid understanding of business cycles. Investments in the essential goods industry should be made if there are signs of a recession; on the other hand, investments in the capital goods industry may be preferred if there are signs of a recovery. An investor will benefit greatly from having a solid understanding of business cycles.

**Inflation:** A general upward trend in prices is referred to as inflation. Consumer purchasing power is impacted by inflationary pressure in the economy, which has a major effect on business performance and profitability. An expansionary phase may be indicated by a low inflation rate, while a high inflation rate may be interpreted as a sign of a slower growth rate. There is a connection between the capital market and inflation. The nominal required rate of return for investors increases during inflation, which lowers the price of bonds and stocks. The consumer price index or the wholesale price index can be used to calculate inflation. These indices' analysis will reveal the anticipated state of the economy.

**Interest Rates:** The cost of financing for the industry is directly impacted by interest rates. Elevated interest rates raise the expense of borrowing money, thereby reducing the earnings of businesses. Conversely, lower interest rates result in higher profit because they lower the cost of borrowing money. Interest rates can fluctuate for a number of reasons, including changes in the inflation rate, monetary and fiscal policies, and so on. The economy's investment pattern is impacted by interest rate changes, regardless of the underlying causes of those changes. Bond and equity prices are impacted by interest rates because they also have an impact on investors' opportunity cost. Consequently, variations in interest rates affect both the market prices and the companies' profits. There are several indicators of interest rates. These are interest rates in the call money market or the bank rate or the prime lending rate of the lending institutions.

**Monetary Policy, Money Supply and Liquidity:** The money supply, which is controlled by the government's monetary policy, determines the amount of liquidity in the economy. The Reserve Bank of India (RBI)



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has implemented various strategies to control the amount of money in circulation and liquidity within the economy. Funds are needed by businesses for projects involving expansion. The economy's liquidity position has an impact on the ability to raise capital from the market. The goal of the monetary policy is to keep the liquidity position in balance. It is not desirable to have shortages or excess liquidity. Interest rates will typically rise in response to a liquidity shortage, while an excess will lead to inflation. By altering the discount rate, the monetary environment and supply have an impact on share prices. It is anticipated that an easy monetary policy will cause the discount rate to decline. A change in the money supply could be a signpost for the start of a new stage in the business and economic landscape. The real economy is also impacted by the money supply because (a) the growth of the supply position and (b) the change in the growth of the demand level. A change in the money supply could be a signpost for the start of a new stage in the business and economic landscape. India's money supply is indicated by a number of variables. The two crucial metrics are  $M_3$  and  $M_1$ . The total amount of money in circulation, plus demand deposits held by banks and additional deposits held by the RBI, is known as the  $M_1$ .

**Additional Factors:** In addition to the previously listed elements, there exist additional factors that must be included in the comprehensive economic analysis. Among these are:

- (a) Total and sectoral industrial growth rates.
- (b) Rainfall patterns and agricultural output.
- (c) The government's fiscal policy.
- (d) Reserves of foreign exchange.
- (e) The expansion of infrastructure.
- (f) Worldwide industrial connections.
- (g) Confidence and the global economic scenario.
- (h) Overall economic feelings and economic confidence.
- (i) Political and economic constancy.

**Leading and Lagging Indicators:** Leading and lagging indicators refer to distinct metrics that represent the degree of economic activity and its fluctuations. The leading indicators are those that experience their peaks



and troughs well ahead of the overall economic activity. Conversely, lagging indicators are those that indicate a turn in the economy after it has already occurred. The following are a few examples of leading and trailing indicators:

### **Leading Indicators**

- (a) Money supply.
- (b) Industrial production.
- (c) Average weekly hours of production.
- (d) New orders with the manufacturers.
- (e) Order for capital goods.

### **Lagging Indicators**

- (a) Industrial loans outstanding.
- (b) Average duration of employment (unemployment).
- (c) Average prime lending rates.
- (d) Average ratio of inventories (stock levels) to sales.
- (e) Ratio of consumer credit outstanding to personal income.

The direction of change in overall economic activity can be inferred from the analysis of leading and lagging indicators. Put differently, it is possible to pinpoint the moments when the volume of economic activity began to decline. It should be noted, though, that the analysis provides no information regarding the length or extent of the change.

The following pattern can be used for economic forecasting:

- (a) To determine the fundamental economic environment, a trend analysis of the GDP and other key economic indicators should be conducted.
- (b) Leading indicators of the economy should be examined in order to predict when the business cycle will shift in phase.
- (c) A study of the effects of a business cycle shift should be conducted using lagging indicator analysis.

An investor should further break down the economy into different industry groups, after developing a scenario for the overall economy. Different industries are impacted differently by national and international conditions. The industry analysis, which is the next component of the EIC approach, must come before the economic analysis.



### 3.4 Industry Analysis

The above economic analysis may help determine the direction of the shift in the capital market. The analyst must understand, though, that various industries react to changes in the capital market in different ways. For instance, consumer goods companies may grow at a faster rate than heavy industries under favorable economic conditions. The analyst needs to understand that various industries react to changes in the capital market in different ways. The goal of every investment analyst is to identify and separate investment opportunities with favorable risk-return characteristics. He might need to respond to multiple questions:

- (a) Do different industries have varying risk profiles?
- (b) Does a certain industry's risk level fluctuate or stay the same?
- (c) Do returns from different industries vary over a given time frame?
- (d) Would a sector of the economy do well going forward?
- (e) Would a company's performance in a given industry remain consistent over time?

For the same reasons economic analysis is significant and pertinent, so too is industry analysis. Just as it is challenging for an industry to thrive in a down economy, it is also challenging for a company to prosper in a troubled industry. Thus, an industry analysis is necessary following an economic analysis. Understanding (a) the major industries and (b) the relative strengths and weaknesses of each industry with regard to economic activity are essential for conducting an industry analysis.

- (i) Product line:** automobiles, steel, cement, textiles, and so on.
- (ii) Sector wise:** agriculture, mining, construction, manufacturing, IT services, transportation, and so on.
- (iii) Business cycle wise:** growth, cyclical, and defensive. Growth industries are those which show high growth rate irrespective of the business cycle. Software industry may be classified as a growth industry. Cyclical industries are those which move with the business cycles. These are benefited as well as have to suffer with the change in phase of the business cycle in the economy. Defensive industries are those which are virtually non-sensitive to business cycles. For example, industries dealing with essential commodities such as food, are defensive industries.



Once the status of the economy has been predicted, the implications of that prediction for the particular industry must be ascertained. It has already been mentioned that not all industries are affected by business cycles and the state of the economy in the same way. While certain industries are highly resilient to business cycles, others are essentially autonomous. Even though economic growth is predicted, some groups are probably going to gain more than others. By focusing on the groups most likely to profit from the current or anticipated economic climate, an investor can refine their analysis. The food and spice industry, for instance, is largely unaffected by the business cycle. However, the market for luxury goods is extremely erratic.

**(a) Sensitivity of Sales:** Business cycles and the state of the economy function in the same way. While certain industries are highly resilient to business cycles, others are essentially autonomous. Even though economic growth is predicted, some groups are probably going to gain more than others. By focusing on the groups most likely to profit from the current or anticipated economic climate, an investor can refine their analysis. The food and spice industry, for instance, is largely unaffected by the business cycle. However, the market for luxury goods is extremely erratic.

Profits in those industries which have high fixed costs will swing more widely with sales because costs do not move to offset sales changes.

**(b) Financial Leverage:** The individual company is important; however, it cannot be denied that the industry group is likely to exert as much influence on the share price. Prices typically move in unison when they do. Investors ought to favor sectors of the economy that are less susceptible to business cycles. Investments in industries with greater sensitivity will carry greater risk.

**Important Elements of Industry Analysis:** To determine the industries where investments can be made, a number of important factors and characteristics should be taken into account in an industry analysis. Among these elements are:

- 1. The Industry's Historical Performance:** To predict future earnings, sales, and earnings for a given year can be analyzed in the past. To investigate the industry's leverages, one may also examine its cost structure.



2. **The Durability of Industry Technology and Products:** If an analyst believes that a certain industry's product demand will soon disappear, they should not make any investments there. The degree of permanence has grown in importance in this era of rapid technological obsolescence in the industry analysis.
3. **The Government's Function in the Sector:** Investors ought to make an effort to determine the likely role of the state. Will it limit the expansion of the industry? Will it offer monetary or other forms of assistance? For instance, import restrictions on various electronic items were lifted in India a few years ago, but this had a significant impact on the country's manufacturers.
4. Industry-specific labor conditions.
5. Market conditions that are competitive.

The following queries should be kept in mind when analyzing the industry's competitive conditions:

- (i) Whether there is a threat or barrier to new businesses entering the market. An industry's prices and profits are under pressure from new competitors.
  - (ii) The level of competition among current participants is an additional factor. When there is fierce competition, the margins will inevitably shrink. Businesses in slow-growing industries are in this situation because they want to grow at the expense of their competitors' market share.
  - (iii) Is there a product that can take the place of the specified product? A substitute product's availability undoubtedly influences the price that can be charged to the customer and, in turn, influences the profit margin.
6. **Interlinkages with Other Industries:** In the industry analysis, the interdependence and interlinkages of one industry with other industries should be considered. For instance, the auto industry's position affects the auto-ancillary industry's position. In a similar vein, the government's infrastructure budget affects the demand for the cement industry.

**IN-TEXT QUESTIONS**

State which of the following statements is True (T) or False (F).

1. GDP helps in estimation of earnings of a company.
2. Business cycle and industry life cycle are two sides of the same coin.
3. Analysis of leading and lagging factors helps in estimating the earnings of a company.
4. In 'EIC' approach, E stands for earnings of the company.

### 3.5 Company Analysis

The company analysis is the third component of the EIC fundamental analysis approach. The economy analysis and industry analysis in the previous discussion have tried to demonstrate how they affect a single company's earnings. While sales in some industries, like automobiles, follow business cycles, sales in other industries, like food, do not. A business cycle's impact on a specific company might differ from that on the sector as a whole. A company's product mix may cause its sales revenue and earnings to fluctuate between being more or less proportionate to the effects of the microeconomic and industry conditions. The link between revenue and expenses is the main focus of the company analysis.

Before moving forward with a thorough examination, an investor would prefer to reduce the list of companies. An astute investor would be curious to learn who the group's innovators and leaders are. Finding higher performing companies within an industry is the main goal of company analysis. These businesses are chosen for investment because they are probably in a competitive position relative to other businesses. A multi-step procedure could be used to achieve the goal. Here are some of the steps that are involved:

1. An analysis of the company's management to determine how reliable it is, and how well-equipped it is to handle any unfavorable circumstances in the sector.
2. Evaluation of the business's financial performance in order to project its potential earnings in the future.



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3. Assessment of the company's long-term goals and plans in light of its organizational capacity and available resources.
4. Examination of the firm's relative strength in relation to a critical success factor for a given industry.

The following are the goals of the company analysis, which is predicated on the completion of the economic and industry analyses: (i) Analyzing the company's expected earnings; and (ii) determining the fair value (intrinsic value).

A company's ability to make money is influenced by a number of factors, including sales, profit margin, tax rate, percentage of debt, asset utilization, and so on. The earnings have an impact on and determine the fair value of the share, along with other factors like future growth rate, and so on. The final goal of company analysis is to determine the share's fair value. However, the analysis of the firm's expected earnings is the only topic covered in this chapter.

**Informational Sources:** The firm's annual financial statements are the main source of information and data needed for an analysis of the earnings of the company. The balance sheet, also known as the position statement, the income statement, also known as the profit and loss account, and the cash flow statement are among the financial statements.

**Balance Sheet (BS):** The BS is thought to be a company's most important and fundamental financial statement. A company creates the BS to give an overview of its financial situation at a specific moment, usually the end of the fiscal year. It displays the company's situation at a specific moment in time. It displays the company's resources, assets, and liabilities, along with the owners' contributions and the company's obligations to third parties. In actuality, the BS balances the company's assets against its financing, which may consist of debt and owner funds. In other words, the total value of the assets must equal the total amount of claims made against the company. This can be expressed as follows:

$$\text{Liabilities} + \text{Shareholders Equity} = \text{Total Assets} - \text{Total Claim (Debt + Shareholders)}$$

It should be mentioned that the BS is pertinent at a specific moment in time. It resembles a financial snapshot taken at a specific moment in time,



both before and after which the situation might have changed. The BS is therefore a status report.

**Income Statement (IS):** The IS, sometimes referred to as the profit and loss A/C or the statement of earnings, provides a summary of the company's expenses and revenue for a given accounting period. It provides a thorough overview of the firm's sources overtime. Income and expenses are included, and as a result, the operating results of the company for a given time period are summarized. It compares the revenues to the expenses incurred in producing the revenues and displays the difference as the net profit or loss realized for the given time period. The IS displays the outcomes of the company's operations over a given time period. As a result, the IS is a flow report in comparison to the BS, which is a stock or status report. The IS shows the company's earning potential in terms of net profit. It facilitates comprehension of the company's performance during the relevant time frame.

**Statement of Change in Cash Position or Cash Flow Statement:** Known as traditional financial statements, the BS and IS are two typical financial statements. The IS displays the net results of the company's operations over a specific time period, while the BS shows the financial position at a specific point in time. However, neither of these financial statements reveals how the financial position changed during the period. Understanding the cash movement during the period is crucial for comprehending the financial positions. Another financial statement called the cash flow statement, which details how the company made and used cash during the period, may be prepared for this purpose. It presents the cash flow that the company experienced during that time. It serves as a historical record of the source and application of the funds. The company may have obtained funds from a variety of sources, and the funds may have been utilized for a variety of purposes. It should be mentioned that the cash flow statement is prepared on a cash basis, but the BS and IS are prepared on an accrual basis. For instance, even though depreciation doesn't involve any cash flow, it is an expense for IS but isn't displayed in CFS.

**Analysis of Financial Statements:** Researchers and investment analysts typically use the data from the company's annual financial statements as the foundation for their company analyses. This is primarily because the Institute of Chartered Accountants of India (ICAI) publishes a number



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of accounting standards that must be adhered to in the preparation of the annual financial statements. These standards are audited and follow a set of guidelines. Companies include a summary of the financial highlights for a period of time, say five or ten years, in their annual report to shareholders in addition to their annual financial statements. An investment analyst can utilize the data in annual financial statements to concentrate on:

- (i) The company's profitability; (ii) liquidity; (iii) solvency; and (iv) activity level.

### 3.6 Summary

The significance of the EIC approach, as the discussion above suggests, is that an investor should take the time to research the forces at play in the industry and the economy in order to determine share valuation. The rationale is that industry position, corporate profit, and security prices are all impacted by the nation's economic climate, which makes forecasting it crucial. A positive and optimistic economic outlook may be a reliable sign of the company's increasing profits. The prices of securities reflect the overall optimism. Conversely, a weakening economic climate naturally leads to pessimism and prices, which in turn causes a decline in corporate profits and security prices. There is a clear and significant relationship between the security prices and the economic environment. An investor can choose where and when to invest with the aid of the EIC approach. A sane investor would want to determine when it is right to invest in the stock market. It could be argued that choosing an industry is more significant than choosing a company. Every member firm is impacted by the growth or decline of a specific industry. It should be mentioned, though, that certain businesses consistently outperform others. However, another viewpoint might hold that the industry is irrelevant and that only the choice of company matters. However, the truth is that a sane investor would find a promising industry first, and then purchase the cheap shares in that industry.

### 3.7 Answers to In-Text Questions

- |          |          |
|----------|----------|
| 1. False | 3. False |
| 2. False | 4. False |



### 3.8 Self-Assessment Questions

1. What do you mean by industry analysis? What factors would you look for in analysis of a particular industry?
2. What are the techniques of economic analysis? How is the economic analysis useful for investment decision?
3. Differentiate between economic analysis and industry analysis.

### 3.9 References

- ◆ Dr. R. P. Rustagi, Investment Analysis and Portfolio Management.
- ◆ Prasanna Chandra, Investment Analysis and Portfolio Management.

### 3.10 Suggested Readings

- ◆ Frank K. Reilly and Keith C. Brown, Investment Analysis and Portfolio Management.
- ◆ Gerald R Jensen and Charles P. Jones, Investments Analysis and Management.





## **UNIT - II**





# Valuation Models

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## STRUCTURE

- 4.1 Learning Objectives**
- 4.2 Introduction to Valuation**
- 4.3 Dividend Discount Models**
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### 4.1 Learning Objectives

- ◆ Comprehending various approaches to valuation.
- ◆ Understanding dividend discount model of valuation.
- ◆ Learning to value companies as per market-based approaches.
- ◆ Understanding comparable company using widely used multiples.



## 4.2 Introduction to Valuation

Valuation means estimating the value of asset, division or an entire business based on estimated earnings, cash flows and risks associated. The process of evaluating or determining the worth of certain assets, such as real or intangible, securities, liabilities, and a particular business as a going concern, as well as any listed or unlisted company, partnership, or sole proprietorship, is known as valuation. Valuation can be seen as both science and art. Valuation process is scientific as it is based on corporate finance theories and principles. Valuation is an art as valuers can paint stories about companies' future and bring them in their projections. Values assigned for a business or an enterprise is only an estimate and cannot be precisely accurate. Valuers need to acquire both number skills and storytelling skills to ace at valuation.

Valuation is used pervasively across investment banking industry for valuing securities and target companies. In merger and acquisition deals, investment bankers value company's equity worth for public/private placement of their securities. Managers deploy valuation while acquiring or divesting a business. It is further deployed by equity research companies and portfolio managers for identifying undervalued or overvalued stocks. Financial institutions investing in companies in form of debt or equity also value the companies to assess the deal.

Valuation of a company can be conducted via discounted cash flow-based approaches or market-based approaches.

Discounted Cash Flow method (DCF) involves estimating intrinsic value of the firm by finding the present value of all cash flows company is expected to make till perpetuity. Discounted cash flow method is an intrinsic value method. It is a financial model which assesses the value of an investment by projecting future cash flows. The foundation of a DCF model is the notion that an organization's worth is established by its capacity to produce future cash flows for its shareholders.

$$DCF = CF_1/(1 + r)^1 + CF_2/(1 + r)^2 + \dots + CF_n/(1 + r)^n$$

$CF_1$  = Initial period cash flow

$CF_2$  = The second period's cash flow



$CF_n$  = Cash flow for the course of “n”

n = The total number of time periods

r = The discount rate.

The DCF model can be deployed to compute equity value or firm value. The DCF model is based on the following propositions:

**Proposition 1:** An asset must have positive projected cash flows at some point during its existence in order to be valued.

**Proposition 2:** Early-generating assets will be more valuable than later-generating assets, even though the latter may have faster growth and cash flows to make up for it.

This method works best for assets (businesses) whose cash flows are positive at the moment, can be reasonably projected for future periods, and have access to a risk proxy that can be used to calculate discount rates. It is most effective for investors who have a long-time horizon, giving the market time to correct its valuation errors and allow price to return to “true” value.

**Free Cash Flow-Based DCF Method:** The DCF model is used to conduct firm valuation and equity valuation. In firm valuation, the entire business is valued by discounting free cash flow for firm. Free cash flow for firm is the cash flow before considering debt payments, while after taking out taxes and after considering the reinvesting needs of the business. In equity valuation, free cash for equity is discounted back at cost of equity, where free cash flow to equity is cash flow after considering debt payments and after considering the reinvesting needs of the business.

Dividend Discount Model estimates equity value of a company by discounting dividends expected to be distributed by the company till perpetuity. The discount rate used to find the present value is the cost of equity, i.e., the expected rate of return by equity shareholders.

Relative valuation model is market-based approach of valuation. The method estimates values on the basis of the price of similar assets in the market. To value a company, one needs to identify similar companies and standardized measure of value. If the assets or businesses are not perfectly comparable, one may need to control for differences. Relative valuation model can be used to value equity, firm, i.e., valuing both equity



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and debt or valuing operating assets (equity and debt value excluding value of cash).

The dividend discount model and relative valuation are elaborated in length in the chapter.

### 4.3 Dividend Discount Model

The Dividend Discount Model (DDM) is an estimation method where expected dividend payments are discounted at a cost of equity to estimate the intrinsic value of a stock. This model is applicable for companies having history of regular dividend payments and is also expected to continue same in future. The basic idea is that intrinsic value of stock is reflected through present value of expected dividends. Dividend discount model has several variations to its model depending upon growth rate of dividends. Dividend discount models discussed on the basis of growth rate variations are discussed as follows:

#### 4.3.1 Zero Growth Model

This model makes the assumption that a firm will always pay the same dividends—i.e., the dividends will not increase during the course of the company's existence. In this scenario, the equity value can be determined as follows:

$$P_0 = \frac{D_1}{K_e}$$

where

$P_0$  = Value per share

$K_e$  = Cost of equity

$D_1$  = Dividend expected at the end of year 1

#### 4.3.2 Constant Growth in Dividends

Since Myron Gordon introduced the constant growth model in 1956, it is sometimes referred to as the Gordon growth model. This model assumes that the cost of stock exceeds the company's growth rate and that dividends



will increase steadily. Dividends in this model are increasing, but at a set yearly rate. In this case, a stock's value can be calculated as:

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

$P_0$  = Value per share

$K_e$  = Cost of equity

$D_1$  = Dividend expected at the end of year 1

$g$  = growth rate of dividends

Growth in cash flows can either be induced by achieving efficiency or infusing new capital to fund new projects. Efficiency induced growth cannot be sustained as the company can only be so much efficient. Sustainable growth is the growth induced by capital infusion in every period. Hence, growth is computed on the basis of how much is invested and how well the capital is invested, i.e.,  $g = b * r$  where  $b$  is reinvestment rate or retention ratio in case of dividend discount model and  $r$  is return on equity.

#### *Illustration 4.1: Estimating Cost of Equity Through DDM*

TT Ltd. has declared dividend in 2023 of \$1.36 on the earnings per share (EPS) of \$3.06. The firm is assumed to maintain a return on equity of 12% in perpetuity. Assuming that beta of the firm is 0.8, risk premium is 4% and currently prevailing risk-free rate is 4.5%. Estimate the value per share if the stock was trading at \$150 in early 2023.

*Solution:*

$$\text{Payout Ratio} = \frac{DPS}{EPS} = \frac{1.36}{3.06} = 44.44\%$$

Retention Ratio = 1 – Payout Ratio

$$\text{Retention Ratio} = 1 - 0.4444 = 55.56\%$$

$$\begin{aligned}\text{Expected growth rate in EPS} &= \text{Return on Equity} \times \text{Retention Ratio} \\ &= 12\% \times 0.5556 = 6.66\%\end{aligned}$$

$$\begin{aligned}\text{Cost of Equity} &= \text{Risk free Rate} + \text{Beta} \times \text{Risk Premium} \\ &= 4.5\% + 0.8 \times 4\% = 7.7\%\end{aligned}$$

$$\text{Value of Equity per share} = \frac{D_1}{k_e - g} = \frac{1.36(1+0.0666)}{0.077-0.0666} = 139.47$$



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The stock was trading at \$150 in early 2023, whereas the value per share obtained through the dividend discount model is \$140 (approx.). Thus, it can be stated that stock is overvalued.

### 4.3.3 Variable Growth Rate Model

A valuation technique used to determine the intrinsic value of a stock where dividend growth is anticipated to occur at varying rates is the variable growth rate model of dividends. For instance, the growth rate may be 10% annually for the first five years, 8% annually for the following five, and so on for an endless amount of time, with dividend increases at the rate of 6% annually. Since the Gordon Growth Model is less flexible than the constant growth model and is appropriate for businesses with variable dividend growth rates, the variable growth rate model is used in this situation. The variable market value of equity under a variable growth rate can be computed as:

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

where

$P_0$  = Value per share

$K_e$  = Cost of equity

$D_0$  = Current year dividends

$D_5$  = Dividends expected at the end of 5<sup>th</sup> year

$D_{10}$  = Dividend expected at the end of 10<sup>th</sup> year

$g_1, g_2, g_3$ , = Growth rate of dividends in different periods

#### Illustration 4.2: Valuing a Firm with Two-Stage DDM

Vanguard Finance is a leading investment bank. Current payout ratio of bank is 10.07% and current return on equity (ROE) is 17.49%. Bank maintains a high growth rate for first 5 year, with risk-free rate of 5.5%, risk premium of 5% and beta of 1.2. Beyond 5 years, the beta of bank becomes 1. Also, after high growth period, bank stabilizes and maintains ROE at 13% with a stable growth rate of 5% for an indefinite period. If current earnings per share (EPS) is 12.05, estimate the value of equity at Vanguard Finance. Also, comment if the current share of Vanguard Finance is trading at \$128.



*Solution:*

Value of Vanguard Finance can be estimated using two-stage dividend discount model:

$$\begin{aligned}\text{Expected growth in earnings per share} &= \text{Return on equity} \times \text{Retention ratio} \\ &= 17.49\% \times (1 - 0.1007) = 15.72\%\end{aligned}$$

$$\text{Stable period payout ratio } 1 = \frac{g}{ROE} = 1 - \frac{0.05}{0.13} = 61.54\%$$

$$\text{Cost of equity in high growth phase} = 5.5\% + 1.2(5\%) = 11.5\%$$

$$\text{Cost of equity in stable growth phase} = 5.5\% + 1(5\%) = 10.5\%$$

Estimating present value of dividends for first 5 years;

Year	EPS	DPS	PV @11.5%
1	13.94	1.40	1.25
2	16.14	1.63	1.31
3	18.67	1.88	1.36
4	21.60	2.17	1.40
5	25.00	2.52	1.46
<b>Sum</b>			<b>6.78</b>

Estimating terminal price during stable growth phase;

$$\text{Terminal price} = \frac{D_6}{K_{e,st-gn}}$$

$$\text{Expected EPS}_6 = \$12.05 \times (1 + 0.1572)^5 \times 1.05 = \$26.26$$

$$\text{Expected DPS}_6 = \text{EPS}_6 \times \text{Stable period payout ratio} = \$26.26 \times 0.6154 = \$16.16$$

$$\text{Terminal price} \frac{\text{Dividends}_6}{K_{e,st-g}} = \frac{\$16.16}{0.105 - 0.05} = \$293.81$$

$$\text{Present value of terminal price} \frac{\$293.81}{(1.115)^5} = \$170.49$$

$$\begin{aligned}\text{Value of equity} &= \text{Present value of dividends} + \text{Present value of terminal price} \\ &= \$6.78 + \$170.49 = \$177.27\end{aligned}$$

Currently, Vanguard Finance is trading at \$128; thus it can be stated that company is significantly undervalued.

**IN-TEXT QUESTIONS**

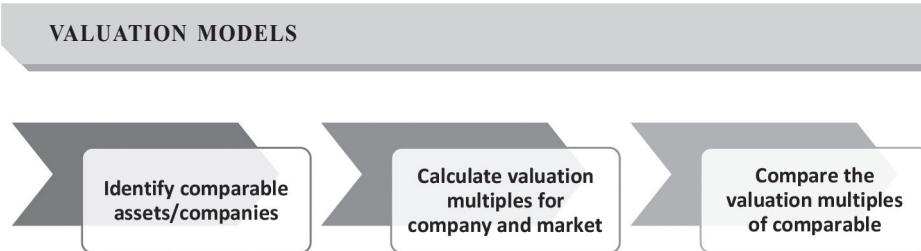
- 1.** When you value assets, you are implicitly assuming that
  - (a) The market is always right
  - (b) The market is always wrong
  - (c) The market is sometimes wrong, but that it corrects itself eventually
  - (d) The market is sometimes wrong, and that it does not correct itself eventually
  - (e) None of the above
- 2.** Valuation is a skill set that is necessary only for
  - (a) Investment bankers who may want to assess the value of acquisitions or IPOs
  - (b) Management consultants who want to provide good corporate finance advice
  - (c) CFOs who want to understand what drives the value of their businesses
  - (d) Investors who want to find cheap and expensive stocks
  - (e) Entrepreneurs who have to negotiate with buyers and VCs about the values of their businesses
  - (f) All of the above

**4.4 Relative Valuation**

Relative valuation model is market-based approach of valuation. The method estimates values on the basis of the price of similar assets in the market. By comparing a company's earnings, book value, revenue, and cash flows to those of other businesses, relative valuation determines the value of the former. The two most used relative valuation methods are comparable company and prior transaction analysis. Comparable companies, also known as comps, are used to evaluate enterprises in light of similarly oriented publicly traded organizations. On the other hand, a firm's worth is determined by looking at previous merger and acquisition transactions in which the entire company was either purchased or sold in prior transaction analysis.



Notes



**Figure 4.1: Steps in Relative Valuation**

A comparison of an asset's value with what the market would pay for similar or comparable assets is known as relative valuation. Relative valuation uses multiples of sales, book value, or earnings to normalize the pricing of the assets (a collection of similar or identical businesses). The price-to-earnings (P/E) ratio is a widely used multiple that is employed to determine the relative value of a business.

Finding comparable assets (often businesses) and learning their market values are the first steps in the relative valuation process. Next, price multiples based on the market values are estimated and compared. Comparable companies aren't always in the same sector or industry; they can be comparable while operating in quite different markets yet sharing similar risk, growth, cash flow, or other essential traits.

Relative valuation aids in determining a company's value and gives investors a more accurate head-to-head assessment of several possible investments. Compared to the discounted cash flow technique, it is computed using fewer assumptions, is easier and faster for clients and businesses to grasp, and is a better representation of the state of the market at the moment. Many multiples are computed using the company's critical financial data and compared to that of similar companies in order to determine the value of a business.

## 4.5 Relative Valuation Multiples

Values of similar enterprises in the market are compared by standardizing them in relation to the firm's revenues, book value, earnings, or other financial metrics. Then, we refer to them as multiples. The market prices are normalized by multiples. These are instruments for measuring finances that assess a company's value and contrast it with those of other companies. To make organizations more comparable, they are typically expressed as a ratio of one financial statistic to another. Multiples show differences in performance between an organization and its rivals. They aid in determining whether businesses add greater value than others in

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## Notes

the sector and are positioned strategically in the market. Enterprise value multiples and equity value multiples are two forms of multiples that are commonly used to value businesses.

There must be a significant link between the numerator and denominator in any multiple. For example, since enterprise value is equal to equity value plus net debt, enterprise value multiples are calculated using the denominator that matters to stakeholders (stock and debt). Thus, earnings in the denominator should be the one computed before considering interest expenses, preference dividends, and minority interest. The earnings should reflect the income belonging to equity and debt holders. Conversely, equity value multiples frequently employ denominators that are exclusive to equity stakeholders. Thus, after interest, preference dividend, and minority interest, the relevant denominator will be computed. Even though multiples like EV/Net Income and Market Capitalization/EBITDA are useless because they don't show a clear correlation between the numerator and the denominator, any multiple can be created to offer insight into the valuation and financial performance of a company with a better understanding of this correlation.

#### **4.5.1 *Enterprise Value (EV) Multiples***

Enterprise value is market value of equity plus debt value minus cash. Enterprise value multiples are more suitable in assessing a merger and acquisition transaction as they eliminate the effect of debt financing. The following are some common enterprise value multiples:

- ◆ **EV/EBITDA:** A commonly used ratio compares a company's enterprise value (EV) to its earnings before interest, tax, depreciation, and amortization (EBITDA). It tells investors how many times EBITDA they need to pay to acquire the business. This multiple is used to determine the multiple at which the company is currently trading, compare the valuation of different businesses, negotiate the acquisition of a business, and calculate the target price for a company. This is the most preferred multiple while performing valuation of capital-intensive businesses.
- ◆ **EV/EBIT:** A ratio compares a company's enterprise value to earnings before interest and taxes while incorporating depreciation and amortization. EV/EBIT usually varies from 10x to 25x. A high ratio indicates that a company's stock is overvalued, while



a low ratio indicates that the company's stock is undervalued. Moreover, a low EV/EBIT indicates a more financially stable and secure company; however, the ratio provides a better picture of the company's financial state and actual worth when used with other ratios. While EV/EBIT is a widely used multiple, it may not be appropriate for companies which are capital-intensive in nature and thus have high depreciation and amortization.

- ◆ **EV/Sales:** EV/Sales multiple is obtained by dividing the company's enterprise value by annual revenue. It is commonly used in companies, usually early-stage and high-growth companies, whose operating cost exceeds revenues. This multiple is useful when EBITDA is negative or almost zero to value a business. EV/Sales ratio usually varies from 1x to 3x. A low EV/Sales indicates that a company is undervalued and may be an attractive investment for investors. Using EV/Sales multiple is the most appropriate option while valuing companies with negative net income, EBITDA, and cash flows.
- ◆ **EV/UFCF:** Unlevered Free Cash Flow (UFCF) is a cash flow available to all equity and debt holders after all the operating expenses, capital expenditures, and investments in working capital are made. EV/UFCF indicates how much investors are willing to pay for the company for each rupee of UFCF it generates. A high EV/UFCF ratio indicates that a more significant premium is attached to the rupee of UFCF generated by the company.

#### 4.5.2 *Equity Value Multiples*

Equity value is equity value minus net debt. Investors often use equity value multiples for equity valuation. The following are some common equity value multiples:

- ◆ **Price/EPS (P/E):** P/E is the most commonly used valuation metric, which is the ratio of the market price of the stock to earnings per share. P/E usually varies from 15x to 30x. Companies growing faster typically have higher P/E ratios, which indicate that investors are willing to pay a higher price for the company's share due to higher growth expectations.
- ◆ **Price/Book Value per Share (P/B):** P/B is expressed as the ratio of market price per share to book value per share. The P/B ratio usually assesses the value of companies in manufacturing or real



estate industries. The book value represents the net asset value of a company, which is the difference between assets and liabilities.

- ◆ **P/E/Growth (PEG Ratio):** The price earnings to growth (PEG) ratio is P/E divided by the expected EPS growth rate. It goes beyond the P/E ratio and factors in future growth earnings potential to value a company's price. In other words, it values a company's share by considering its market price, earnings, and future growth prospects. The PEG ratio usually varies from 0.5x to 3x. It facilitates comparison between companies at different stages of life cycles. The ratio indicates that any company that is expected to grow its revenues, earnings, and cash flows at a high rate is more valuable than a company with fewer growth prospects.
- ◆ **Dividend Yield:** It is the annual dividend per share divided by the stock's market price per share. This multiple is more suitable for comparison between companies operating in similar industries. A low or high dividend yield depends on the industry and the company's business life cycle. Fast-growing companies may reinvest in the business and report low yields, whereas mature companies may report high yields due to a lack of high growth opportunities.

**Table 4.1: Relative Valuation Multiples**

Multiple	Formula
EV/EBITDA	$\frac{\text{Enterprise Value} (\text{MV of Equity} + \text{Debt} - \text{Cash})}{\text{Earnings Before Interest, Taxes, Depreciation, and Amortization}}$
EV/EBIT	$\frac{\text{Enterprise Value}}{\text{Earnings Before Interest and Taxes}}$
EV/Sales	$\frac{\text{Enterprise Value}}{\text{Sales}}$
P/E	$\frac{\text{Market Price Per Share}}{\text{Earnings Per Share}}$
P/B	$\frac{\text{Market Price Per Share}}{\text{Book Value Per Share}}$
PEG	$\frac{\text{Price / EPS}}{\text{Earnings Per Share Growth}}$



Notes

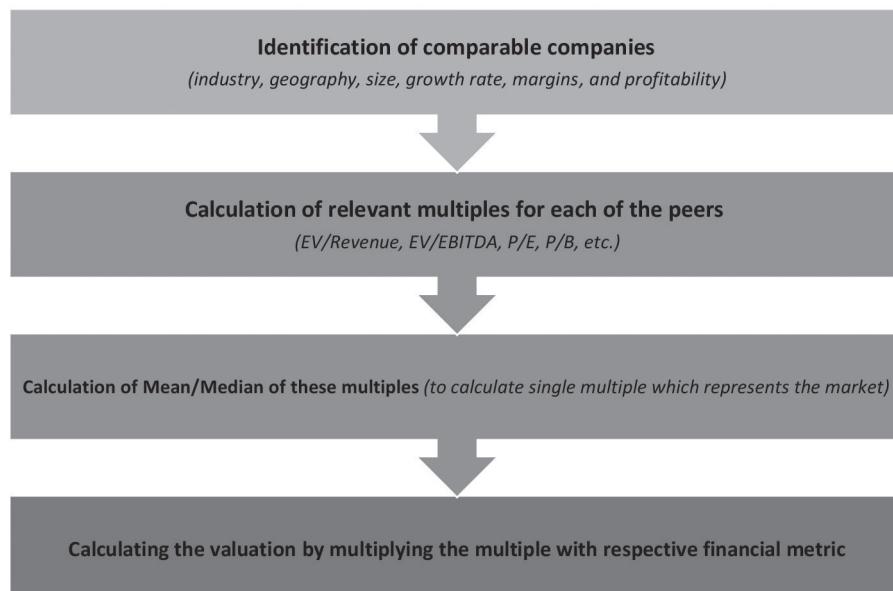
## VALUATION MODELS

### 4.6 Relative Valuation Model

Relative valuation approaches are used to value a business by comparing it to other businesses based on certain financial metrics. A business can be valued using comparable companies analysis or precedent transaction analysis.

#### 4.6.1 Comparable Companies' Analysis

**Comparable companies' analysis** or **trading comps** is commonly used to value companies by comparing them to publicly traded companies having similar operating businesses. A multiple, like market price per share to earnings per share (P/E precisely), may be used to find the target company's worth in relation to comparable publicly traded companies. Under comparable companies' analysis, a target company's operating metrics and valuation multiples are compared with those of public comparables within the comparable asset universe. Comparable companies' analysis involves valuing private companies or securities and identifying if a public company is undervalued, overvalued, or correctly valued compared to the market.



**Figure 4.2: Steps in Performing Comparable Companies' Analysis**



*Illustration 4.3: Following Is the Relative Valuation Schedule for Bajaj Auto Ltd Computed in 2021*

Comparable Companies	BAJAJ AUTO		
	HERO MOTORCOP		
	TVS MOTORS		
	ATUL AUTO		
	SCOOTERS INDIA		
Described Multiples	EV/EBITDA	EV/REVENUE	
Application	COMPANY	EV/EBITDA	EV/REVENUE
	BAJAJ AUTO	14.4	10.50
	HERO MOTORCOP	12.6	5.80
	TVS MOTORS	19.4	8.28
	SCOOTERS INDIA	17.4	52.17
	<b>Average</b>	<b>15.95</b>	<b>19.19</b>
EBITDA of Bajaj Auto	7,442.43	Revenue of Bajaj	10,203
Computed EV of Bajaj Auto	$(1/2 * EBITDA (BAJAJ) * Industry Average of EV/EBITDA) + (1/2 * Revenue * Industry Average of EV/Revenue)$		
	59,353.38368		97,896.18721
Computed EV of Bajaj Auto	<b>1,57,249.5709</b>		



#### 4.6.2 Precedent Transaction Analysis

Usage of comparable companies' analysis is relatively easy; however, at times, it is difficult to find comparable public companies where the target company operates in a niche sector. Moreover, the valuation under comparable companies' analysis does not consider any premiums paid. Precedent transaction analysis overcomes such challenges and assists in understanding multiples and premiums paid in a specific industry. It also helps in understanding how buyers/sellers assess private market valuations.

- ◆ **Precedent transaction analysis** or **precedents** involves valuation of companies by looking at the historical merger and acquisitions transactions where the entire companies were bought or sold. Such transactions indicate how much an investor was willing to pay for purchasing the entire business of the company. Though precedents are useful in valuing a business, however such information may not always be easy to find and it quickly becomes out of date. Under precedent transaction analysis, the value of a company is estimated by analyzing the price paid by different acquirers of similar companies under similar circumstances. Precedents also provide information on the premium paid in previous acquisitions to gain control of the target, called control premium. Because of this, transaction multiples are usually higher in the case of precedents than trading comps. The analysis includes the identification of relevant transactions on the basis of industry and financial characteristics, deal size, transaction-specific characteristics, timing, etc. Data gathering is required for relevant transaction. Transaction multiples are then calculated and value is computed.

To conclude, while comparable company analysis uses current market values to calculate the target company's valuation, precedent transaction analysis relies on historical sale prices of similar companies to estimate the same value. In other words, comparable company analysis looks at how the market values a company right now, and precedent transaction analysis looks at how the companies were valued in the past when they were bought and sold. So, eventually, both approaches estimate the value of a company in relation to a comparable group of peers. However, they use different benchmarks (current vs. historical prices).



## Notes

Lastly, comparable company analysis is more suitable in technology, retail, and financial service industries, where detailed financial information, transparent reporting, and accounting practices are available. On the other hand, precedent transaction analysis is relevant in industries like healthcare, technology, and finance, which often experience multiple mergers and acquisitions, and where companies do not rely on public market valuation and a significant number of transactions happen privately.

**IN-TEXT QUESTIONS**

3. When you use relative valuation, you are trying to price assets based upon what similar assets are being priced at. In comparing across these assets, which of the following do you have to do?
  - (a) Find similar or comparable assets, with trading prices
  - (b) Standardize the prices to a common variable available for all assets
  - (c) Control the standardized prices for differences across the assets
  - (d) All of the above
  - (e) None of the above
4. In precedent transaction analysis, valuation is based on
  - (a) historical merger and acquisitions transactions
  - (b) comparison between target company's operating metrics and valuation multiples with those of public companies.
  - (c) present value of expected future cash flows
  - (d) share price of a comparable public company

**4.7 Summary**

The proceeding chapter enables us to develop an understanding about the different models of valuation of companies based on dividends and free cash flows. The basic difference between dividend discount model and free cash flows model is definition of cash flows—dividend discount model uses cash flows that are distributed to equity holder's, i.e., potential



dividends on stock, whereas free cash flows model expands the definition of cash flows and includes cash flows available to a firm. Both models have subvariations depending on growth rates. Though estimating dividends is easier than estimating free cash flows as FCFF and FCFE are complicated to obtain, but provide a better approximation of intrinsic value as they consider factors related to operations of the firm. Thus giving a true perspective on the value of the firm.

#### 4.8 Answers to In-Text Questions

1. (c) The market is sometimes wrong, but that it corrects itself eventually
2. (f) All of the above
3. (d) all of the above
4. (a) Historical merger and acquisition transactions

#### 4.9 Self-Assessment Questions

1. TCS Ltd. is the second largest IT company in the world with global revenues of over INR 25,00,000 Mn and current earnings per share of Rs. 103. TCS is expected to yield a high growth rate for the next 3 years, and it is assumed that it will maintain its current payout ratio of 25% and current return on equity of 30% in this period. Beyond 3 years, it is expected that the return on equity will come down to 20% and the growth rate will come down to 6%. The firm will have a beta of 1.47 for a high growth period and beta of 1.0 thereafter. The risk-free rate and risk premium of the market is 5% and 5.7%, respectively. Estimate the intrinsic value of equity using a two-stage dividend discount model and comment on the path that its market price can follow if the company is currently trading at Rs. 3,500.
2. Sun Pharmaceutical Industries Ltd. is the fourth largest specialty generic pharmaceutical company in the world with global revenues of over US\$5.1 billion and current earnings per share of Rs. 13.72. Sun Pharma is expected to yield a high growth rate for the next 3 years and it is assumed that it will maintain its current payout ratio of 15% and current return on equity of 25% in this period. Beyond



## Notes

3 years, it is expected that the return on equity will come down to 20% and the growth rate will come down to 6%. The firm will have beta of 1.47 for high growth rate period and beta of 1.0 thereafter. The risk-free rate and risk premium of market is 5% and 5.7%, respectively. Estimate the intrinsic value of equity using two-stage dividend discount model and comment on the path that its market price can follow if the company is currently trading at Rs. 112.

3. NESTLÉ India manufactures products of truly international quality under internationally famous brand names, such as NESCAFÉ, MAGGI, MILKYBAR, KIT KAT, BAR-ONE, MILKMAID, and NESTEA, and in recent years, the company has also introduced products of daily consumption and use, such as NESTLÉ Milk, NESTLÉ SLIM Milk, NESTLÉ Dahi, and NESTLÉ Jeera Raita. NESTLÉ India is a responsible organization and facilitates initiatives that help to improve the quality of life in the communities where it operates. Mr. Manoj is fascinated to compute the value of Nestle Ltd. with the help of relative valuation approach using following information. Mr. Manoj feels that 30% weightage should be given to earnings in the valuation process, sales may be given 30% weightage, and book value may be given 40% weightage. The valuer has identified 3 firms which are comparable to operations of Nestle Ltd.

(In Crores)

Particulars	Pepsi Co Ltd.	General Mills Inc.	Pioneer Foods Ltd	Nestle Ltd.
Sales	18,200	20,100	15,400	16,700
EBITDA	12,455	14,167	10,280	11,540
Book Value	5,600	6,200	3,800	4,500
Enterprise Value	14,700	24,100	27,800	32,000

#### 4.10 References

- ◆ Damodaran, A. Damodaran on Valuation, Security Analysis for Investment and Corporate Finance (2nd ed.). Wiley India Pvt. Ltd.
- ◆ K. G., CA, & Sehrawat, N. K. Handbook on Valuation—Concept & Cases. New Delhi, Bharat Law House Pvt. Ltd, ISBN: 978-93-5139-497-6.



## 4.11 Suggested Readings

- ◆ Damodaran. Investment Valuation, Tools and Techniques for Determining the Value of Any Asset (3rd ed.). Wiley India Pvt. Ltd.
- ◆ Damodaran. Corporate Finance (2000), Theory and Practical (2nd ed.). Wiley India Pvt. Ltd.
- ◆ K. G., CA, & Sehrawat, N. K. Handbook on Valuation—Concept & Cases. New Delhi, Bharat Law House Pvt. Ltd, ISBN: 978-93-5139-497-6.



# Technical Analysis

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## STRUCTURE

- 5.1 Learning Objectives**
- 5.2 Introduction**
- 5.3 Meaning**
- 5.4 Assumptions of Technical Analysis**
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### 5.1 Learning Objectives

- ◆ Know what is technical analysis.
- ◆ Understand the difference between fundamental and technical analysis.
- ◆ Understand the various price and volume indicators.
- ◆ Know various technical charts and patterns.



## 5.2 Introduction

Technical analysis is a tool employed in financial markets to analyse and forecast the price movements of assets using past price and volume data. Technical analysis diverges from fundamental analysis by prioritising the examination of charts, trends, levels of resistance and support, technical signals, and chart patterns in order to detect prospective trading prospects. This strategy is employed by traders to analyse the psychology of the market, detect trends, and make well-informed judgements regarding the purchase or sale of financial assets. Although technical analysis is commonly employed, it is not immune to criticism. Consequently, many traders opt to integrate it with fundamental research to conduct a more thorough market analysis.

## 5.3 Meaning

Technical analysis is a systematic approach to assessing and predicting changes in financial markets by examining past data on prices and trading activity. Technical analysis disregards basic elements such as corporate profitability or economic data and instead focuses on the examination of charts, trends, patterns, and diverse technical indicators. The main goal is to recognise possible future price fluctuations and make well-informed trading choices by analysing past market patterns. Technical analysts think that past price patterns exhibit a tendency to recur, and by identifying these patterns, they strive to predict the future direction of market movements.

Technical analysis is a systematic approach employed by traders and investors to examine financial markets and make informed judgements by studying past price and volume patterns. Technical analysis disregards the examination of a company's financial well-being or economic indicators, and instead concentrates on chart patterns, trends, and statistical metrics generated from previous market action.

Important components of technical analysis encompass the ability to recognise and acknowledge trends, recognise levels of support and resistance, comprehend patterns displayed on charts, and effectively utilise a range of technical indicators like moving averages, oscillators, and volume analysis. Traders that utilise technical analysis seek to capitalise



on these patterns and trends in order to generate profits. They make judgements based on the belief that the market retains information from the past and that past price behaviour can provide valuable information about future movements.

Technical analysis involves analysing historical data to predict the future trajectory of financial markets. It is a crucial tool for traders who rely on charts and statistical indicators to inform their trading tactics.

#### 5.4 Assumptions of Technical Analysis

Technical analysis is based on a collection of fundamental principles, which are explained below:

- 1. Price Discounts Everything:** The principle of “Price Discounts Everything” asserts that technical analysts hold the belief that the price of an asset already incorporates all pertinent information, encompassing economic, political, and psychological considerations. Hence, the prevailing market price encompasses and mirrors the combined knowledge and anticipations of all participants in the market.
- 2. Price Moves in Trends:** Technical analysis is based on the concept that markets exhibit trends, indicating that prices have a tendency to move consistently in a particular direction over a period of time. It is imperative to identify and track these trends in order to make informed and profitable trading decisions.
- 3. History Repeats Itself:** It is believed that historical price movements and patterns are prone to recurring. Through the examination of historical market trends, analysts strive to discern recurring patterns that might provide valuable insights into anticipated future price movements.
- 4. Formation of Patterns:** Technical analysts concentrate on identifying distinct price patterns, such as head and shoulders or triangles that are regarded as suggestive of market psychology and have the potential to indicate future price moves.
- 5. Volume Confirmation:** Volume, which refers to the level of trading activity measured in shares or contracts, is considered a validating factor for trends. Heightened trading activity during a period of



upward price movement, such as an uptrend, is frequently perceived as an indication of robust demand, hence strengthening the probability of the trend persisting.

- 6. Support and Resistance Recognition:** Technical analysts posit the presence of support and resistance levels in markets. Support refers to a point at which an asset often stops decreasing, whereas resistance is a level at which it typically stops increasing. These levels are crucial for determining the points at which to enter and exit.
- 7. Momentum Continuation:** Expanding upon the principle of momentum, technical analysts think that markets are inclined to maintain their present trajectory rather than undergo a reversal. This statement serves as the foundation for the widely-known phrase in technical analysis, “trend is your friend.”

Although these assumptions serve as the basis for technical analysis, it is important to acknowledge that not all market players endorse or exclusively depend on these ideas. Traders frequently use a combination of technical and fundamental analysis, along with strong risk management measures, to make well-informed decisions.

### IN-TEXT QUESTIONS

1. A Society is a group of people who\_\_\_\_\_
  - (a) Jargons live together in an organised way
  - (b) Making decisions about how to do things
  - (c) Sharing the work that needs to be done
  - (d) All of these
2. Modern Society comprise of\_\_\_\_\_
  - (a) Agricultural Society
  - (b) Industrial Society
  - (c) Information Society
  - (d) All of these



## 5.5 Difference Between Fundamental and Technical Analysis

Aspect	Fundamental Analysis	Technical Analysis
Basis of analysis	Focuses on economy, industry, and company analysis to evaluate the intrinsic value of an asset.	Utilises previous price and volume data, patterns, and technical indicators to forecast future price fluctuations.
Time horizon	Long-term perspective.	Short- to medium-term perspective.
Information sources	For analysis, uses financial reports, economic statistics, news, and other external elements.	For analysis, it primarily employs charts, technical indicators, and historical price and volume data.
Decision-making factors	Examines variables such as profits, dividends, economic circumstances, and competitive strengths of a company.	Focuses on analysing price patterns, trends, support and resistance levels, as well as technical indicators, in order to make informed trading decisions.
Market participants	Preferable to investors with a long-term perspective and value investors who are looking for assets that are currently undervalued.	Commonly preferred by individuals engaged in short-term trading, day traders, and trend followers seeking to exploit brief fluctuations in prices.
Risk consideration	Focuses on comprehending an investment's potential for long-term success or failure as well as its inherent dangers.	Uses stop-loss orders and other technical techniques frequently to emphasise risk management within the context of individual trades.



Aspect	Fundamental Analysis	Technical Analysis
Applicability	Often employed in stock investing, specifically for value-focused methods.	Commonly utilised in the trading of several financial items, including equities, commodities, currencies, and cryptocurrencies.
Market efficiency	Believes that markets may exhibit imperfections in efficiency, hence presenting possibilities to identify assets that are either undervalued or overvalued.	Believes that market prices inherently incorporate all pertinent information, hence posing a challenge to continually outperform the market.

## 5.6 Price Indicators

In finance, price indicators relate to numerous instruments and measurements used to analyse and evaluate historical fluctuations in the prices of financial instruments. These indicators offer valuable information regarding market patterns, volatility, momentum, and potential points of reversal. Traders and analysts utilise price indications to make well-informed decisions regarding the purchase or sale of assets. Price indications are crucial for conducting technical analysis, a frequently employed practice in trade and investment.

### 5.6.1 Dow Theory

The Dow Theory, a fundamental paradigm in technical analysis developed by Charles H. Dow, one of the founders of Dow Jones & Company, provides valuable insights into the fluctuations of stock prices and market trends. The theory, created in the latter part of the nineteenth and early twentieth centuries, comprises key ideas affecting the understanding of the market's general health and facilitating decision-making for traders. The fundamental principles of Dow Theory encompass:

- 1. Market Discounts Everything:** The concept of "The Market Discounts Everything" implies that the financial market takes into



account and reflects all available information and factors that could potentially impact the prices of assets. The Dow Theory operates under the assumption that all relevant information, encompassing economic, political, and psychological factors, has already been taken into account and reflected in the present market prices. This suggests that the current market values accurately represent the combined influence of all known causes.

## 2. The Market Movements Can Be Divided into Three Distinct Phases:

- (i) **Primary Trend:** The main, long-range trend can either be bullish, bearish, or range-bound.
- (ii) **Secondary Trend:** Secondary reactions refer to intermediate-term movements that go against the dominant trend.
- (iii) **Daily Fluctuation:** It refers to the short-term, daily changes in prices that occur within the framework of secondary responses.



**Figure 5.1: Phases of Market Movements as per Dow Theory**

- 3. **Trend Validation by Averages:** Dow Theory utilises averages, such as the Dow Jones Industrial Average (DJIA) and Dow Jones Transportation Average (DJTA), to confirm trends. A trend is deemed strong when both averages exhibit consistent movement, hence corroborating one another.
- 4. **Volume Confirms Trend:** Volume serves as a crucial factor in confirming trends and is an essential component of Dow Theory. The theory highlights the importance of trading volume being in



line with the principal trend. Specifically, it should grow during price rises in a bullish trend and decrease during corrections.

**5. Persistence of Trend:** Trends continue until there are evident indications of a reversal, as stated by Dow Theory. Reversal indications can be recognised by analysing trend lines, chart patterns, and volume patterns. The Dow Theory is a fundamental aspect of contemporary technical analysis, providing a fundamental comprehension of market movements. Analysts sometimes combine these ideas with supplementary technical tools to conduct a full evaluation of market trends and prospective investment prospects.

### 5.6.2 Advances and Declines

In technical analysis, advances and declines refer to the number of stocks or securities that have had upward (advances) or downward (declines) price changes during a specified period. These measurements function as indications of breadth, providing insights into the general health and robustness of the market. The use of advances and declines as price indicators is complex and has multiple aspects.

- (a) Evaluating Market Breadth:** Advances and decreases serve as a measure of market breadth, reflecting the extent of participation in a price change. A significant quantity of rising issues indicates a strong market, whilst a frequency of declining issues may signal market weakness.
- (b) Confirmation of Bull or Bear Phase:** Bullish and bearish confirmation refers to the validation of an upward or downward trend in a healthy bull market. In this context, a substantial number of advancing issues confirms the upward trend, while a growing number of decreasing issues supports a bearish trend.
- (c) Identifying Divergences:** Examining increases and decreases can expose disparities between the breadth of the market and the price index. For example, when the market index is reaching new highs but the number of advancing issues is decreasing, it could indicate a decline in market strength.
- (d) Detecting Overbought and Oversold Conditions:** Abnormal levels of advances and falls might be indicative of overbought or



oversold conditions. A market exhibiting significant advances may be excessively bought, indicating a future correction.

- (e) **Confirming Trend Reversals:** Alterations in the ratio of upward movements to downward movements can offer early signals of possible trend reversals. A diminishing number of advancements during an upward trend may indicate a deteriorating trend.
- (f) **Sentiment Analysis:** It involves analysing data on advances and drops to provide insights into market sentiment. For instance, a significant increase in advancing issues during a market collapse could suggest the presence of resilient industries and a more positive mindset.

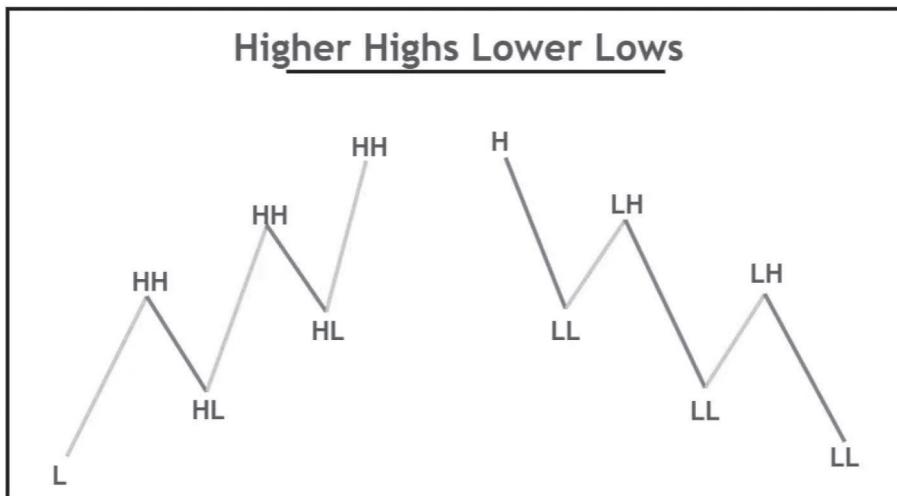
Integrating advancements and declines with volume analysis amplifies their efficacy. Significant advancements accompanied by substantial trading volume validate the robustness of an upward trend, while decreases accompanied by elevated trading volume may indicate a possible reversal of the trend. It is imperative to incorporate advances and dips in conjunction with other technical indicators and research methodologies. Although they offer valuable insights into market breadth, they do not provide specific information regarding the magnitude of price fluctuations. Analysts commonly utilise a blend of indicators to develop a comprehensive comprehension of market conditions and trends.

### 5.6.3 New Highs and New Lows

The phrase “new highs and lows” is frequently employed in financial markets to denote the peak and bottom values attained by an asset, market index, or another financial instrument within a specified timeframe.

**New Highs:** The term “high” refers to the maximum price that a securities or market index has reached within a specific period of time. It indicates a high level of strength and optimism in the stock market. Investors may perceive new highs as an encouraging indication of a strong market.

**New Lows:** The term “New Low” refers to the minimum price that a securities or market index has reached during a particular period of time. It indicates weakness and a pessimistic outlook in the market. A decline to record levels can signal possible issues in the market or specific stocks, leading investors to reconsider their investments.



**Figure 5.2: Higher Highs and Lower Lows**

Understanding higher highs and lower lows is vital for conducting market analysis. The ratio of new highs to new lows might offer valuable insights into the overall market's condition. If there is a substantial quantity of new highs, it can be seen as an indication of a robust, upward-trending market. On the other hand, a large number of new lows could indicate a market that is under pressure or going through a downward trend.

Investors and traders frequently observe the occurrence of new highs and lows in order to evaluate market mood, detect possible investment prospects, and evaluate the overall trend conditions. Examining these measurements in conjunction with other technical indicators enhances the thorough assessment of market dynamics.

#### 5.6.4 Circuit Filters

Circuit filters, also referred to as circuit breakers, are regulatory measures employed in financial markets to temporarily suspend or restrict trading activity during periods of significant price volatility or market strain. These procedures are specifically created to avert chaotic market conditions and offer a short pause for investors to evaluate information, manage the selling panic, and prevent the quick reduction of market liquidity. The purpose of implementing circuit filters is to uphold market stability and safeguard investors against the detrimental impacts of extremely swift and substantial



price fluctuations. Stock exchanges and financial authorities may have different circuit breaker rules and trigger thresholds. These laws are usually implemented to regulate and minimise the effects of abrupt market swings. In India, circuit filters are decided by the Securities Exchange Board of India (SEBI). It depends on previous day closing prices.

## 5.7 Volume Indicators

Volume indicators in the financial markets measure the level of trading activity for a certain asset within a defined period of time. They have a significant function in technical analysis, offering valuable insights on the strength or instability of price movements. Volume indicators assist traders and analysts in verifying the authenticity of price movements, identifying possible reversals, and evaluating the general market attitude. Examining the correlation between volume and price fluctuations gives a more comprehensive comprehension of market dynamics and facilitates the process of making well-informed trading choices.

### 5.7.1 *Role of Volume in Dow Theory*

Volume plays a pivotal role in Dow Theory, since it is regarded as a vital factor in validating trends and evaluating the overall robustness of market movements.

The integration of volume into Dow Theory is as follows:

- (i) **Volume Confirmation:** As per Dow Theory, a trend is deemed real only if it is supported by a noticeable increase in trade volume. During an upward trend, the augmentation in trading volume as prices ascend is regarded as a validation of the optimistic market trend. Similarly, during a period of declining prices, an increase in volume validates the bearish trend.
- (ii) **Volume Expansion During Major Trend:** According to Dow Theory, it is expected that there would be an increase in volume throughout the major trend. Consequently, when prices align with the trend, there should be a corresponding surge in trading volume. This principle is in accordance with the notion that robust trends are bolstered by active involvement from a diverse range of market participants.



- (iii) Volume Analysis at the Time of Reversals:** It is taken into account while assessing the possibility of trend reversals. For instance, if there is a reduction in volume while there is a counter-trend movement (secondary response), it could imply a lack of strong belief in the reversal, indicating that the main trend is likely to continue.

Dow Theory seeks to enhance its understanding of market behaviour by integrating volume analysis into its paradigm. The hypothesis recognises that price fluctuations accompanied by significant trading volume are more likely to persist, whereas those with low trading volume may lack confidence and be prone to reversals. Traders and analysts that employ Dow Theory frequently take into account both the fluctuations in price and the changes in trading volume in order to gain a more comprehensive comprehension of market patterns.

### **5.7.2 Institutional Activity as Volume Indicator**

Within financial markets, institutional investors play a significant role as volume indicators because of the magnitude of their transactions. Keeping an eye on institutional investor trading volumes might reveal important trends or changes in mood while also offering insights into market dynamics. Here are some methods via which institutional investors function as volume indicators:

- (i) Size of Transactions:** Institutional investors generally conduct trades of bigger sizes in comparison to individual or retail investors. Heightened trading volume, particularly in substantial block trades, can indicate institutional involvement.
- (ii) Effect on Liquidity:** Institutional trades, due to their large scale, can have a substantial influence on market liquidity. An increase in trading volume, specifically driven by institutional investors, has the potential to cause price fluctuations and impact the overall liquidity of the market.
- (iii) Market Sentiment:** The trading choices made by institutional investors frequently reflect their combined sentiment and perspective on the market. Observing fluctuations in their trade volumes can offer insights into the current market sentiment.
- (iv) Sector Rotation:** It refers to the practice of institutions reallocating their holdings in response to economic conditions and market



developments. Analysing fluctuations in trading volumes within particular industries can indicate changes in institutional opinion.

- (v) **Trend Confirmation:** Consistent patterns accompanied by rising institutional trading volumes may suggest robust and enduring market movements. This information might be highly beneficial for traders who are seeking confirmation of trends.

Although institutional activity serves as a substantial measure of trading volume, it is crucial to take into account additional elements and use a comprehensive approach to market analysis. Individual investors frequently include institutional trading volumes, technical indicators, chart patterns, and fundamental analysis into their investing decision-making process to ensure educated choices.

## 5.8 Resistance and Support Levels

Support and resistance are fundamental principles in the field of technical analysis. Understanding their meaning and their actual implementation is crucial for accurately interpreting price charts.

- (i) **Support Level:** During a downturn, prices decline due to an imbalance when the supply surpasses the demand. As prices decrease, they become more appealing to potential buyers who have been observing from the sidelines. Eventually, the demand that was previously growing gradually will reach a point where it equals the supply. At this juncture, prices will cease to decline. This is support.

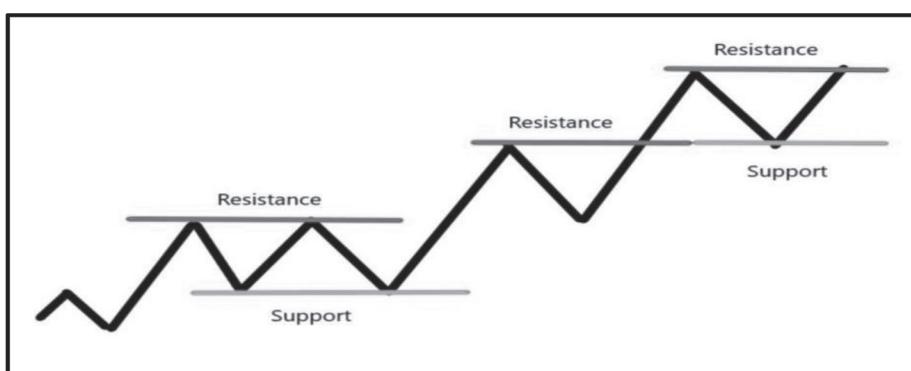
Support may appear as either a specific price level or a range of prices on a chart. Support, in the context of a price chart, refers to a specific area where buyers demonstrate their readiness to purchase. At this particular level, the demand typically surpasses the supply, resulting in an end and reversal of price drop.



Figure 5.3(a): Support and Resistance Level

**(ii) Resistance Level:** Resistance can be defined as the opposite of support. Prices increase due to a higher demand relative to the available supply. As prices increase, there will be a threshold where the urge to sell surpasses the urge to acquire. There are other factors that contribute to this occurrence. Traders may have concluded that prices are excessively high or have reached their desired level. Buyers may be hesitant to enter new holdings at high valuations. It could be due to various different factors. However, a specialist will easily identify on a price chart a point at which the amount of supply starts to surpass the amount of demand. This represents resistance. Similar to assistance, it can refer to either a level or a zone.

Technical analysts utilise support and resistance levels to pinpoint certain price points on a chart where the likelihood of a temporary halt or reversal of an ongoing trend is higher. Support is a level where a downward trend is anticipated to temporarily halt because there is a high concentration of buyers who are willing to purchase the asset at that price. Resistance arises when there is a temporary halt in an upward trend, caused by a significant accumulation of supply. Market psychology significantly influences traders and investors as they recall previous events and respond to evolving circumstances in order to predict future market trends. Trend lines as well as moving averages can be utilised on charts to identify support and resistance regions.



**Figure 5.3(b): Resistance Level Becoming Support Level**



## 5.9 Technical Charts and Patterns

Technical charts, frequently employed in the practice of technical analysis, visually depict the past price fluctuations of financial instruments, such as commodities, stocks, or currencies. These charts assist traders and analysts in identifying patterns, trends, and probable points of reversal, enabling them to make well-informed investment choices.

### 5.9.1 *Types of Technical Charts*

- (i) **Line Chart:** A line chart is a basic and essential tool in technical analysis that depicts the past price fluctuations of a financial instrument by connecting the closing prices over a defined timeframe with a line. It gives a clear and easily understandable representation of the underlying pattern in the value of an item.
- (ii) **Bar Chart:** A bar chart is a widely used and adaptable tool in technical analysis that visually displays the price fluctuations of financial assets within a designated timeframe. Bar charts offer a more comprehensive depiction compared to line charts, as they encompass the open, high, low, and closing prices for each period.
- (iii) **Candlestick Chart:** A candlestick chart is a visually captivating variation of a bar chart. Every candlestick comprises the values for the opening, closing, highest, and lowest prices. The candle's body is either filled or hollow, depending on whether the closing price is higher or lower than the initial price.
- (iv) **OHLC Chart:** An OHLC chart represents the Open, High, Low, and Close prices. This chart displays data regarding the opening, maximum, minimum, and closing prices during a period of time.
- (v) **Point and Figure Chart:** Point and Figure charts streamline the process of technical analysis by depicting price fluctuations using columns of Xs (indicating an upward trend) and Os (indicating a downward trend). By disregarding the element of time, they concentrate on significant fluctuations in price, offering distinct indications for the identification of trends and points of reversal. Point and Figure charts are widely used due to their simplicity and



ability to provide clear insights into market patterns. They assist traders in making well-informed decisions regarding potential entry or exit points in the market.

## 5.10 Summary

Technical analysis is a systematic approach used by traders and investors to assess financial markets and make well-informed judgements by examining previous price and volume patterns. It ignores the practice of fundamental analysis, which entails evaluating a company's financial well-being and economic indicators. Instead, it concentrates on chart patterns, trends, and statistical measures generated from past market action.

Essential elements of technical analysis comprise:

**Trend Recognition:** The process of identifying and comprehending market trends, regardless of whether they are ascending, descending, or horizontal. Support and resistance levels refer to specific price points where the price of an asset is likely to either find support or encounter resistance. These levels can offer valuable information about possible future price movements.

**Chart Patterns:** Examining different patterns created by price fluctuations on charts, such as head and shoulders, triangles, and flags, in order to predict future price movements. **Technical Indicators:** Employing diverse mathematical computations and statistical metrics based on price and volume data, such as moving averages, oscillators (e.g., Relative Strength Index, MACD), and volume analysis tools, to detect prospective trading prospects.

Traders utilising technical analysis strive to exploit discovered patterns and trends in order to create profits. Their operation is based on the premise that market prices include all accessible information, including historical data, and that previous pricing patterns might yield important predictions about future market trends.

In general, technical analysis is crucial in the decision-making process of several traders and investors, as it offers them a systematic framework to comprehend market dynamics and recognise potential trading opportunities.



### 5.11 Answers to In-Text Questions

1. (d) All of these
2. (c) Information Society

### 5.12 Self-Assessment Questions

1. What is Technical Analysis? Explain the assumptions of technical analysis.
2. Explain in detail the Dow Theory.
3. What is the difference between fundamental analysis and technical analysis?

### 5.13 References

- ◆ Chandra, P. (2017). Investment Analysis and Portfolio Management. Delhi: McGraw Hill Education.
- ◆ Elton, E. J., Gruber, M. J., Brown, S. J. & Goetzmann, W. N. (2014). Modern Portfolio Theory and Investment Analysis. USA: John Wiley & Sons.
- ◆ Fischer, D. E. & Jordan, R. J. (1995). Security Analysis and Portfolio Management. New Delhi: Pearson Education.

### 5.14 Suggested Readings

- ◆ Chandra, P. (2017). Investment Analysis and Portfolio Management. Delhi: McGraw Hill Education.
- ◆ Elton, E. J., Gruber, M. J., Brown, S. J. & Goetzmann, W. N. (2014). Modern Portfolio Theory and Investment Analysis. USA: John Wiley & Sons.
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# Portfolio Analysis and Management

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## STRUCTURE

- 6.1 Learning Objectives**
- 6.2 Introduction**
- 6.3 Concept of Financial Portfolio**
- 6.4 Portfolio Management**
- 6.5 Portfolio Analysis – Concept of Portfolio Risk, and Return**
- 6.6 Relationship Between Coefficient of Correlation, Portfolio Risk and Diversification**
- 6.7 Portfolio Theories**
- 6.8 Solved Illustrations**
- 6.9 Summary**
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- 6.13 Suggested Readings**

### 6.1 Learning Objectives

- ◆ Understand the concept and process involved in portfolio management.
- ◆ Comprehend the idea of portfolio risk and return.
- ◆ Understand the relationship between the coefficient of correlation, portfolio risk, and diversification.
- ◆ Understand the relevance of portfolio theories.

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*Department of Distance & Continuing Education, Campus of Open Learning,  
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## 6.2 Introduction

Different investments have distinct risk and return characteristics, with expected future returns being inherently variable and the uncertainty of returns known as risk. Investors typically avoid investing all their savings in a single security or asset. Rather, they spread their money across different types of financial securities simultaneously, adhering to the principle of Warren Buffet “Don’t put all eggs in one basket”. The aim is to diversify and mitigate risk, ensuring that gains in others can compensate for losses in one security. The concept of constructing a portfolio is based on investing money in various securities to maximise returns with a minimum level of risk, which is explored in this chapter. The present chapter further describes the process of portfolio management and its theories that construct an optimal portfolio and offer maximum satisfaction along with the best combination of risk and return.

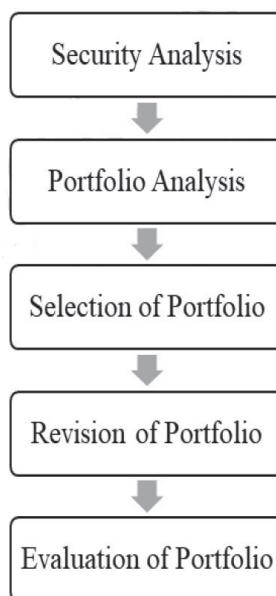
## 6.3 Concept of Financial Portfolio

A portfolio is a collection of different kinds of financial securities such as shares, bonds, debentures, mutual funds, and other assets, together for investment. It is not merely a mix of unrelated financial assets; rather, it is a thoughtfully integrated combination of assets within a unified framework. Making a portfolio is putting one’s egg in different baskets with varying degrees of risk and return. For instance, an investor might decide to allocate his funds solely to the shares of XYZ Ltd. Alternatively, he could distribute his funds to shares of five different companies equally. In the former case, he would be exposed to high risk as expected returns depend solely on XYZ Ltd.’s performance. Conversely, in the latter scenario, the risk would be diversified across various companies. Hence, the losses that occur in the shares of one company may be compensated by profits earned in others; ultimately, portfolio risk will be reduced. There can be numerous portfolios constructed from a given set of securities. A prudent investor always seeks the most efficient portfolio to meet his investment goals. An efficient portfolio attempts to maximise returns at a given risk tolerance of the investor.



## 6.4 Portfolio Management

Portfolio management involves formulating, maintaining, revising, and continuously evaluating a portfolio to maximise returns with the given risk profile of the investor. The steps involved in managing the combination of various securities in a portfolio can be understood with the help of the flowchart shown in Figure 6.1. The five steps of the process for portfolio management are described below:



**Figure 6.1: Process of Portfolio Management**

- (a) **Security Analysis:** The initial step involves analysing the risk, return, and price level of a large number of available securities in the financial market. These securities, categorised as equity shares, bonds, debentures, GDRs, ADRs, and derivatives are some of them. Now, the investor needs to decide the financial security for investment. The decision is based on the risk and return profile of the individual securities. Three methods for security analysis have been employed, i.e., fundamental analysis, technical approach, and the Efficient Market Hypothesis (EMH).
- (b) **Portfolio Analysis:** The next step is to build an infinite number of possible portfolios using information gathered from security analysis.



The portfolio analysis is crucial to select the optimal portfolio. The objective of portfolio analysis is to evaluate the effectiveness of various portfolios concerning their risk and return characteristics. It helps in identifying portfolios that provide maximum returns for a given level of risk or the least risk for a given level of return.

- (c) **Selection of Portfolio:** In this step, an investor selects the efficient portfolio that optimises his utility based on risk and return preferences. For portfolio selection, an investor constructs the indifference curves that measure his utility scores. The optimal portfolio is determined by selecting the point on the indifference curve that offers the highest utility. Two popularly known portfolio theories, i.e., the Harry Markowitz Model and Capital Market Theory are used by an investor to select an optimal portfolio.
- (d) **Revision of Portfolio:** Portfolio management is a continuous and dynamic process that requires ongoing monitoring to enhance the expected returns of the portfolio. This involves tracking changes taking place in the risk and return profiles as well as the price levels of individual securities, in response to shifts in the financial environment. Adjustments to the portfolio are essential to adapt to alterations in the financial goals or investors' preferences, as well as when additional funds are invested.
- (e) **Evaluation of Portfolio:** The evaluation of a portfolio is the last step as well as an integral part of the portfolio management process. It helps to determine whether the selected efficient portfolios are gaining the desired returns. Various widely recognised techniques such as Jensen's alpha, Sharpe's ratio, Treynor's ratio, etc. are employed to assess portfolio performance.

#### IN-TEXT QUESTIONS

1. A combination of various financial assets for investment purposes is called
  - (a) Portfolio
  - (b) Gambling
  - (c) Speculation
  - (d) Investment



2. In the context of portfolio management, what does the term “diversification” aim to achieve?
  - (a) Increasing portfolio risk
  - (b) Allocate funds in a single asset
  - (c) Reducing overall risk through a variety of investments
  - (d) Maximizing short-term returns
3. Portfolio revision is one of the steps in the process of portfolio management.
  - (a) True
  - (b) False
  - (c) Partially True or False
  - (d) None of the above

## 6.5 Portfolio Analysis – Concept of Portfolio Risk and Return

The importance of portfolio risk and return lies in their crucial role in investment decision-making, risk management, wealth management, and the pursuit of financial goals. The determination of the expected return and risk of the portfolio is designated as the first step in portfolio analysis.

### 6.5.1 Expected Portfolio Return

The return on the portfolio is defined as the weighted average of the returns of individual assets/securities that are held in the portfolio. The weights are determined based on the individual securities' proportion in the overall portfolio composition.

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

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



Notes

where

 $E(R_p)$  = Expected return on portfolio $W_i$  = Proportion of funds invested in  $i^{\text{th}}$  security $E(R_i)$  = Expected return on  $i^{\text{th}}$  security $n$  = Number of securities in the portfolio.

For example, if an investor invests 60% of their total funds in equity shares P, which has an expected return of 40%, and allocates the remaining 40% to equity shares Q, with an expected return of 20%, the expected portfolio return,  $E(R_p)$ , is determined by multiplying the respective weights of each share by its expected return and summing the results.

**Portfolio Return = Weight of Security P × Return of Security P + Weight of Security Q × Return of Security Q**

Symbolically,

$$\begin{aligned}E(R_p) &= (.60 \times .40) + (.40 \times .20) \\&= 32\%\end{aligned}$$

### 6.5.2 Portfolio Risk

Portfolio risk, also termed investment risk, refers to the collective risk associated with all the securities that are held in a portfolio. It measures the degree to which the actual returns of a portfolio will deviate from the expected returns. To calculate the risk of a portfolio, the weighted average of the standard deviations of individual securities along with covariance is used. Covariance is a statistical metric that measures the interactive risk among the securities that form a portfolio. It captures how the returns of two securities are related and move in tandem.

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

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

where

 $\sigma_p$  = Portfolio risk consisting of securities X and Y $w_x$  = Percentage of total funds invested in security X $w_y$  = Percentage of total funds invested in security Y



$\sigma_x$  = Standard deviation of the returns of security X

$\sigma_y$  = Standard deviation of the returns of security Y

$\text{Cov}_{XY}$  = Covariance between security X and Y.

*Example 1:* An investor is investing in securities R and S, whose details are given below:

	Security R	Security S
E(R)	13%	20%
Risk ( $\sigma$ )	5%	10%
Weight (W)	40%	60%

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

*Solution:*

#### (a) Portfolio Return

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

$$E(R_p) = .40 \times 13 + .60 \times 20$$

$$E(R_p) = 17.2\%$$

#### (b) Portfolio Risk

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

$$\sigma_{xy} = \sqrt{(0.4)^2 (5)^2 + (.6)^2 (10)^2 + 2 (.4) (.6) 100}$$

$$\sigma_{xy} = 9.38\%$$

The term covariance between two variables is the multiplication of their correlation coefficients by the standard deviations of both securities. The coefficient of correlation is a relative measure whose range lies between -1 and +1. A correlation coefficient of +1 indicates a perfect positive correlation, meaning that the returns of portfolio securities move in the same direction. Conversely, a correlation coefficient of -1 signifies a perfect negative correlation, indicating opposite movements in securities returns.



## Notes

The formula is shown below:

$$\text{Cov}_{xy} = \rho_{xy} \sigma_x \sigma_y$$

Alternatively,

$$\rho_{xy} = \text{Cov}_{xy} / \sigma_x \sigma_y$$

where  $\rho_{xy}$  = Coefficient of correlation between securities X and Y.

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

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

Based on the above discussion, portfolio return depends on the percentage of total funds invested in each asset and the return of each security. However, the portfolio risk depends on the proportion of funds invested in available security, the riskiness ( $\sigma$ ) of each security, and the coefficient of correlation or covariance between the securities.

*Example 2:* An investor is investing in securities X and Y. Calculate portfolio's risk and return.

Security	X	Y
$E(R)$	15%	7%
Risk ( $\sigma$ )	5%	3%
Weight (W)	70%	30%
$\rho_{xy}$ between X and Y = 0.90		

*Solution:*

**(a) Portfolio Return**

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

$$E(R_p) = .70 \times 15 + .30 \times 7$$

$$E(R_p) = 12.6\%$$

**(b) Portfolio Risk**

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

$$\sigma_{xy} = \sqrt{(0.7)^2 (5)^2 + (.3)^2 (3)^2 + 2(0.7) (.3) (0.90) (5)(3)}$$

$$\sigma_{xy} = 4.33\%$$



## 6.6 Relationship Between Coefficient of Correlation, Portfolio Risk, and Diversification

### 6.6.1 Relationship Between Coefficient of Correlation and Portfolio Risk

The degree of correlation between the returns of securities directly affects the portfolio's risk. A lower correlation results in reduced risk, while when securities are highly correlated, the risk will be higher. The impact of perfectly correlated, uncorrelated, or negatively correlated returns on the overall risk of the portfolio can be explained with the help of a numerical given below:

*Example 3:* Suppose an investor invests in securities X and Y in equal proportion. The risk and return of the securities are as follows:

Security	$E(R)$	$\sigma$
X	10	4
Y	15	5

Calculate and examine the portfolio risk if the coefficient of correlation is  $-1, -0.4, 0, 0.4$ , or  $1$ .

*Solution:*

#### (a) Portfolio Return

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

$$E(R_p) = .50 \times 10 + .50 \times 15$$

$$E(R_p) = 12.5\%$$

Hence, it is important to note that the expected portfolio return will be the same in all five cases.

#### (b) Portfolio Risk

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

$$\sigma_{xy} = \sqrt{(0.5)^2 (4)^2 + (.5)^2 (5)^2 + 2(.5) (.5) \rho_{xy} (4) (5)}$$

$$\sigma_{xy} = \sqrt{10.25 + 10\rho_{xy}}$$



Notes

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

$$\begin{aligned}\sigma_{xy} &= \sqrt{10.25 + 10 \rho_{xy}} \\ &= \sqrt{10.25 + 10(-1)} \\ &= 0.5\end{aligned}$$

**Case 2:  $\rho_{xy} = -0.4$** 

$$\begin{aligned}\sigma_{xy} &= \sqrt{10.25 + 10 \rho_{xy}} \\ &= \sqrt{10.25 + 10 (-0.4)} \\ &= 2.5\end{aligned}$$

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

$$\begin{aligned}\sigma_{xy} &= \sqrt{10.25 + 10 \rho_{xy}} \\ &= \sqrt{10.25 + 10(0)} \\ &= 3.2\end{aligned}$$

**Case 4:  $\rho_{xy} = 0.4$** 

$$\begin{aligned}\sigma_{xy} &= \sqrt{10.25 + 10 \rho_{xy}} \\ &= \sqrt{10.25 + 10 (0.4)} \\ &= 3.78\end{aligned}$$

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

$$\begin{aligned}\sigma_{xy} &= \sqrt{10.25 + 10 \rho_{xy}} \\ &= \sqrt{10.25 + 10 (1)} \\ &= 4.5\end{aligned}$$

We can conclude that the portfolio risk is minimal when the correlation coefficient is perfectly negative. It increases with an increase in the coefficient of correlation and becomes maximum when the returns on securities are perfectly positively correlated.

### 6.6.2 Relationship Between Coefficient of Correlation and Diversification

Diversification is based on the notion of spreading funds across different investment avenues to mitigate risk. The benefits of diversification can



be reaped when the returns of the securities that are held in a portfolio exhibit a less than perfect positive correlation. A lower correlation coefficient indicates more effective diversification for investors, helping to avoid unsystematic risk. When the returns of two securities forming a portfolio are negatively correlated, this is termed hedging. However, when the coefficient of correlation is perfectly negative, i.e.,  $-1$ , such securities are termed hedge assets. The relationship among diversification, correlation coefficient, and portfolio risk has been summarised below.

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

## 6.7 Portfolio Theories

Every investor in the marketplace is risk-averse, yet they vary in terms of their attitude towards risk and return. Some investors are conservative, while others are less risk-averse in terms of holding risk. The utility or satisfaction derived from the same security can differ among investors depending upon the degree of risk possessed by them. The main objective for every investor is to maximise his utility scores by constructing an optimal portfolio that offers maximum return and minimises overall



portfolio risk. Modern portfolio theories, such as Portfolio Theory, Capital Market Theory, etc., were proposed to guide the selection and construction of portfolios. These theories have been explained in detail in the following sections.

### 6.7.1 Portfolio Theory: The Harry Markowitz Model

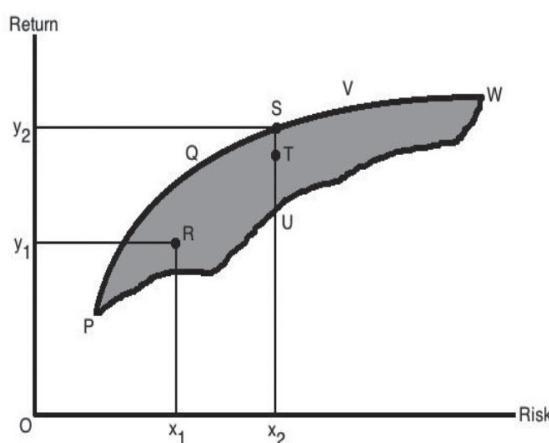
Harry Markowitz's pioneering work, titled "Portfolio Selection" was published in the Journal of Finance in 1952. He discussed the analytical and conceptual foundation for selecting an optimal portfolio by a rational investor, popularly known as the Markowitz Model or Mean-Variance Optimisation Model.

*Assumptions for the HM Model are as follows:*

- ◆ Investors are conservative, and inclined to avoid unnecessary risks.
- ◆ Portfolio analysis is conducted based on risk and return.
- ◆ Investors are rational, choosing those securities that provide maximum return with a minimum degree of risk.
- ◆ The decision to select an optimal portfolio is dependent on means (returns) and variance (risk).
- ◆ The utility scores of every investor are affected based on their different preferences towards risk and return.
- ◆ The financial markets are efficient, and investors have easy access to all the available information related to returns, risks, and coefficient of correlation between the securities.

#### Steps in Optimal Portfolio Selection

**(a) Setting the Risk–Return Opportunity Set:** The initial step is to create an investment opportunity set from the available securities in the financial market, offering an infinite number of possible portfolios. An investor's portfolio opportunity set depicts expected returns and associated risks for all the possible combinations that are formed from a set of available securities. A large number of portfolios can be constructed even with two securities by adjusting their weights only. As the number of securities increases, the possible portfolios will also grow exponentially.



**Figure 6.2: Investment Opportunity Set**

Figure 6.2 shows a shaded region PVWP, known as the investment opportunity region, which depicts the risk and returns for all the possible sets of portfolios, e.g., combination R represents  $x_1$  level of risk and  $y_1$  level of return. Each point within this region represents a particular portfolio. The region has many feasible portfolios in which investors can invest based on their risk appetite. Investors can invest in portfolio P, which has a minimum degree of risk, or in portfolio W, which provides maximum returns, or select another portfolio based on their minimum return expectations concerning their risk appetite.

**(b) Determining the Efficient Set of Portfolios:** The subsequent step involves identifying the efficient set of portfolios. The efficient set of portfolios is subject to two propositions:

- ◆ Among all the possible portfolios offering an equal expected return, an investor consistently opts for the one with the lowest degree of risk.
- ◆ Among all the possible portfolios having the same degree of risk, an investor consistently opts for the one with the highest expected return.

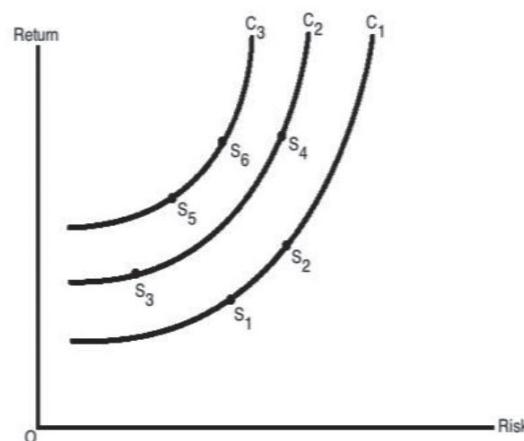
The collection of efficient portfolios is known as **Efficient Frontier**. In simple words, the efficient frontier is the graphical representation of all the optimal portfolios among the feasible portfolios. All efficient portfolios are feasible but all feasible portfolios are not efficient due to their



## Notes

risk–return profile. In Figure 6.2, the points aligning along the boundary PQSVW collectively form the efficient frontier. Portfolios to the right of this boundary are deemed inefficient as they possess a greater risk for the given level of return. Conversely, portfolios positioned at lower levels of the boundary are suboptimal, offering fewer returns for a given level of risk. Portfolio S dominates all other portfolios lying below it. All three portfolios, i.e., S, T, and U are providing the same degree of risk,  $x_2$  at different levels of returns. However, portfolio S has the highest return, i.e.,  $y_2$  at  $x_2$  level of risk, and hence, it is called an efficient portfolio.

**(c) Constructing Indifference Curves (IC) of the Investor:** Every investor aims to select an optimal portfolio for maximum utility. The indifference curve is used to analyse the level of satisfaction of an investor. The indifference curve (IC) assesses an investor's satisfaction level, revealing the risk–return trade-off. Investors are generally risk-averse, showing upward-sloping indifference curves. The slope of the IC varies with an investor's risk preference; a steeper slope indicates higher risk aversion, while a flatter slope suggests lower risk aversion. The main characteristic feature of an investor's utility curves is that they never intersect with each other and remain parallel. In Figure 6.3, an investor has three ICs,  $C_1$ ,  $C_2$ , and  $C_3$ , denoting different levels of risk and return. The utility on  $C_1$  is lowest and on  $C_3$  is highest. Points  $S_1$  and  $S_2$  are on the same IC, i.e.,  $C_1$ , so they provide the same amount of utility.



**Figure 6.3: Indifference Curves of a Risk-Averse Investor**

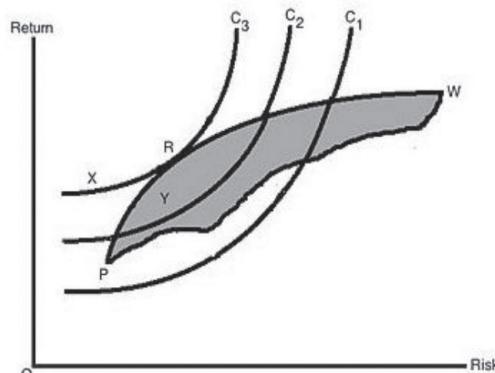


If the satisfaction increases, an investor will move to the higher IC, i.e.,  $IC_2$  and  $IC_3$ . The higher the IC, the more will be the utility.

**(d) Selecting the Optimal Portfolio:** The final step in portfolio selection involves choosing the optimal portfolio, aiming to maximise the investor's utility, i.e., to attain the highest IC. The optimal portfolio is the one that satisfies the following conditions:

- ◆ The portfolio must lie on an efficient frontier and
- ◆ The satisfaction of the investor is maximised.

Figure 6.4 shows the efficient frontier PRW on the indifference map. The indifference curves  $C_1$  and  $C_2$  are attainable but inferior, while  $C_3$  represents the desired satisfaction level. On  $C_3$ , portfolios R and X offer the same level of satisfaction. However, X is not lying on the efficient frontier; hence, it is not an efficient portfolio. Therefore, R would be the best/optimal portfolio, as it is on the efficient frontier as well as providing the maximum level of satisfaction to the investor.



**Figure 6.4: Selecting the Optimal Portfolio**

#### ***Limitations of the HM Model***

Firstly, the model requires an extensive amount of input data to assess a portfolio's risk and reward. If there are N securities in the portfolio, then N estimates of return, N standard deviations, and  $N(N - 1)/2$  covariances are required. Handling such a huge quantum of data poses a significant challenge. Furthermore, the model suggests that there are as many optimal portfolios as there are number of investors. However, this limitation is mitigated by incorporating a risk-free asset into the capital market.

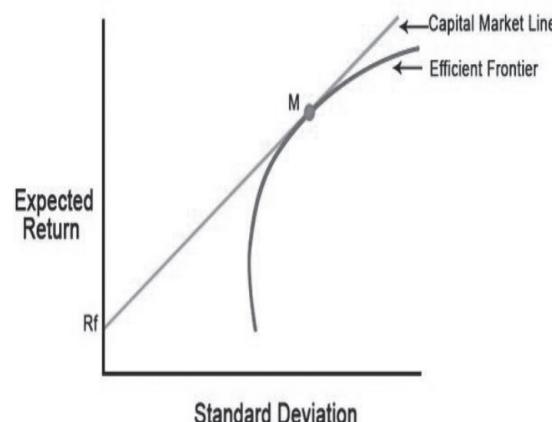


### 6.7.2 Capital Market Theory Model

The Capital Market Theory is an extension of the Portfolio Theory introduced by Sharpe in 1964, which incorporates risk-free lending and borrowing.

*Assumptions for the Capital Market Theory are as follows:*

- ◆ Investors behave rationally and assess risk and return to make investment decisions.
- ◆ Infinitely divisible securities.
- ◆ No limits on short sales/selling.
- ◆ A large number of investors and their buying or selling behaviour do not affect the price of the security.
- ◆ Frictionless markets, i.e., no transaction costs or taxes.
- ◆ The presence of risk-free assets along with risky assets in the market.
- ◆ Investors have uniform or identical expectations of returns, return variances, and covariances for all the security pairs. This is an important assumption for ensuring a unique efficient frontier.



**Figure 6.5: Capital Market Line**

Figure 6.5 shows that the efficient frontier is concave in shape. When a risk-free asset is introduced in the capital market, the efficient frontier transforms into a straight line originating from the risk-free return on the Y axis. This straight line is known as the Capital Market Line, which is tangent to the original efficient frontier at point M.



The CML is given by the following equation:

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

where

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

$R_f$  = risk-free rate of interest

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

$\sigma_p$  = standard deviation of the portfolio

$\sigma_m$  = standard deviation of the market portfolio.

The capital market line shows the return of the portfolio is equal to the risk-free rate plus a risk premium. The higher the risk, the higher the expected return.

#### The Characteristic Features of CML are as Follows:

- ◆ The CML shows a direct relationship between portfolio risk ( $\sigma_p$ ) and expected return  $E(R_p)$ .
- ◆ CML originates from  $R_f$ , hence the slope of CML is determined by the risk-free rate.
- ◆ It represents the reward-to-variability ratio, measured as  $[E(R_m) - R_f]/\sigma_m$ .
- ◆ CML is tangent to the original efficient frontier at point M, i.e., the optimal portfolio of risky assets or the market portfolio.
- ◆ Only efficient portfolios lie on CML consisting of risk-free assets and portfolios of risky assets.

*Example 4:* The information on the portfolios is available to an investor:

Portfolio	$E(R)$	$\sigma$
P	8%	3%
Q	12%	5%
R	11%	4%

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



*Solution:*

To check if these are efficient portfolios, we have to calculate the expected return as per CML.

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

Portfolio	$E(R)$ (given)	$E(R)$ as per CML	Efficient Portfolio or not
P	8%	$4 + (12 - 4)3/5 = 8.8\%$	Not efficient
Q	12%	$4 + (12 - 4)5/5 = 12\%$	Efficient
R	11%	$4 + (12 - 4)4/5 = 10.4\%$	Not efficient

Portfolio Q is considered efficient as its estimated return is equal to the return calculated by the Capital Market Line (CML). Both P and R are not efficient portfolios in the capital market. Portfolio P, with an actual return of 8% below the CML estimate, is considered overpriced. Conversely, Portfolio R, with an actual return of 11% exceeding the CML estimate, is considered underpriced.

### 6.7.3 Capital Asset Pricing Model (CAPM)

CAPM was discussed independently by Sharpe (1964), Lintner (1965), and Mossin (1966) in their research papers. CAPM is an extension of Capital Market Theory, which is used to predict the expected return on a security or portfolio. It helps assess whether a security is outperforming or underperforming in comparison to the expected return. CAPM establishes a direct link between the expected return and systematic risk, denoted by  $\beta$ . With two types of risks, systematic and unsystematic, the latter can be diversified through portfolio construction while the former cannot. Hence, as per this model, an investor must be rewarded for bearing the systematic risk only.

CAPM is given by the following equation:

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



where

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

$R_f$  = Risk-free rate of return

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

$\beta_i$  = Beta coefficient of security i, a measure of systematic risk

According to CAPM,

**Expected Return = Risk-free rate + Market risk premium**

In other words, it can be written as

**Expected Return = Reward for Time + Reward for Risk**

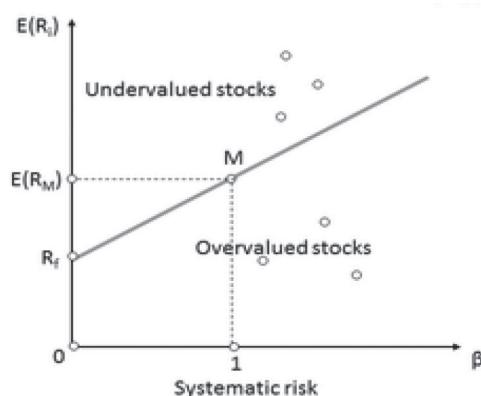
*Example 5:* Calculate the expected return for a security X using CAPM. The required information is given below:

$$R_f = 7\% \quad R_M = 14\% \quad \beta_i = 0.70$$

*Solution:*

$$\begin{aligned} E(R_X) &= R_f + [E(R_M) - R_f] \beta_x \\ &= 0.07 + (.14 - 0.07) * .70 \\ &= 11.9\% \end{aligned}$$

The graphical representation of CAPM is done through the security market line. It is a straight line, which shows a linear relationship between the expected return on security and the systematic risk. The slope of SML is the market risk premium, i.e.,  $[E(R_M) - R_f]$ .



**Figure 6.6: Security Market Line**



## Notes

As shown in Figure 6.6, all the fairly priced securities are plotted on the SML. The assets above the line are undervalued because, for a given amount of risk (beta), they earn a higher return. The assets below the line are overvalued because, for a given amount of risk, they earn a lower return.

*Example 6:* From the information given below, find out which of the securities are underpriced or overpriced in terms of the SML equation:

Security	Actual Return (%)	Beta
A	8	0.5
B	20	1.2
C	15	1.0
D	22	1.6
E	24	2.0

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

*Solution:* As per SML,

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

Security	Actual Return (%)	Beta	Return as per SML	Underpriced/ Overpriced
A	8	0.5	$6 + (15 - 6) * 0.5$ = 10.5	Overpriced
B	20	1.2	$6 + (15 - 6) * 1.2$ = 16.8	Underpriced
C	15	1.0	$6 + (15 - 6) * 1.0$ = 15	Fairly priced
D	22	1.6	$6 + (15 - 6) * 1.6$ = 20.4	Underpriced
E	24	2.0	$6 + (15 - 6) * 2$ = 24	Fairly priced

Security A is overpriced as its actual return is lower than the SML-calculated return, thus it is recommended to be sold. However, securities



B and D are underpriced and advisable for purchase. Securities Q and S have actual returns equal to the CAPM return, and therefore, they are correctly priced.

### IN-TEXT QUESTIONS

4. If two assets in a portfolio have a correlation coefficient of  $-1$ , what does this imply?
  - (a) The assets have no relationship
  - (b) The assets move in the same direction
  - (c) The assets move in opposite directions
  - (d) The correlation coefficient cannot be  $-1$
5. In the CAPM, what happens to an asset's expected return if its beta increases?
  - (a) Increase
  - (b) Decreases
  - (c) No change in expected return
  - (d) Cannot be determined
6. In the CAPM formula,  $R_f + [E(R_M) - R_f] \beta_i$ 
  - (a) Market risk premium
  - (b) Risk-free rate
  - (c) Beta coefficient
  - (d) Total risk

### 6.8 Solved Illustrations

*Question 1:* An investor allocates his funds in securities S and T, whose details are given below:

	Security S	Security T
$E(R)$	7%	20%
Risk ( $\sigma$ )	8%	14.9%
Weight (W)	30%	70%



## Notes

The covariance between the returns of the securities is 90. Find out the portfolio's risk and return. Also, find the correlation between the returns of X and Y.

*Solution:*

**(a) Portfolio Return**

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

$$E(R_p) = .30 \times 7 + .70 \times 20$$

$$E(R_p) = 16.1\%$$

**(b) Portfolio Risk**

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

$$\sigma_{xy} = \sqrt{(0.3)^2 (8)^2 + (.7)^2 (14.9)^2 + 2 (.3) (.7) 90}$$

$$\sigma_{xy} = 12.34\%$$

**(c) Correlation Between the Returns:**

$$\text{Cov}_{xy} = \rho_{xy} \sigma_x \sigma_y$$

$$90 = \rho_{xy} (8) (14.9)$$

$$\rho_{xy} = 0.75$$

*Question 2:* Consider a portfolio with two assets, P and Q, with the following details:

Asset A -  $E(R)$ : 10%       $\sigma$ : 15%      Weight of Security A: 0.6

Asset B -  $E(R)$ : 12%       $\sigma$ : 18%      Weight of Security A: 0.4

$$\rho_{xy} = 0.4$$

*Solution:*

**(a) Portfolio Return**

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

$$E(R_p) = .60 \times 10 + .40 \times 12$$

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

**(a) Portfolio Risk**

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

$$\sigma_{xy} = \sqrt{(0.6)^2 (15)^2 + (.4)^2 (18)^2 + 2 (.6) (.4) (0.4) (15) (18)}$$

$$\sigma_{xy} = 13.6\%$$

*Question 3:* Mr. Modi is investing in securities X and Y, whose details are given below:

	Security X	Security Y
$E(R)$	10%	15.5%
$\sigma$	3%	7%
Weight	40%	60%

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

*Solution:*

**(a) Portfolio Return**

$$E(R_p) = .40 \times 10 + .60 \times 15.5$$

$$E(R_p) = 13.3\%$$

**(b) Portfolio Risk**

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

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

$$\sigma_{xy} = \sqrt{(0.4)^2 (3)^2 + (.6)^2 (7)^2 + 2 (.4) (.6) (-1) (3) (7)}$$

$$\sigma_{xy} = 3\%$$

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

$$\sigma_{xy} = \sqrt{(0.4)^2 (3)^2 + (.6)^2 (7)^2 + 2 (.4) (.6) (1) (3) (7)}$$

$$\sigma_{xy} = 5.4\%$$

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

	Security X	Security Y
$E(R)$	10%	12%
$\sigma$	20%	24%



## Notes

The coefficient of correlation between the returns of two securities is 0.3. An investor has to decide about the portfolio of X and Y as 20% + 80% or 80% + 20%. Which one should he accept?

*Solution:*

**For 80% + 20% portfolio of X and Y:**

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

$$E(R_{xy}) = .80 \times 10 + .20 \times 12$$

$$E(R_{xy}) = 10.4\%$$

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

$$\sigma_{xy} = \sqrt{(0.80)^2 (20)^2 + (.20)^2 (24)^2 + 2 (.80) (.20) (0.3) (20) (24)}$$

$$\sigma_{xy} = 18.03\%$$

**For 20% + 80% portfolio of X and Y:**

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

$$E(R_{xy}) = .20 \times 10 + .80 \times 12$$

$$E(R_{xy}) = 11.6\%$$

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

$$\sigma_{xy} = \sqrt{(0.20)^2 (20)^2 + (.80)^2 (24)^2 + 2 (.20) (.80) (0.3) (20) (24)}$$

$$\sigma_{xy} = 20.75\%$$

An investor will choose the one which is less risky by calculating the coefficient of variation.

$$\begin{aligned} CV_{(80,20)} &= \sigma_{xy}/R \\ &= 18.03/10.4 \\ &= 1.73 \end{aligned}$$

$$\begin{aligned} CV_{(20,80)} &= \sigma_{xy}/R \\ &= 20.75/11.6 \\ &= 1.79 \end{aligned}$$

It is concluded that the investor should prefer the portfolio having weights of 80% + 20% respectively. The CV of the other portfolio is slightly higher, hence making it a risky investment.



Question 5: The information on three portfolios is available to an investor. Comment on whether these portfolios are efficient or not.

Portfolio	E(R)	$\sigma$
A	19%	16%
B	40%	30%
C	29%	18%

$$R_f = 7\% \quad R_m = 18\% \quad \sigma_m = 10\%$$

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

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

Portfolio	E(R) (given)	E(R) as per CML	Efficient Portfolio or not
A	19%	$7 + (18 - 7)16/10$ = 24.6%	Not efficient
B	40%	$7 + (18 - 7)30/10$ = 40%	Efficient
C	29%	$7 + (18 - 7)18/10$ = 26.8%	Not efficient

Portfolio B is considered efficient as its estimated return is equal to the return calculated by the Capital Market Line (CML). Both A and C are not efficient portfolios in the capital market. Portfolio A, with an actual return of 19% below the CML estimate, is considered overpriced. Conversely, Portfolio C, with an actual return of 29% exceeding the CML estimate, is considered underpriced.

Question 6: The risk-free rate of interest is 5% and the return on the market portfolio is 17%. The risk of the market portfolio is 10%. An investor has constructed a portfolio having a risk of 8%. Find out the expected return as per CML.



Notes

*Solution:*

$$\begin{aligned}E(R_p) &= \frac{R_f + \sigma_p * (ER_m - R_f)}{\sigma_m} \\&= \frac{5 + (17 - 5) * 8}{10} \\&= 5 + 9.6 \\&= \mathbf{14.6\%}\end{aligned}$$

*Question 7:* The risk-free rate is 5% and the market risk premium is 10%, and the beta of the security is 1.3. What is the expected return of the security under CAPM?

*Solution:*

$$\begin{aligned}E(R_x) &= R_f + [E(R_M) - R_f] \beta_x \\&= 5 + (10) * 1.3 \\&= \mathbf{18\%}\end{aligned}$$

*Question 8:* Find out the expected return of the following securities if the prevailing interest rate on Govt. securities is 7% and the rate of return on the market index is 10%. The beta factors of security A, B, and C are 1, 1.25, and 1.50, respectively.

*Solution:*

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

**Expected Return for Security A**

$$\begin{aligned}&= 7 + (10 - 7) * 1 \\&= 10\%\end{aligned}$$

**Expected Return for Security B**

$$\begin{aligned}&= 7 + (10 - 7) * 1.25 \\&= 10.75\%\end{aligned}$$

**Expected Return for Security C**

$$\begin{aligned}&= 7 + (10 - 7) * 1.50 \\&= 11.50\%\end{aligned}$$



## 6.9 Summary

Portfolio management involves diversifying investments across various financial securities to minimise risk. This process includes formulating, maintaining, revising, and continuously evaluating a portfolio. It starts with portfolio analysis, which assesses the efficiency of different portfolios in terms of risk and return profile of the investor. Portfolio theories, i.e., Harry Markowitz Model and Capital Market Theory are discussed in the literature and have been used by an investor to select an optimal portfolio. Continuous monitoring of the portfolio to track changes in the financial environment takes place. Finally, the evaluation of a portfolio is the last step as well as an integral part of the portfolio management process. Portfolio evaluation is a dynamic process aimed at determining whether the selected efficient portfolios have been reaping the desired return or not.

## 6.10 Answers to In-Text Questions

1. (a) Portfolio
2. (c) Reducing overall risk through a variety of investments
3. (a) True
4. (c) The assets move in opposite directions
5. (a) Increase
6. (a) Market risk premium

## 6.11 Self-Assessment Questions

1. Define a portfolio. Explain its significance in investment.
2. What is portfolio management? Outline the steps involved in managing a portfolio.
3. How do the coefficient of correlation, portfolio risk, and diversification contribute to the informed decision-making process?
4. Explain Harry Markowitz Theory along with its assumptions and limitations.
5. Explain the distinctive features of the Capital Market Line.



## Notes

6. Explain the Capital Asset pricing model along with its assumptions and limitations.
7. The expected return and risk of M and N are given below:

	Security M	Security N
$E(R)$	20%	15%
$\sigma$	15%	8%

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

(Ans. – Portfolio return = 18.75%, Portfolio risk = 12.73%)

8. Mr. Keshav has two securities for his portfolio, whose details are given below:

	Security X	Security Y
$E(R)$	15%	19%
$\sigma$	5%	7%

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

(Ans. – Portfolio return = 17.4%, Maximum risk = 6.2%, Minimum risk = 2.2%)

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

(Ans. – Covariance<sub>ST</sub> = 0.0045)

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

(Ans. –  $\rho_{AB}$  = 0.167)

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

(Ans. –  $E(R_p)$  = 15.28%)



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

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

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

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

## 6.12 References

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## 6.13 Suggested Readings

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# Portfolio Management

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## STRUCTURE

- 7.1 Learning Objectives**
- 7.2 Introduction**
- 7.3 Traditional Portfolio Management for Individuals**
- 7.4 Factors for Traditional Portfolio Management for Individuals**
- 7.5 Approaches to Asset Allocation**
- 7.6 Summary**
- 7.7 Answers to In-Text Questions**
- 7.8 Self-Assessment Questions**
- 7.9 References**
- 7.10 Suggested Readings**

### 7.1 Learning Objectives

- ◆ Understand the concept of traditional portfolio management for individuals.
- ◆ Examine the objectives of traditional portfolio management.
- ◆ Analyze the types of asset allocation.
- ◆ Differentiate between active and passive portfolio management services.



## 7.2 Introduction

Portfolio management involves the strategic management of investments to achieve specific financial objectives. It includes selecting and managing a mix of assets—such as stocks, bonds, and commodities—while considering risk tolerance, time horizon, and desired returns. The goal is to optimize the portfolio's performance while minimizing risk through diversification, asset allocation, and ongoing monitoring and rebalancing. Marko Wiz analyzed the implications of the fact that the investors seek high expected return and wish to avoid risk. This is the base of all scientific portfolio management. The basic idea behind portfolio formulation is holding securities in different asset classes to spread and minimize risk. One should not put all his/her eggs in one basket. This process of creating portfolio is called diversification. A rational investor tries to make the most efficient portfolio. Portfolio efficiency depends on expected risk and return. Portfolio management is about SWOT (strength, weakness, opportunities, and threats) analysis of the choice of debt vs. equity, domestic vs. international, growth vs. safety, and various other trade-offs in order to maximize return at a given preference for risk.

## 7.3 Traditional Portfolio Management for Individuals

Traditional portfolio management recognizes the importance of risk and return. The traditional approach to portfolio management involves the following two decisions:

1. Determination of portfolio objectives
2. Selection of securities

Traditional portfolio management for individuals typically involves a hands-on approach by either the individual investor or a financial advisor. It often includes:

1. **Asset Allocation:** Determining the ideal mix of assets based on the investor's risk tolerance, financial goals, and time horizon.
2. **Diversification:** Spreading investments across different asset classes, industries, or geographic regions to reduce risk. Portfolio diversification is based on investor's need for income and risk tolerance.



3. **Security Selection:** Selection of portfolio depends on various objectives of investors. They choose specific stocks, bonds, mutual funds, or other assets that align with the investment strategy. If the main objective is to earn regular income, the investor will invest more in debt. If appreciation of capital is the main objective, then investors will invest in long-term debt and not in short-term debt.
4. **Regular Monitoring and Rebalancing:** Reviewing the portfolio periodically to ensure it stays aligned with the investor's objectives and making adjustments as needed.
5. **Risk Management:** Employing strategies to mitigate risks and potentially hedge against market downturns.
6. **Performance Evaluation:** Assessing the portfolio's performance against benchmarks or goals and making changes accordingly.

This approach often requires active decision-making and ongoing management to adapt to changing market conditions and investor circumstances.

#### DO YOU KNOW

##### What are the phases of portfolio management?

1. Specification of constraints and investment objectives
2. Choice of asset-mix
3. Formulation of portfolio strategy
4. Choice of securities
5. Portfolio execution
6. Portfolio revision
7. Portfolio evaluation

#### 7.4 Factors for Traditional Portfolio Management for Individuals

1. **Objectives:** Understanding the investor's goals, whether it's wealth accumulation, retirement planning, income generation, or capital preservation.
2. **Constraints:** Identifying limitations or restrictions such as risk tolerance, legal or regulatory constraints, and ethical considerations that may impact investment choices.



- 3. Time Horizon:** Assessing the period over which the investor plans to achieve their financial goals—short-term (less than 3 years), intermediate (3–10 years), or long-term (10+ years).
- 4. Current Wealth:** Evaluating the investor's existing assets, income, liabilities, and expenses to determine the available resources for investment.
- 5. Tax Considerations:** Considering the impact of taxes on investment returns and employing strategies to minimize tax liabilities, such as utilizing tax-advantaged accounts or tax-efficient investment vehicles.
- 6. Liquidity Requirements:** Assessing the need for access to funds in the short term and ensuring a balance between investments that offer potential returns and those that provide immediate liquidity.
- 7. Anticipated Inflation:** Recognizing the effect of inflation on purchasing power and aiming for investments that outpace or at least keep pace with inflation to preserve the real value of wealth over time.

Balancing these elements is crucial in constructing a portfolio that aligns with an individual's financial objectives while managing risk and meeting specific constraints.

#### IN-TEXT QUESTIONS

1. The main objective of portfolio is to reduce \_\_\_\_\_ by diversification.
  - (a) Return
  - (b) Risk
  - (c) Uncertainty
  - (d) Percentage
2. A combination of various investment products like bonds, shares, securities, mutual funds, and so on is called as \_\_\_\_\_ .
  - (a) Portfolio
  - (b) Investment
  - (c) Speculation
  - (d) Gambling

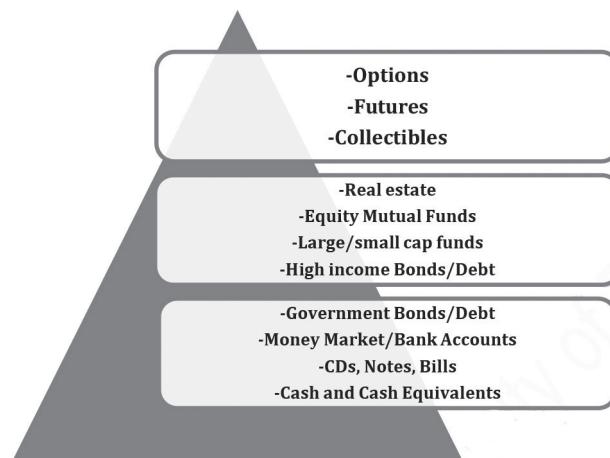


## 7.5 Approaches to Asset Allocation

Asset allocation refers to the distribution of investments across different asset classes, such as stocks, bonds, cash, and alternative investments. Two common approaches to asset allocation are the asset allocation pyramid and the investor life cycle approach.

### 1. Asset Allocation Pyramid

- ◆ This approach visualizes asset allocation in a hierarchical pyramid. At the base, the largest portion of the portfolio consists of low-risk, stable assets like cash and fixed-income securities. The foundation of this pyramid is the strongest portion, as it supports everything above it. This area includes those investments which have a low risk.
- ◆ As you move up the pyramid, the allocation shifts toward higher risk and potentially higher return assets like equities or real estate. This area includes medium-risk investments. These investments have stable return with capital appreciation. These risks are comparatively riskier than base of the pyramid, but these investments are relatively safe.
- ◆ The pyramid emphasizes a foundation of less volatile assets to provide stability and then builds upward with riskier assets to potentially enhance returns. This area is the smallest area with high-risk investments.



**Figure 7.1: Asset Allocation Pyramid**



## 2. Investor Life Cycle Approach

- ◆ This method tailors asset allocation based on an investor's stage in life. It typically divides an investor's life into stages such as early career, mid-career, pre-retirement, and retirement.
- ◆ In early stages, when an investor has a longer time horizon, there might be a higher allocation to growth-oriented assets like stocks.
- ◆ As the investor ages and approaches retirement, the allocation tends to shift toward more conservative assets to preserve wealth and generate income, often favoring fixed-income securities.

Both approaches aim to balance risk and return based on an investor's risk tolerance, time horizon, and financial goals. The choice between these methods often depends on an individual's preferences, risk appetite, and investment objectives.

### 7.5.1 *Passive Portfolio Management Strategies*

Passive strategies do not outperform the market, but the emphasis is on minimizing transaction costs and time spent in managing the portfolio. Passive investors act as if the market is efficient and accept the consensus estimates of return and risk, accepting the current market price as the best estimate of a security's value. According to the efficient market hypothesis, security prices are always near to their fair/intrinsic value or justified economic value. Economic value is calculated by investors' expectations about risks, earnings, etc. In an efficient market, with the arrival of new information, prices adjust quickly to the new information.

#### (a) Index Funds:

These funds aim to replicate the performance of a specific market index (e.g., S&P 500, FTSE 100) by holding the same securities in the same proportions as the index. They offer broad market exposure at low costs.

1. **Diversification:** Index funds provide exposure to a wide range of stocks or securities that constitute the index they track. This inherent diversification helps spread risk across multiple assets and reduces the impact of individual stock performance on the overall portfolio.



2. **Low Costs:** These funds typically have lower expense ratios compared to actively managed funds because they follow a passive investment strategy. With fewer trading activities and lower management involvement, index funds often have lower fees and expenses, which can significantly impact long-term returns.
3. **Consistent Performance:** While they aim to match the performance of a specific index, index funds generally offer consistent and predictable returns that closely mirror the market index they track. While they might not beat the market, they aim to replicate it.
4. **Transparency:** Index funds usually hold a portfolio that replicates the index composition, making their holdings transparent and easily accessible to investors. This transparency allows investors to know exactly what stocks or assets they are investing in.
5. **Long-Term Strategy:** Index funds are suitable for investors with a long-term investment horizon. By holding investments for an extended period, investors can benefit from the overall growth of the market over time.
6. **Passive Management:** As they follow a passive investment strategy, index funds require minimal day-to-day management. This approach can be appealing to investors who prefer a hands-off approach to investing and don't want to spend time on active trading or stock selection.
7. **Historical Performance:** Over the long term, many index funds have shown competitive performance compared to actively managed funds. While they may not outperform the market, they often deliver returns in line with the index they track, which can be attractive for investors seeking stable, market-matching returns.

#### (b) Systematic Investment Plans (SIPs):

SIPs involve investing a fixed amount regularly (weekly, monthly, etc.) regardless of market conditions. It's a disciplined approach to investing and benefits from rupee cost averaging, buying more units when prices are low and fewer units when prices are high.

#### Benefits of Systematic Investment Plans (SIPs):

1. **Regular Investments:** SIPs encourage disciplined and regular investing, allowing investors to accumulate wealth gradually by investing small amounts over time.



- 2. Rupee Cost Averaging:** By investing a fixed amount at regular intervals, SIPs enable investors to buy more units when prices are low and fewer units when prices are high, averaging out the cost per unit over time.
- 3. Risk Mitigation:** SIPs can help reduce the impact of market volatility on investments as the fixed amount is invested at regular intervals, irrespective of market conditions.
- 4. Long-Term Wealth Creation:** SIPs are suitable for individuals looking for long-term wealth creation and are considered a convenient way to participate in the financial markets regularly.

### 7.5.2 Active Portfolio Management Strategies

The investors, who don't accept the efficient market hypothesis (EMH) or have doubts, use active investment strategies. They believe in the identification of undervalued stocks and lag in the market's adjustment of these stocks' prices to new and better information. Such investors incur more search costs and transaction costs, and they believe that the benefits outweigh the marginal costs incurred. The quest for active strategies assumes that investors have some advantages in the form of superior analytical or judgment skills and superior information compared to other investors.

#### (a) Market Timing:

This involves making investment decisions based on predictions about future market movements. Investors try to buy and sell assets at optimal times to take advantage of anticipated market trends. However, it's challenging to consistently predict market movements accurately.

This is also called dynamic asset allocation. In this strategy, one purchases stocks/bonds before these assets have positive returns and sell them prior to the time when they have negative returns.

#### Examples of Market Timings:

- 1. Buying Low and Selling High:** An investor might try to time the market by buying stocks when prices are perceived to be low, anticipating future appreciation, and selling them when prices are high to lock in gains.
- 2. Sector Rotation:** Some investors try to predict which sectors will outperform the market and shift their investments accordingly. For



instance, moving investments from technology stocks to healthcare stocks based on market predictions.

3. **Market Corrections:** During market corrections or downturns, investors might attempt to time the market by purchasing stocks at what they believe to be the bottom of the market cycle to benefit from the potential rebound.

#### (b) Style Investing:

Investors using this approach focus on specific styles or factors like value, growth, momentum, or size when selecting investments. For instance, value investing targets undervalued stocks, while growth investing focuses on companies with strong growth potential.

#### Some Common Styles in Style Investing Include:

1. **Value Investing:** This style focuses on identifying undervalued stocks or assets that are trading below their intrinsic value. Value investors seek companies with low price-to-earnings ratios, low price-to-book ratios, or strong fundamentals compared to their market price.
2. **Growth Investing:** Growth investors target stocks or assets of companies expected to have above-average growth rates in earnings, revenue, or cash flow. These companies might reinvest earnings rather than paying dividends to fuel further growth.
3. **Quality Investing:** Quality investors look for companies with strong fundamentals, stable earnings, low debt, consistent profitability, and robust management. These companies are typically considered to have resilient business models.
4. **Momentum Investing:** Momentum investors focus on stocks or assets that have demonstrated strong recent performance. They believe that assets that have performed well recently will continue to do so in the short term.
5. **Dividend Investing:** Dividend investors prioritize stocks of companies that regularly pay dividends. They seek stable and consistent dividend-paying companies to generate income from their investments.
6. **Contrarian Investing:** Contrarian investors go against prevailing market trends. They seek opportunities in assets or sectors that are undervalued or unpopular due to market sentiment but have the potential for future growth.



Each style has its own set of criteria and strategies for selecting investments. Investors might adopt a single style or combine multiple styles in their portfolio to achieve diversification and balance. However, it's important to note that each style may perform differently under various market conditions, and no single style consistently outperforms others in all market environments. Investors often choose a style or combination of styles that align with their risk tolerance, investment objectives, and beliefs about market behavior.

Both passive and active strategies have their merits and drawbacks. Passive strategies typically have lower fees, while active strategies rely on the skills and insights of fund managers. The choice between the two often depends on an investor's preferences, risk tolerance, and belief in the efficiency of markets.

#### IN-TEXT QUESTIONS

3. Pursuit of an \_\_\_\_\_ strategy assumes that investors possess some advantage relative to other market participants.
4. The asset allocation decision refers to the allocation of \_\_\_\_\_ assets to \_\_\_\_\_ asset markets.
5. The foundation of the investment pyramid represents the \_\_\_\_\_ portion.

#### 7.6 Summary

Portfolio means a collection or combination of financial assets (or securities) such as shares, debentures, and government securities. Most people have a portfolio, or collection of assets. Such a collection may include real assets like a refrigerator, house, or automobile and financial assets like stocks and bonds. The portfolio formulation could be the consequence of several random actions that are unrelated, or it might be the outcome of careful planning. The asset-allocation design will determine results in both short- and long-term periods. What's more, both risk and returns will be driven far more by asset allocation than stock selection or market timing. The asset allocation decision refers to the allocation of portfolio assets to broad asset markets; in other words, how much of



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the portfolio's funds are to be invested in stocks, how much in bonds, money market assets, and so forth.

### 7.7 Answers to In-Text Questions

1. (b) Risk
2. (a) Portfolio
3. Active
4. Portfolio, broad
5. Strongest

### 7.8 Self-Assessment Questions

1. Why asset allocation is considered a critical factor in portfolio performance?
2. What is the traditional approach of portfolio management? What are the factors affecting it?
3. Differentiate between active and passive portfolio management strategies.
4. What are the approaches to asset allocation?
5. Explain the following:
  - (a) Style Investing
  - (b) SIP
  - (c) Market Timing
  - (d) Index Funds

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## 7.10 Suggested Readings

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# Asset Pricing Models

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## STRUCTURE

- 8.1** *Learning Objectives*
- 8.2** *Introduction*
- 8.3** *Risk*
- 8.4** *Capital Asset Pricing Model (CAPM)*
- 8.5** *Assumptions of CAPM*
- 8.6** *Limitations of CAPM*
- 8.7** *The CAPM and the Efficient Frontier*
- 8.8** *Security Market Line (SML)*
- 8.9** *Arbitrage Pricing Theory (APT)*
- 8.10** *Summary*
- 8.11** *Answers to In-Text Questions*
- 8.12** *Self-Assessment Questions*
- 8.13** *References*
- 8.14** *Suggested Readings*

### 8.1 Learning Objectives

- ◆ Understand the concept of asset pricing models and their significance in finance.
- ◆ Differentiate between various asset pricing models and their applications.
- ◆ Analyze the role of risk in asset pricing and investment decisions.
- ◆ Evaluate the Capital Asset Pricing Model (CAPM) and its underlying principles.
- ◆ Identify the key assumptions underlying the CAPM.
- ◆ Recognize the limitations associated with the CAPM.



- ◆ Understand the relationship between the CAPM and the efficient frontier.
- ◆ Explain the concept of the security market line (SML) and its importance.
- ◆ Explore the arbitrage pricing theory (APT) and its relevance in asset pricing.

## 8.2 Introduction

Asset pricing models are theoretical frameworks used in finance to determine the fair market value of financial assets. These models attempt to quantify the relationship between risk and return, helping investors make informed decisions about how to allocate their capital. There are several well-known asset pricing models, each with its own assumptions and implications. Here are some of the key ones:

1. **Capital Asset Pricing Model (CAPM):** CAPM is a widely used model that relates the expected return on an asset to its systematic risk, as measured by beta. The formula for CAPM is:  
$$\text{Expected return} = \text{Risk-free rate} + \beta \times (\text{Market return} - \text{Risk-free rate})$$
2. **Arbitrage Pricing Theory (APT):** APT is an alternative to CAPM and suggests that an asset's return can be modeled as a linear function of various macroeconomic factors. Unlike CAPM, APT does not rely on a specific market index and allows for multiple sources of systematic risk.
3. **Fama–French Three-Factor Model:** Developed by Eugene Fama and Kenneth French, this model extends the CAPM by incorporating two additional factors: the size effect (SMB—small minus big) and the value effect (HML—high minus low). It aims to better explain the variation in stock returns.
4. **Carhart Four-Factor Model:** An extension of the Fama–French model, the Carhart model includes a momentum factor (UMD—up minus down) in addition to the size, value, and market factors.
5. **Black–Scholes Model:** While primarily used for pricing European-style options, the Black–Scholes model also plays a role in understanding the pricing of financial assets. It assumes constant volatility and no transaction costs.



- 6. Multifactor Models:** Beyond the three- or four-factor models mentioned above, researchers and practitioners may develop models with more factors to account for specific risk factors relevant to a particular market or investment strategy.

These models help investors and analysts assess the risk and expected return associated with an investment. It is important to note that these models are simplifications of real-world complexities and are based on various assumptions that may not always hold true. Investors often use a combination of models and judgment to make well-informed investment decisions.

In this lesson, we will only encapsulate CAPM and APT models.

### 8.3 Risk

Risk in the context of investments is the deviation or change in actual returns from the expected returns. It encompasses the potential of losing some or all of the initial investment. Every investment inherently carries some degree of risk, and each investor possesses a distinct risk profile dictating their capacity and willingness to endure such uncertainties. Generally, as the level of investment risk escalates, investors anticipate higher returns as compensation for shouldering additional uncertainties.

While it is true that no security is entirely without risk, certain investments are considered relatively risk-free, such as Treasury bills (T-bills), public provident fund, and other low-risk securities. Despite this, it is essential to acknowledge that absolute zero risk is elusive.

Risk can be broadly categorized into two types: systematic risk and unsystematic risk. Systematic risk, also known as non-diversifiable risk, emanates from factors beyond the control of an individual company. Efficient diversification of a portfolio cannot mitigate systematic risk, which is often synonymous with market risk. Examples include macroeconomic factors like GDP, interest rates, and inflation. Systematic risk is quantified by the beta coefficient ( $\beta$ ), which gauges a security's responsiveness to market returns. Conversely, unsystematic risk, or diversifiable risk, is the portion of total risk that can be eliminated through efficient diversification. It is influenced by factors within a company's control, such as management decisions, operational efficiency, and financial leverage. Diversification involves



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incorporating a mix of securities that are not perfectly correlated or even negatively correlated, thereby reducing or eliminating unsystematic risk. Beta ( $\beta$ ) serves as an indicator of systematic risk. In an optimally diversified portfolio, unsystematic risk is eradicated, leaving only systematic risk. Thus, the market only prices in systematic risk.

- ◆ If  $\beta > 1$ , it signifies a security's heightened responsiveness to market fluctuations.
- ◆ If  $\beta < 1$ , then the security is less responsive to the changes in the market return.
- ◆ A risk-free asset, being impervious to market risk, boasts a  $\beta$  of zero.
- ◆ The market portfolio's  $\beta$  is always 1, as it is compared to itself.

For instance, if a security has a  $\beta$  of 0.90, it implies that a 10% increase or decrease in the market return will result in a corresponding 9% rise or fall in the security's returns. This relationship underscores the significance of understanding  $\beta$  to assess the systematic risk associated with an investment.

$\beta$  of a security can be calculated as:

$$\beta = \frac{\text{Cov}(S, M)}{\sigma_M^2}$$

*Illustration 8.1:* Following Information Is Available in Respect of a Security  $G$  and the Market Portfolio  $M$

Probabilities	Security G	Market Portfolio M
0.3	10	12
0.4	12	15
0.3	14	18

Find out  $\beta$  of security G.

*Solution:*

Pi	G	M	PiG	PiM	Pi(G - exp G) <sup>2</sup>	Pi(M - exp M) <sup>2</sup>	Pi(G - exp G)(M - exp M)
0.3	10	12	3	3.6	1.2	2.7	1.8
0.4	12	15	4.8	6	0	0	0
0.3	14	18	4.2	5.4	1.2	2.7	1.8
			$\sum = 12$	$\sum = 15$	$\sum = 2.4$	$\sum = 5.4$	$\sum = 3.6$

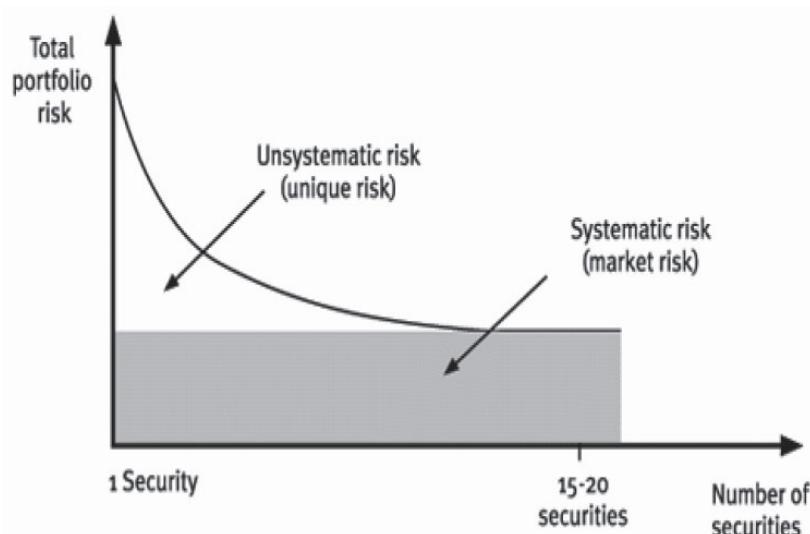


Illustration 8.1 shows that:

Mean return of  $G = 12\%$ , mean market return =  $15\%$ , variance of  $G = 2.4 \text{ sq. \%}$ , variance of  $M = 5.4 \text{ sq. \%}$ , covariance =  $3.6 \text{ sq. \%}$ .

$$\beta = \text{Cov}/\text{Market variance} = 3.6/5.4 = 0.67$$

Hence,  $\beta$  of security  $G$  is 0.67.



**Figure 8.1: No. of Securities and Risks**

#### 8.4 Capital Asset Pricing Model (CAPM)

The capital asset pricing model (CAPM) is a financial model that establishes a relationship between the expected return on an investment and its systematic risk (measured by  $\beta$ ). It is widely used in finance for estimating the expected return of an asset and determining whether the potential investment is worthwhile.

The basic idea behind CAPM is that the expected return on investment should compensate for both the time value of money (measured by risk-free rate of return) and the risk associated with that investment, i.e., the risk premium ( $R_m - R_f$ ). The model is often used to calculate the expected return on an individual stock, a portfolio of stocks, or any other asset.

In simpler terms, the CAPM formula suggests that the expected return on an investment is equal to the risk-free rate plus a risk premium.



### 8.4.1 Key Components of the CAPM

**Expected Return ( $R_i$ ):** The model calculates the expected return of an investment, or a portfolio based on three components:

- ◆ The risk-free rate ( $R_f$ ): The return on an investment with no risk, usually approximated using government bonds. This part of the risk accounts for time value of money.
- ◆ The market risk premium ( $R_m - R_f$ ): The excess return expected from the overall market compared to the risk-free rate. It is the extra return that an investor anticipates for shouldering extra risk.
- ◆ Beta ( $\beta$ ): A measure of the investment's systematic risk, representing its sensitivity to market movements. Beta indicates how much the investment's returns are expected to move in relation to the overall market.

The formula for expected return ( $R_i$ ) is given by

$$E(R_i) = R_f + \beta \times (R_m - R_f)$$

*Illustration 8.2:*  $R_f = 5\%$ ,  $E(R_m) = 11\%$ , and  $\beta$  of a security  $T$ , is 1.5 then what will be the expected return of the security?

*Solution:*

$$\begin{aligned} E(R_i) &= R_f + \beta \times (R_m - R_f) \\ E(R_i) &= 0.05 + (0.11 - 0.05)(1.5) \\ &= 0.14\% \text{ or } 14\% \end{aligned}$$

### 8.4.2 Purpose of CAPM

- ◆ **Cost of Capital Estimation:** CAPM is commonly used to determine the cost of equity capital for a company. It helps in evaluating the return required by investors for holding a company's stock, considering the systematic risk associated with the stock.
- ◆ **Investment Decision Support:** CAPM aids in making investment decisions by providing a framework to assess the expected return on an investment in relation to its risk. Investors can compare the expected return with the required return to make informed investment choices.



- ◆ **Portfolio Management:** CAPM is widely used in portfolio theory to analyze and construct well-diversified portfolios. It helps investors optimize their portfolio by considering the risk and return trade-offs of individual securities.
- ◆ **Corporate Finance Decisions:** Companies may use CAPM to evaluate projects or investments by discounting future cash flows at a rate that reflects the risk associated with the investment.

While CAPM provides a useful framework for understanding the relationship between risk and return, it has some limitations and assumptions, such as the assumption of a single-period investment horizon, perfect capital markets, and constant  $\beta$  over time, which may not always hold true in real-world situations.

## 8.5 Assumptions of CAPM

The CAPM relies on several assumptions to establish its theoretical framework. It is essential to note that these assumptions may not always hold true in real-world financial markets. The key assumptions of CAPM include:

- 1. Perfect Capital Markets:** CAPM assumes that financial markets are perfect and efficient. This means there are no taxes, transaction costs, or restrictions on the flow of information. Investors can buy or sell any amount of a security without affecting its price.
- 2. Investors Are Rational:** The model assumes that all investors are rational and aim to maximize their utility by making optimal investment decisions. Investors have access to all relevant information and make decisions based on expected returns and risks.
- 3. Single Investment Period:** CAPM assumes a single-period investment horizon. It does not consider multi-period investments or compounding over time.
- 4. Homogeneous Expectations:** All investors have the same expectations about future returns, standard deviations, and other parameters related to the assets in the market. There is a consensus among investors about the future prospects of securities.
- 5. Risk-Free Rate Is Available:** The model assumes the existence of a risk-free rate, representing the return on an investment with no risk. Typically, this is approximated using government bonds.



6. **Homogeneous Assets Are Divisible:** Securities are perfectly divisible, meaning investors can buy and sell any fraction of a security. This assumption allows for continuous trading and ensures that investors can achieve their desired portfolio composition precisely.
7. **No Borrowing or Lending Constraints:** Investors can borrow or lend unlimited amounts at the risk-free rate. There are no restrictions on short selling, and investors can take any desired leveraged position.
8. **Constant Correlation between Securities:** CAPM assumes a constant correlation between the returns of different securities. This implies that the relationships between securities and the overall market remain stable over time.
9. **Markowitz Mean-variance Efficiency:** Investors base their portfolio decisions on mean-variance analysis, seeking to achieve the highest expected return for a given level of risk or the lowest risk for a given level of expected return.
10. **Systematic Risk:** All the investors hold efficiently diversified portfolios having no unsystematic risk. The only relevant risk in estimating return is systematic risk.

It is important to recognize that these assumptions are simplifications, and real-world financial markets may deviate from these idealized conditions. The limitations of these assumptions should be considered when applying CAPM in practical situations.

## 8.6 Limitations of CAPM

The CAPM is a widely used financial model that attempts to determine the expected return on an investment based on its systematic risk. However, it has some limitations and drawbacks:

1. **Simplifying Assumptions:** CAPM relies on several simplifying assumptions that may not hold true in the real world. For example, it assumes that investors have homogenous expectations and that markets are frictionless, which may not accurately reflect the complexities of real financial markets.
2. **Single-Factor Model:** CAPM is a single-factor model that only considers market risk and ignores other risks. In reality, many



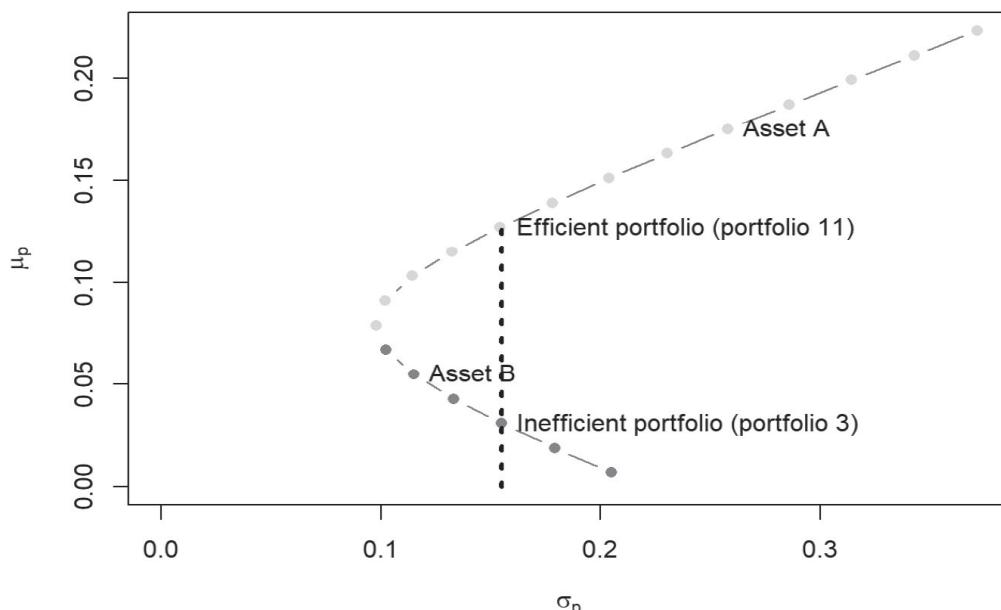
- factors contribute to an asset's risk, and the model may not capture the full spectrum of risks involved.
- 3. Beta as a Sole Measure of Risk:** CAPM uses  $\beta$  as the measure of systematic risk. Beta represents the sensitivity of an asset's returns to market movements. However,  $\beta$  might not fully capture an asset's risk, especially for assets with nonlinear payoffs or exposures to multiple factors.
  - 4. Assumption of a Risk-Free Rate:** The commonly accepted rate used as the  $R_f$  is the yield on short-term government securities. The issue with using this input is that the yield changes daily, creating volatility.
  - 5. Market Efficiency Assumption:** CAPM assumes that markets are efficient, meaning that all relevant information is reflected in asset prices. In reality, markets may not always be perfectly efficient due to various behavioral biases, information asymmetry, or other market imperfections.
  - 6. Time-Varying Risk:** CAPM assumes a constant risk over time. In practice, risk can vary due to changes in economic conditions, market sentiment, or other external factors that the model does not account for.
  - 7. Homogeneous Expectations:** CAPM assumes that all investors have the same expectations about future returns, which may not be true in reality. Different investors may have different views and expectations, leading to variations in asset prices.
  - 8. Difficulty in Estimating Expected Returns:** Estimating the expected return on the market is crucial in CAPM, but it can be challenging. Different methodologies and assumptions can lead to varying estimates, affecting the reliability of the model's predictions.

Despite these limitations, CAPM remains a widely used tool for estimating the cost of equity and making investment decisions. It is important to be aware of its assumptions and limitations when using it in practice. Researchers and practitioners often explore alternative models or adjustments to address some of these drawbacks.



## 8.7 The CAPM and the Efficient Frontier

- Efficient Portfolios:** These are feasible portfolios with the highest expected return for a given level of risk, measured by portfolio standard deviation. Graphically, efficient portfolios start with the global minimum variance portfolio and are located above and to the right of it on the Markowitz bullet.
- Inefficient Portfolios:** These portfolios have the same risk as another feasible portfolio but a lower expected return. Graphically, inefficient portfolios are below and to the right of the global minimum variance portfolio.



**Figure 8.2: Efficient and Inefficient Portfolios for Example Data**

Figure 8.2 shows the efficient and inefficient portfolios. The efficient portfolios are those that have the highest expected return for a given standard deviation value. These portfolios are the green dots starting with the global minimum variance portfolio at the tip of the Markowitz bullet. The inefficient portfolios are the red dots below the global minimum



variance portfolio. For example, Figure 8.2 shows two feasible portfolios, portfolio 3 and portfolio 11, with the same standard deviation value but different expected return values. Portfolio 11 has the highest expected return, and so is the efficient portfolio. Portfolio 3, with the lower expected return, is an inefficient portfolio.

### 8.7.1 *Optimal Portfolios*

Given the efficient set of portfolios as described in Figure 8.2, which portfolio will an investor choose? Of the efficient portfolios, investors will choose the one that accords with their *risk preferences*. Very risk-averse investors will want a portfolio that has low volatility (risk) and will choose a portfolio very close to the global minimum variance portfolio. In contrast, very risk-tolerant investors will ignore volatility and seek portfolios with high expected returns. Hence, these investors will choose portfolios with large amounts of asset *A* which may involve short-selling asset.

### 8.7.2 *Efficient Portfolios with a Risk-Free Asset*

In the preceding section, we constructed an efficient set of portfolios involving two risky assets. Now, we consider what happens when we introduce a *risk-free* asset. In the present context, a risk-free asset is equivalent to a default-free pure discount bond that matures at the end of the assumed investment horizon. The *risk-free rate*,  $R_f$ , is then the nominal return on the bond. For example, if the investment horizon is one month, then the risk-free asset is a 30-day Treasury bill (T-bill), and the risk-free rate is the nominal rate of return on the T-bill. If our holdings of the risk-free asset are positive, then we are “lending money” to the government at the risk-free rate, and if our holdings are negative, then we are “borrowing” from the government at the risk-free rate.

The assumption that investors can borrow and lend at the same risk-free rate is unrealistic in the real world due to investors’ differing creditworthiness. Investors can certainly buy T-bills and receive the risk-free rate. However, most investors can only borrow funds at rates much higher than the T-bill rate.



### 8.7.3 Portfolios with One Risky Asset and One Risk-Free Asset

In this subsection, we consider portfolios of a single risky asset with random return  $R \sim N(\mu, \sigma^2)$  and a risk-free asset with nonrandom return  $r_f$ . Since the risk-free rate is fixed over the investment horizon it is not a random variable. As a result, it has some special properties summarized in the following proposition.

Let  $r_f$  denote the fixed nonrandom risk-free rate, and let  $R$  denote the random return on a risky asset with  $E[R] = \mu$  and  $\text{var}(R) = \sigma^2$ .

Then

$$E[r_f] = [r_f]$$

$$\text{var}(r_f) = E[(r_f - E[r_f])^2] = 0,$$

$$\text{cov}(R, r_f) = E[(r_f - E[r_f])(R - E[R])] = 0.$$

Consider an investment in the risky asset and the risk-free asset (henceforth referred to as a T-bill). Let  $x$  denote the share of wealth in the risky asset, and  $x_f$  denote the share of wealth in T-bills such that  $x + x_f = 1$ . Using  $x_f = 1 - x$ , the portfolio return can be written as:

$$R_p = x_f r_f + xR = (1 - x)r_f + xR = r_f + x(R - r_f).$$

The quantity  $R - r_f$  is called the *excess return* (over the return on T-bills) on the risky asset. The portfolio expected return is then:

$$\mu_p = r_f + x(E[R] - r_f) = r_f + x(\mu - r_f),$$

where the quantity  $(\mu - r_f)$  is called the *expected excess return* or *risk premium* on the risky asset. The risk premium is typically positive indicating that investors expect a higher return on the risky asset than the safe asset (otherwise, why would investors hold the risky asset?). We may express the risk premium on the portfolio in terms of the risk premium on the risky asset:

$$\mu_p - r_f = x(\mu - r_f).$$

The more we invest in the risky asset the higher the risk premium on the portfolio of T-bills and the risky asset.



Because the risk-free rate is constant, the portfolio variance only depends on the variability of the risky asset and is given by

$$\sigma_p^2 = \text{var}(R_p) = \text{var}(xR) = x^2\sigma^2$$

The portfolio standard deviation is therefore proportional to the standard deviation on the risky asset.

$$\sigma_p = |x|\sigma.$$

Finally, the expected return for a portfolio of the risk-free asset and a risky asset is expressed as the risk-free rate plus the product of the share of wealth in the risky asset and the expected excess return on the risky asset. The portfolio variance depends only on the variability of the risky asset and is given by the square of the share of wealth in the risky asset multiplied by the variance of the risky asset.

#### **8.7.4 Criticisms of the Efficient Frontier**

The efficient frontier and modern portfolio theory have many assumptions that may not properly represent reality. For example, one of the assumptions is that asset returns follow a normal distribution.

In reality, securities may experience returns (also known as tail risk) that are more than three standard deviations away from the mean. Consequently, asset returns are said to follow a leptokurtic distribution or heavy-tailed distribution.

Additionally, Markowitz posits several assumptions in his theory, such as that investors are rational and avoid risk when possible, that there are not enough investors to influence market prices, and that investors have unlimited access to borrowing and lending money at the risk-free interest rate.

However, reality proves that the market includes irrational and risk-seeking investors, there are large market participants who could influence market prices, and there are investors who do not have unlimited access to borrowing and lending money.

#### **8.8 Security Market Line (SML)**

The security market line (SML) is a graphical representation of the CAPM. It establishes a relationship between the expected return on an investment



## Notes

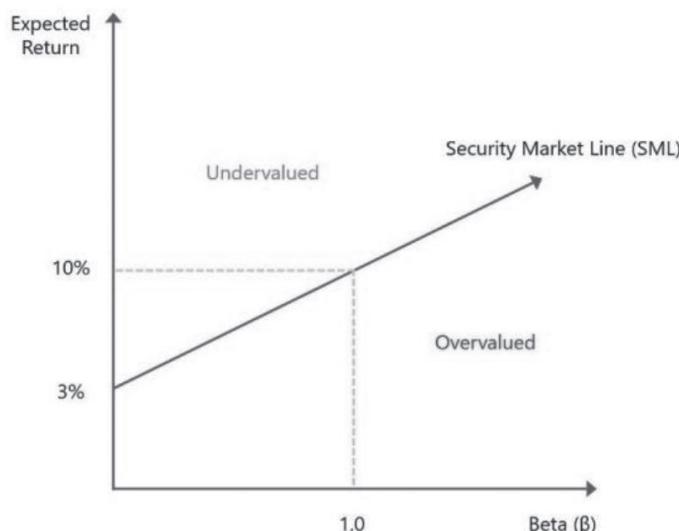
and its systematic risk. The SML is used to determine the appropriate required rate of return for an investment based on its systematic risk, also known as  $\beta$ .

Here are the key components and concepts associated with the SML:

- 1. Expected Return (Y-axis):** The vertical axis of the SML represents the expected return on an investment. This is the return that investors anticipate receiving for taking on a certain level of risk.
- 2. Beta (X-axis):** The horizontal axis represents the  $\beta$  of an investment. Beta is a measure of the systematic risk or volatility of an investment in relation to the overall market. A  $\beta$  of 1 indicates that the investment's price is expected to move in line with the market, while a  $\beta$  greater than 1 suggests higher volatility, and a  $\beta$  less than 1 suggests lower volatility.
- 3. Risk-Free Rate:** The SML starts at the point where the  $\beta$  is zero on the X-axis, and this represents the risk-free rate of return. The risk-free rate is the return an investor can earn with certainty, typically associated with government bonds.
- 4. Market Risk Premium:** The slope of the SML is determined by the market risk premium, which is the excess return expected from the overall market above the risk-free rate. It reflects the compensation investors require for taking on the systematic risk associated with the market.

The SML is a tool used in finance to evaluate whether an investment offers a sufficient expected return given its level of risk. If an investment's expected return is above the SML, it may be considered undervalued, while if it falls below the SML, it may be considered overvalued. Investors can use the SML to make informed decisions about whether to invest in a particular security based on its risk and potential return.

- ◆ Securities which lie on SML are efficiently priced in the market. For such securities actual return (or expected return based on probability distribution) is equal to expected return based on CAPM.
- ◆ If a security lies below SML then it is inefficiently priced, in fact overpriced in the market. Such a security provides an actual return which is lower than the expected return based on CAPM. A prospective investor should not invest in such a security.



**Figure 8.3: Security Market Line**

- ◆ If a security lies above SML then also it is inefficiently priced, but it is underpriced in the market. Such a security provides an actual return which is higher than the expected return based on CAPM. A prospective investor should invest in such a security.

*Illustration 8.3:* You Are Given the Following Information about Two Securities  $P$  and  $Q$

Security	$P$	$Q$
Actual return %	12	16
$\beta$	0.7	1.3

Risk free rate is 5% and expected return on market portfolio is 15%. Do you think that securities  $A$  and  $B$  are efficiently priced in the market? Do they lie on SML?

*Solution:* Here we need to calculate expected return as per CAPM

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

Expected return from  $A = 5 + (15 - 5)(0.7) = 12\%$

Expected return from  $B = 5 + (15 - 5)(1.3) = 18\%$

Since the actual return of  $P$  is same as the expected return under CAPM, Security  $A$  is efficiently priced, and it will lie on SML.



### 8.8.1 *SML and CML*

The actual return of security  $Q$  is lower than the expected return under CAPM; hence, security  $B$  is inefficiently priced. It lies below SML. It is overpriced in the market.

The SML and the capital market line (CML) are related concepts in finance, but they serve different purposes and are associated with different models. Let us explore the key differences between the SML and CML:

#### 1. Purpose and Model

- ◆ **SML (Security Market Line):** The SML is associated with the CAPM. It represents the relationship between the expected return and systematic risk ( $\beta$ ) of an individual security. The SML helps determine the required rate of return for a security based on its level of systematic risk.
- ◆ **CML (Capital Market Line):** The CML is associated with the capital market theory. It focuses on the risk-return trade-off for a portfolio of all risky assets in the market. The CML provides a graphical representation of the optimal portfolios that can be formed by combining a risky portfolio with a risk-free asset.

#### 2. Risk-Free Asset

- ◆ **SML:** The SML starts from the risk-free rate on the  $Y$ -axis, representing the return of a risk-free asset (e.g., government bonds).
- ◆ **CML:** The CML incorporates a risk-free asset as well, but it is integral to the construction of optimal portfolios. The CML extends from the risk-free rate and intersects with the efficient frontier (set of optimal portfolios with various risk-return combinations).

#### 3. Inclusion of Risk-Free Rate

- ◆ **SML:** The risk-free rate is a key component in the calculation of expected returns on the SML. The slope of the SML represents the market risk premium.
- ◆ **CML:** The risk-free rate is a starting point on the CML. Investors can then combine the risk-free asset with a risky portfolio to achieve their desired level of risk and return along the CML.



#### 4. Applicability

- ◆ **SML:** Primarily used for evaluating individual securities and determining their required rates of return based on the CAPM.
- ◆ **CML:** Used in the context of portfolio theory to analyze the risk and return characteristics of diversified portfolios. It helps investors construct optimal portfolios by combining a risk-free asset with a risky portfolio.

#### 5. Graphical Representation

- ◆ **SML:** Represents the expected return of an individual security as a function of its  $\beta$ . The SML is a straight line with the slope equal to the market risk premium.
- ◆ **CML:** Represents the risk-return trade-off for portfolios of risky assets combined with a risk-free asset. The CML is a straight line that starts at the risk-free rate and intersects with the efficient frontier of risky portfolios.

In summary, while both the SML and CML involve the consideration of risk-free rates and the relationship between risk and return, the SML is primarily concerned with individual securities and their systematic risk, whereas the CML focuses on the construction of optimal portfolios that combine a risk-free asset with risky assets.

#### IN-TEXT QUESTIONS

1. What does the capital asset pricing model (CAPM) consider as the risk-free rate?
  - (a) Market interest rate
  - (b) Expected return on risky assets
  - (c) Rate of return with no risk
  - (d) Historical average return
2. In the context of the efficient frontier, what is the significance of combining risky and risk-free assets?
  - (a) Reducing the overall portfolio risk
  - (b) Maximizing the portfolio return
  - (c) Achieving the highest possible return
  - (d) Eliminating the need for risk-free assets



Notes

3. Which assumption is a key feature of the single-period classical CAPM model?
  - (a) Perfect competition in financial markets
  - (b) Constant risk-free rate over time
  - (c) Unlimited investment horizon
  - (d) Predictable market fluctuations
4. What does the term “overvalued assets” imply in the context of CAPM?
  - (a) Expected return is higher than required return
  - (b) Expected return is equal to required return
  - (c) Expected return is lower than required return
  - (d) Required return is undefined

## 8.9 Arbitrage Pricing Theory (APT)

Arbitrage pricing theory (APT) is a financial model used to estimate the expected returns of an asset by considering multiple factors that may influence its performance. Unlike the CAPM, which relies on a single factor (systematic risk or  $\beta$ ), APT is a multifactor model that allows for a broader range of influences on asset returns.

Here are the key components and concepts of APT:

### 1. Multifactor Model

- ◆ APT assumes that an asset's return is influenced by several macroeconomic, industry-specific, or other relevant factors. These factors are not predefined by the theory but are derived empirically through statistical analysis.

### 2. Risk Factors

- ◆ The factors considered in APT are assumed to be systematic risks that affect a broad range of assets. These factors could include inflation rates, interest rates, economic indicators, or other variables that impact the overall market and specific industries.



### 3. Factor Sensitivities ( $\beta$ Coefficients)

- ◆ APT represents the sensitivity of an asset's return to each factor through  $\beta$  coefficients. Each factor has an associated  $\beta$  coefficient that measures the asset's exposure to that specific risk factor.

### 4. Arbitrage-Free Pricing

- ◆ A key concept in APT is the absence of arbitrage opportunities. If an asset is mispriced in the market, traders could exploit this mispricing to generate risk-free profits through arbitrage. APT assumes that any arbitrage opportunities will be quickly eliminated in an efficient market.

### 5. Linear Relationship

- ◆ APT assumes a linear relationship between the expected return of an asset and the various risk factors. The expected return of an asset is expressed as a linear combination of the  $\beta$  coefficients and the expected changes in the relevant risk factors.

### 6. No Requirement for a Risk-Free Rate

- ◆ Unlike CAPM, APT does not require the existence of a risk-free rate. It can be applied in situations where a risk-free rate may not be well-defined or available.

### 7. Empirical Estimation

- ◆ APT is often applied empirically, where researchers or analysts identify relevant factors that may influence asset returns. The model is then estimated using historical data to determine the  $\beta$  coefficients for each factor.

### 8. Flexibility

- ◆ APT is considered more flexible than CAPM because it allows for the consideration of various factors beyond market risk. This flexibility makes it potentially applicable in a wider range of economic conditions and market environments.

The general form of the APT formula is expressed as follows:

$$E(R_i) = R_f + \beta_{i1} \times RP_1 + \beta_{i2} \times RP_2 + \dots + \beta_{iK} \times RP_K$$



where

- ◆  $E(R_i)$  is the expected return of asset  $i$ ,
- ◆  $R_f$  is the risk-free rate of return,
- ◆  $\beta_{i1}, \beta_{i2}, \dots, \beta_{iK}$  are the  $\beta$  coefficients representing the sensitivity of asset  $i$  to each of the  $K$  risk factors, and
- ◆  $RP_1, RP_2, \dots, RP_K$  are the expected excess returns of  $K$  risk factors.

In this formula, the expected return of an asset is modeled as the sum of the risk-free rate and the product of each  $\beta$  coefficient and its corresponding risk factor's expected excess return.

It is important to note that the  $\beta$  coefficients in APT are determined empirically through statistical analysis of historical data rather than being assumed as in the CAPM. Analysts or researchers may use factor analysis or other techniques to estimate the  $\beta$  coefficients and identify the relevant risk factors for a particular set of assets.

The flexibility of APT allows for the consideration of multiple factors, making it a useful tool for asset pricing in various economic conditions. However, the success of APT depends on the accurate identification and measurement of relevant risk factors in a given market or industry.

### 8.9.1 CAPM versus APT

The CAPM and APT are both financial models used to estimate the expected returns on assets. While they share the common goal of pricing assets based on risk and return, they have different approaches and assumptions. Here is a brief comparison of CAPM and APT:

#### 1. Theoretical Basis

- ◆ **CAPM:** CAPM is based on the idea that an asset's expected return is determined by its  $\beta$ , which measures its systematic risk or sensitivity to overall market movements. The model assumes a single-factor market risk as the sole determinant of asset prices.
- ◆ **APT:** APT, on the other hand, is a multifactor model that does not rely on a specific market risk factor. Instead, APT allows for multiple factors influencing asset returns, and these factors are not predefined as they are in CAPM.



## 2. Factors

- ◆ **CAPM:** Only considers one systematic risk factor, usually the overall market return.
- ◆ **APT:** Allows for multiple factors to influence asset returns. These factors are not specified by the theory but are derived empirically.

## 3. Assumptions

- ◆ **CAPM:** Assumes a risk-free rate of return, a market portfolio that includes all risky assets, and a linear relationship between an asset's expected return and its  $\beta$ .
- ◆ **APT:** Assumes that factors influencing asset returns can be identified, and their impact on returns can be measured. It does not rely on specific assumptions about the market portfolio or the risk-free rate.

## 4. Beta

- ◆ **CAPM:** Beta is a measure of an asset's sensitivity to market movements. It represents the asset's exposure to systematic risk.
- ◆ **APT:** Beta is not predefined in APT. Instead, factors are identified empirically, and their impact on asset returns is estimated through statistical analysis.

## 5. Applicability

- ◆ **CAPM:** Commonly used in practice due to its simplicity and ease of application. However, it has been criticized for its reliance on strong assumptions.
- ◆ **APT:** More flexible in terms of the factors it considers, making it applicable in situations where the market might not be the sole driver of asset returns.

## 6. Flexibility

- ◆ **CAPM:** Less flexible compared to APT due to its reliance on a single market factor.
- ◆ **APT:** More flexible as it can accommodate a variety of factors that might be relevant in different economic environments.

In summary, while both CAPM and APT aim to explain asset returns based on risk factors, CAPM is a single-factor model with specific assumptions about market behavior, while APT is a more flexible, multifactor model



that allows for a broader range of influences on asset returns. However, the empirical application of APT may require identifying and estimating the relevant factors, which can be a complex task.

### IN-TEXT QUESTIONS

5. According to CAPM, what is the relationship between expected return and bet?
  - (a) Positive correlation
  - (b) Negative correlation
  - (c) No correlation
  - (d) Exponential correlation
6. How does the arbitrage pricing theory (APT) differ from CAPM?
  - (a) APT considers only one factor, while CAPM considers multiple factors
  - (b) APT assumes perfect competition, while CAPM does not
  - (c) APT uses historical data, while CAPM uses future projections
  - (d) APT does not rely on the concept of beta
7. In APT, what is the role of arbitrage in asset pricing?
  - (a) Arbitrage eliminates the need for asset pricing models
  - (b) Arbitrage ensures equal expected and required returns
  - (c) Arbitrage creates opportunities for risk-free profits
  - (d) Arbitrage is irrelevant in APT
8. What is the primary difference between expected return and required return in the context of CAPM?
  - (a) Expected return includes risk premium, while required return does not
  - (b) Expected return is investor-specific, while required return is market-based
  - (c) Expected return is calculated retrospectively, while required return is forward-looking
  - (d) Expected return is always higher than required return



- 9.** How is the efficient frontier related to portfolio optimization?
- It represents portfolios with the maximum return and minimum risk
  - It includes all possible asset combinations, regardless of risk and return
  - It focuses on high-risk, high-return portfolios
  - It is unrelated to the concept of portfolio optimization
- 10.** What is a common criticism of both CAPM and APT?
- They rely too heavily on historical data
  - They assume unrealistic market conditions
  - They ignore the concept of risk
  - They are not applicable to diversified portfolios

## 8.10 Summary

In this lesson on asset pricing models, we delved into fundamental concepts that are crucial for understanding and navigating the complex landscape of financial markets. Here is a concise summary of the key points covered:

- ◆ Explored the definition and significance of asset pricing models in the realm of finance.
- ◆ Emphasized their role in aiding investment decisions.
- ◆ Examined the concept of risk in financial markets, highlighting its importance in the investment process.
- ◆ Identified various types of risks associated with investments.
- ◆ Unpacked the principles of the CAPM, providing a foundational understanding of its structure.
- ◆ Outlined the components of the CAPM formula used to calculate expected returns.
- ◆ Discussed the assumptions underpinning the CAPM and their implications.



## Notes

- ◆ Evaluated the limitations and criticisms associated with the model.
- ◆ Explored the relationship between the CAPM and the efficient frontier.
- ◆ Considered how incorporating the CAPM contributes to portfolio construction strategies.

This lesson serves as a comprehensive exploration of asset pricing models, equipping students with the knowledge needed to critically analyze investments, assess risks, and make informed decisions in the dynamic world of finance.

### 8.11 Answers to In-Text Questions

1. (c) Rate of return with no risk
2. (a) Reducing the overall portfolio risk
3. (a) Perfect competition in financial markets
4. (a) Expected return is higher than required return
5. (a) Positive correlation
6. (a) APT considers only one factor, while CAPM considers multiple factors
7. (c) Arbitrage creates opportunities for risk-free profits
8. (a) Expected return includes risk premium, while required return does not
9. (a) It represents portfolios with the maximum return and minimum risk
10. (b) They assume unrealistic market conditions

### 8.12 Self-Assessment Questions

1. Explain the concept of the efficient frontier in the context of portfolio theory. How does the combination of risky and risk-free assets contribute to the construction of portfolios along the efficient frontier? Provide a numerical example to illustrate the principles.
2. Discuss the assumptions underlying the single-period classical CAPM. How does the model incorporate the concept of systematic risk and the risk-free rate? Critically evaluate the real-world applicability of these assumptions in financial markets.



3. Compare and contrast the CAPM and the APT as asset pricing models. Highlight the key differences in their approaches, assumptions, and the factors influencing asset prices. Provide examples to illustrate the application of each model.
4. Define and explain the terms “overvalued” and “undervalued” assets within the framework of the CAPM. How are these concepts determined, and what implications do they have for investors in making investment decisions? Discuss the limitations and criticisms associated with using CAPM for asset valuation.
5. Analyze the role of multiple-factor models in asset pricing, focusing on the APT. How does APT differ from the single-factor CAPM in its treatment of risk factors? Discuss the advantages and challenges of using APT compared to CAPM in explaining asset returns and pricing in real-world financial markets.

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# Mutual Funds

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## STRUCTURE

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## 9.1 Learning Objectives

- ◆ Understand the concept, advantages, and limitations of mutual funds.
- ◆ Comprehend the trajectory of mutual funds in India.
- ◆ Acquaint themselves with different types of mutual funds schemes.
- ◆ Evaluate the performance of managed funds.
- ◆ Gauge the return from an investment after accounting for the risk associated with it.



## 9.2 Introduction

### CASE STUDY

Four Friends Aryan, Riya, Rahul, and Neha have just started working in a MNC. Each friend had distinct financial goals and risk preferences. Aryan aspired for long-term wealth creation, Riya sought a balance between growth and safety, Rahul aimed for aggressive growth, and Neha, being risk-averse, prioritized stable income.

Faced with a multitude of mutual fund options, the group grappled with the challenge of making informed decisions. Aryan favored equity funds for potentially higher returns, while Neha inclined toward debt funds for stability.

Recognizing the need for expert guidance, the group decided to consult a financial advisor. The advisor comprehensively analyzed their financial goals, risk tolerance, and investment horizon. Subsequently, a tailored recommendation for a diversified mutual fund portfolio was provided to each friend.

- ◆ **Aryan:** The advisor suggested a blend of large-cap and mid-cap equity funds, aligning with Aryan's goal of long-term wealth creation.
- ◆ **Riya:** A balanced fund was recommended, investing in a mix of equities and debt to achieve a balance between growth and safety as per Riya's preference.
- ◆ **Rahul:** Given Rahul's appetite for aggressive growth, the advisor proposed investing in a sectoral fund.
- ◆ **Neha:** To accommodate Neha's risk aversion, a combination of debt funds and hybrid funds was advised, ensuring stable income with lower risk exposure.

The friends soon grasped the advantages of mutual funds. Diversification helped mitigate risks, and the expertise of professional fund managers in decision-making provided a sense of security. Liquidity features allowed them to access their investments when required.



## Notes

As time progressed, the group understood the significance of periodic reviews. They monitored the performance of their mutual fund investments and adjusted their portfolios based on changing market conditions and evolving financial goals.

The friends' journey into the realm of mutual funds granted them a diversified and professionally managed investment portfolio and instilled essential lessons in risk management and aligning investments with individual financial objectives.

### QUESTIONS

1. What are mutual funds?
2. What are the benefits of mutual funds?
3. What are the different types of mutual funds?
4. Why is it important to regularly monitor and make adjustments to one's fund investments?

Imagine you and your friends want to invest in the stock market to make your money grow. However, investing in individual stocks can be risky and requires a lot of time and expertise. This is where a mutual fund comes in.

A mutual fund is like a big pool of money collected from many people, called unit holders (you and your friends in this case). Instead of each person figuring out where to invest, a professional fund manager takes care of it. This manager is like a financial expert who decides what stocks, bonds, or other investments to buy.

When you invest in a mutual fund, you get units that represent your share of the pool. The more money you put in, the more units you get. The fund manager uses the combined money from all the unit holders to create a diversified portfolio, which means they invest in a mix of different things to reduce risk.

Now, when the investments make money (through dividends or selling investments for a profit), everyone in the mutual fund gets a share. The amount you get depends on how many units you have. Similarly, if the



investments do not do well, everyone shares the loss, but because the fund is diversified, the impact is minimized.

However, the mutual fund company charges a small fee to manage the fund and make these investment decisions. This fee is used to pay the experts' salaries, cover administrative costs, and ensure the smooth functioning of the mutual fund.

It is important to note that all mutual funds in India are approved and monitored by a regulatory body called SEBI (Securities and Exchange Board of India) to ensure they follow the rules and protect the interests of investors like you. So, investing in a mutual fund is like being part of a team where everyone works together to make their money grow.

### 9.3 Mutual Funds

#### 9.3.1 *Definition*

A mutual fund is a professionally managed investment scheme, usually run by an Asset Management Company (AMC), that brings together a group of people and invests their money in stocks, bonds, and other securities.

SEBI (Mutual Fund) Regulations, 1996, defines a mutual fund as under:

“mutual fund” means a fund established in the form of a trust to raise monies through the sale of units to the public or a section of the public under one or more schemes for investing in securities including money market instruments or gold-related instruments or real estate assets.

#### 9.3.2 *Mutual Funds Are an Indirect Mode of Investment*

Imagine you and your friends contributing money to a shared piggy bank, and an expert piggy bank manager (let us call them the fund manager) decides how to invest that money. You own a part of the piggy bank based on your contribution, and the manager diversifies the investments for everyone. This is like investing in a mutual fund, where you are part of a collective investment pool managed by a professional.



### 9.3.2.1 *Direct Mode of Investment*

Now, picture yourself going to a candy store with your own money and personally choosing which candies to buy. You are in control of your choices, and there is no shared piggy bank. This is similar to the direct mode of investment. Instead of pooling money with others, you directly purchase individual stocks, bonds, or other securities according to your personal preferences and investment strategy.

### 9.3.2.2 *Key Contrasts*

#### 1. Decision-Making

- ◆ **Mutual Funds (Indirect):** A fund manager makes investment decisions on behalf of a group of investors.
- ◆ **Direct Mode:** You, as an individual, make all the investment decisions.

#### 2. Diversification

- ◆ **Mutual Funds (Indirect):** Your money is pooled with others, allowing for diversification across various assets.
- ◆ **Direct Mode:** You decide which specific assets to buy, and your portfolio depends on your individual choices.

#### 3. Control

- ◆ **Mutual Funds (Indirect):** You have less control over specific investment choices, as the fund manager handles them.
- ◆ **Direct Mode:** You have full control over your investment decisions and can tailor your portfolio to your liking.

#### 4. Professional Management

- ◆ **Mutual Funds (Indirect):** Benefit from the expertise of a professional fund manager.
- ◆ **Direct Mode:** You take full responsibility for managing your investments.

In essence, mutual funds provide a collaborative and professionally managed approach, while direct investment offers individual control and decision-making. Each approach has its advantages and considerations depending on the investor's preferences and financial goals.

**IN-TEXT QUESTIONS**

- 1.** What is a mutual fund?
  - (a) A personal savings account
  - (b) A professionally managed investment scheme
  - (c) A real estate investment trust
  - (d) A fixed deposit in a bank
  
- 2.** Which regulatory body in India oversees and approves mutual funds?
  - (a) RBI (Reserve Bank of India)
  - (b) AMFI (Association of Mutual Funds in India)
  - (c) SEBI (Securities and Exchange Board of India)
  - (d) IRDAI (Insurance Regulatory and Development Authority of India)

## 9.4 Evolution of Mutual Funds in India

The evolution of mutual funds in India can be traced through several pivotal phases, marked by regulatory changes, industry developments, and increasing investor awareness. Let us subsume this in four phases.

### 1. Introduction (1963–1987)

- ◆ The concept of mutual funds was introduced in India in 1963 with the formation of the Unit Trust of India (UTI), which was sponsored by the Reserve Bank of India (RBI) and managed by the State Bank of India (SBI).
- ◆ UTI initially had a monopoly in the mutual fund industry and launched its first scheme in 1964.

### 2. Entry of Other Public Players (1987–1993)

- ◆ The mutual fund industry saw significant changes in 1987 when public sector banks, Life Insurance Corporation (LIC), and General Insurance Corporation (GIC) were allowed to establish mutual funds. SBI Mutual Fund established the first non-UTI mutual



fund in India in 1987. The same year, Canbank Mutual Fund was also introduced. Then, PNB Mutual Fund, Indian Bank Mutual Fund, Bank of India, Bank of Baroda Mutual Fund, LIC, and GIC followed suit.

### 3. Entry of Private Players (1993–2003)

- ◆ In 1993, the industry witnessed the entry of private sector players following the SEBI Act. SEBI passed the first Mutual Fund Regulations (1993). Pursuant to Mutual Fund Regulations (1993), all mutual funds, barring UTI, were mandated to be registered with SEBI. The first private mutual fund to be registered was Kothari Pioneer, which later merged with Franklin Templeton. In 1996, SEBI replaced the Mutual Fund Regulations (1993) with the new SEBI (Mutual Fund) Regulations 1996. This phase witnessed a paradigm shift in the mutual fund industry. In 1994, Morgan Stanley, the first foreign mutual fund, entered the industry.

### 4. Fourth Phase (2003–present)

- ◆ In this phase, UTI spun off into two separate entities. First is the Specified Undertaking of the UTI, which functions under an administrator and the rules framed by the Government of India and does not come under the purview of the Mutual Fund Regulations. Second is UTI Mutual Fund, sponsored by SBI, PNB, BOB, and LIC, registered with SEBI and functions under Mutual Fund Regulations.

In 2013, SEBI introduced direct plans, and fund houses like Axis Mutual Fund and Franklin Templeton embraced this concept. The recategorization in 2018 led to clear distinctions among mutual fund schemes.

Now, the industry is witnessing consolidation, with some mergers and acquisitions among fund houses, like the one between JP Morgan Asset Management and Edelweiss Mutual Fund.

The digital era is leading to the rise of online platforms like Zerodha Coin and Groww, offering investors a convenient way to invest in mutual funds. With a measly penetration of 14% of the GDP, mutual funds have a huge window of opportunity in India.

**IN-TEXT QUESTIONS**

- 3.** What does a mutual fund's net asset value (NAV) represent?
  - (a) Total assets minus liabilities
  - (b) Total number of unit holders
  - (c) Total returns earned by the fund
  - (d) Total units held by the fund
  
- 4.** In which phase did private sector players enter the mutual fund industry in India?
  - (a) Introduction (1963–1987)
  - (b) Entry of other public players (1987–1993)
  - (c) Entry of private players (1993–2003)
  - (d) Fourth phase (2003–present)

**9.5 Apparatus of Mutual Funds****9.5.1 Three-Tier Structure**

- ◆ **Sponsor:** Initiates the mutual fund, requires SEBI approval, and submits necessary documents.
- ◆ **Trust and Trustees:** Formed under the Indian Trust Act of 1882, they oversee fund activities to ensure compliance.
- ◆ **Asset Management Companies (AMCs):** Appointed by trustees, manage fund portfolios, operate under SEBI regulations.

**1. Sponsor in Mutual Fund**

A sponsor is likened to a company's promoter, and he conceives the idea of creating a mutual fund. According to SEBI, a sponsor is a person who can start a mutual fund alone or in combination with another entity. They have the right to form a trust, appoint the board of trustees (BOT), and then appoint the AMC or a fund manager. The sponsor has to submit the trust deed, draft a memorandum, and submit articles of association of AMC to SEBI.



## Notes

As per the SEBI MF Regulations, 1996, some criteria must be fulfilled before anyone can become a sponsor and get a “Certificate of Registration.” A few of them are enumerated below:

- ◆ A sponsor should have at least five years of experience in the financial services industry.
- ◆ The business's net worth should have been positive in the last five years.
- ◆ The net worth of the sponsor in the previous year must exceed the capital contribution of the AMC.
- ◆ The sponsor should have earned the profits in the last three out of five years after deducting depreciation, interest, and tax.
- ◆ The sponsor should be sound and physically fit.
- ◆ The sponsor has to contribute at least 40% of the net worth of the AMC.
- ◆ Existing or new mutual fund sponsors should not be found guilty of any fraud or convicted of any offense.

## 2. Trust and Trustee

- ◆ A trust is created by a sponsor through trust deeds, and this trust company is governed by the Companies Act 1956. The trustees and board of trustees internally manage these trusts, governed by the Indian Trust Act of 1882. At least two-thirds of the directors must be independent, that is, they should not be related to the sponsor.
- ◆ Trustees ensure AMC compliance, review transactions, handle customer grievances, and submit periodic reports to the board.

## 3. Asset Management Companies (AMCs)

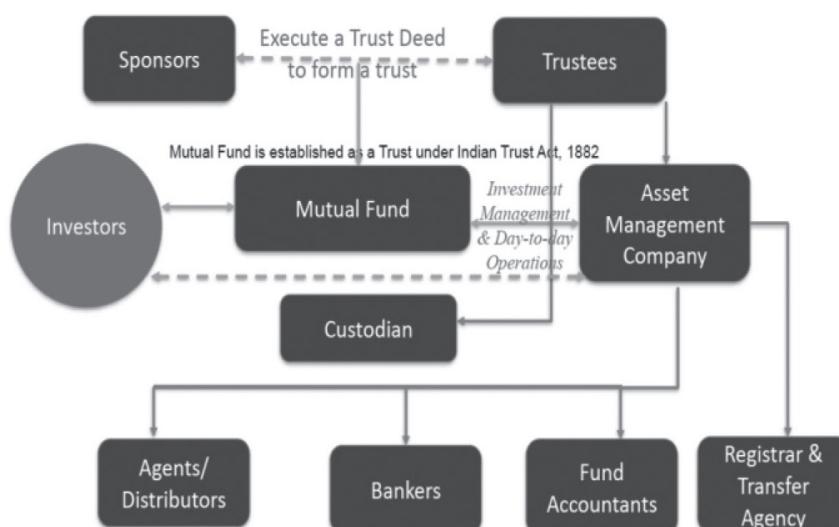
- ◆ AMCs are the companies that trustees or the sponsor appoints, and they are responsible for managing the fund's portfolio and the securities in which they invest. They have their board of directors and work under the supervision of trustees and SEBI.
- ◆ The appointed AMC can be terminated by the majority of trustees or by the vote of 75% of the unit holders.
- ◆ It is the trust's investment manager and should not undertake any other business apart from financial services.
- ◆ Fifty percent of the directors of the AMC should not be directly related to any sponsor or trustee.



- The AMC's work is to adhere to the investment scheme in line with the trust deed, provide all the related information to the unit holders, and manage the risk according to the guidelines given by AMFI and SEBI. The AMC can choose to do all the work themselves or hire third-party services from outside.

#### 4. Other Participants

- Custodians:** Hold securities in demat form and handle back-office bookkeeping.
- Registrar and Transfer Agents (RTA):** Facilitate communication between AMC and unit holders. It handles the issuance and redemption of units. Two RTAs handle 80% of mutual fund work in India, Computer Age Management Services (CAMS) and Karvy.
- Fund Accountant:** Calculates daily NAV from scheme assets and liabilities. The AMC can outsource this work to a third party or do it internally.
- Auditor:** Ensures accounting compliance, verifies transactions, and checks for fraudulent activities.
- Broker:** Attracts new investors, holds SEBI license, acts as an intermediary.
- Dealers:** Facilitate deals in capital and money market instruments.



**Figure 9.1: Structure of Mutual Funds**

Source: BSE



## 9.6 Advantages of Investing in Mutual Funds

### 1. Risk Diversification

- ◆ Mutual funds pool money from various investors to create a diversified portfolio of stocks, bonds, or other securities. This diversification helps spread the risk across different assets, reducing the impact of poor performance in any single investment.
- ◆ *Example:* Suppose an investor invests in an equity mutual fund that holds stocks from various sectors like IT, healthcare, and finance. If one sector faces a downturn, the impact on the overall portfolio is mitigated by the positive performance of other sectors.

### 2. Professional Management

- ◆ Mutual funds are managed by professional fund managers who have expertise in financial markets. These managers analyze market trends, company performance, and economic conditions to make informed investment decisions on behalf of the investors.
- ◆ *Example:* The HDFC Equity Fund is managed by experienced professionals at HDFC Asset Management Company. Investors benefit from the expertise of the fund managers who actively manage the portfolio to achieve optimal returns.

### 3. Affordability and Convenience

- ◆ Mutual funds allow investors to participate in the financial markets with relatively small amounts of money. This makes investing more accessible to a broader range of individuals. Additionally, investors can buy or sell mutual fund units at the net asset value (NAV) price, which is calculated at the end of each trading day.
- ◆ *Example:* The SBI Bluechip Fund allows investors to start the SIP (systematic investment plan) with a puny amount of Rs. 500, making it affordable for retail investors. The convenience lies in the ease of buying and selling units through online platforms.

### 4. Liquidity

- ◆ Mutual funds provide liquidity as investors can redeem their units at the prevailing NAV of open-end funds, and the settlement cycle is  $T + 2$  days.



- ◆ *Example:* Investors in the ICICI Prudential Liquid Fund can easily redeem their units, and the proceeds are generally credited to their bank accounts in  $T + 2$  days. This liquidity feature is handy for short-term financial needs.

## 5. Well Regulated

- ◆ Mutual funds in India are regulated by the SEBI. This regulatory oversight ensures transparency, protects investors' interests, and establishes guidelines for functioning mutual funds.
- ◆ *Example:* SEBI regulations mandate that mutual funds disclose their investment portfolios regularly ensuring investors have access to accurate and timely information. This regulatory framework instills confidence in investors.

## 6. Tax Benefits

- ◆ Certain mutual funds in India, such as Equity Linked Saving Schemes (ELSS), offer tax benefits under Section 80C of the Income Tax Act. Investors can claim deductions on the amount invested, subject to specified limits.
- ◆ *Example:* An investor in the Axis Long-Term Equity Fund (an ELSS) can avail of tax benefits by investing in this fund. The three-year lock-in period and tax-saving features make ELSS an attractive option for tax-conscious investors.

## 7. Automated Investments

- ◆ SIPs allow investors to automate their investment contributions, investing a fixed amount at regular intervals. This disciplined approach to investing helps in rupee cost averaging and reduces the impact of market volatility.
- ◆ *Example:* An investor in the Mirae Asset Emerging Bluechip Fund can set up a monthly SIP to invest a fixed amount automatically. This systematic approach promotes regular investing without the need for constant monitoring.

## 8. Lower Expenses

- ◆ Mutual funds benefit from economies of scale, as the operating expenses are distributed across a large number of investors. This often results in lower costs compared to managing an individual portfolio of stocks or bonds.



- ◆ *Example:* The expense ratio of the Aditya Birla Sun Life Frontline Equity Fund is a mere 1%, thanks to the large assets under management. This cost efficiency is passed on to investors, making mutual funds a cost-effective investment option.

In conclusion, mutual funds offer a range of advantages that cater to different investor needs and preferences. These advantages contribute to the popularity and widespread adoption of mutual funds in the Indian investment landscape.

#### IN-TEXT QUESTIONS

5. Which entity initiates the formation of a mutual fund, requires SEBI approval, and appoints the asset management company (AMC)?
  - (a) Trust and trustees
  - (b) Sponsors
  - (c) Unit holders
  - (d) Custodians
6. What is a key advantage of mutual funds in terms of risk management?
  - (a) High concentration in individual stocks
  - (b) Limited diversification across assets
  - (c) Pooling money for risk diversification
  - (d) Lack of regulatory oversight

#### 9.7 Disadvantages of Investing in Mutual Funds

Despite the numerous advantages stated above, mutual funds are also plagued by a few shortcomings. These limitations are expounded below:

1. **No Control:** When you invest in a mutual fund, you are essentially pooling your money with other investors, and professional fund



managers make decisions on your behalf. This lack of control can be a disadvantage for investors who prefer to have direct control over their investment decisions. It means you cannot individually select or manage the specific securities in the fund portfolio.

- 2. Fund Managers:** The success of a mutual fund often depends on the skills and decisions of the fund manager. If the fund manager makes poor investment choices or fails to adapt to market conditions, it can negatively impact the performance of the mutual fund.
- 3. Cost:** Mutual funds typically charge fees and expenses, including management fees, administrative costs, and other charges. These fees can erode the overall returns on your investment. Front-end loads (fees when you buy the fund) or back-end loads (fees when you sell the fund) further reduce the amount of money that goes directly into the investment. Investors should carefully consider the total cost of owning a mutual fund and how it may impact their returns.
- 4. CAGR (Compounded Annual Growth Rate):** While CAGR is often used to measure the annual growth rate of an investment, it may not always represent the actual returns an investor receives. Mutual funds can be subject to market risks, and the CAGR might not account for factors such as taxes, inflation, or changes in the fund's NAV. Therefore, investors should interpret CAGR cautiously and consider other performance metrics.
- 5. Lock-in Period:** Some mutual funds like ELSS have a three-year lock-in period, during which investors are restricted from redeeming their units. This can limit liquidity and flexibility for investors who may need access to their funds in case of financial emergencies or changes in investment strategy. Early redemption during a lock-in period may also incur penalties or charges.

It is important to note that while these are potential disadvantages, mutual funds also offer diversification, professional management, and ease of investment, making them a suitable choice for many investors depending



on their financial goals and risk tolerance. It is crucial for investors to thoroughly understand the features and risks associated with mutual funds before making investment decisions.

## 9.8 Classification of Mutual Funds

### 9.8.1 Based on Structure

#### 1. Open-ended Funds

- ◆ These funds do not have a fixed maturity period.
- ◆ Investors can buy and sell units at any point, and the fund continuously issues and redeems units based on the NAV.
- ◆ *Examples:* HDFC Equity Fund, ICICI Prudential Bluechip Fund.

#### 2. Closed-ended Funds

- ◆ These funds have a fixed maturity period and a fixed number of units, which can only be purchased during the initial offer period. Once the NFO (New Fund Offer) period ends, investors cannot purchase or redeem units of a closed-ended fund.
- ◆ Investors can sell units on the stock exchange if there is enough liquidity.
- ◆ *Examples:* SBI Small Cap Fund—Series II, ICICI Prudential Value Fund—Series 18.

#### 3. Interval Funds

- ◆ These funds combine features of both open-ended and closed-ended funds.
- ◆ Investors can buy or sell units at predefined intervals (monthly, quarterly, annually, etc.) at NAV-related prices.
- ◆ *Examples:* IDFC yearly series Interval Fund—Series II, Reliance yearly Interval Fund—Series I—Growth



## 9.8.2 Based on Investment Objective

### 1. Debt Funds

- ◆ Invest primarily in fixed-income securities like bonds and debentures.
- ◆ Aim for regular income and capital preservation.
- ◆ *Examples:* HDFC Short Term Debt Fund, ICICI Prudential Corporate Bond Fund.

### 2. Equity Funds

- ◆ Invest primarily in stocks.
- ◆ Aim for capital appreciation over the long term.
- ◆ *Examples:* SBI Bluechip Fund and Reliance Large Cap Fund.

### 3. Hybrid Funds

- ◆ Also known as balanced funds, they invest in a mix of equity and debt.
- ◆ Aim for a balance between capital appreciation and income.
- ◆ *Examples:* ICICI Prudential Balanced Advantage Fund, HDFC Hybrid Equity Fund.

## 9.8.3 Based on Investment Style

### 1. Passive Funds

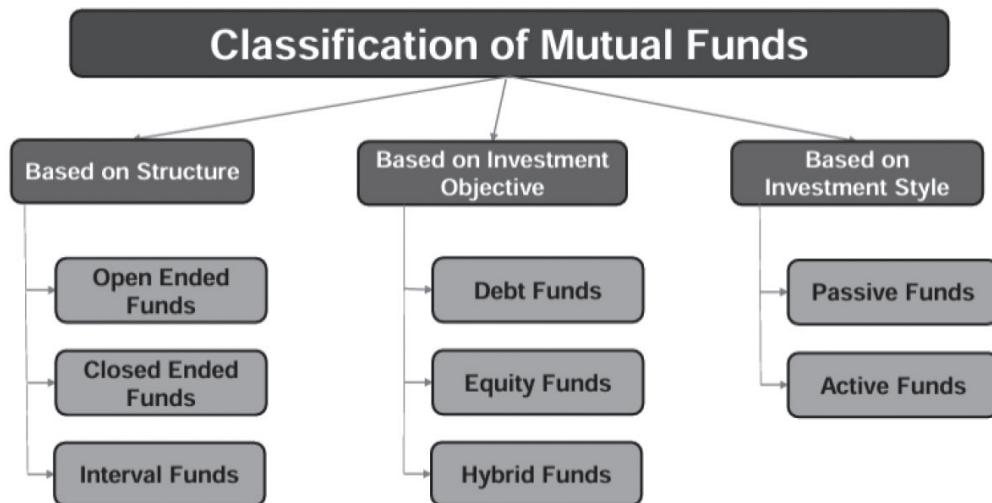
- ◆ These funds aim to replicate the performance of a specific market index.
- ◆ They have a lower expense ratio compared to actively managed funds.
- ◆ *Examples:* Nippon India ETF Nifty BeES, UTI Nifty Index Fund.

### 2. Active Funds

- ◆ Fund managers actively make investment decisions to outperform the market.
- ◆ Generally, these funds have higher expense ratios.
- ◆ *Examples:* Kotak Standard Multicap Fund, Aditya Birla Sun Life Frontline Equity Fund.



### 9.8.4 *Others*



**Figure 9.2: Classification of Mutual Funds**

Source: BSE

#### IN-TEXT QUESTIONS

7. Which type of fund has a fixed maturity period and a fixed number of units that can only be purchased during the initial offer period?
  - (a) Open-ended funds
  - (b) Closed-ended funds
  - (c) Interval funds
  - (d) Hybrid funds
8. What is the primary goal of debt funds?
  - (a) Capital appreciation over the long term
  - (b) Balance between capital appreciation and income
  - (c) Regular income and capital preservation
  - (d) Replication of market index performance



## 9.9 Latest Developments Regarding Mutual Funds

### 9.9.1 Exchange Traded Funds (ETF)

Exchange Traded Funds (ETFs) are investment funds that are traded on stock exchanges, similar to individual stocks. They are designed to track the performance of a specific index, commodity, bond, or basket of assets. ETFs provide investors with a way to gain exposure to a diversified portfolio of assets without having to buy each individual security separately. Here are some key characteristics and advantages of ETFs:

- Diversification:** ETFs often represent a basket of assets, providing investors with instant diversification. This can help spread risk and reduce the impact of poor performance in a single security.
- Liquidity:** ETFs are traded on stock exchanges like individual stocks. This means they can be bought or sold throughout the trading day at market prices, offering liquidity to investors.
- Transparency:** The majority of ETFs disclose their holdings on a daily basis. This transparency allows investors to know exactly what assets they own within the fund and helps them make informed investment decisions.
- Lower Costs:** ETFs generally have lower expense ratios compared to traditional mutual funds. This is because many ETFs passively track an index, requiring less active management and reducing associated costs.
- Flexibility:** ETFs provide investors with the flexibility to trade throughout the day at market prices. This is in contrast to mutual funds, which are priced at the end of the trading day.
- Tax Efficiency:** ETFs are structured in a way that can be tax-efficient. Because of their “in-kind” creation and redemption process, ETFs may minimize capital gains distributions, which can be a tax advantage for investors.
- Accessibility:** ETFs allow investors to gain exposure to various asset classes, including stocks, bonds, commodities, and more, without the need for large amounts of capital. This makes them accessible to a wide range of investors.



8. **Intraday Trading:** Unlike mutual funds, which can only be traded at the end of the trading day at the NAV price, ETFs can be bought or sold at any time during market hours at market prices.
9. **Options Trading:** Many ETFs have options available, providing additional flexibility for investors to implement various investment strategies, including hedging and income generation.

It is important to note that while ETFs offer several advantages, they also come with risks, and investors should carefully consider their investment objectives and the specific characteristics of the ETF before investing.

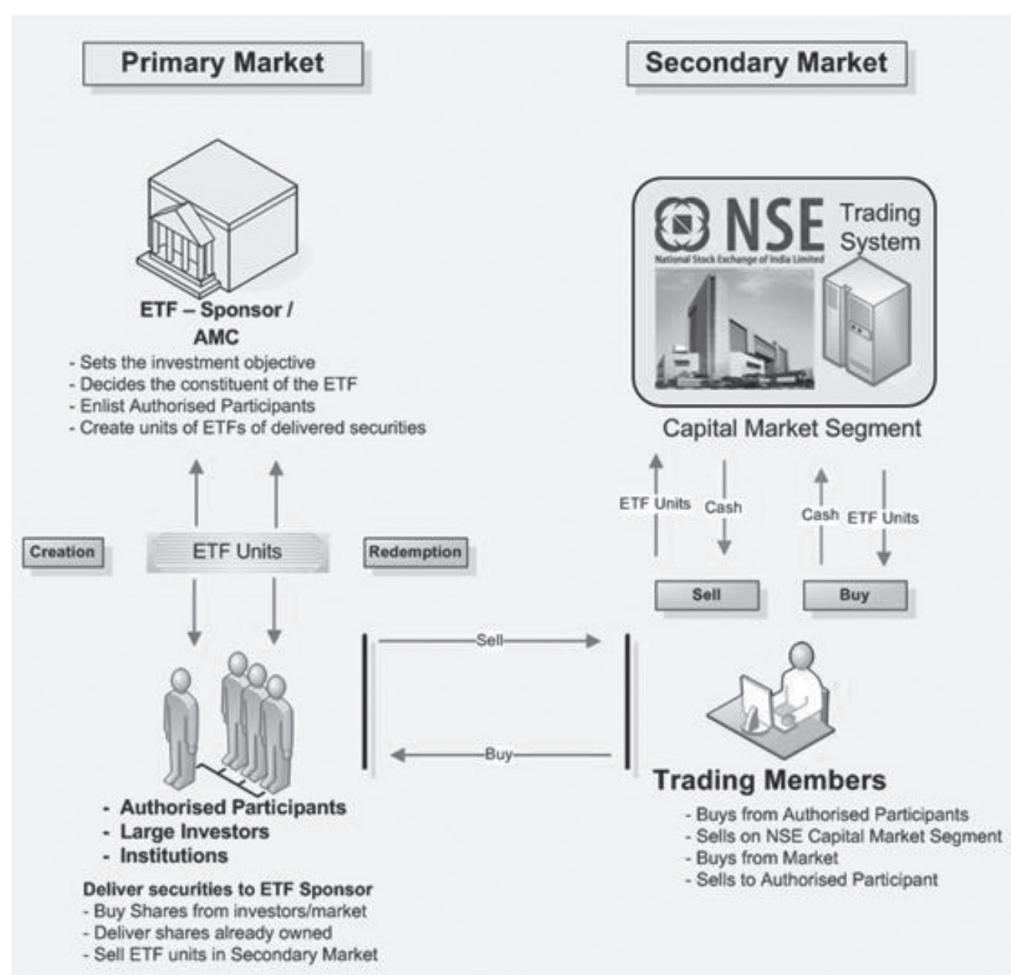


Figure 9.3: Exchange Traded Funds (ETF)

Source: NSE



### **9.9.2 Fund of Funds (FoF)**

A Fund of Funds (FoF) in the mutual fund industry is a type of investment fund that primarily invests in other mutual funds rather than directly in individual securities like stocks or bonds. In other words, it is a mutual fund that pools money from investors and allocates that money across a diversified portfolio of other mutual funds.

The main objective of an FoF is to provide investors with a convenient way to achieve diversification across various asset classes and investment styles without having to manage multiple individual funds themselves. Instead of selecting and managing individual securities, investors can delegate the task to the fund manager of the FoF.

Here are some key characteristics and considerations related to FoF:

- 1. Diversification:** FoFs provide investors with instant diversification across different mutual funds, which may invest in various asset classes, sectors, or geographical regions. This diversification can help reduce the risk associated with individual fund selection.
- 2. Professional Management:** The FoF is managed by a fund manager or a team of managers who make decisions about asset allocation and fund selection. These professionals aim to optimize the portfolio's performance based on the fund's investment objectives.
- 3. Costs:** One potential drawback of FoFs is that they may have an additional layer of fees. Investors in FoFs pay fees for the underlying funds and an additional fee for the management of the FoF. This can result in a higher overall expense ratio compared to investing directly in individual funds.
- 4. Suitability for Investors:** FoF can be suitable for investors who prefer a hands-off approach to investing and want exposure to a broad range of investments without the need for detailed research and management.
- 5. Types of Fund of Funds:** There are different types of FoF, such as those that invest in a specific asset class (e.g., equity FoFs, debt FoFs) or those that focus on a particular investment style (e.g., value-oriented, growth-oriented).



## Notes

It is essential for investors to carefully review the prospectus of a FoF to understand its investment strategy, objectives, fees, and risks before making an investment decision. As with any investment, there are potential advantages and disadvantages, and suitability depends on an individual investor's goals and risk tolerance.

### 9.9.3 Systematic Investment Plans (SIP)

A SIP is a disciplined and systematic way of investing money in mutual funds. It allows investors to contribute a fixed amount regularly (usually monthly) to a selected mutual fund scheme. SIP is a popular investment strategy, especially among retail investors, as it offers several benefits:

- 1. Affordability:** SIPs allow investors to start with a small amount, making it affordable for individuals with limited resources to participate in the financial markets.
- 2. Disciplined Saving:** SIPs promote disciplined saving and investing. Since a fixed amount is invested at regular intervals, investors develop a savings habit and are less affected by short-term market fluctuations.
- 3. Rupee Cost Averaging:** SIPs follow the principle of rupee cost averaging. Investors buy more units when prices are low and fewer units when prices are high. Over time, this strategy averages out the cost of investment, reducing the impact of market volatility.
- 4. Power of Compounding:** The power of compounding plays a crucial role in wealth creation. As SIPs continue over the long term, the returns generated on the accumulated investment, along with reinvested dividends, can compound and significantly enhance the overall returns.
- 5. Flexibility:** Investors have the flexibility to increase, decrease, or stop their SIP contributions based on their financial goals and circumstances.
- 6. Diversification:** Mutual funds typically invest in a diversified portfolio of stocks, bonds, or other securities. By investing in mutual funds through SIPs, investors gain exposure to a diversified set of assets, spreading risk.



- 7. Long-Term Gains:** Due to rupee-cost averaging and the power of compounding SIPs have the potential to deliver attractive returns over a long investment horizon.
- 8. Professional Fund Management:** SIPs invest in mutual funds managed by professional fund managers. These managers conduct research, make investment decisions, and actively manage the fund to achieve optimal returns for investors.
- 9. Goal-Oriented Investing:** SIPs are often aligned with specific financial goals, such as buying a house, funding education, or retirement planning. This goal-oriented approach helps investors stay focused on their objectives.

#### 9.9.4 Systematic Withdrawal Plans (SWP)

A Systematic Withdrawal Plan (SWP) is a facility offered by mutual funds that allows investors to withdraw a specific amount of money at regular intervals from their investment in the fund. It is essentially the opposite of a SIP, where investors regularly invest a fixed amount.

Here is how SWP generally works:

##### 1. Investment

- ◆ Investors initially invest a lump-sum amount in a mutual fund.

##### 2. Withdrawal Plan

- ◆ Instead of redeeming the entire investment at once, investors set up a withdrawal plan specifying the amount they want to withdraw periodically (monthly, quarterly, or annually).

##### 3. Regular Withdrawals

- ◆ The mutual fund then disburses the specified amount at the chosen intervals directly to the investor's bank account.

##### 4. Remaining Investment

- ◆ The remaining investment continues to stay invested in the mutual fund, and its value fluctuates based on market conditions.

SWP can be useful for investors looking to generate a regular income stream from their investments while keeping the principal amount invested. It is commonly used by retirees or individuals looking for a steady income in their post-employment years.



## Notes

Investors should consider factors like the fund's performance, fees, and their own financial goals before opting for a SWP. Additionally, taxes may apply to the withdrawn amount, so it is important to be aware of the tax implications associated with SWP withdrawals.

### 9.9.5 Systematic Transfer Plans (STP)

A Systematic Transfer Plan (STP) is a financial investment strategy that allows an investor to transfer a fixed amount of money regularly from one mutual fund scheme to another within the same fund house. This allows investors to benefit from the potential advantages of both equity and debt funds while managing risk according to their investment goals and risk tolerance.

Here is how a Systematic Transfer Plan generally works:

#### 1. Selection of Funds

- ◆ Investors initially invest a lump-sum amount in a mutual fund scheme of their choice, typically in a liquid or debt fund.

#### 2. Fixed Transfer Amount

- ◆ The investor then decides on a fixed amount or a fixed number of units to be transferred from the source fund (usually a debt or liquid fund) to the target fund (equity fund) at regular intervals.

#### 3. Transfer Frequency

- ◆ Investors can choose the frequency of transfers, which could be monthly, quarterly, or any other predetermined interval.

#### 4. Risk Management

- ◆ By using STP, investors can manage their exposure to market volatility. For instance, if an investor has a lump-sum amount and wants to gradually invest in equities, they can start with a debt fund and transfer a fixed amount periodically to an equity fund.

#### 5. Tax Efficiency

- ◆ STP can also be used for tax planning. For example, if an investor has a lump-sum amount and wants to invest in an equity fund for the long term, they can use STP to spread the investment over a period, potentially benefiting from lower tax implications due to long-term capital gains.



## 9.10 Performance Evaluation of Managed Funds

Portfolio management involves two primary approaches: passive management and active management. According to the efficient market hypothesis (EMH), passive management is deemed the most efficient strategy, as consistently outperforming the market is unattainable by any fund manager. In an ideal efficient market, securities are accurately valued at their intrinsic worth, leaving no room for undervalued or overvalued stocks. However, the real-world market is not perfectly efficient, allowing for the viability of active management. Investors must regularly assess investment performance and adapt to changing needs and market conditions. Evaluation of portfolio performance encompasses a variety of methods categorized into absolute return and risk-adjusted methods.

**1. Absolute Return Methods:** Under this approach, the absolute return of each portfolio, as well as a benchmark portfolio, is measured. The portfolio yielding the highest return is considered superior. For instance, if Portfolio X generates a 15% return while Portfolio Y achieves 10%, Portfolio X is deemed better.

However, a critical limitation of absolute return methods is their failure to account for the varying risk levels associated with different portfolios. Without considering risk, a portfolio with a higher return may not necessarily be the better choice. For example, if Portfolio X has a 20% risk and Portfolio Y only 2%, a simple comparison of returns will not accurately reflect their relative efficiency.

**2. Risk-Adjusted Methods:** These methods address the limitation of absolute return methods by adjusting returns for underlying risk. Prominent risk-adjusted methods include the Sharpe ratio, Treynor's ratio, and Jensen's alpha. These measures provide a more comprehensive assessment of portfolio performance by factoring in the associated risk.

In essence, while absolute return methods offer a straightforward comparison based on returns alone, risk-adjusted methods provide a more nuanced evaluation, considering the crucial element of risk. Investors can use these tools to make informed decisions based not only on returns but also on the risk-adjusted efficiency of their portfolios.



## 9.11 Risk-Adjusted Methods

### 1. Sharpe's Ratio (or Sharpe Index or Reward to Volatility Ratio):

The Sharpe ratio measures the excess return of a portfolio in terms of per unit of risk (volatility).

Formula: Sharpe's ratio =  $(R_p - R_f)/\sigma_p$ , where:

- ◆  $R_p$  is the portfolio's return.
- ◆  $R_f$  is the risk-free rate.
- ◆  $\sigma_p$  is the portfolio's standard deviation (volatility).

Sharpe's ratio converts risk premium into risk premium per unit of risk. The higher the Sharpe's ratio, the better it is.

When we have to rank the portfolios, the one having the highest Sharpe's ratio triumphs all other.

### 2. Treynor's Ratio (or Treynor's Index):

The Treynor ratio evaluates the excess return of a portfolio per unit of systematic risk (beta).

Formula: Treynor ratio =  $(R_p - R_f)/\beta_p$ , where

- ◆  $R_p$  is the portfolio's return.
- ◆  $R_f$  is the risk-free rate.
- ◆  $\beta_p$  is the portfolio's beta, representing systematic risk.

### 3. Jensen's Alpha:

Jensen's alpha assesses the risk-adjusted performance by comparing the actual portfolio return with the expected return based on the Capital Asset Pricing Model (CAPM).

Formula: Jensen's alpha =  $R_p - [R_f + \beta_p(R_m - R_f)]$ , where

- ◆  $R_p$  is the portfolio's return.
- ◆  $R_f$  is the risk-free rate.
- ◆  $\beta_p$  is the portfolio's beta.
- ◆  $R_m$  is the market return.

These ratios help investors and analysts to evaluate and compare portfolios by considering not only the returns they generate but also the level of risk or systematic risk involved. A higher value for each of these ratios generally indicates better risk-adjusted performance. It is important to note that these ratios have their limitations and should be used in conjunction with other metrics for a comprehensive analysis of portfolio performance.



*Illustration 9.1:* The Following Information Is Available about Two Portfolios S and W, Market Index, and Risk-Free Asset.

Portfolio	Actual return (%)	Beta	SD of returns (%)
S	21	1.1	20
W	26	1.8	25
Risk-free asset	7	0	0
Market index	19	1.00	16

- Rank the portfolios S and W on the basis of the Sharpe ratio and state whether they have outperformed or underperformed the market index.
- Rank the portfolios S and W on the basis of Treynor's ratio and state whether they have outperformed or underperformed the market index.
- Is there any difference in the results stated in (1) and (2) above? Why?

*Solution:* Sharpe's ratio ( $S_p$ ) and Treynor's ratio ( $T_p$ ) are calculated as follows:

$$S_p = [R_p - R_f]/\sigma_p$$

$$T_p = [R_p - R_f]/\beta_p$$

Portfolio	$R_p$	$\sigma_p$	Sharpe's ratio ( $S_p$ )	Rank	
S	21	20	$[21 - 7]/20 = 0.70$	2	Underperformed as $S_p < S_m$
W	26	25	$[26 - 7]/25 = 0.76$	1	Outperformed as $S_p > S_m$
Market index	19	16	$[19 - 7]/16 = 0.75$		

Portfolio	$R_p$	$\beta_p$	Treynor ratio ( $T_p$ )	Rank	
S	21	20	$[21 - 7]/20 = 0.70$	1	Outperformed as $T_p > T_m$
W	26	25	$[26 - 7]/25 = 0.76$	2	Underperformed as $T_p < T_m$
Market index	19	16	$[19 - 7]/16 = 0.75$		



## Notes

The rankings provided by Sharpe's ratio and Treynor's ratio are different. As per Sharpe's ratio portfolio W is better than portfolio S. As per Treynor's ratio, portfolio S is better than portfolio W. This is because of the difference in the measure of risk. In the case of the Sharpe ratio, we consider total risk, while in the case of Treynor's ratio, we consider only systematic risk.

*Illustration 9.2:* The following information is available about three portfolios P1, P2, and P3. The market index provided a return of 20% over the same period while returns on Treasury bills were 6%.

Portfolio	Actual return (%)	Beta
P1	15	0.60
P2	30	1.80
P3	27	1.5

Calculate Jensen's alpha for each portfolio and state whether they have outperformed or underperformed the market index.

*Solution:* Jensen's alpha is calculated as follows:

$\alpha = \text{Actual return} - \text{Expected return as per CAPM}$

Expected return as per CAPM is calculated as follows:

$$E(R_p) = R_f + [R_m - R_f]\beta_p$$

Portfolio	Actual return (%)	Beta	CAPM returns	$\alpha$
P1	15	0.60	$6 + [20 - 6](0.6)$ = 14.4	$15 - 14.40$ = 0.60
P2	30	1.80	$6 + [20 - 6](1.80)$ = 3.12	$30 - 31.20$ = -1.20
P3	27	1.5	$6 + [20 - 6](1.5)$ = 27	$27 - 27$ = 0

Portfolio P1 has outperformed the market as its Jensen's alpha is positive. Portfolio P2 has underperformed the market as its Jensen's alpha is negative. Portfolio P3 is efficiently priced in the market and has neither outperformed nor underperformed. Its actual performance is the same as expected.



## IN-TEXT QUESTIONS

9. Which ratio measures the excess return of a portfolio per unit of systematic risk (beta)?
  - (a) Sharpe's ratio
  - (b) Treynor's ratio
  - (c) Jensen's alpha
  - (d) Expense ratio
  
10. What is a limitation of absolute return methods in portfolio evaluation?
  - (a) They ignore the portfolio's systematic risk
  - (b) They provide a comprehensive assessment of risk
  - (c) They are not influenced by benchmark portfolios
  - (d) They accurately account for varying risk levels

**9.12 Performance Evaluation of Mutual Funds**

A mutual fund is essentially a curated portfolio of securities, and its performance can be assessed through absolute returns and various risk-adjusted metrics such as the Sharpe ratio, Treynor's ratio, and Jensen's alpha. To comprehend the return from a mutual fund, it is crucial to delve into the calculation of NAV and the associated costs.

**1. Net Asset Value (NAV):** NAV represents the amount a unit holder would receive per unit if the mutual fund were to be liquidated. It is derived from the net assets of the fund, calculated as the market value of investments, receivables, accrued income, and other assets minus accrued expenses, payables, and other liabilities. The NAV per unit is determined by dividing the NAV of the fund by the number of units outstanding.

$$\text{NAV per unit} = \frac{\text{Net asset value of the fund}}{\text{No. of units outstanding}}$$

Where net assets = Market value of investments + receivables + accrued income + other assets - accrued expenses - payables - other liabilities.

**2. Costs Incurred by Mutual Fund:** "In the mutual fund field, costs assume a tremendous importance for the long-term investor. Other things held equal, lower costs mean higher returns."—John Bogle.



## Notes

Costs in the mutual fund arena are pivotal for long-term investors, with lower costs translating to higher returns. These costs encompass initial expenses for setting up the scheme and ongoing recurring expenses (management expenses). The management expense ratio, expressed as a percentage of average assets under management, includes expert investment analyst costs, administration expenses, and advertising costs. It is computed as below:

$$\text{Expense ratio} = \frac{\text{Expenses}}{\text{Average Assets under Management}}$$

**3. Return from Mutual Fund:** Returns from a mutual fund can be dividends, capital gains disbursement, or changes in NAV over a specified period. The return formula incorporates dividends, realized capital gains, and the change in NAV, expressed as a percentage of the NAV at the beginning of the period.

$$\text{Return} = \frac{\text{Div}_1 + \text{CG}_1 + [\text{NAV}_1 - \text{NAV}_0]}{\text{NAV}_0} \times 100$$

where

- ◆  $\text{Div}_1$  is the dividends for the period;
- ◆  $\text{CG}_1$  is the Capital gains realized;
- ◆  $\text{NAV}_1$  = NAV at the end of the year; and
- ◆  $\text{NAV}_0$  = NAV in the beginning of the year.

**4. Performance Evaluation of Mutual Funds:** Once the return from a mutual fund is calculated, we can also determine its total risk by calculating the standard deviation of returns. Further beta of a mutual fund can also be determined to capture the sensitivity of a mutual fund scheme to market portfolio returns. Once we have actual return, risk, and beta factor of the mutual fund, we can apply the following measures for the performance evaluation of a mutual fund:

1. Absolute return
2. Risk-adjusted measures: this include
  - (a) Sharpe's ratio
  - (b) Treynor's ratio
  - (c) Jensen's alpha



*Illustration 9.3:* Find out NAV per unit from the following information:

Size of the scheme	Rs. 10,00,000
Face value of shares	Rs. 10
Number of outstanding shares	Rs. 1,00,000
Market value of fund's investment	Rs. 18,00,000
Bills receivable	Rs. 20,000
Liabilities	Rs. 10,000

*Solution:*

$$\begin{aligned}\text{Total Assets} &= \text{Market value of investment} + \text{Bills receivable} \\ &= \text{Rs. } 18,00,000 + \text{Rs. } 20,000 \\ &= \text{Rs. } 18,20,000\end{aligned}$$

Liabilities = Rs. 10,000

Net Assets = Rs. 18,20,000 - Rs. 10,000 = Rs. 18,10,000

$$\begin{aligned}\text{NAV per unit} &= \frac{\text{Net asset value of the fund}}{\text{No. of units outstanding}} = \frac{\text{Rs. } 18,10,000}{1,00,000} \\ &= \text{Rs. } 18.1 \text{ per share}\end{aligned}$$

### 9.13 Summary

The lesson provides an overview of mutual funds, covering various aspects such as their definition, types, historical evolution in India, and the three-tier structure involving sponsors, trusts, and asset management companies. The lesson emphasizes the professional management, risk diversification, and regulatory oversight offered by mutual funds, making them an attractive investment option.

The lesson further delves into the structure of mutual funds, categorizing them based on open-ended, closed-ended, and interval funds, as well as their investment objectives (debt, equity, and hybrid) and investment styles (passive and active funds). It discusses the advantages of mutual funds, including risk diversification, professional management, affordability, liquidity, and regulatory compliance.

However, the lesson also addresses the limitations of mutual funds, such as the lack of individual control, dependence on fund managers, associated



## Notes

costs, lock-in periods, and potential impact on returns. Despite these drawbacks, mutual funds offer a range of benefits tailored to different investor preferences and financial goals.

The lesson concludes with an exploration of portfolio management, distinguishing between passive and active management approaches. It introduces absolute return and risk-adjusted methods for evaluating portfolio performance, including Sharpe's ratio, Treynor's ratio, and Jensen's alpha. These measures help investors make informed decisions by considering both returns and risk in their portfolio analysis. The summary highlights the importance of using these ratios in conjunction with other metrics for a comprehensive assessment of portfolio performance.

### 9.14 Answers to In-Text Questions

1. (b) A professionally managed investment scheme
2. (c) SEBI (Securities and Exchange Board of India)
3. (a) Total assets minus liabilities
4. (c) Entry of Private Players (1993–2003)
5. (b) Sponsors
6. (c) Pooling money for risk diversification
7. (b) Closed-ended funds
8. (c) Regular income and capital preservation
9. (b) Treynor's ratio
10. (a) They ignore the portfolio's systematic risk

### 9.15 Self-Assessment Questions

1. Explain the three-tier structure of mutual funds in India. Highlight the roles and responsibilities of sponsors, trustees, and asset management companies (AMCs) in the functioning of a mutual fund.
2. Trace the historical evolution of mutual funds in India through different phases. Discuss the key milestones, regulatory changes, and industry developments that shaped the mutual fund landscape from its introduction in 1963 to the present day.
3. Compare and contrast the advantages and disadvantages of investing in mutual funds.



4. Describe the various types of mutual funds based on their structure, investment objectives, and investment styles. Provide examples for each category and explain how these classifications cater to different investor needs and preferences.
5. Examine the methods used for evaluating portfolio performance, distinguishing between absolute return methods and risk-adjusted methods. Discuss the significance of Sharpe's ratio, Treynor's ratio, and Jensen's alpha in assessing the efficiency and risk of a portfolio.

### 9.16 References

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### 9.17 Suggested Readings

- ◆ Reilly, F. K., & Brown, K. C. (2012). *Analysis of Investments and Management of Portfolios* (12th ed.). Cengage India Pvt. Ltd.
- ◆ Singh, R. (2017). *Security Analysis and Portfolio Management* (2nd ed.). Excel Books.





# Glossary

**Adaptation and Learning:** Being responsive to changing market conditions, economic trends, and personal circumstances allows for the adaptation of the portfolio strategy.

**APT (Arbitrage Pricing Theory):** APT is an alternative to CAPM and suggests that an asset's return can be modeled as a linear function of various macroeconomic factors.

**Asset Allocation:** This involves dividing investments across different asset classes like stocks, bonds, real estate, and commodities to optimize returns while managing risk. The allocation is based on an investor's goals, risk tolerance, and market conditions.

**Asset Management Companies (AMCs):** AMCs are the companies that trustees or the sponsor appoints, and they are responsible for managing the fund's portfolio and the securities in which they invest. They have their board of directors and work under the supervision of trustees and SEBI.

**Bar Charts:** A chart that has open, high, low, and close data sets in a vertical line in the form of a bar. It's also referred to as an open-high-low-close (or OHLC) chart.

**Beta ( $\beta$ ):** It serves as an indicator of systematic risk.

**Bond Valuation:** The process of figuring out a bond's theoretical fair value is known as bond valuation. Bond valuation involves figuring out the face value, or par value, of the bond at maturity as well as the present value of the bond's future interest payments, or cash flow.

**Bond's Yield:** The return an investor anticipates earning on a bond over the course of its term until maturity is known as the yield. The bond yield, for the investor who bought the bond, is an overview of the total return that takes into consideration the principle and interest that will remain after the bond's purchase price.

**Broker:** Attracts new investors, holds SEBI license, acts as an intermediary.

**CAGR:** Compounded Annual Growth Rate.

**Candlestick Charts:** A chart that has open, high, low, and close data sets in a candle form.

**CAPEX:** Expenditure incurred for property, plant, and equipment.

**Capital Asset Pricing Model:** It is an extension of Capital Market Theory and serves as a tool to predict the expected return on a security or portfolio.



**Capital Market Line:** The efficient portfolios are created by combining the optimal portfolio of risky assets with risk-free lending or borrowing.

**Capital Market:** A financial marketplace that facilitates the trading of financial assets having a maturity period of more than one year.

**CAPM (Capital Asset Pricing Model):** Is a financial model that establishes a relationship between the expected return on an investment and its systematic risk.

**Closed-Ended Funds:** These funds have a fixed maturity period and a fixed number of units, which can only be purchased during the initial offer period. Once the NFO (New Fund Offer) period ends, investors cannot purchase or redeem units of a closed-ended fund. Investors can sell units on the stock exchange if there is enough liquidity.

**Covariance:** It is a statistical tool which measures the degree of interaction between two random variables.

**Custodians:** Hold securities in demat form and handle back-office bookkeeping.

**DCF:** Discounted cash flow analysis

**DDM:** Dividend discount model

**Dealers:** Facilitate deals in capital and money market instruments.

**Diversification:** A strategy to minimise risk by investing in different investment options.

**Downtrend:** Stocks are in a downtrend when they're making lower highs and lower lows.

**EBIT:** Earnings before interest and taxes

**Efficient Frontier:** The set of efficient portfolios.

**Efficient Portfolios:** These are feasible portfolios with the highest expected return for a given level of risk, measured by portfolio standard deviation.

**Exchange Traded Funds (ETF):** are investment funds that are traded on stock exchanges, similar to individual stocks. They are designed to track the performance of a specific index, commodity, bond, or basket of assets.

**FCFE:** Free cash flows to equity

**FCFF:** Free cash flows to firm



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**Fixed-Income Securities:** An investment that yields a return through fixed periodic interest payments and the eventual repayment of principle upon maturity is known as a fixed-income security. In contrast to variable-income securities, which have payments that fluctuate according to an underlying metric like short-term interest rates, fixed-income securities have known returns.

**Fund of Funds (FoF):** Industry is a type of investment fund that primarily invests in other mutual funds rather than directly in individual securities like stocks or bonds.

**Indifference Curve:** It shows the utility score of an investor in terms of expected returns and risk. All the points on a particular IC represent different levels of risk and return with the same amount of satisfaction.

**Inefficient Portfolios:** These portfolios have the same risk as another feasible portfolio but a lower expected return.

**Interval Funds:** These funds combine features of both open-ended and closed-ended funds. Investors can buy or sell units at predefined intervals (monthly, quarterly, annually, etc.) at NAV-related prices.

**Investment Selection:** Portfolio managers select specific investments within each asset class, considering factors like company fundamentals, market trends, and potential returns.

**Line Chart:** A single line that connects stock prices is called a line chart.

**Liquidity Management:** Balancing the need for liquidity with long-term investment goals ensures that investors can meet short-term financial needs while maximizing long-term growth.

**Market Risk Premium:** It is the excess return expected from the overall market above the risk-free rate.

**Mutual Fund:** A mutual fund is a professionally managed investment scheme, usually run by an Asset Management Company (AMC), that brings together a group of people and invests their money in stocks, bonds, and other securities.

**Net Asset Value (NAV):** NAV represents the amount a unit holder would receive per unit if the mutual fund were to be liquidated.

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**Non-Cash Working Capital:** Working capital of firm excluding cash

**Objective Setting:** Investors define their financial goals, whether it's wealth accumulation, retirement planning, or risk mitigation, aligning these objectives with their risk tolerance and investment horizon.

**Open Ended Funds:** These funds do not have a fixed maturity period. Investors can buy and sell units at any point, and the fund continuously issues and redeems units based on the net asset value (NAV).

**Optimal Portfolio:** The point of tangency between an efficient set and an investor's indifference curve.

**Patterns:** Price patterns are trends that occur in stock charts. The patterns form recognizable shapes.

**Performance Evaluation:** Investors regularly assess portfolio performance against benchmarks and goals, making adjustments as necessary to optimize returns.

**Regular Monitoring and Rebalancing:** Portfolios are continuously monitored to ensure they remain aligned with investors' goals. Rebalancing involves adjusting the allocation periodically to maintain the desired risk-return profile.

**Relative Strength Index:** The Relative Strength Index (or RSI) is a measure of the overbought and oversold position of a stock.

**Resistance:** A straight line that connects three or more of a stock's data points. It usually indicates the stock is going up.

**Risk:** It is the deviation or change in actual returns from the expected returns.

**Risk in Bonds:** Although bonds are regarded as secure investments, there are certain risks associated with them, including call, reinvestment, interest rate, inflation, and default risks. Risk-taking investors typically generate more money, but they may experience anxiety when the stock market declines.

**Risk Management:** Portfolio managers assess and manage risks associated with investments, aiming to strike a balance between risk and return. Diversification across assets and industries helps mitigate risks.

**Risk-Averse Investor:** An investor who prefers minimal risk, and consequently, tends to avoid investment in relatively risky financial assets.



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**Risk-Free Asset:** An asset whose returns are certain and known at the beginning of the holding period.

**Sideways Trend:** Stocks that trade in a range are in a sideways trend.

**Simple Moving Average:** An average of the closing price of the stock over a specified number of periods.

**SML (Security Market Line):** It is a graphical representation of the Capital Asset Pricing Model (CAPM).

**Sponsor:** Initiates the mutual fund, requires SEBI approval, and submits necessary documents.

**Support:** A straight line that connects three or more of a stock's data points. It usually indicates the stock is going down.

**Systematic Investment Plans (SIP):** It allows investors to contribute a fixed amount regularly (usually monthly) to a selected mutual fund scheme.

**Systematic Risk:** It emanates from factors beyond the control of individual companies. It is also known as a non-diversifiable risk.

**Systematic Transfer Plans (STP):** It is a financial investment strategy that allows an investor to transfer a fixed amount of money regularly from one mutual fund scheme to another within the same fund house.

**Systematic Withdrawal Plans (SWP):** It is a facility offered by mutual funds that allows investors to withdraw a specific amount of money at regular intervals from their investment in the fund.

**Tax Efficiency:** Investors consider tax implications when making investment decisions, utilizing tax-advantaged accounts or strategies to minimize tax burdens.

**Trend:** The directional movement of a stock price.

**Trust and Trustees:** Formed under the Indian Trust Act of 1882, they oversee fund activities to ensure compliance.

**Unsystematic Risk:** It is influenced by factors within a company's control. It is also known as diversifiable risk.

**Uptrend:** Stocks are in an uptrend when they're making higher highs and higher lows.

**Volume:** The measure of the number stock's shares traded on the stock exchange in a day or a period of time.

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