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Education for All

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

NAAC ACCREDITED A++ GRADE 3.55/4

# MBA
# SEMESTER - 4
# MBA04EF403
# Derivatives & Risk Management

## Message for the Students

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

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

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

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

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

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

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

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

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

**MBA**
**SEMESTER-4**
**(SPECIALIZATION) (FINANCE)**
**DERIVATIVES & RISK MANAGEMENT**
**BLOCK: 1**


Authors' Name: Prof. (Dr.) Manoj Shah, Professor & Director, Dr. BAOU, Ahmedabad
Dr. Narayan Baser, Associate Professor, PDPU,Gandhinagar
Dr. Shailaja Parmar, Assistant Professor, Sheth H.P.Arts &T.S.M College, Talod
Dr. Dipak Sanki, Assistant Professsor, Kbs college vapi,Vapi

Review (Subject): Dr. Dhaval Maheta, Professor, Department of Business and Industrial Management, Veer Narmad South Gujarat University, Surat
Dr. Narayan Baser, Associate Professor, PDPU,Gandhinagar

Review (Language): Dr.Ketan K.Gediya,Associate Professor,Smt.S.R.Mehta Arts College, Ahmedabad

Editor's Name: Prof. (Dr.) Manoj Shah,
Professor and Director,
School of Commerce and Management,
Dr. Babasaheb Ambedkar Open University,
Ahmedabad.

Co-Editor's Name: Dr. Dhaval Pandya
Assistant Professor,
School of Commerce and Management,
Dr. Babasaheb Ambedkar Open University,
Ahmedabad.



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**MBA**
**SEMESTER - 4**
**MBA04EF403**

# Derivatives & Risk Management

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# UNIT-1 INTRODUCTION TO RISK & RISK MANAGEMENT – FRAMEWORK


**1.1 Introduction**

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## 1.1 Introduction:

Exposure to harm, danger is known as risk. It can be a chance of loss arising out of any action. Greater the uncertainty of any event, greater will be the risk and vice versa. In simple words, optimizing the returns out of prospected risk will be a wise approach by an individual. Risk is always associated with profit. If an individual has a risk-taking capacity, means it explores the opportunity to profit.

Risk takes on many forms but is broadly categorized as the chance an outcome or investment's actual gain will differ from the expected outcome or return. Risk includes the possibility of losing some or all of an investment. There are several types of risk and several ways to quantify risk for analytical assessments. Risk can be reduced using diversification and hedging strategies.

Risks are of different types and originate from different situations. We have liquidity risk, sovereign risk, insurance risk, business risk, default risk, etc. Various risks originate due to the uncertainty arising out of various factors that influence an investment or a situation.

## 1.2 DEFINITION OF RISK MANAGEMENT:

**1)** Risk management is an integrated process of delineating (define) specific areas of risk, developing a comprehensive plan, integrating the plan, and conducting the ongoing evaluation' **– Dr. P.K. Gupta.**

2) Managing the risk can involve taking out insurance against a loss, hedging a loan against interest rate rises, and protecting an investment against a fall in interest rates' **– Oxford Business Dictionary.**
3) The possibility that the occurrence of an event will adversely affect the achievement of the organization's objectives. – **Stanford University**
4) Risk implies future uncertainty about deviation from expected earnings or expected outcome. Risk measures the uncertainty that an investor is willing to take to realize a gain from an investment. **– The Economic Times**

## 1.3 What is Risk?

**Risk** is the exposure to danger, harm, or loss. It can be loss of money, home, car, potentiality of earning, loss of assets. This is known as loss **of an asset**. If an individual is harmed out of any activity resulting into permanent inefficiency to work then in that case it's a loss of potentiality. Here an individual is compromised with his ability to work a particular type of work so it is known as **loss of earning potentiality**.

Risk refers to the degree of uncertainty and/or potential financial loss inherent in an investment decision. Risk is defined in financial terms as the chance that an outcome or investment's actual gains will differ from an expected outcome or return. Risk includes the possibility of losing some or all of an original investment.

## 1.4 Nature of Risk:

The nature of risk is inevitable and uncertain. Its there in everyday life and any decision related with finance. There can be some level of uncertainty in such type of financial decisions. It can not be completely eliminated. The external factors basically unavoidable, uncontrollable are responsible for risk. Some of the examples are job loss, unexpected expenses, heavy loss, changes in economic planning or government policies, change is consumer taste and preferences.

This is why it is important for individuals to be aware of the potential risks and to have a plan for managing them.

The financial risks might be in the form of high inflation, volatility in capital markets, recession, bankruptcy, etc. So, in order to minimize and control the exposure of investment to such risks, fund managers and investors practice risk management. Not giving due importance to risk management while making investment decisions, but risk arises due to change in an economy. Different levels of risk come attached with different categories of asset classes.

## 1.5 What is Risk Management?

Risk management is the process of identifying, analyzing, and responding to risk. This involves looking at the potential risks involved in a financial decision, figuring out how likely they are to happen, and deciding how to respond.

Risk management is a process to protect the organization, its capital, earnings and operations. This is done by identifying, measuring, monitoring and controlling threats.

Risk management is the process of identifying, assessing, and taking steps to minimize or eliminate the risks that we face in our daily lives.

According to PwC's Global Risk Survey, organizations that embrace strategic risk management are five times more likely to deliver stakeholder confidence and better business outcomes and two times more likely to expect faster revenue growth.

Businesses can't operate without risk. Economic, technological, environmental, and competitive factors introduce obstacles that companies must not only manage but overcome.

## 1.6 Need of Risk Management:

- **Crucial for Planning**

Believe it or not, risk management strategy plays an important role in planning for the future. Through an increased awareness of hazards, and therefore possible risks, your department can create a strategy that effectively controls hazards and risks moving forward.

- **Informed Decision-Making**

Risk management in health and safety is a great tool for forward-thinking. Not only can you plan better with a more informed understanding of risk, but you can also make quicker decisions across business operations due to available data. With more information, decisions can be made with more confidence.

- **Safer Work Environment**

Greater visibility and awareness of risks within the workplace allows your employees and EHS department to proceed with appropriate training that will ensure safety.

- **Demonstrates Leadership**

Risk management allows the implementation of a proactive risk management strategy. Such a strategy helps demonstrate to employees that leadership is serious about protecting both their physical and mental health. This will in turn help strengthen employee loyalty, retention and motivation.

- **Improved Employee Engagement and Productivity**

Employees feel encouraged by their employer's dedication to providing and maintaining a safe working environment. This can translate to increased engagement and productivity. Your employees will be less likely to leave if they feel the organization is attentive to their needs and well-being.

- **Improved Communication**

When risk management is carried out correctly, the organization should have a good understanding of how the business is working together when it comes to health and safety. Forming a strategy can help you find gaps in your communication, which can then be strengthened. Strategies should prioritize visibility, which will stimulate communication.

- **Financial Savings**

Incidents incur both direct and indirect costs. Direct costs consist of lost wages and medical treatment, while indirect costs include lost working hours, damage to property and diminished employee morale. These are only some of the costs of workplace accidents. Mitigating hazards can help prevent accidents from occurring, saving your organization the hefty financial and administrative burden of incidents.

## 1.7 The Benefits of Risk Management

Effective risk management decreases the losses and increases the efficacy of the business operations. These are the benefits of implementing risk management strategies:

- Regulation and internal compliance demands are more effectively and efficiently complied.
- Increased operational effectiveness by applying risk procedures and controls more consistently.
- The awareness about risks increases across all levels of organization.
- Increased assurance in the aims and ambitions of the company when strategy takes risk into account.
- A market-based competitive differentiator.
- Enhanced security and safety at work for both clients and staff.

❖ **Benefits of Risk Management**

**1. Risk management can save you from financial losses**

While it may appear costly, risk management can protect your company from financial losses. Risk management can save your company from bankruptcy and liquidation in certain extreme situations.

**2. Risk management ensures compliance with regulations**

The regulatory environment is becoming extremely complex. And risks of compliance oversights place a heavy burden on organizations.

**3. Risk management can improve planning**

A business must evaluate where it will be five or ten years down the line. Even the most accurate forecasts can crumble in the face of unexpected risks.

**4. Risk management demonstrates leadership**

Businesses require confident, trustworthy leaders who inspire and motivate employees. According to management experts, leaders must have confidence in their abilities to instill confidence in others. This is where risk management enters the picture.

**5. Risk management can help preserve brand image**

Although not directly related to your duties in the finance department, brand image and reputation are undeniably critical in risk management.

**6. Risk management can improve employee productivity**

Developing an Enterprise Risk Management Framework is a highly collaborative and consultative endeavor within a business.

## 1.8 Approaches or Methods or Strategies to Risk Management:

There are four main strategies that we can use to manage risk:

- Avoiding,
- Reducing,
- Retaining,
- Transferring
- Diversification
- Duplication

Each strategy has its merits and demerits. Adoption of risk management strategy is completely a situational decision.

**1. Avoiding Risk**

Avoiding risk is the safest option, as it eliminates the possibility of loss or harm altogether. The first strategy for managing risk is to simply avoid it altogether. This can be done by choosing not to engage in activities that are risky, or by taking steps to prevent risky situations from occurring. For example, if you are concerned about the risk of getting into a car accident, you might choose to walk or take public transportation instead of driving.

It may not always be possible or practical to avoid risk. For example, you might not be able to avoid driving if you live in a rural area without access to public transportation. Avoiding risk can also limit your opportunities and prevent you from taking advantage of potentially beneficial situations.

**2. Reducing Risk**

Another strategy for managing risk is to take steps to reduce the chance or impact of a potential loss. This can be done by implementing safety measures, using protective equipment, or taking other precautions. For example, you might choose to wear a helmet when riding a bike or to install smoke detectors in your home to reduce the risk of injury or fire. Reducing risk can help to minimize the potential for loss or harm, without completely avoiding the activity or situation. This strategy can be more

practical and realistic than avoiding risk altogether. It may not be possible to completely eliminate the risk, even with precautions in place. Reducing risk can also require an investment of time, money, or effort.

**3. Retaining Risk**

The third strategy for managing risk is to retain it, or to accept the possibility of loss or harm and be prepared to deal with the consequences. This can be done by setting aside money in an emergency fund, or by developing a plan for how to handle a potential loss. For example, if you work for yourself, you might save money in case you don't have a lot of work or if a project gets cancelled. This way, you can still pay for things you need even if you don't have a lot of work. Retaining risk can allow you to take advantage of potentially beneficial situations, without avoiding or reducing the risk. This strategy can also be more cost-effective than transferring risk, as it does not require you to pay for insurance or other forms of protection. Retaining risk means that you will be responsible for dealing with the consequences of a potential loss or harm. It may also require you to have access to financial resources or other forms of support in order to cope with a potential loss.

**4. Transferring Risk**

The final strategy for managing risk is to transfer it to someone else, typically through the use of insurance or other forms of protection. For example, you might choose to purchase car insurance to transfer the risk of an accident to the insurance company. Transferring risk can provide you with financial protection in the event of a loss or harm. This strategy can also help to reduce your overall level of risk, as you will not be solely responsible for dealing with the consequences of a potential loss. Transferring risk can be expensive, as you will need to pay for insurance or other forms of protection. It may also not be possible to transfer all of the risk, as insurance policies often have exclusions or limitations.

**5. Duplication:**

Duplication is a risk management technique that essentially involves the creation of a backup plan. This is often necessary with technology. A failure with an information systems server should not bring the whole business to a halt. Instead, a backup or failover server should be really available for access in the event that the primary serve fails. Another example of duplication as a risk management technique is when a company makes use of disaster recovery service.

**6. Diversification:**

Diversification is a risk management technique that allocates business resources to create multiple lines of business that offer a variety of products and / or services in different industries. With diversification, a significant revenue loss from one line of business will not cause irreparable harm to the company’s bottom line.

## 1.9 Risk Reporting Process:

Risk reporting is communication of risk and risk management outcomes for the purpose of comparing the results with the policy.

An organization should ensure that information about risks derived from the risk management process is adequately reported, and used as a basis for decision making at all relevant levels. Clear reporting line mechanisms and strong inter-department knowledge sharing should be established in order to encourage accountability of risk, and to ensure reports are delivered in an accurate, consistent and timely manner. Inadequate risk reporting can lead to a failure to fully integrate identified risks into strategic and operational decisions.

The quality and success of risk reporting depends on the following factors like Target audience, Input and processes, Frequency, Content, Format, Dissemination channels. The reporting of risk should be done to the internal stakeholders and external stakeholders. Internal stakeholders can be board of directors, regulators of the company, policy makers of the company and external stakeholders can be media, citizens of India, employees to whom voluntary disclosure is to be done. Organizations may consider preparing different, customized risk reports for different external stakeholders. Whilst internal risk reports aim exclusively at internal audiences, external risk reporting, including corporate annual reports, may more broadly include both external users and interested internal groups.

**Define the reporting objectives.**

Establishing clear reporting objectives is fundamental to the risk-reporting process. Aside from outlining the company's goals, this step avoids unnecessary complexity and prompts targeted actions. Here are some considerations:

- Types of risk reporting (e.g., commercial, environmental, health and safety, etc.)
- Target audience and their specific needs
- Purpose of the report (i.e., compliance vs. decision-making)
- Key message
- Level of detail (i.e., summary vs. in-depth discussion)
- Frequency of reporting

**1. Gather risk data.**

This involves collecting relevant information to identify risks comprehensively and accurately. These are the usual sources to review:

- Internal data from financial statements, operational reports, and incident logs
- External data from industry reports, economic forecasts, and competitive intelligence
- Expert opinions

**2. Analyze risks and prioritize.**

The collected data on potential threats will be carefully evaluated to determine their possible impact and likelihood of occurrence. This process helps organizations focus their resources on the most critical risks.

A risk reporting matrix is a powerful tool for this task. It typically includes the following:

- Risk description
- The probability of the risk occurring
- Potential consequences
- Risk score
- The risk owner or the individual responsible for managing the risk

**3. Develop mitigation plans**

This proactive blueprint outlines the specific actions to safeguard the company against the prioritized risks. A risk mitigation plan assigns responsibilities, sets the timeline for implementation, and lists the necessary resources (e.g., budget, personnel, equipment) to support the plan.

**4. Create workflows for monitoring and updates.**

Establishing a systematic process to track the progress of preventive and corrective actions is crucial because this ensures the ongoing effectiveness of the risk management program. Here are some considerations:

- Monitoring schedules should be followed in response to significant events and changes in the risk landscape.
- Risk reporting dashboards help present key risk information.
- Risk register updates should reflect the changes in risk profiles and mitigation plans.

**5. Prepare the risk report.**

Compile and organize the information gathered throughout the process in a clear and concise document. Aside from communicating the insights to stakeholders, this report will be used for strategic decision-making and compliance.

This is one of the simplest risk reporting examples:

- The introduction should state the following:
- Purpose of the risk report
- Scope and limitations
- Methodologies used for risk identification and assessment
- The risk assessment section

- The risk mitigation strategies
- Procedures for monitoring and reporting

**6. Distribute and communicate the report:**

The last step is disseminating the final report to the intended audience (e.g., senior management, board of directors, and external stakeholders). This ensures all parties fully understand the identified risks, corresponding mitigation strategies, and adjustment plans.

## 1.10 Risk Management Organization Structure:

Organizational structure is the framework that holds an organization together and defines the lines of authority within a company, nonprofit organization or governmental agency. A well-defined organizational structure provides a clear path for risk assessment procedures. Before risk assessment teams can begin to work, each member of the team must have a good working understanding of how the company is organized. The organizational structure will show team members who is responsible for each area or operation being evaluated.

### 1.10.1 Traditional Structures:

Traditional organizational structures typically show clear lines of authority that emanate from a central manager at the top of the organization. The authority vested in each department is clearly defined by its place within the organizational structure. Risk assessment operations can become bogged down when assessment operations are required to strictly follow established lines of authority in the company. The management of risks that cross these established lines can become a complicated process requiring intervention from the senior leadership.

### 1.10.2 Modern Structure:

Modern organizational structures are arranged around teams, organizational processes, organizational functions and virtual operations. These types of organizational structures allow companies greater flexibility to react and adjust to changing market conditions and advancing technology. Risk assessment teams may find modern organizational structures difficult to understand because there may not be clear lines of authority for reporting identified risks. In response to these changing business realities, many organizations are turning to enterprise risk management systems to evaluate and control risks.

## ❖ Exercises:

- **Fill in the blanks.**

1. Exposure to harm, danger is known as _____ (risk.)
2. _____is an integrated process of delineating (define) specific areas of risk, developing a comprehensive plan, integrating the plan, and conducting the ongoing evaluation. (Risk management)
3. _____ is the exposure to danger, harm, or loss. (**Risk** )

4. loss of money, home, car, potentiality of earning, loss of assets. This is known as_____ . (loss **of an asset)**
5. an individual is compromised with his ability to work a particular type of work so it is known as _____ (**loss of earning potentiality)**
6. _____ is the process of identifying, analyzing, and responding to risk. (Risk management)
7. _____is a process to protect the organization, its capital, earnings and operations. (Risk management)
8. _____ is a risk management technique that essentially involves the creation of a backup plan. (Duplication)

- **Answer the following questions**

1. Define risk and explain its nature.
2. Explain the benefits of risk management.
3. Explain the importance of risk management.
4. What is risk management and explain the benefits of risk management
5. Explain the methods of risk management
6. Write a note on risk management organization structure

# UNIT-2 INTRODUCTION TO DERIVATIVES

**2.1 Introduction**

**2.2 Types of Derivatives**

**2.3 Development of Exchange Traded Derivatives**

**2.4 Global Derivatives Market**

**2.5 Derivatives Market in India**

**2.6 Keywords**

❖ **Exercise**

## 2.1 Introduction:

By the end of the 20th century, financial markets such as the stock market, money market, and foreign exchange market grew rapidly around the world. In the last 15 years of the 20th century, derivative markets expanded significantly in many global stock exchanges. Derivative markets cannot operate independently as they are connected to the spot market. These markets are derived from the spot market, and their financial instruments are called derivatives. Derivatives are used to manage financial risks associated with cash transactions. Similar to the cash market, the derivatives market is also an important part of the stock market.

Derivatives are financial instruments whose value is determined by the value of the underlying asset or benchmark. The market where transactions of derivative instruments take place is known as the derivatives market. The derivatives market is a part of the stock market and operates under strict rules, sub-regulations, controls, and standards including stock market indices, interest rates, commodities, the spot market, and clearing house regulations. Any change in the prices of these underlying factors leads to a change in the value of derivatives as well.

Participants in the derivatives market are required to maintain strict financial discipline. In India, the derivatives market has been gradually introduced under the supervision of SEBI at platforms like the Bombay Stock Exchange (BSE) and the National Stock Exchange (NSE). The transactions conducted in the derivatives market primarily include hedging and speculative deals.

### ❖ DEFINITION AND CONCEPT:

### ➢ CONCEPT:

The term 'derivatives' is derived from the word 'to derive,' which means 'to take from' or 'to depend on something else.' Derivatives are similar to insurance. Just as insurance provides protection against risks like fire, floods, and theft, derivatives offer protection against unforeseen risks, uncertainties, and volatility related to price changes in commodities, stock prices, interest rates, and market fluctuations. Examples include foreign exchange rates, stocks, and government bonds.

In essence, the human inclination to manage risks has driven the growth of derivatives. Risk management is essential for survival, especially in today's financial markets characterized by high volatility. In this context, derivatives play a crucial role as tools for mitigating risk.

- **DEFINITION:**

In the context of India, the definition of derivatives is provided under the Securities Contracts (Regulation) Act, 1956, as follows:

1. A security that originates from debt instruments such as shares, loans (secured or unsecured), risk instruments, contracts, or any other type of securities.

2. A contract whose value is determined based on the securities underlying a price index.

According to another definition, derivatives are methods used to manage risks related to interest rates, exchange rates, and the hedging market.

## 2.2 Types of Derivatives:

Derivatives are financial instruments that derive their value from an underlying asset or benchmark. They're used for risk management, hedging, and speculation. The following are the primary types of derivatives:

1. **Futures Contracts:**
   A futures contract is a standardized agreement to buy or sell an asset at a specific price on a predetermined future date. These contracts are traded on organized exchanges and are commonly used for commodities, stocks, and currencies.

   **Features:**

   - **Fixed Time Frame:** Delivery occurs at a specific future date.
   - **Standardized Quantity:** The contract specifies the asset's quantity and price.
   - **Regulated:** Futures are traded on exchanges, ensuring transparency and reducing counterparty risk.
   - **Cash Settlement:** No physical delivery; transactions are settled in cash.

   **Types of Futures:**

   - **Index Futures:** Based on stock market indices like Nifty. Useful for portfolio managers and mutual funds to hedge risks.
   - **Stock Futures:** Futures based on individual stocks like Infosys, Reliance, etc.

2. **Options Contracts:**

   An option gives the buyer the right, but not the obligation, to buy or sell an asset at a specified price within a fixed period.

- **Types of Options:**

1. **Call Option:** Right to buy shares at a predetermined price if prices are expected to rise.

2. **Put Option:** Right to sell shares at a predetermined price if prices are expected to fall.

3. **Dual Option:** Combines both call and put options to handle uncertain price movements.

**Example:**

If the stock price of Tata Steel is ₹700 on April 1st, an investor buys both call and put options by paying a premium of ₹5,000. If the price falls to ₹600 by April 30th, the investor can exercise the put option and profit.

**Profit Calculation:** ₹100 (price difference) × 1,000 shares - ₹5,000 (premium) = ₹95,000

**Advantages:**

- Protects against price fluctuations.
- Requires minimal investment for significant benefits.
- Adds liquidity and stability to markets.

**Disadvantages:**

- Encourages speculative behavior.
- Non-standardized transactions can lead to unregulated risks.

**3. Forward Contracts:**

A forward contract is a customized agreement between two parties to buy or sell an asset at a specified price on a future date. Unlike futures, forward contracts are traded over-the-counter (OTC) and are not standardized.

- **Current Agreement, Future Delivery:** The deal and price are decided today, but the delivery happens on a future date.
- **Purpose:** Often used to protect against price fluctuations in markets like stocks, commodities, or currencies.
- **Customization:** These are private agreements (Over-the-Counter - OTC) that can be tailored to the needs of the parties involved.
- **No Initial Payment:** No payment is made when the contract is signed, and settlement happens on the maturity date.
- **Risks:** There's a chance of default by either party, which can lead to counterparty risk.

**Advantages:** Helps manage risks caused by price fluctuations.
**Limitations:** Not standardized, involves counterparty risks, and requires intermediaries like banks or financial institutions.

4. **Swaps:**
Swaps are agreements between two parties to exchange cash flows or financial instruments. The most common types of swaps include:

**Interest Rate Swaps**: Exchange of fixed interest rates for floating rates or vice versa.

**Currency Swaps**: Exchange of cash flows in different currencies.

**Key Characteristics of Swaps:**

- **Combination of Forward Contracts:**

A swap is essentially a combination of forward contracts and shares similar characteristics with them.

- **Bilateral Agreement:**

Swaps require a bilateral arrangement between two parties with matching but opposite needs.

- **Need for Intermediaries:**

Intermediaries play a crucial role in connecting parties with opposite but complementary needs. These intermediaries, such as financial institutions or banks, earn revenue by facilitating swaps. Banks, with their expertise in financial markets and knowledge of clients' diverse needs, play a significant role in this field.

- **Settlement Process:**

Although swaps mention a principal amount, it is not exchanged between the parties. Instead, the exchange involves cash flows, such as interest payments. For example, one party agrees to pay a fixed interest rate while receiving a floating interest rate from the other party.

- **Long-Term Contracts:**

Unlike forward contracts, which are typically short-term, swaps are designed for long-term agreements. This is because forward contracts for longer terms involve higher risks, such as default or interest rate volatility. Swaps, on the other hand, are better suited for managing these risks.

- **Cross-Currency Swaps:**

Swaps that involve the exchange of two currencies are referred to as cross-currency swaps.

**5. Credit Derivatives:**

These are financial instruments designed to transfer credit risk from one party to another. Common examples include credit default swaps (CDS), which provide protection against the risk of default on a debt instrument.

**Price Arbitrage Deals (Arbitrage):**

A company can list its shares on multiple stock exchanges. If the share prices of the same company differ across exchanges, traders exploit this difference for profit. Shares are purchased in the market where prices are lower and sold in the market where prices are higher.

For example, if a company's share price is ₹150 on the Mumbai Stock Exchange and ₹135 on the Delhi Stock Exchange, the trader will buy from Delhi and sell in Mumbai. The price difference (₹150 - ₹135 = ₹15) is the trader's profit.

**Types of Arbitrage:**

1. Future-Future Arbitrage
2. Cash-Futures Arbitrage

**Reasons for Price Differences:**

- Demand and supply fluctuations.
- Uneven availability of critical company information across markets.

Arbitrage helps balance prices across markets. Increased demand in the cheaper market raises prices, while higher supply in the expensive market reduces prices. This process continues until prices across markets align.

**Role of Technology in Arbitrage Success:**

Efficient information systems are essential for successful arbitrage. Rapid communication infrastructure, such as PTI, links stock exchanges in Ahmedabad, Mumbai, Delhi, Kolkata, and Chennai. Today, with advances in information technology, real-time stock market data is readily available, enabling brokers to execute arbitrage deals quickly.

- **Difference between forward contracts and future contracts:**

**Forward Contract**

A forward contract is a customized agreement created between two parties based on their specific requirements. These contracts are tailored to include terms such as quantity, delivery date, and other specific conditions.

**Features:**

1. **Customizable Contract:**
   In a forward contract, the terms (such as quantity, delivery date, etc.) are decided as per the requirements of both parties.

2. **No Secondary Market:**
   Since forward contracts are not standardized, they cannot be traded on organized stock exchanges. Consequently, there is no secondary market for forward contracts.

3. **Settlement Rules:**
   Settlement in forward contracts always occurs on the maturity date.

4. **Asset Delivery:**
   Delivery of the underlying asset is mandatory on the maturity date of a forward contract.

5. **No Margin or Down Payment:**
   Forward contracts do not require any margin money or down payment during the contract period.

- **Futures Contract**

A futures contract is a standardized agreement executed under the rules of an organized stock exchange. These contracts are governed by predefined terms.

**Features:**

1. **Standardized Contract:**
   Futures contracts are standardized, meaning that terms like quantity, delivery date, etc., are defined by the exchange itself.

2. **Existence of Secondary Market:**
   Futures contracts are traded in secondary markets on organized exchanges, making them more liquid.

3. **Daily Settlement:**
   Futures contracts are settled daily based on the market price using a mark-to-market system, irrespective of the final maturity date.

4. **Cash Settlement:**
   Futures contracts are generally settled in cash based on price differences, without requiring physical delivery of the asset.

5. **Margin Requirement:**
   To trade in futures contracts, margin money must be deposited, which serves as a safeguard against market risks.

**Difference between Forward Contracts and Future Contracts:**

| Sr. No. | Forward Contract | Futures Contract |
|---|---|---|
| 1 | A customized agreement between two parties. | A standardized agreement between two parties. |
| 2 | Delivery timing is decided by the | Delivery months are predefined by |

| | | |
|---|---|---|
| | parties. | the exchange. |
| 3 | Quantity is determined as per the parties' requirements. | Trade is conducted in standardized quantities defined by the exchange. |
| 4 | Intent is to deliver or receive the asset. | Typically used for hedging or speculation. |
| 5 | Settled by delivery of the asset. | Settled by paying the price difference in cash. |
| 6 | Not subject to strict regulatory controls or market standards. | Subject to strict regulatory controls and market standards. |

Each type of derivative serves a specific purpose and helps participants manage financial risks effectively. These instruments are integral to modern financial markets and play a critical role in enhancing market efficiency.

## 2.3 Development Of Exchange Traded Derivatives:

Exchange-traded derivatives (ETDs) represent a significant milestone in the evolution of financial markets, offering standardized contracts and centralized platforms for trading. These derivatives, including futures and options, are traded on regulated exchanges, ensuring transparency, risk mitigation, and liquidity. The development of ETDs reflects the progression of financial systems in addressing price volatility, credit risk, and economic uncertainties.

❖ **Early Origins:**

**1. Commodities Market**

- The roots of exchange-traded derivatives can be traced to agricultural markets, where producers and buyers used forward contracts to hedge against price volatility.
- The first formalized derivatives exchange, the Dojima Rice Exchange, was established in Japan in the early 1700s. It allowed rice merchants to trade standardized contracts and manage risks effectively.
- In the U.S., the establishment of the Chicago Board of Trade (CBOT) in 1848 marked the beginning of structured commodity futures trading.

**2. Credit Risk Solutions**

- CBOT addressed the issue of credit risk by introducing futures contracts. These contracts obligated participants to trade at a predetermined price and date, reducing uncertainty.
- By the late 19th century, standardized trading rules and clearinghouses were developed, further ensuring the integrity of transactions.

❖ **Expansion into Financial Derivatives:**

1. **Introduction of Financial Futures**
    - The 20th century witnessed the expansion of derivatives from commodities to financial instruments.
    - The Chicago Mercantile Exchange (CME), founded in 1919, played a pivotal role in introducing financial futures.
    - On May 16, 1972, the CME launched the first financial futures contract, focusing on foreign exchange rates. This innovation was driven by the increasing volatility in currency markets following the collapse of the Bretton Woods system.
2. **Stock Index Futures**
    - In 1982, stock index futures were introduced, beginning with the S&P 500 Futures contract on the CME.
    - These instruments allowed investors to hedge or speculate on the overall performance of stock markets, revolutionizing risk management for institutional investors.
3. **Options Trading**
    - The development of options markets paralleled that of futures.
    - The Chicago Board Options Exchange (CBOE), established in 1973, launched standardized stock options trading. Options provided traders with flexibility, enabling them to hedge or speculate with limited risk.

❖ **Features of Exchange-Traded Derivatives:**

1. **Standardization**
    - Contracts are standardized in terms of size, expiration, and settlement terms, making them easily tradable and reducing ambiguity.
2. **Centralized Trading Platforms**
    - Exchanges like the CME, CBOT, and Intercontinental Exchange (ICE) provide a centralized platform for buyers and sellers, improving market transparency.
3. **Clearinghouses**
    - Clearinghouses act as intermediaries, guaranteeing the performance of contracts and reducing counterparty risk.

4. **Regulation**

    - ETDs are subject to strict regulatory oversight by financial authorities, ensuring fair practices and protecting market participants.

❖ **Growth of Exchange-Traded Derivatives:**

1. **Globalization of Financial Markets**

    - The globalization of markets in the late 20th century spurred the demand for derivatives to hedge against currency and interest rate risks.

    - Exchanges began introducing innovative products tailored to global financial needs, including cross-border derivatives.

2. **Technological Advancements**

    - The adoption of electronic trading platforms revolutionized the derivatives market. Automated systems increased efficiency, reduced transaction costs, and enhanced accessibility for retail investors.

    - Exchanges such as the National Stock Exchange (NSE) in India leveraged technology to emerge as global leaders in derivatives trading.

3. **Emerging Markets**

    - Emerging economies, particularly in Asia and Latin America, developed derivatives markets to attract foreign investment and manage financial risks.

    - In India, the NSE launched derivatives trading in 2000 with index futures based on the Nifty 50. Today, the NSE is among the largest derivatives exchanges globally.

❖ **Challenges and Reforms:**

1. **Regulatory Oversight:**

    - Following the 2008 financial crisis, global regulators imposed stricter rules on derivatives trading to prevent systemic risks.

    - The Dodd-Frank Act in the U.S. and similar regulations worldwide mandated higher transparency and the use of clearinghouses for derivatives.

2. **Liquidity and Access:**

    - While ETDs provide liquidity, smaller markets and exchanges often face challenges in attracting participants and maintaining active trading volumes.

3. **Technology-Driven Risks**

    - The rise of high-frequency trading (HFT) has introduced new risks, including flash crashes and market manipulation. Exchanges are now focusing on implementing safeguards to mitigate these risks.

❖ **Current Trends in Exchange-Traded Derivatives:**

1. **Sustainability-Linked Derivatives**

    - Exchanges are introducing derivatives tied to environmental, social, and governance (ESG) benchmarks, catering to the growing demand for sustainable finance.

2. **Cryptocurrency Derivatives**

    - The emergence of cryptocurrencies has led to the launch of Bitcoin and Ethereum futures and options on major exchanges, reflecting the adaptability of derivatives markets.

3. **Data-Driven Trading**

    - The integration of big data analytics and artificial intelligence is transforming derivatives trading strategies and improving market efficiency.

The development of exchange-traded derivatives has transformed global financial markets by providing robust tools for risk management and speculation. From their origins in agricultural commodities to their current role in financial innovation, ETDs have evolved to meet the demands of an increasingly interconnected and dynamic global economy. As technology and regulation continue to shape the landscape, exchange-traded derivatives will remain central to the functioning of modern financial systems

## 2.4 Global Derivatives Market:

Derivatives originated centuries ago as tools for managing price fluctuations in the commodities market. The first organized commodity exchange was established in Japan in the early 1700s. In the United States, the Chicago Board of Trade (CBOT) was founded in 1848 to address credit risk issues and to provide a centralized platform for negotiating forward contracts. Futures contracts emerged during this period, with the first futures contract being introduced in the 1860s.

In 1919, the Chicago Mercantile Exchange (CME) was established to help businesses mitigate price risks associated with trade activities. On May 16, 1972, the first financial futures contract was introduced, followed by the commencement of trading in stock index futures and options in 1982.

Options contracts, like futures, have a long history. The concept of "put" and "call" options was first developed in 1872 by an American financier, Russell Sage. To facilitate trading in stock options, the Chicago Board Options Exchange (CBOE) was established on April 26, 1973.

Today, CBOT offers 48 different futures and options contracts, allowing trading in major U.S. indices such as the S&P 100, S&P 500, NASDAQ 100, and Nikkei 225. These developments have significantly contributed to the growth of derivatives markets, providing essential tools for risk management and price discovery in financial and commodity markets worldwide.

The global derivatives market is one of the largest and most complex financial markets in the world. It serves as a critical tool for managing financial risks, price discovery, and speculation. Derivatives derive their value from underlying assets such as stocks, bonds, commodities, currencies, interest rates, or market indices. The market can be broadly classified into exchange-traded derivatives and over-the-counter (OTC) derivatives.

**1. Exchange-Traded Derivatives:**

These derivatives are standardized contracts traded on regulated exchanges like the Chicago Mercantile Exchange (CME) or the Intercontinental Exchange (ICE). Examples include futures and options contracts. The transparent nature of these markets reduces counterparty risks and ensures price discovery.

**2. Over-the-Counter (OTC) Derivatives:**

OTC derivatives are privately negotiated contracts between parties, such as forward contracts, swaps, and customized options. Although they offer flexibility in terms of contract design, they carry higher counterparty risks due to the absence of centralized clearing mechanisms.

❖ **Key Developments in the Global Derivatives Market:**

- **Rapid Growth in the 20th Century:**
    - The derivatives market expanded rapidly after the 1970s, driven by innovations such as financial futures and options. The introduction of stock index futures in 1982 further propelled the market's growth.
- **Increased Participation:**
    - Institutional investors, corporations, and governments have become major participants in the derivatives market. They use derivatives for hedging currency, interest rate, and commodity price risks.
- **Diverse Instruments:**
    - The market now includes a wide range of instruments such as credit default swaps (CDS), equity derivatives, and exotic options, enabling participants to manage risks across multiple sectors.
- **Geographic Distribution:**
    - The U.S. and European markets have traditionally dominated global derivatives trading, but Asian markets, particularly China, Japan, and India, are emerging as significant players due to their growing economies and regulatory advancements.

- **Regulatory Reforms:**
    - After the 2008 financial crisis, global regulatory bodies such as the Financial Stability Board (FSB) and International Organization of Securities Commissions (IOSCO) implemented reforms to increase transparency and reduce systemic risks in the OTC derivatives market.

❖ **Current Trends and Challenges:**

- **Technological Advancements**:

  The adoption of advanced technologies such as algorithmic trading and block chain is reshaping the market structure.

- **Sustainability-linked Derivatives**:

  Instruments tied to environmental, social, and governance (ESG) goals are gaining popularity.

- **Regulatory Challenges**:
  Divergent regulatory standards across regions pose challenges to global harmonization.

The global derivatives market continues to grow, offering innovative tools to address the complexities of modern financial risks. Its role in global financial stability and economic growth makes it a cornerstone of the financial system.

## 2.5 Derivatives Market In India:

India's commodity futures market has existed since 1875. However, during the 1960s and 1970s, the government imposed restrictions on trading futures for various commodities. Although India had a long tradition of forward trading, it was prohibited in the 1960s. Derivatives, previously referred to as "Teji-Mandi," were not formally recognized as options or futures. Under Section 16 of the Securities Contracts (Regulation) Act (SCRA), 1969, the government banned all forward trading in securities through a public notification.

Forward contracts in foreign exchange rates received approval from the Reserve Bank of India (RBI) and were widely utilized. At present, futures trading is allowed in 41 commodities, and India has eight commodity exchanges regulated by the Forward Markets Commission under the Ministry of Consumer Affairs, Food, and Public Distribution.

- **Challenges and Reforms in Financial Derivatives:**

In the equity markets, the indigenous *badla* system, which was over 125 years old, was widely used by brokers and investors. However, during the 1990s, the influx of Foreign Institutional Investors (FIIs) and several financial scandals led to the banning of the *badla* system. FIIs were not in favor of this system and emphasized better risk management tools. Consequently, the Securities and Exchange Board of India (SEBI) decided to introduce financial derivatives in India.

- **Legal and Regulatory Developments:**

The introduction of derivatives faced several legal hurdles. The SCRA aimed to prevent undesirable transactions in securities by regulating them and prohibiting options. Section 20 of the Act explicitly banned all options trading. To address this, the government repealed these restrictions and amended the SCRA in 1995 through the Securities Laws (Amendment) Ordinance, removing Section 20. However, a regulatory framework to govern derivatives trading was still absent.

To resolve this, committees were formed to recommend suitable frameworks. Based on their suggestions, derivatives were included under the definition of securities in the SCRA. Section 2(h) of the Act was amended to include derivatives as securities. The revised bill was introduced in 1998, passed in 1999, and included Section 2(h)(i)(a) to incorporate derivatives into securities trading.

Under the chairmanship of Dr. R.J. Varma, a group was established to reassess measures for controlling risks in the derivatives market. In March 2000, the government repealed the 1969 notification, lifting the three-decade-old ban on forward trading in securities. On June 12, 2000, derivatives trading began on the National Stock Exchange (NSE) with Nifty-based futures contracts.

- **Current Status of the Derivatives Market in India:**

The NSE is now the leading exchange for both equity and derivatives, accounting for over 65% of contracts traded. The exchange has trained more than 11,200 investors in derivatives trading. Globally, financial derivatives emerged in the 1970s and now account for approximately 75% of financial market activity in regions such as North America and East Asia.

## 2.6 Keywords:

- **Put Option:**

  A type of options contract that gives the holder the right to sell an underlying asset at a specified price before the contract expires.

- **Call Option:**

  A type of options contract that gives the holder the right to buy an underlying asset at a specified price before the contract expires.

- **Interest Rate Derivatives:**

  Derivatives whose value is determined by changes in interest rates, such as interest rate swaps, futures, and options.

- **Commodity Market:**

  A marketplace where raw products (commodities) like metals, agricultural products, and energy are bought and sold. Derivatives markets were initially developed around these commodities for price risk management.

- **Stock Index Futures:**

  A type of futures contract where the underlying asset is a stock index, like the Nifty or Sensex, allowing traders to speculate on the future movement of the index.

- **Risk Management:**

  The process of identifying, assessing, and controlling risks to minimize potential negative financial impacts, often through derivatives like futures, options, and swaps.

- **Over-the-Counter (OTC) Derivatives:**

  Financial contracts that are traded directly between two parties outside of formal exchanges, often customized and not regulated to the same extent as exchange-traded derivatives.

- **Exchange-Traded Derivatives:**

  Derivatives that are standardized and traded on a regulated exchange, such as futures and options contracts, as opposed to over-the-counter (OTC) derivatives which are privately traded.

- **Forward Contracts:**

  A customized contract between two parties to buy or sell an asset at a specific future date for a price that is agreed upon today. These are typically over-the-counter (OTC) and not traded on exchanges.

- **Futures Contracts:**

  Standardized contracts traded on exchanges where the buyer agrees to purchase, and the seller agrees to sell, a commodity or financial instrument at a predetermined future date for a specified price.

- **Options Contracts:**

  A financial derivative that gives the buyer the right, but not the obligation, to buy or sell an underlying asset at a specified price before a certain date. There are two types: call options (right to buy) and put options (right to sell).

- **Swaps**:

  A financial contract in which two parties agree to exchange cash flows or other financial instruments over a specified period based on underlying variables like interest rates or currencies.

- **Hedging:**

  A risk management strategy used to offset potential losses in investments by taking an opposite position in a related asset, typically using derivatives like futures or options.

- **Speculation:**

  The practice of engaging in financial transactions with the hope of making a profit from future price movements, often involving high risk.

- **Arbitrage:**

  The practice of taking advantage of price differences in different markets to make a profit, such as buying an asset in one market and simultaneously selling it at a higher price in another market.

- **Swap Contracts:**

  Derivative contracts in which two parties exchange cash flows or liabilities for a set period, usually based on variables like interest rates, currency exchange rates, or commodities.

## ❖ EXERCISE:

- **Fill in the Blanks:**

Complete the following sentences by filling in the blanks with the correct terms:

1. _____ is a financial instrument whose value is determined based on the value of another asset.
2. _____ contracts are not standardized.
3. A trader who agrees to buy in a forward contract is said to take a _____ position.
4. In an options contract, the seller is referred to as the _____.
5. Under financial derivatives, _____ are considered long-term contracts.

- **Answer Key:**

1. Derivative
2. Forward
3. Long
4. Writer
5. Swaps

- **Multiple Choice Questions (MCQs):**

Choose the correct option from the given choices and write your answer:

1. _____ represents the right to buy or sell securities or other property at a specified price at a specific time.
   (a) Forward
   (b) Futures
   (c) Options
   (d) Swaps

2. Derivatives are instruments of the _____ market.
   (a) Capital Market
   (b) Primary Market
   (c) Secondary Market
   (d) None of the above

3. The origin of derivative products primarily began as hedging tools for fluctuations in _____.
   (a) Bond Prices
   (b) Equity Prices
   (c) Commodity Prices
   (d) Interest Rates

4. _____ is a type of private agreement between two parties to exchange cash flows in the future based on a specific formula.
   (a) Forward
   (b) Futures
   (c) Options
   (d) Swaps

5. Which of the following is an index derivative whose value is derived from indices like Nifty or Sensex?
   (a) Stock Index Futures
   (b) Interest Rate Futures
   (c) Bond Index Futures
   (d) Currency Futures

6. _____ is the buying and selling of futures contracts to hedge against market price risks.
   (a) Hedging
   (b) Speculation
   (c) Arbitrage
   (d) Spreading

7. _____ is considered a method of profiting from price differences between two markets.
   (a) Hedging
   (b) Speculation
   (c) Arbitrage
   (d) Spreading

8. Financial derivatives are primarily used for _____.
   (a) Speculative Activities
   (b) Hedging Risks
   (c) Earning Income
   (d) Increasing Risks

9. Instruments marked to market are _____.
   (a) Forward
   (b) Futures
   (c) Swaps
   (d) Options

10. If an option contract is exercisable only on its expiry date, it is called _____.
    (a) Double Options
    (b) American Options
    (c) Put Options
    (d) European Options

- **Answer Key:**

1. Options
2. Secondary Market
3. Commodity Prices
4. Swaps
5. Stock Index Futures
6. Hedging
7. Arbitrage
8. Hedging Risks
9. Futures
10. European Options

- **Theoretical questions:**

1. Explain the meaning, definition and necessity of derivatives.
2. Write a detailed note on derivatives market in India:
3. Define a futures contract and explain its features.
4. What is a forward contract? Explain its characteristics.
5. What is an options contract? Explain the different types of options contracts.
6. Explain the advantages and disadvantages of options contracts.
7. Discuss the benefits and drawbacks of futures contracts.
8. Explain the difference between forward contracts and futures contracts.
9. Write a short note on exchange-traded and OTC derivatives markets.

# UNIT-3 TRADING AND CLEARING MECHANISM OF F&O MARKET

**3.1. Introduction**

**3.2. Important Entities in the Trading System of F&O Market**

**3.3. Clearing Bank**

**3.4. Clearing member eligibility norms**

**3.5. Order types, order condition and order matching rules**

**3.6. Clearing & settlement of F&O trades**

**3.7. Clearing mechanism**

**3.8. Final Settlement of future**

❖ **Exercise**

## 3.1. Introduction:

Welcome to a thrilling chapter in your financial development! With a focus on the operation of trading and clearing systems, this chapter will explore the fascinating world of Futures and Options (F&O) markets. Have you ever wondered how large corporations or even individual investors manage risk or forecast price movements when they do not actually own the underlying asset? F&O markets are crucial in precisely such circumstance.

Derivative contracts, such as futures and options, derive their value from an underlying asset, such as stocks, indexes, commodities, or commodities. These financial products are frequently used for hedging, speculation, and arbitrage. It's not only about buying and selling contracts, though; you also need to know the processes that ensure trades are executed, settled, and cleared efficiently.

Picture yourself at a crowded stock exchange where hundreds of traders are simultaneously placing trades. How does everything stay organized without getting out of control, in your opinion? A well-structured trading and settlement system is the answer. Clearing houses, margin requirements, settlement processes, and trading platforms all work behind the scenes to maintain order, reduce risk, and ensure buyer-seller trust.

As we proceed, we will examine the trading process in greater detail, going over everything from margin systems and settlement cycles to order placement and trade execution. We will also discuss the critical role clearing businesses play as middlemen in guaranteeing smooth transaction execution.

## 3.2 Important Entities in the Trading System of F&O Market

A number of important organizations collaborate to guarantee seamless and effective trading in the Futures and Options (F&O) market. Let me explain these key players and their responsibilities; picture them as various cricket players, each having a distinct duty to play in order to ensure the success of the match.

**1. Stock Exchange (Trading Platform)**

- The stock exchange is like a marketplace where F&O contracts are bought and sold.
- Major exchanges in India include the **National Stock Exchange (NSE)** and **Bombay Stock Exchange (BSE)**.
- It provides an electronic platform for executing trades and ensures transparency, liquidity, and fair pricing.

**2. Trading Members (Brokers)**

- Brokers act as intermediaries between you (the investor) and the exchange.
- They help you place orders, execute trades, and provide margin facilities.
- Examples include brokers like **Zerodha, Angel Broking, ICICI Direct**, and many others.
- Brokers must be registered with **SEBI (Securities and Exchange Board of India)**.

**3. Investors and Traders**

- You, as an investor or trader, are the key players who buy or sell F&O contracts.
- Participants can include:
    - **Retail Investors** – Individual traders like us.
    - **Institutional Investors** – Banks, mutual funds, and hedge funds.
    - **Proprietary Traders** – Firms trading on their own behalf.
    - **Arbitrageurs** – Traders who exploit price differences between markets.
    - **Hedgers** – Participants using F&O to manage risk, like farmers or exporters.

**4. Clearing Corporation (Clearing House)**

- Think of the clearing house as the umpire in a cricket match—ensuring everything is settled fairly.
- In India, the **National Securities Clearing Corporation Limited (NSCCL)** is the clearing corporation for the NSE.
- **Key roles:**
    1. Acts as a counterparty to both buyer and seller, ensuring smooth settlement.
    2. Collects margins and monitors risk.
    3. Guarantees trade settlement, even if one party defaults.

**5. Depositories**

- Depositories hold securities (like stocks or F&O contracts) in electronic form.
- Major depositories in India:
    1. **National Securities Depository Limited (NSDL)**
    2. **Central Depository Services Limited (CDSL)**
- They ensure that your contracts are safely recorded and settled electronically.

**6. Securities and Exchange Board of India (SEBI)**

- SEBI is the regulator of the financial markets—like a referee ensuring fair play.
- Key responsibilities:
    1. Frames rules and regulations for F&O trading.
    2. Protects investors' interests.
    3. Monitors brokers and exchanges.
    4. Prevents fraudulent activities like insider trading.

**7. Market Makers**

- Market makers provide liquidity by continuously quoting buy and sell prices.
- They ensure that you can easily enter or exit trades without large price fluctuations.
- Without market makers, trading volumes could drop, and prices could become unstable.

**8. Custodians**

- Custodians hold and manage securities on behalf of institutional investors.
- They handle administrative tasks like settling trades, managing margins, and ensuring compliance.

**9. Banks and Financial Institutions**

- Banks play a critical role in facilitating payments and margin management.
- They issue bank guarantees and letters of credit required for large trades.

**10. Technology Providers**

- Technology providers supply trading terminals, analytical tools, and software platforms for trading.
- Examples: **NEST, ODIN, and Algo Trading platforms**.

## 3.3 Clearing Bank

**What is a Clearing Bank?**

A **Clearing Bank** is a bank authorized by the **Clearing Corporation** to handle funds related to trading activities. It facilitates the financial leg of the settlement process, such as:

- **Collection of margins** from brokers and traders.
- **Processing pay-ins and pay-outs** (debits and credits for trades).
- **Handling settlement of profits and losses.**

### 3.3.1. Role of Clearing Banks in the F&O Market

- **Managing Margins:**
    1. When you place an F&O trade, you must deposit an initial margin.
    2. The broker transfers your margin money to the clearing bank, which holds it on behalf of the **Clearing Corporation** (like **NSCCL** for NSE).
- **Facilitating Settlements:**
    1. Clearing banks handle the **pay-in (debit)** and **pay-out (credit)** of funds during trade settlement.
    2. For example, if you profit from a futures trade, your earnings are credited through the clearing bank.
- **Handling Penalties and Default Management:** If a trader defaults on payment, the clearing bank helps the clearing corporation recover dues.
- **Bank Guarantees and Letters of Credit:** Clearing banks issue **bank guarantees (BGs)** and **letters of credit (LCs)** to brokers, which can be used as collateral for margin requirements.
- **Maintaining Transaction Records:** Every financial transaction between traders, brokers, and clearing corporations is recorded and verified through clearing banks.

**Example of Clearing Banks in India:**

Some of the prominent SEBI-approved clearing banks include:

- **State Bank of India (SBI)**
- **ICICI Bank**
- **HDFC Bank**
- **Axis Bank**
- **Kotak Mahindra Bank**
- **Yes Bank**

### 3.3.2. How Does Clearing Bank Fit into the Trading Cycle?

1. **Trader Places Order:** Margin is transferred to the clearing bank via the broker.
2. **Trade Execution:** The exchange sends trade details to the clearing corporation.
3. **Pay-in Process:** The clearing bank debits funds from the broker's account.
4. **Pay-out Process:** The clearing bank credits funds to the broker's account for profit settlements.
5. **Settlement Completion:** Clearing corporation confirms the trade is settled.

## 3.4. Clearing Member Eligibility Norms

In the Futures and Options (F&O) market, a number of important organizati ons collaborate toguarantee seamless and effective trading.

These key players and their functions, picture them as various cricket player s, each with a distinct role to play in order to win the match.

**Who is a Clearing Member (CM)?**

A Clearing Member is a registered entity with the **Clearing Corporation** (like **NSCCL** for NSE) that handles settlement obligations for their own trades, clients' trades, and even other trading members' trades if they are a professional clearing member.

**Types of Clearing Members:**

1. **Trading-cum-Clearing Member (TCM):** Clears and settles trades executed by themselves and their clients.
2. **Professional Clearing Member (PCM):** Clears and settles trades on behalf of other trading members but does not trade themselves.
3. **Self-Clearing Member (SCM):** Clears and settles only their own trades.

**Eligibility Norms for Clearing Members:**

**1. Registration and Membership Requirements:**

- Must be registered with the **Securities and Exchange Board of India (SEBI)**.
- Must become a member of the respective **Clearing Corporation** (e.g., **NSCCL** for NSE).

**2. Net Worth Requirement:**

- The applicant must maintain a minimum net worth as specified by the clearing corporation.
    1. **Trading-cum-Clearing Member:** Minimum ₹3 crores.
    2. **Professional Clearing Member:** Minimum ₹10 crores.

3. **Self-Clearing Member:** Minimum ₹5 crores.

**3. Security Deposits and Collaterals:**

- Must deposit both cash and non-cash collateral with the clearing corporation.
- Required to furnish a **Bank Guarantee (BG)** from a recognized clearing bank.

**4. Infrastructure Requirements:**

- Must have a proper back-office system for maintaining records and managing settlements.
- Should have adequate **risk management systems** to monitor margins and positions.

**5. Qualified Personnel:**

- Must employ certified professionals with experience in **F&O clearing and settlement operations**.
- Key personnel must have completed the **NISM (National Institute of Securities Markets)** certification.

**6. Risk Management Capability:**

- Must have systems to monitor real-time margins and positions.
- Should maintain an **online risk management system** integrated with the clearing corporation.

**7. Compliance with SEBI Regulations:**

- Must adhere to all **SEBI Circulars and Risk Management Guidelines**.
- Must submit regular **audit reports** and undergo periodic inspections.

**8. Clearing Bank Tie-Up:**

- Must have an operational account with an **SEBI-approved Clearing Bank** for fund settlements.

**Additional Obligations for Clearing Members:**

- **Default Fund Contribution:** Must contribute to the **Settlement Guarantee Fund (SGF)** to cover losses in case of member defaults.
- **Daily Margin Payments:** Must ensure timely collection and deposit of margins.
- **Reporting Requirements:** Submit trade details, margin reports, and financial statements to the clearing corporation regularly.

## 3.5. Order Types, Order Conditions, and Order Matching Rules

In the F&O (Futures and Options) market, placing orders correctly is critical for executing trades at desired prices and conditions. Let me guide you through the key concepts of order types, order conditions, and how trades are matched.

### 1. Order Types in F&O Market

An order type specifies how a trade should be executed. There are several types of orders based on price and execution conditions:

**a) Market Order:**

- An order to buy or sell a contract immediately at the best available market price.
- Suitable for traders who prioritize execution speed over price.

**b) Limit Order:**

- An order to buy or sell a contract at a specific price or better.
- For a buy limit order, execution happens at the limit price or lower.
- For a sell limit order, execution happens at the limit price or higher.

**c) Stop Loss Order:**

- An order designed to limit losses by triggering a market or limit order once a specified price (stop price) is reached.
    1. **Stop Loss Market Order:** Executes at the market price after the stop price is triggered.
    2. **Stop Loss Limit Order:** Executes at a specified limit price after the stop price is triggered.

**d) Cover Order:**

- A two-legged order combining a market or limit order with a mandatory stop-loss order.
- Reduces risk by setting a predefined exit level.

**e) Bracket Order:**

- A comprehensive order with three components: an initial order, a profit-booking order (target), and a stop-loss order.
- Automatically cancels the other two orders if one gets executed.

**f) Good-Till-Date (GTD) Order:**

- Remains active until the specified date unless executed or cancelled.

**g) Immediate or Cancel (IOC) Order:**

- Executes immediately for the available quantity and cancels the remaining portion.

### 2. Order Conditions in F&O Market

Order conditions add specific instructions to how orders should be executed:

**a) Time Conditions:**

- **Day Order:** Valid for the trading day and expires if not executed by the end of the session.

- **GTD (Good-Till-Date):** Valid until a specified date.
- **GTC (Good-Till-Cancelled):** Remains active until executed or manually cancelled.

**b) Quantity Conditions:**

- **All or None (AON):** Executes only if the entire order quantity is available; otherwise, it remains unfilled.
- **Minimum Fill Order:** Specifies a minimum quantity to be executed in a single trade.

**c) Price Conditions:**

- **Limit Condition:** Executes at the specified price or better.
- **Market Condition:** Executes at the current market price.
- **Stop Condition:** Triggers the order upon reaching the stop price.

**3. Order Matching Rules in F&O Market**

Order matching is the process of pairing buy and sell orders based on specific rules. The two primary types of matching rules are:

**a) Price-Time Priority Principle:**

- **Price Priority:** Orders with the best price (lowest sell or highest buy) are matched first.
- **Time Priority:** If multiple orders are at the same price, the earliest placed order is matched first.

**Example:**

- Buy Order 1: ₹100 at 10:00:01
- Buy Order 2: ₹100 at 10:00:05
  The sell order at ₹100 will match with Buy Order 1 due to time priority.

**b) Order Matching in Continuous Market:**

- Matches orders continuously during market hours.
- Executions occur whenever a buy and sell order match based on price-time priority.

**c) Call Auction Matching:**

- Orders are collected over a specific period and then matched at a single equilibrium price.
- Commonly used for pre-opening sessions and illiquid securities.

## 3.6. Clearing and settlement of F & O trades

The clearing and settlement process is crucial for ensuring the smooth functioning and reliability of the Futures and Options (F&O) market. It involves verifying trade details, calculating obligations, and facilitating the transfer of funds and securities.

**1. Clearing Process:**

**Role of Clearing Corporation:** The clearing corporation (e.g., NSCCL for NSE) acts as a central counterparty, guaranteeing the settlement of trades by assuming the role of both buyer and seller.

**Key Steps in Clearing:**

- **Trade Confirmation:** All trades executed on the exchange are matched and confirmed.
- **Position Management:** The clearing corporation records open positions and applies mark-to-market (MTM) margins.
- **Collateral Management:** Margins are collected from clearing members to cover potential losses.

**2. Settlement Process:**

Settlement in F&O contracts involves cash settlement or delivery settlement, depending on the contract type.

- **Daily Settlement:** MTM profits and losses are settled daily.
- **Final Settlement:** On the expiry date, contracts are settled either by delivery or cash payment.

**3. Settlement Mechanism:**

- **Pay-In:** Members deposit funds and securities with the clearing corporation.
- **Pay-Out:** The clearing corporation transfers funds and securities to entitled members.

**4. Settlement Timelines:**

- **Daily MTM Settlement:** T+1 day.
- **Final Settlement:** T+1 day after the expiry date.

Understanding these processes ensures clarity in obligations, reduces counterparty risk, and maintains market integrity.

## 3.7. Clearing Mechanism

The clearing mechanism in the Futures and Options (F&O) market ensures that trades are settled efficiently, mitigating counterparty risks. The clearing corporation plays a central role in managing this process.

**Participants in the Clearing Mechanism:**

1. **Clearing Corporation:** Acts as a central counterparty to all trades, guaranteeing settlement.
2. **Clearing Members (CM):** Responsible for settling trades and fulfilling financial obligations.
3. **Clearing Banks:** Handle the fund transfers for margin deposits and settlements.

4. **Depositories:** Manage the transfer of securities.

**Key Steps in the Clearing Mechanism:**

1. **Trade Confirmation:** The exchange confirms the trade and forwards it to the clearing corporation.
2. **Position Management:** Open positions are recorded, and margins are computed.
3. **Margin Collection:** Initial, exposure, and mark-to-market (MTM) margins are collected from clearing members.
4. **Settlement Obligation:** The clearing corporation notifies clearing members of their pay-in (debit) and pay-out (credit) amounts.
5. **Funds Settlement:** Clearing banks execute the transfer of funds from pay-in members to pay-out members.
6. **Securities Settlement:** Depositories manage the transfer of securities for exercised contracts.
7. **Settlement Completion:** The clearing corporation updates records, confirming settlement.

**Settlement Types:**

- **Daily Settlement:** Involves daily MTM adjustments.
- **Final Settlement:** Occurs on contract expiry for futures and exercised options.

The clearing mechanism ensures secure and efficient trading, reducing counterparty risks and maintaining market integrity.

## 3.8. Final Settlement of future:

Final settlement is the process where all open positions in a futures contract are closed on the expiry date, with gains or losses settled between the buyer and seller. Here's a detailed look at the process:

❖ **Types of Final Settlement:**

1. **Cash Settlement:**
    1. The contract is settled in cash based on the closing price on the expiry date. No delivery of the underlying asset occurs.
    2. Common in index futures.
2. **Physical Settlement:**
    1. The actual delivery of the underlying asset takes place.
    2. Common in stock futures, where the buyer pays the final settlement price and receives the shares.

❖ **Final Settlement Process:**

1. **Mark-to-Market (MTM):** All gains or losses are adjusted daily until expiry. On the expiry day, the final MTM is calculated.
2. **Determination of Settlement Price:** The final settlement price is typically the closing price of the underlying asset on the expiry date, as declared by the exchange.
3. **Settlement of Obligations:** Traders with a profit receive funds, while those with losses must pay. For physically settled contracts, the buyer must take delivery, and the seller must deliver the asset.

❖ **Settlement Timelines:**

1. Final Settlement Date: Typically, the last Thursday of the contract month.
2. Pay-in and Pay-out: Usually completed on the trading day following the expiry.

This process ensures that all financial obligations are resolved smoothly, marking the conclusion of a futures contract.

Final settlement is the process where all open positions in a futures contract are closed on the expiry date, with gains or losses settled between the buyer and seller. Here's a detailed look at the process:

## ❖ Exercise:

**1. Answer the following short questions:**

1. What are Futures and Options (F&O) contracts, and how do they derive their value?
2. Name the key entities involved in the F&O trading system and their roles.
3. What is the role of a clearing bank in the F&O market?
4. How do clearing banks manage margin requirements for traders?
5. What are the eligibility norms for clearing members in the F&O market?
6. Explain the different types of clearing members in the F&O market.
7. What is a market order, and when would it be used in F&O trading?
8. Define a stop-loss order and explain its significance in managing risk.
9. What is the "Price-Time Priority" in order matching rules?
10. How does the Clearing Corporation ensure smooth trade settlements in the F&O market?

**2. Answer the following long questions:**

1. What are Futures and Options (F&O) contracts, and how do they function within financial markets?

2. Describe the roles and responsibilities of key entities involved in the Futures and Options trading system, such as brokers, exchanges, clearing houses, and clearing banks.
3. Explain the concept of margin requirements in Futures and Options trading. How do clearing banks assess and manage margin requirements for traders to minimize risks associated with market volatility?
4. What are the eligibility norms for clearing members in the Futures and Options market?
5. In the context of Futures and Options trading, explain the concept of order types, specifically market orders and limit orders.
6. Discuss the significance of stop-loss orders in Futures and Options trading.

# UNIT-4 FUTURE/FORWARD MARKETS PRICING THEORIES

**4.1. Introduction**

**4.2. The valuation of forward and future contract**

**4.3. Valuating forward contract**

**4.4. Valuating future contract**

**4.5 Difference between forward and future Contract**

❖ **Exercise**

## 4.1. Introduction

Have you ever wondered how prices are decided for contracts that lock in the cost of buying or selling something in the future? We're talking about *futures* and *forwards*—two essential tools that help businesses, investors, and traders manage risk and seize opportunities in the fast-moving financial markets.

So, what's behind the pricing of these contracts? Well, it's more than just technical jargon for finance professionals—it's a window into how market forces interact and influence each other.

Let's break it down together. We'll dive into key concepts like:

- **Cost-of-carry:** What does it actually cost to hold an asset until the contract expires?
- **Arbitrage opportunities:** How do traders make risk-free profits by spotting price differences between markets?
- **Interest rates:** How do borrowing costs and returns on investments shape the prices of these contracts?

But here's the real magic: Pricing theories don't just predict future numbers; they connect today's market conditions with tomorrow's possibilities. They ensure markets stay efficient, balanced, and fair.

As we explore these concepts together, you'll start to see how futures and forwards are more than just contracts—they're key players in the financial world's intricate dance of risk, reward, and strategy. Ready to dive in? Let's get started!

## 4.2. The Valuation of Forward and Futures Contracts

Let's talk about financial derivatives—specifically, *forwards* and *futures* contracts. These are agreements that let you lock in today's price for something you'll buy or sell later. Pretty handy, right? That's why traders and investors use them to manage risks (*hedging*) or to make a profit from market predictions (*speculation*).

But have you ever wondered what actually determines the price of these contracts? It's not just guesswork—several key factors come into play:

- **Spot Price:** Think of this as the asset's current price in the market. It's the starting point for any forward or futures pricing.

- **Interest Rates:** Since you're locking in a future price, borrowing costs or the return from investing that money matter a lot.
- **Storage Costs:** If the underlying asset is something like oil or grain, storing it until delivery adds to the total cost.
- **Dividends or Yields:** For assets like stocks, future earnings (like dividends) can reduce the cost of carrying the asset forward.
- **Time to Maturity:** The longer you hold the contract, the more time these factors can influence the price.

In this chapter, we'll explore how each of these elements shapes the pricing of forward and futures contracts. You'll discover how markets balance today's costs with tomorrow's expectations—and why understanding these relationships is crucial for making smart financial moves.

**Forward Contracts Valuation:** Imagine you and a friend agree today on a price for something you'll buy or sell in the future—whether it's gold, stocks, or even coffee beans. That's exactly what a **forward contract** is: a deal between two parties to trade an asset at a fixed price on a future date.

Now, let's talk about the most important part—the **forward price**. It's the price you both agree to exchange the asset for later. But how is this price decided? It's not just a random number! The key goal when setting the forward price is to ensure that neither side can make a *risk-free profit* by exploiting price differences between markets—a concept known as **arbitrage**.

So, pricing a forward contract is all about balance. It ensures fairness and keeps the market efficient. Want to know how this pricing works and what factors influence it

❖ **The Formula for Forward Pricing:**

To value a forward contract, we can use the following formula:

$F_0 = S_0 \times (1+r)^T$

$F_0$ = Forward price of the asset at time 0

$S_0$ = Spot price of the asset today.

r = Risk-free interest rate (assumed to be constant).

T = Time to maturity of the forward contract (in years).

**Factors Affecting Forward Pricing:**

**When it comes to forward contracts, three major factors shape the forward price. Let's break them down in a simple, interactive way:**

1. **Spot Price – The Starting Point:** Think of the spot price as the asset's *current market value*. It's like checking the price tag before agreeing to buy something later. Naturally, if the spot price goes up, the forward price will also increase.
2. **Interest Rates – The Cost of Waiting:** Imagine you have money tied up in this contract. Could that money earn more elsewhere—like in a savings account with interest? Higher interest rates mean there's more opportunity cost to holding the contract, so forward prices increase to balance that out.

3. **Time to Maturity – The Longer, the Costlier:** The longer you hold onto an asset for future delivery, the more expenses pile up—think storage costs or lost interest on invested money. As time stretches, so does the forward price.

Understanding these three factors helps you see how forward prices are shaped—and why markets rarely leave room for risk-free profits through arbitrage.

**Futures Contracts Valuation:** Similar to forward contracts, futures contracts entail an agreement to purchase or sell an item at a predetermined price at a later date. On the other hand, futures contracts are more liquid and subject to daily settlements because they are standardized and traded on exchanges.

The same variables that impact forwards also impact futures contract pricing, with daily marking-to-market being taken into account.

**The Formula for Futures Pricing:**

The futures price can be computed using the following formula:

$F_0 = S_0 \times e^{(r-q)T}$

Where:

Fo = Futures price of the asset at time 0.

So = Spot price of the asset today.

r = Risk-free interest rate.

q = Dividend yield (if applicable).

T = Time to maturity.

**Factors Affecting Futures Pricing:**

**Futures contracts are close cousins of forward contracts, but with some key differences. Let's break down the main factors that influence futures prices:**

1. **Spot Price and Cost of Carry – The Basics of Pricing:** Just like with forwards, the spot price (today's market price) and the cost of carry (expenses like storage and insurance) directly impact the futures price. But here's the twist—because futures are settled daily (*marking-to-market*), their pricing can behave differently than forwards, especially as market conditions change.

2. **Risk-Free Rate and Dividends – The Cost of Opportunity:**

    1. The risk-free rate (like interest from a safe investment) raises the futures price, just as it does with forwards.
    2. However, if the underlying asset pays dividends, the buyer of the futures contract *misses out* on them. As a result, futures prices are reduced by the expected dividend yield.

3. **Marking-to-Market – Daily Settlements Matter:** Unlike forwards, futures are settled daily, meaning profits and losses are adjusted every day based on market movements. This daily process—called marking-to-market—reduces

the chance of big differences between the futures price and the spot price over time.

**In short, while futures and forwards share similarities, *marking-to-market* and the impact of dividends give futures contracts their unique pricing behaviour**

## 4.3 Valuing a Forward Contract

So, what exactly is a **forward contract**? It's a private agreement between two parties to buy or sell something at a fixed price on a future date. But here's the real question: *How do we decide the right price for that future deal—the forward price?*

The forward price is the rate agreed upon for the future transaction. But pricing it isn't guesswork—it's all about making sure *neither side can grab a risk-free profit*, a trick known as **arbitrage**.

Here's how it works: At the very start of the contract, neither party should have an automatic gain or loss. Fair, right? To achieve that, we consider several important factors:

- **Current Price of the Asset (Spot Price):** The starting point for any forward price.
- **Time to Maturity:** The longer the wait, the more time costs and market changes come into play.
- **Risk-Free Interest Rate:** What you could earn from a safe investment, like a government bond, if you didn't enter this contract.
- **Carrying Costs or Benefits:** Things like storage fees (which increase costs) or dividends (which reduce costs) if you hold the asset until delivery.

Together, these factors help us calculate a forward price that's fair for both parties—and keeps the market efficient by eliminating easy profit loopholes.

### ❖ The Formula for Valuing a Forward Contract

The no-arbitrage condition, which guarantees that there is no risk-free profit to be realized by taking opposite positions in the spot and future markets, is the foundation of the most widely used approach for pricing a forward contract. The following formula can be used to find the forward price Fo for a financial asset, like a stock or bond:

$F_0 = S_0 \times e^{(r \times T)}$

Where:

Fo = Futures price of the time the contract is entered.

So = Spot price of the asset today.

r = Risk-free interest rate. (annualized and expressed as a decimal)

T = Time to maturity of the forward contract (in years)

e = Euler's number, the base of the natural logarithm

This formula assumes no dividends or other factors that may impact the underlying asset's value. It calculates the forward price by considering the opportunity cost of capital over the time until the contract's maturity.

❖ **Valuation of a Forward Contract at Maturity**

When a forward contract matures, the difference between the agreed-upon forward price Fo and the spot price at maturity Sr determines the contract's value. The following formula can be used to determine a forward contract's value upon maturity:

Vr = Sr – Fr

Vr = Value of the forward contract at time T

Sr = Spot price of the underlying assets at time T

Fo = Forward price agreed upon at the initiation of the contract.

If Sr > Fo, the buyer of the forward contract will profit and the seller will face a loss. Conversely, if Sr < Fo, the seller will profit, and the buyer will incur a loss.

**Ever wondered what really shapes the price of a forward contract? Let's dive into the key factors—think of it like discovering the ingredients behind a recipe!**

1. **Spot Price – The Starting Point:** Imagine you're buying something for future delivery. Naturally, the current market price of that asset (called the *spot price*) sets the baseline. If the spot price goes up, the forward price follows suit—simple as that!
2. **Interest Rates – The Cost of Locking Up Money:** Think about it this way: If you invest money in this contract, you lose the chance to earn interest from a risk-free source (like a government bond). Higher interest rates increase this *opportunity cost*, which pushes the forward price higher.
3. **Time to Maturity – More Time, More Cost:** The longer you wait for delivery, the longer your money is tied up. More time means more accumulated interest (due to higher opportunity cost), which increases the forward price.
4. **Storage Costs (For Commodities) – Keeping It Safe Isn't Free:** For physical items like gold or oil, storage matters. Sellers must pay to store the goods until delivery. Naturally, those costs get added to the forward price.
5. **Dividends (For Stocks) – Missed Earnings Matter:** If the underlying asset is a stock, think about dividends—the payouts you'd miss by holding a forward instead of the stock itself. Since you *don't* get those dividends, the forward price actually *drops* by their value.
6. **Convenience Yield (For Commodities) – The Hidden Value of Holding:** Here's something unique for physical goods—sometimes, there's a benefit to having the commodity on hand (like oil for production). This *convenience yield* offsets carrying costs, *lowering* the forward price.

**So, forward pricing is like balancing a scale—opportunity costs on one side, carrying costs and benefits on the other.**

❖ **No-Arbitrage Condition in Forward Contracts:** So, what's the golden rule behind pricing forward contracts? It's called the **no-arbitrage condition**—and trust me, it's what keeps the market fair!

Think of it this way: Imagine you spot a loophole where you could make a guaranteed profit without risk. Sounds amazing, right? But that's exactly what the market works hard to prevent!

Here's how it plays out:

If the **forward price is too low**, smart traders (called arbitrageurs) would:

1. Buy the asset immediately at the **current market price (spot price)**.
2. Simultaneously sell it at the higher **forward price** through a forward contract.
   And guess what? They'd lock in a risk-free profit—without breaking a sweat!

If the **forward price is too high**, they'd simply flip the strategy:

3. Sell the asset now at the high spot price.
4. Commit to buying it later at the lower forward price.
   Again, free money—if no one was watching!

But here's the catch: Markets don't like freebies. These opportunities vanish quickly because traders rush in and push prices back into balance. That's what we call **market efficiency**.

So, how do we find the *right* forward price—the one that leaves no room for easy profits? It's all about balancing these key factors:

- **Spot Price:** The asset's value today.
- **Interest Rates:** The cost of tying up your money (or the return you're giving up).
- **Time to Maturity:** More time, more carrying costs.

The forward price is designed so that the cost of buying the asset today and holding it until maturity matches the cost of simply entering the forward contract.

In short, **no arbitrage** means **no free lunch**, and that's how forward prices stay fair and stable. Want to dive deeper and see how this formula works with numbers? Let's explore it together!

## 4.4. Valuing future contract:

Imagine a **futures contract** as a standardized, exchange-traded agreement to buy or sell an asset at a fixed price on a future date. Unlike **forward contracts**, which are private and customized between two parties, futures are traded on established exchanges and are subject to daily changes.

Here's a key difference: **Futures contracts are marked to market every day**. This means the contract's value is adjusted at the end of each trading day to reflect the price movement of the underlying asset. So, if the asset price goes up or down, your **futures contract's value shifts** accordingly.

Let's break down what drives the price of a futures contract:

1. **Spot Price:** The current market price of the underlying asset sets the baseline. If the spot price rises or falls, the futures price will follow suit.
2. **Interest Rates:** Higher interest rates increase the cost of carrying the asset, pushing the futures price higher.
3. **Dividends:** If the asset is a stock, dividends matter. Since futures contract holders don't receive dividends, those payments are deducted from the futures price.
4. **Carrying Costs:** These are the costs tied to holding the asset until the contract's maturity. Think storage fees, insurance, or maintenance costs for commodities.

Because of the daily **marking-to-market** process, futures contracts adjust continuously to reflect market conditions, unlike forward contracts, which only settle once at maturity.

❖ **The Formula for Valuing a Futures contract:**

The futures price can be computed using the following formula:

$F_0 = S_0 \times e^{(r-q)T}$

Where:

Fo = Futures price of the asset at time 0.

So = Spot price of the underlying asset today.

r = Risk-free interest rate (annualized and expressed as a decimal).

q = Dividend yield of the underlying asset (if applicable, otherwise q=0).

T = Time to maturity of the futures contract (in years).

e = Euler's number (approximately 2.71828), the base of the natural logarithm.

The formula accounts for the cost of carry, which is the cost of holding the asset until the futures contract matures. This cost includes the opportunity cost of not investing in risk-free assets (represented by the risk-free rate r) and the potential income from the asset (like dividends, represented by q).

**Futures contract pricing isn't just random—it's influenced by a few key factors that drive how its value changes over time. Let's go over the main ones you need to know:**

1. **Spot Price**: The spot price of the underlying asset is the starting point for calculating the futures price. It's simple: if the spot price goes up, the futures price will typically rise as well, and if the spot price falls, the futures price tends to follow.

2. **Risk-Free Interest Rate**: The risk-free interest rate is a big deal because futures contracts involve delaying payments. Higher interest rates increase the opportunity cost of holding cash instead of the underlying asset, which pushes futures prices higher. In other words, the higher the risk-free rate, the more expensive it becomes to store money instead of investing in the asset.
3. **Dividend Yield:** If the asset in question is a stock or another asset that pays dividends, the dividend yield will impact the futures price. Since the holder of the futures contract won't receive dividends during the contract period, the futures price is typically lowered to account for this lost income.
4. **Time to Maturity:** The more time there is until the contract matures, the more time-sensitive factors (like interest rates, dividends, and spot prices) can affect the futures price. Longer maturity = more time for these factors to influence the price, leading to greater potential price swings.

❖ **Valuation of a Futures Contract at Maturity**

Similar to forward contracts, the spot price at maturity determines the futures contract's value. However, because of marking-to-market, the price of futures might change every day, unlike forwards. The value of the futures contract at maturity ($V_T$) is:

$V_T = S_r - F_0$

Where:

$V_T$ = Value of the futures contract at time (maturity).

$S_r$ = Spot price of the underlying asset at time

$F_0$ = Futures price agreed upon at the initiation of the contract.

At maturity:

- If $S_r > F_0$, the buyer of the futures contract gains, and the seller loses.
- If $S_r < F_0$, the seller gains, and the buyer loses.

As the maturity date draws near, the price of the futures converges to the spot price. This is because the futures price needs to closely follow the spot price because the spot price has less time to fluctuate as the contract matures.

❖ **Arbitrage in Futures Pricing:**

Arbitrage plays a crucial role in **futures pricing**, and the **no-arbitrage condition** ensures that any pricing discrepancies between the futures and spot market are eliminated quickly. Here's a closer look at the concepts:

**1. Arbitrage Opportunities:**

- **Futures vs Spot Pricing**: If there's a significant difference between the futures price and the spot price (after considering factors like interest rates, dividends, and storage costs), arbitrageurs can exploit that gap.
- **How Arbitrage Works**: By simultaneously buying the asset in one market (e.g., the spot market) and selling it in another (e.g., the futures market), arbitrageurs can lock in a **risk-free profit**. This leads to an equilibrium,

ensuring that the **futures price stays close** to the spot price when adjusted for carrying costs.

**2. Futures Contract Valuation:**

- Valuing a **futures contract** is similar to how we value **forward contracts**, but the presence of **daily marking-to-market** adds an extra layer of complexity.
- In contrast to forward contracts, futures contracts are **settled daily**. This process involves recognizing profits and losses every day, reflecting the latest market conditions and reducing the potential for **big discrepancies** at maturity.

**3. Factors Influencing Futures Prices:**

Futures pricing depends on a few critical variables:

- **Spot Price**: The current market price of the underlying asset.
- **Risk-Free Interest Rate**: This rate affects the opportunity cost of holding the asset versus holding cash.
- **Dividend Yields**: For assets like stocks, dividends impact futures prices as the futures buyer doesn't receive dividends during the contract period.
- **Time to Maturity**: The closer the contract is to maturity, the more sensitive it will be to changes in these factors.

**4. Marking-to-Market:**

- **Daily Settlement**: The marking-to-market process ensures that futures prices are adjusted each day, reflecting the state of the market.
- This feature of futures contracts means that large deviations between futures prices and the spot price are **corrected more quickly**, reducing the possibility of significant discrepancies at maturity.

## 4.5. Difference between forward and future Contract

| Feature | Forward Contracts | Futures Contracts |
|---|---|---|
| **Customization** | Highly customizable | Standardized |
| **Market Type** | Over-the-counter (OTC) private market | Exchange-traded |
| **Liquidity** | Low liquidity | High liquidity |
| **Pricing Transparency** | No price transparency, private pricing | Transparent pricing, publicly available |
| **Settlement Process** | No daily marking-to-market | Daily marking-to-market (cash settlement) |
| **Counterparty Risk** | Higher risk (no clearinghouse) | Lower risk (guaranteed by clearinghouse) |
| **Settlement Method** | Physical delivery or cash settlement | Cash settlement or physical delivery |
| **Arbitrage Pricing** | Based on cost of carry (no-arbitrage) | Based on market forces and no-arbitrage |

## ❖ Exercise:

- **Answer the following questions:**
  1. Explain the process of valuing a forward contract
  2. Discuss the valuation process of a futures contract, and explain how futures prices are determined in an exchange-traded market.
  3. Compare the advantages and disadvantages of forward and futures contracts in terms of customization, liquidity, and risk.
  4. Explain the concept of "marking-to-market" in the context of futures contracts.
  5. Define "cost of carry" and explain its significance in forward pricing.
  6. How does the risk-free interest rate affect the pricing of both forward and futures contracts?
  7. What is the relationship between forward prices and spot prices for commodities?
  8. Describe the impact of storage costs on forward contract pricing.
  9. Explain the role of arbitrage in maintaining the relationship between spot and futures prices.
  10. How does daily settlement affect futures prices as compared to forward prices?

- **Answer the following Short Questions.**

1. What is the key difference between a forward contract and a futures contract?
2. How is the forward price determined in a forward contract?
3. What factors influence the pricing of a futures contract?
4. Write a note on Valuing forward contract.
5. Write a short note on Valuing future contract.
6. Write a difference on forward and future prices.

# UNIT-5 HEDGING STRATEGY USING FUTURES/FORWARDS

**5.1 Introduction**

**5.2 Key Aspects of Hedging**

**5.3 Basic strategies using future**

**5.4 Short hedge**

**5.5 Long hedge**

**5.6 Cross hedging**

**5.7 Steps to be followed while hedging**

**5.8 Benefits of Hedging**

**5.9 Limitations of Hedging**

❖ **Exercise**

## 5.1 Introduction:

The general meaning of the word hedging is to protect oneself from losing or failing by a counterbalancing action. The specific meaning in finance is risk reduction with offsetting transactions that usually involve derivative securities. In risk management, **hedging** refers to a strategy used to reduce or offset the risk of adverse price movements or financial losses. It involves taking a position in a related asset or financial instrument to counterbalance potential losses in another position.

## 5.2 Key Aspects of Hedging:

The primary goal of hedging is to provide protection against unfavorable market events, such as price volatility, exchange rate fluctuations, or interest rate changes. A hedge typically involves using financial instruments such as: forwards, futures, or options. Hedging is done normally via taking an offsetting positions that moves inversely to the original position. For example

- A commodity producer may use futures contracts to lock in a selling price for their product, protecting against price declines.
- An investor holding foreign stocks might use currency hedging to mitigate the risk of exchange rate fluctuations.

By employing hedging strategies, individuals and organizations can better manage their financial exposure, ensuring greater predictability in financial outcomes.

## 5.3 Basic strategies using future

To hedge again the price risk, the market participant is taking various positions in forward or futures market are termed as strategies. It also refer to the various methods used to hedge against risks. Hedging involves taking offsetting positions in the market to reduce risk exposure. Various hedging techniques are used to manage various types of risks like price risk, interest rate risk, currency

risk, etc. Shared hedging techniques include futures, forwards, options, and swaps. This unit is limited to discuss the strategies using Futures and forwards contracts to hedge the price risk. As you are aware that Forwards and Futures are the derivative contracts to buy or sell an asset at a predetermined price at a future date. By using them, one can lock the price and hedges against adverse price moves. Options give the right but not the obligation to buy or sell an asset in the future, providing an upper or lower limit on prices. We will restrict our discussion for this chapter limited to Forwards and Futures contract only.

Let us have clear understanding of Forwards and Futures contracts first!

A futures contract is an agreement to buy or sell an asset at a certain time in the future for a certain price. Forward contracts are similar to futures except that they trade in the over-the-counter market while futures are traded on exchanges like BSE, NSE or MCX.

Forwards and Futures are similar in concept but differ in operational aspects where in Futures have active secondary market with high liquidity and proper risk management with no counterparty or default risk.

There are broadly two strategies termed as Short Hedge and Long Hedge with respect to price risk management using forwards or futures contracts. We will discuss each of them with an illustration.

## 5.4 Short hedge

Short hedge is the term used when a short position is taken on a futures contract. It is typically appropriate for a hedger to use when an asset is expected to be sold in the future. It is used by businesses or investors who need to protect against falling prices. Example: A farmer expecting a decline in wheat prices can sell wheat futures to secure a pre-determined selling price.

A short futures hedge is appropriate when you know you will sell an asset in the future and want to lock in the price today itself.

**Illustration:**

Assume a ginner is holding stocks of 1000 bales of cotton in October. By hedging, he can lock in the price for his stock in October itself and protect himself against the possibility of falling prices.

Today's spot price of cotton is INR 25,000/bale and the price of December futures contract is INR 25,500 a bale.

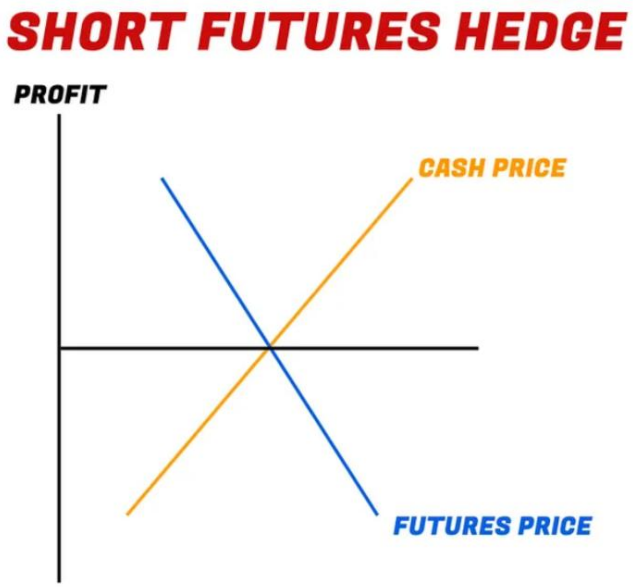
The ginner sells (short) 40 lots of December futures contract in the month of October at INR 25,500/bale for a delivery in December. He pays margin money around 10% of the contract value to the exchange for entering a position in the futures market.

Let us assume the prices fall by INR 1000/bale in the month of December. What will be the price realised by the ginner.

The ginner sold his stock in the physical market @ INR 24,000/bale and takes an opposite position in the futures market, by buying 40 lots of December future contract at INR 24,500 per bale (square off).

| TIME | SPORT PRICE (Rs./Bale) | FUTURES PRICE (Rs./Bale of 170 Kg) |
|---|---|---|
| October 202X | 25,000 | Sell 40 lot of Dec 202X at Rs. 25,500 |
| December 201X | 24,000 | Buy 40 lot of Dec 202X at Rs. 24,500/- |
| Result | Loss of Rs. 1000 Per Bale | Gained Rs. 1000 per bale |

Thus, the ginner protected himself from falling prices in the spot market with an effective selling price of INR 25,000 per bale.




## 5.5 Long hedge

Long hedge is the term used when a long position is taken on a futures contract. It is typically appropriate for a hedger to use when an asset is expected to be bought in the future. It is used by businesses or investors who need to protect against rising prices. Example: A wheat miller anticipating a rise in wheat prices can buy wheat futures to lock in the current price.

A long futures hedge is appropriate when you know you will purchase an asset in the future and want to lock in the price today itself.

**Illustration:**

Suppose that today (in the month of October), an exporter receives an order to export 1000 bales of cotton in the month of December. He is planning to buy cotton from spot market and export it in December.

Assuming, today's spot prices is INR 25,000/bale and December futures contract trading at INR 25,500 and he is worried that prices may rise in the month of December (spot).

By hedging, he can lock in the purchase price in October itself (today) and protect himself from rise in prices in the spot market.

| TIME | SPORT PRICE (Rs./Bale) | FUTURES PRICE (Rs./Bale of 170 Kg) |
|---|---|---|
| October 202X | 25,000 | Sell 40 lot of Dec 202X at Rs. 25,500 |
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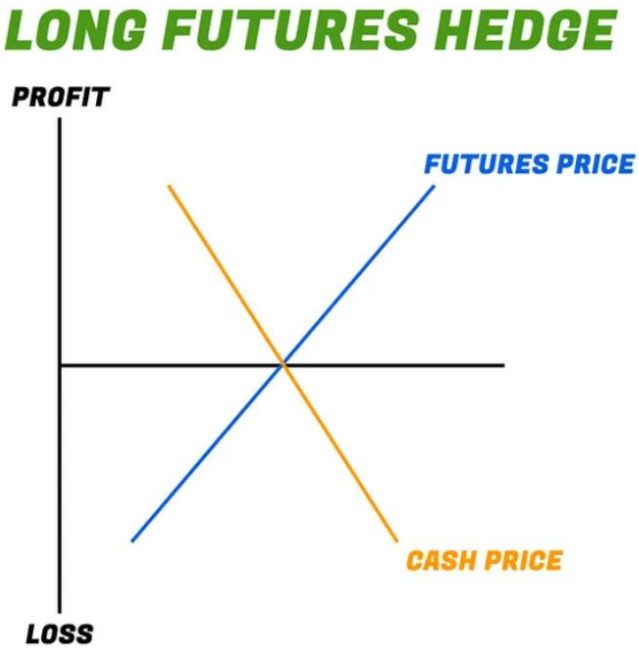


## 5.6 Cross hedging

Hedging a position in one asset with a futures contract of a related but not identical asset. **Example**: A company exposed to jet fuel prices might hedge with crude oil futures due to their correlation. This correlation actually decide the hedge ratio. Hedge Ratio is the ratio of size of position taken in futures contract to size of exposure. If objective is to minimize risk, hedge ratio of 1.0 is not necessarily optimal all the time. Proportion of the exposure that should optimally be hedged is

$$h = \rho \frac{\sigma_S}{\sigma_F}$$

where

$\sigma_S$ is the standard deviation of $\Delta S$, the change in the spot price during the hedging period.

$\sigma_F$ is the standard deviation of $\Delta F$, the change in the futures price during the hedging period.

$\rho$ is the coefficient of correlation between $\Delta S$ and $\Delta F$.

Cross heading also leads to Basis Risk as the underlying assets are identical but not the same.

**Basis Risk:**

Basis risk refers to the difference between the cash price for the asset to be hedged and the futures price. If the hedged asset is identical to the commodity underlying the futures contract, the cash price and futures price should converge as delivery nears. Changes in basis price do not impact the futures contract but do impact the sales price for the asset to be hedged. Basis risk arises due to following reasons:

- Asset to be hedged is different from asset underlying the futures contract.
- Hedger is uncertain about exact date when asset is sold/bought.
- Futures contract may be closed well before expiration.

Basis risk may be in favour or may be against hedger depending of the long or short hedge and strengthening or weakening of Basis.

- Strengthening of basis: When spot price increases by more than futures price, the basis increases.
- Weakening of basis: When futures price increases by more than spot price, the basis decreases.

**Numerical Illustration of Cross Hedging Using Futures:**

A jet fuel retailer is exposed to the risk of rising jet fuel prices. However, there are no actively traded futures contracts for jet fuel. The retailer decides to use crude oil futures for hedging, as jet fuel prices are closely correlated with crude oil prices.

**Step 1: Data and Assumptions**

**Jet Fuel Exposure**: 100,000 gallons of jet fuel to be purchased in 3 months.

**Current Jet Fuel Price**: $3.50 per gallon.

**Current Crude Oil Futures Price**: $70 per barrel.

**Conversion**: 1 barrel = 42 gallons (for crude oil).

Effective price per gallon of crude oil: $70/42 \approx 1.67$

**Hedge Ratio**: Correlation between jet fuel and crude oil is 0.9.

Hedge ratio = 0.9.

**Crude Oil Contract Size**: 1 futures contract = 1,000 barrels.

**Step 2: Determine the Number of Futures Contracts**

**Total Jet Fuel Exposure**: $100{,}000 \text{ gallons} \times 3.50 = \$350{,}000$

**Equivalent Exposure in Crude Oil**: $100{,}000 \text{ gallons} \times 1.67 = \$167{,}000$

**Hedge Ratio Adjustment**: $167{,}000 \times 0.9 = 150{,}300$ (Adjusted Exposure)

**Number of Contracts**: Each crude oil contract represents:
$1{,}000 \text{ barrels} \times 42 \text{ gallons/barrel} = 42{,}000 \text{ gallons}$

Required contracts: 100,000/42,000≈3.57. Round to **4 contracts**.

**Step 3: Hedge Execution**

The retailer sells 4 crude oil futures contracts at $70 per barrel.

**Step 4: Outcome Analysis**

***Case A: Jet Fuel Prices Rise***

New Jet Fuel Price: $4.00 per gallon.

Jet fuel purchase cost: 100,000 gallons×4.00=$400,000

Crude Oil Futures Price: $80 per barrel.

Futures Gain: 4 contracts×1,000 barrels×(80−70)=$40,000

Net Cost: 400,000−40,000=$360,000.

***Case B: Jet Fuel Prices Fall***

New Jet Fuel Price: $3.00 per gallon.

Jet fuel purchase cost: 100,000 gallons×3.00=$300,000

Crude Oil Futures Price: $60 per barrel.

Futures Loss: 4 contracts×1,000 barrels×(70−60)=$40,000

Net Cost: 300,000+40,000=$340,000

The hedge effectively reduces the risk of adverse price movements in jet fuel. The mismatch between the underlying (jet fuel) and the hedging instrument (crude oil futures) is managed by using the hedge ratio.

## 5.7 Steps to be followed while hedging

The first step in implementing effective hedges is carefully identifying and assessing the risks involved. For instance, a wheat farmer must consider the potential risk of a future price drop, which could significantly impact their profitability.

Once the risks are identified, the next crucial step is selecting an appropriate futures contract that aligns with the farmer's needs. In the case of our wheat farmer, they would choose a wheat futures contract that corresponds to the same volume as their crop. This ensures that the hedge is accurately tailored to their circumstances.

After selecting the futures contract, the producer takes an opposing position in the futures market. They would go long by buying wheat futures to protect against potential price increases. On the other hand, if they intend to hedge against price decreases, they would go short by selling wheat futures. This offsetting position helps mitigate the potential losses caused by adverse price movements.

Remember that markets are constantly evolving. Therefore, regular monitoring and adjustments to the hedge are necessary to ensure its effectiveness in aligning with the changing market conditions. By staying vigilant and proactive in assessing the market trends, the wheat farmer can make timely adjustments to their hedge, thus maximising its protective potential.

## 5.8 Benefits of Hedging:

Hedging reduces uncertainty of future price movements as it gives a chance to lock the price in advance. It protects against extreme losses where the prices are not in your favour. It helps companies to stabilize their cash flows.

## 5.9 Limitations of Hedging:

Hedging can be expensive due to transaction costs, premiums, or margins. It may limit potential gains, as the hedge offsets both losses and profits. Over-hedging, where the extent of the hedge exceeds the actual risk exposure, can limit potential profits. If the hedging is more than necessary, gains in the underlying asset may be offset by losses in the hedging instrument. Some hedging instruments, such as derivatives, can be complex and difficult to understand. This complexity may increase the risk of mismanagement or misunderstanding of the hedge's effectiveness. Hedging strategies may not always work as intended, especially during extreme market conditions or unforeseen events. The effectiveness of the hedge depends on the correlation between the hedged item and the hedging instrument

❖ **Keywords**

Hedge, Long hedge, Short hedge, Cross Hedge, Basis Risk, Hedge Ratio

❖ **Exercise**

- **Theoretical:**

  Q: 1 Explain the term Hedging in the context of Risk Management.

  Q: 2 What is Long Hedge?

  Q: 3 What is Short Hedge?

  Q: 4 What is Basis risk and why it arises?

  Q: 5 What is Hedge ratio?

- **Numerical:**

  Q: 1 The risk of spot prices on silver as measured from its standard deviation is placed at Rs 120. Similarly the price risk of the 3-m futures contract on silver is estimated to be Rs 150. The co-efficient of correlation between the two is placed at 0.85. In order to hedge spot position on silver what ratio of futures contract would be optimal?

  Q: 2 The spot price of Rs 75,000 per 10 gms. The 3-m futures contract for size of 100 gms on gold is Rs 75,400 per 10 gms. In order to protect

against the fall in value of the gold the trader decides to sell 10 contracts in gold for 3-m delivery. However after one month the trader is required to sell the stock of gold at Rs 74,500 and therefore also cancels his position in futures at Rs 74,700. Find out the price the trader realised.

Q: 3 Assume in Problem 2 the trader had planned to buy gold and thus went short on the futures on gold. After one month the trader bought gold and lifted the hedge. What price did trader ended up paying?

**MBA**
**SEMESTER-4**
**(SPECIALIZATION) (FINANCE)**
**DERIVATIVES & RISK MANAGEMENT**
**BLOCK: 2**


Authors' Name: Prof. (Dr.) Manoj Shah, Professor & Director, Dr. BAOU, Ahmedabad
Dr. Narayan Baser, Associate Professor, PDPU,Gandhinagar
Mr. Devang Mehta, Assistant Professor, Christ College, Rajkot
Dr. Varsha Gondaliya, Assistant Professor, C.K. Pithwalla College of Commerce-Management-Computer Application,Surat.
Dr. Raviraj Gohil,Associate Professor & Area Chair,Shanti Business School (SBS),Ahmedabad.

Review (Subject): Dr. Dhaval Maheta, Professor, Department of Business and Industrial Management, Veer Narmad South Gujarat University, Surat.
Dr. Narayan Baser, Associate Professor, PDPU,Gandhinagar

Review (Language): Dr.Ketan K.Gediya,Associate Professor,Smt.S.R.Mehta Arts College, Ahmedabad

Editor's Name: Prof. (Dr.) Manoj Shah,
Professor and Director,
School of Commerce and Management,
Dr. Babasaheb Ambedkar Open University,
Ahmedabad.

Co-Editor's Name: Dr. Dhaval Pandya
Assistant Professor,
School of Commerce and Management,
Dr. Babasaheb Ambedkar Open University,
Ahmedabad.



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Dr. Babasaheb Ambedkar Open University
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# UNIT-5 HEDGING STRATEGY USING FUTURES/FORWARDS

**5.1 Introduction**

**5.2 Key Aspects of Hedging**

**5.3 Basic strategies using future**

**5.4 Short hedge**

**5.5 Long hedge**

**5.6 Cross hedging**

**5.7 Steps to be followed while hedging**

**5.8 Benefits of Hedging**

**5.9 Limitations of Hedging**

❖ **Exercise**

## 5.1 Introduction:

The general meaning of the word hedging is to protect oneself from losing or failing by a counterbalancing action. The specific meaning in finance is risk reduction with offsetting transactions that usually involve derivative securities. In risk management, **hedging** refers to a strategy used to reduce or offset the risk of adverse price movements or financial losses. It involves taking a position in a related asset or financial instrument to counterbalance potential losses in another position.

## 5.2 Key Aspects of Hedging:

The primary goal of hedging is to provide protection against unfavorable market events, such as price volatility, exchange rate fluctuations, or interest rate changes. A hedge typically involves using financial instruments such as: forwards, futures, or options. Hedging is done normally via taking an offsetting positions that moves inversely to the original position. For example

- A commodity producer may use futures contracts to lock in a selling price for their product, protecting against price declines.
- An investor holding foreign stocks might use currency hedging to mitigate the risk of exchange rate fluctuations.

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To hedge again the price risk, the market participant is taking various positions in forward or futures market are termed as strategies. It also refer to the various methods used to hedge against risks. Hedging involves taking offsetting positions in the market to reduce risk exposure. Various hedging techniques are used to manage various types of risks like price risk, interest rate risk, currency

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Let us have clear understanding of Forwards and Futures contracts first!

A futures contract is an agreement to buy or sell an asset at a certain time in the future for a certain price. Forward contracts are similar to futures except that they trade in the over-the-counter market while futures are traded on exchanges like BSE, NSE or MCX.

Forwards and Futures are similar in concept but differ in operational aspects where in Futures have active secondary market with high liquidity and proper risk management with no counterparty or default risk.

There are broadly two strategies termed as Short Hedge and Long Hedge with respect to price risk management using forwards or futures contracts. We will discuss each of them with an illustration.

## 5.4 Short hedge

Short hedge is the term used when a short position is taken on a futures contract. It is typically appropriate for a hedger to use when an asset is expected to be sold in the future. It is used by businesses or investors who need to protect against falling prices. Example: A farmer expecting a decline in wheat prices can sell wheat futures to secure a pre-determined selling price.

A short futures hedge is appropriate when you know you will sell an asset in the future and want to lock in the price today itself.

**Illustration:**

Assume a ginner is holding stocks of 1000 bales of cotton in October. By hedging, he can lock in the price for his stock in October itself and protect himself against the possibility of falling prices.

Today's spot price of cotton is INR 25,000/bale and the price of December futures contract is INR 25,500 a bale.

The ginner sells (short) 40 lots of December futures contract in the month of October at INR 25,500/bale for a delivery in December. He pays margin money around 10% of the contract value to the exchange for entering a position in the futures market.

Let us assume the prices fall by INR 1000/bale in the month of December. What will be the price realised by the ginner.

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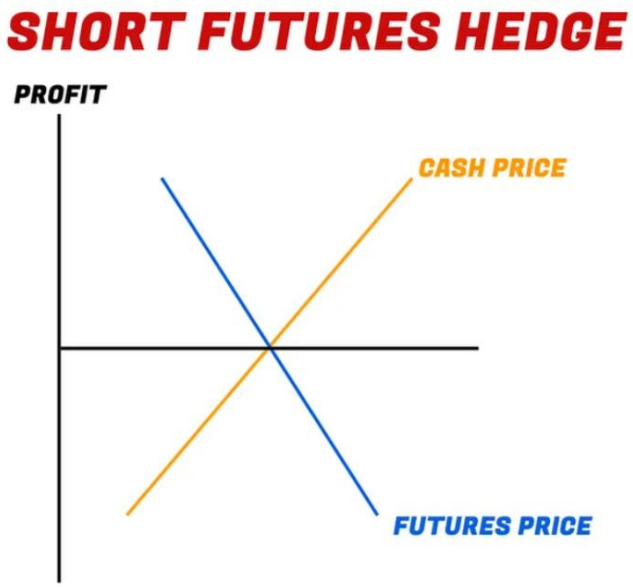


## 5.5 Long hedge

Long hedge is the term used when a long position is taken on a futures contract. It is typically appropriate for a hedger to use when an asset is expected to be bought in the future. It is used by businesses or investors who need to protect against rising prices. Example: A wheat miller anticipating a rise in wheat prices can buy wheat futures to lock in the current price.

A long futures hedge is appropriate when you know you will purchase an asset in the future and want to lock in the price today itself.

**Illustration:**

Suppose that today (in the month of October), an exporter receives an order to export 1000 bales of cotton in the month of December. He is planning to buy cotton from spot market and export it in December.

Assuming, today's spot prices is INR 25,000/bale and December futures contract trading at INR 25,500 and he is worried that prices may rise in the month of December (spot).

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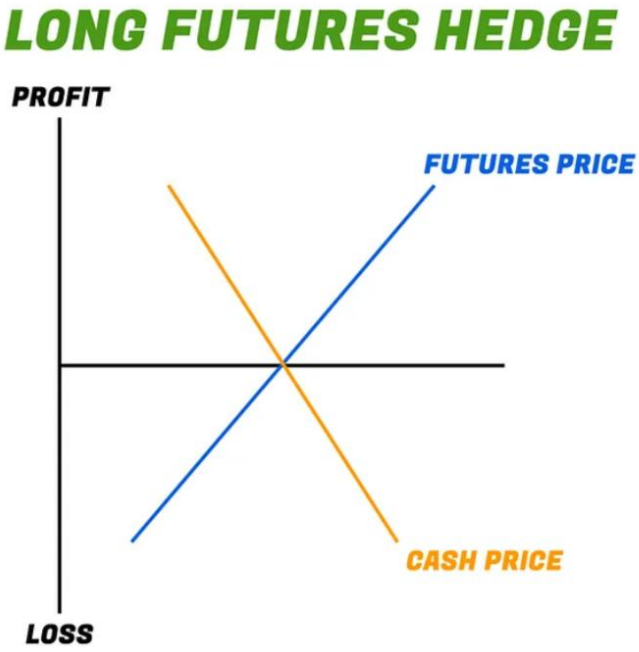


## 5.6 Cross hedging

Hedging a position in one asset with a futures contract of a related but not identical asset. **Example**: A company exposed to jet fuel prices might hedge with crude oil futures due to their correlation. This correlation actually decide the hedge ratio. Hedge Ratio is the ratio of size of position taken in futures contract to size of exposure. If objective is to minimize risk, hedge ratio of 1.0 is not necessarily optimal all the time. Proportion of the exposure that should optimally be hedged is

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Cross heading also leads to Basis Risk as the underlying assets are identical but not the same.

**Basis Risk:**

Basis risk refers to the difference between the cash price for the asset to be hedged and the futures price. If the hedged asset is identical to the commodity underlying the futures contract, the cash price and futures price should converge as delivery nears. Changes in basis price do not impact the futures contract but do impact the sales price for the asset to be hedged. Basis risk arises due to following reasons:

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**Numerical Illustration of Cross Hedging Using Futures:**

A jet fuel retailer is exposed to the risk of rising jet fuel prices. However, there are no actively traded futures contracts for jet fuel. The retailer decides to use crude oil futures for hedging, as jet fuel prices are closely correlated with crude oil prices.

**Step 1: Data and Assumptions**

**Jet Fuel Exposure**: 100,000 gallons of jet fuel to be purchased in 3 months.

**Current Jet Fuel Price**: $3.50 per gallon.

**Current Crude Oil Futures Price**: $70 per barrel.

**Conversion**: 1 barrel = 42 gallons (for crude oil).

Effective price per gallon of crude oil: $70/42 \approx 1.67$

**Hedge Ratio**: Correlation between jet fuel and crude oil is 0.9.

Hedge ratio = 0.9.

**Crude Oil Contract Size**: 1 futures contract = 1,000 barrels.

**Step 2: Determine the Number of Futures Contracts**

**Total Jet Fuel Exposure**: $100{,}000 \text{ gallons} \times 3.50 = \$350{,}000$

**Equivalent Exposure in Crude Oil**: $100{,}000 \text{ gallons} \times 1.67 = \$167{,}000$

**Hedge Ratio Adjustment**: $167{,}000 \times 0.9 = 150{,}300$ (Adjusted Exposure)

**Number of Contracts**: Each crude oil contract represents:
$1{,}000 \text{ barrels} \times 42 \text{ gallons/barrel} = 42{,}000 \text{ gallons}$

Required contracts: 100,000/42,000≈3.57. Round to **4 contracts**.

**Step 3: Hedge Execution**

The retailer sells 4 crude oil futures contracts at $70 per barrel.

**Step 4: Outcome Analysis**

***Case A: Jet Fuel Prices Rise***

New Jet Fuel Price: $4.00 per gallon.

Jet fuel purchase cost: 100,000 gallons×4.00=$400,000

Crude Oil Futures Price: $80 per barrel.

Futures Gain: 4 contracts×1,000 barrels×(80−70)=$40,000

Net Cost: 400,000−40,000=$360,000.

***Case B: Jet Fuel Prices Fall***

New Jet Fuel Price: $3.00 per gallon.

Jet fuel purchase cost: 100,000 gallons×3.00=$300,000

Crude Oil Futures Price: $60 per barrel.

Futures Loss: 4 contracts×1,000 barrels×(70−60)=$40,000

Net Cost: 300,000+40,000=$340,000

The hedge effectively reduces the risk of adverse price movements in jet fuel. The mismatch between the underlying (jet fuel) and the hedging instrument (crude oil futures) is managed by using the hedge ratio.

## 5.7 Steps to be followed while hedging

The first step in implementing effective hedges is carefully identifying and assessing the risks involved. For instance, a wheat farmer must consider the potential risk of a future price drop, which could significantly impact their profitability.

Once the risks are identified, the next crucial step is selecting an appropriate futures contract that aligns with the farmer's needs. In the case of our wheat farmer, they would choose a wheat futures contract that corresponds to the same volume as their crop. This ensures that the hedge is accurately tailored to their circumstances.

After selecting the futures contract, the producer takes an opposing position in the futures market. They would go long by buying wheat futures to protect against potential price increases. On the other hand, if they intend to hedge against price decreases, they would go short by selling wheat futures. This offsetting position helps mitigate the potential losses caused by adverse price movements.

Remember that markets are constantly evolving. Therefore, regular monitoring and adjustments to the hedge are necessary to ensure its effectiveness in aligning with the changing market conditions. By staying vigilant and proactive in assessing the market trends, the wheat farmer can make timely adjustments to their hedge, thus maximising its protective potential.

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❖ **Keywords**

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❖ **Exercise**

- **Theoretical:**

  Q: 1 Explain the term Hedging in the context of Risk Management.

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  Q: 4 What is Basis risk and why it arises?

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  Q: 1 The risk of spot prices on silver as measured from its standard deviation is placed at Rs 120. Similarly the price risk of the 3-m futures contract on silver is estimated to be Rs 150. The co-efficient of correlation between the two is placed at 0.85. In order to hedge spot position on silver what ratio of futures contract would be optimal?

  Q: 2 The spot price of Rs 75,000 per 10 gms. The 3-m futures contract for size of 100 gms on gold is Rs 75,400 per 10 gms. In order to protect

against the fall in value of the gold the trader decides to sell 10 contracts in gold for 3-m delivery. However after one month the trader is required to sell the stock of gold at Rs 74,500 and therefore also cancels his position in futures at Rs 74,700. Find out the price the trader realised.

Q: 3 Assume in Problem 2 the trader had planned to buy gold and thus went short on the futures on gold. After one month the trader bought gold and lifted the hedge. What price did trader ended up paying?

# UNIT-6 OPTION MARKET: MECHANICS

**6.1 Introduction**

**6.2 Types of Option**

**6.3 Option Positions and Profit/Loss Diagrams**

**6.4 Underlying Assets**

**6.5 Key Words**

❖ **Exercise**

## 6.1 Introduction

Option is an instrument that gives the holder or buyer the right but no obligation to buy or sell an asset, which is called the underlying asset. It is also a derivative instrument since the right it confers always draws its value from the underlying. Options are different than others in a way that it absolves holder of the option of any duty, hence if one hold an option then he or she is not obligated to perform, whereas the holder can force the counterparty to honor the commitment, should the trade be favorable to the holder of the option. Hence option is an instrument which gives holder the right but no obligation to buy or sell an asset at predetermined price within a stipulated time period. It is this feature which separates it from other instruments like Futures and Forwards which provide for equal and binding obligations on both the parties.

## 6.2 Types of Option

### 6.2.1 Call Option

A call option gives holder the right but no obligation, to buy an asset at predetermined price within the specified time interval. If we have to illustrate this with a help of an example, assume that share of A is trading at Rs 100 and an investor Mohan believes that the share can go upto Rs150 in next 3 months but Mohan does not have the required amount of money to purchase share "A" but expects to get it after 3 months. He is not willing to let go the opportunity to own this share. He does not want to forego this opportunity but at the same time there is another investor Murali, who holds contrary view and is willing to sell the same share. Instead of buying the share outright Mohan can buy a call option (assuming Murali is read to sell such on option) which gives Mohan the right to buy shares of "A" at a price of, say Rs110 at any time during next 3 months. This is a Call option where Mohan is the buyer and Murali is the seller. Mohan for the next three months will have the right to exercise this option should the opportunity arise but Murali would have no choice but to honor the commitment. For all this to happen and Murali giving this right to Mohan, he should be compensated. Hence Mohan will give a fee to Murali to have this right, it called

**Premium.**

Circumstances in which Mohan would exercise the option can be understood from the below mentioned table

| Condition | Exercise (Yes/No) | Payoff |
|---|---|---|
| Price of A<110 | No | Loss of Premium |
| Price of A>110 | Yes | Price Of A- 110- Premium |

### 6.2.2 Put Option

A Put option is also an option akin to a call option, but the difference is that it gives holder the right to sell a share at a particular price within the specified time frame. Again taking the example of Mohan and Murali , but this time let's assume that the share of A is trading at Rs160 and Murali holds it but at the same time is skeptical that the share might fall to Rs120 in the near term. He is not sure of the fall but would like to exit the stock at Rs160 in case of a fall. At the same time Mohan has a contra view and believes that the share might not fall at all, on the contrary it can rise a bit from here. Due to these diverse views both can enter an arrangement and Murali can buy a Put option from Mohan which allows him to sell his shares at Rs160, Mohan would receive a premium in lieu of this and in case should the opportunity arises Mohan would be required to comply and purchase the share from Murali at Rs160.

Circumstances in which Murali would exercise the option can be understood from the below mentioned table

| Condition | Exercise (Yes/No) | Payoff |
|---|---|---|
| Price of A>160 | No | Loss of premium |
| Price of A<160 | Yes | 160-Price of A- Premium |

## 6.3 Option Positions and Profit/Loss Diagrams

### 6.3.1 Important terms in Options

a) Buyer or Holder: The person who has the right but no obligation to perform is called the holder of the option.

b) Writer or Seller: The person who sells the option for consideration hence is liable to comply, is called the Seller of the Option.

c) Premium: The upfront fee given by the buyer to the seller is called the Premium. This amount stays with the seller irrespective of whether the Option is exercised or not.

d) Strike Price: The predetermined price at the time of buying or selling an Option at which it can be exercised is called the Strike Price. This is the price at which the buyer of an option wished to buy or sell the asset.

e) Maturity Date: The time period within which the option can be exercised. It is also referred to as Expiry Date.

### 6.3.2 Moneyness of the Options

Moneyness of the option is defined as the benefit that holder or buyer would get if he exercises then option. The table below would illustrate the conditions for the same

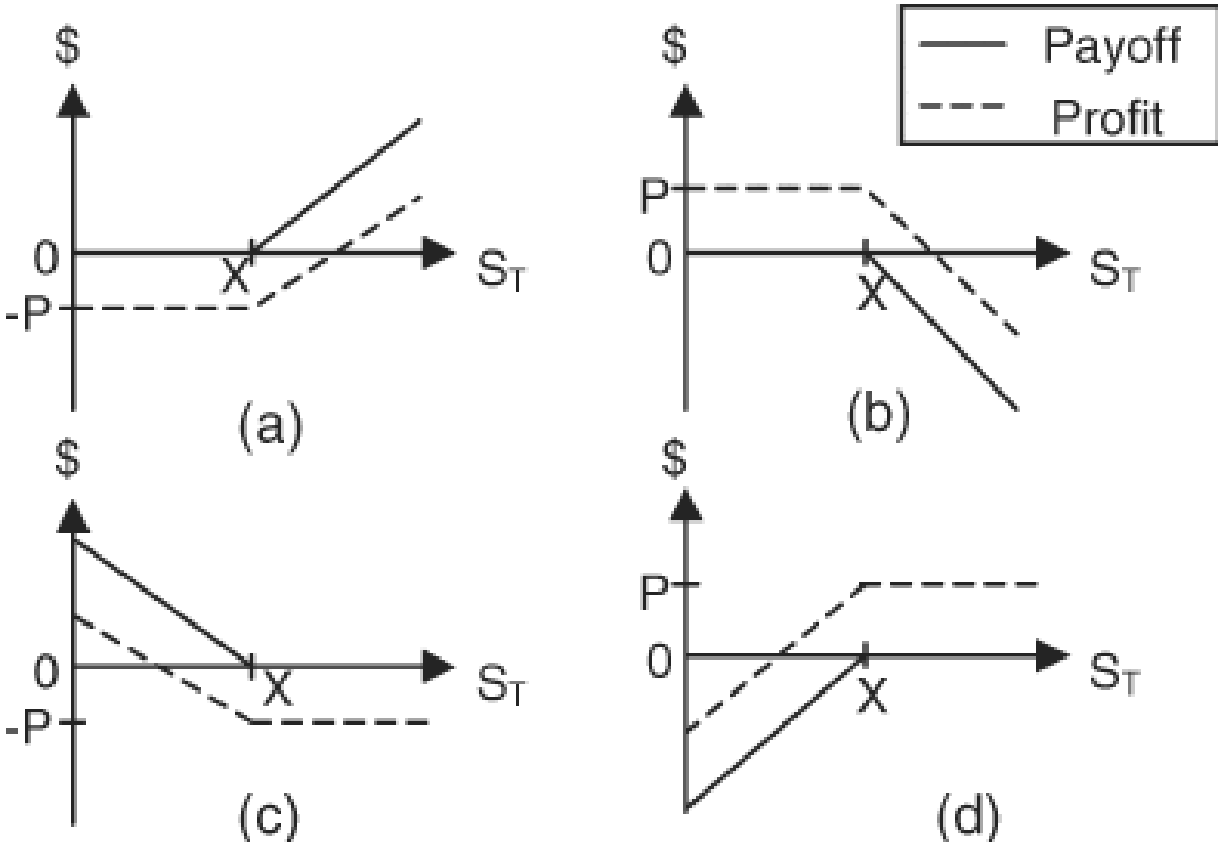
| Share Price(S) | S<X(exercise price) | S=X | S>X |
|---|---|---|---|
| Call option | Out of the money | At the Money | In The Money |
| Put Option | In the Money | At the Money | Out of the Money |

Call option is in the money when the spot price is more than the exercise price.

Put option is in the money when the spot price is less than the exercise price.

### 6.3.3 Payoff Diagrams

Call Option & Put Option payoff




Profit & payoff for Options a) Long call b) short Call c) Long Put d) Short Put

## 6.4 Underlying Assets

Just as we have in Forwards and Futures, the options too can have several assets as underlying. Stocks, Indices, currencies, Interest rates, commodities. The options in commodities have also started in India and they can be very useful for

producers and traders alike as they can hedge the risk and prove to be a good risk management tool.

Options are also available on major currencies and they serve their purpose of hedging and risk management for export import businesses.

Options on stocks and Indices are very common and their trading volumes have always been on the rise ever since their inception from the year 2000. They provide much needed depth to the stock markets and lead to efficient price discovery. Similarly there are options on Interest rates as well and they serve the same purpose as the options on Stock and Indices. The trading volume in all the Option instruments however differ, still lot of action is witnessed in Indices options and that too in the near month, the long dated options are still not in vogue in India.

### 6.4.5 Specifications and Types of Options

Options are more complex derivative instruments than forwards and futures, since they have features which enables the user to use them in various conditions. Options can be classified on the basis of these features in the following manner:

- As per the exercise of options
- Based on how they are generated, traded and settled
- Based on the underlying assets on which the options are created.

American Vs European Options

American options can be exercised anytime during the month before expiry date of the option contract whereas the European options can be exercised only upon the maturity of the contract.

Options can also classified as OTC and Exchange traded based on where they are generated and traded and settled.

### 6.4.6 Underlying assets

Like other derivative instruments, options too can have various underlying assets like stocks, Indices, commodities, currencies and interest rates.

### 6.4.7 Margins & Taxation

Options are derivative contracts which gives buyer the right and obligation to the seller, hence they are not uniform in terms payoff to both the parties. The buyer has to give premium to have the right and the seller honors his commitment to the buyer in lieu of this sum of money. The buyer settles his commitment by paying premium but it is the seller who assumes unlimited risk in this case and the exchange which has the responsibility of settling every trade, it face the risk of option seller not meeting his obligation. Hence in this case the exchange would be required to collect daily mark to market from the sellers as per the market conditions. Only writers of options have to make good of any MTM losses.

**1. Classification of Income:**

- Capital Gains Tax: If options are treated as capital assets, profits from the sale are classified as either short-term or long-term capital gains.
- Short-term capital gains (STCG) apply if the options are held for less than 12 months, and they are taxed at a flat rate of 15%.
- Long-term capital gains (LTCG**)** occur if options are held for more than 12 months, but note that in India, options trading typically does not fall into the long-term capital gains category since the holding period is generally less than a year.
- Business Income: If you are frequently trading options as part of a systematic trading strategy, the income may be considered business income and taxed under the head "Profits and Gains of Business or Profession." This income is taxed at the applicable slab rates based on total income.

**2. Tax Deducted at Source (TDS):**

- **There is no TDS on profits arising** from trading options in the stock market. The trader is responsible for calculating and paying their own taxes.Set-Off of Losses:

- **Set-Off Against Capital Gains:**

  Short-term capital losses from options trading can be set off against other short-term and long-term capital gains.

- **Set-Off Against Business Income:**

  If option trading is classified as business income, losses from it can be set off against other business incomes, but this has to be done within the same assessment year.

- **Carry Forward of Losses:**

Short-term capital losses can be carried forward for up to 8 years to set off against future capital gains.

**6.4.8 Employee Stock options**

When an employer offers securities to an employee under an Employee Stock Option Plan (ESOP) scheme, free of cost or at a concessional rate, it is taxable as a perquisite in the year in which the securities have been allotted to the employee. However, the liability of payment or deduction of tax on such perquisite is allowed to be deferred in case of an employee of an eligible start-up. The value of the perquisite shall be its market value as on the date of exercising the ESOP, as reduced by the amount recovered from the employee. When securities allotted under ESOPs are

subsequently transferred by the employee, the gains arising therefrom shall be taxable under the head 'Capital Gains'

Generally, ESOPs are offered by employers as an award to employees in order to retain top talent. It acts as a motivational tool for employees, making them feel responsible for the performance of the company after owning a stake in it. ESOPs are particularly popular among start-ups that cannot afford to pay high salaries to employees in the initial phase. ESOPs allow start-ups to employ highly talented employees at a relatively low salary amount with the balance being made up via ESOPs

## 6.5 Key Words

**American Option**: An option that can be exercised on or before the maturity.

**Option Contract**: An option contract confers the right to the buyer but no obligation, to buy or sell an asset at a given price before or maturity of the contract.

**Premium:** Amount of money upfront paid by the option buyer to the option seller.

**European option:** An option that can only be exercised at Maturity

**Call option**: An option that confers right but no obligation to buy an asset at a given price on or before the maturity of the contract.

**Put option**: A put option confers the right to sell an asset at a given price on or before the maturity of the contract.

## ❖ Exercise

1. What do you understand the options contact? Illustrate with the help of an example.
2. Explain features of an option.
3. Explain the concept of “In the money” & “Out of the money” in context of options.
4. What are the advantages of Options over Futures and Forwards?
5. What is the difference in payoff between a long position on an asset and the call option on the same?
6. What are the key specification and parameters of an options contract?

# UNIT-7 PROPERTIES AND PRICING OF OPTION CONTRACTS


**7.1 Introduction**

**7.2 Options Contract**

**7.3 Call & Put options**

**7.4 Factors Affecting Options Pricing**

**7.5 Boundaries For Option Prices**

**7.6 Upper Bounds for European Call and Put Options (No Dividends)**

**7.7 Lower Bounds for European Call Options (No Dividends)**

**7.8 Lower Bounds for European Put Options (No Dividends)**

**7.9 Put-Call Parity**

**7.10 Black-Scholes Model of Option Pricing**

❖ **Exercise**


## 7.1 Introduction:

We examine the variables influencing stock option prices in this unit. We investigate the connections between the underlying stock price, American option prices, and European option prices using a variety of arbitrage arguments. Put-call parity, or the relationship between the prices of a European call option, the price of a European put option, and the price of the underlying stock, is the most significant of these relationships. We will also discuss the models of pricing options contracts.

## 7.2 Options contract:

Options are traded in the over-the-counter market as well as on exchanges. Two categories of options exist. The holder of a call option has the right to purchase the underlying asset at a specific price by a specific date. The holder of a put option is entitled to sell the underlying asset by a specific date at a specific price. The contract's date is referred to as the expiration date or maturity, and the price is known as the strike price or exercise price. Up to the expiration date, American options are exercisable whenever they choose. European options are only exercisable on the day of expiration. American options make up the majority of options traded on exchanges.

## 7.3 Call & Put options:

Options contracts are of two major types. 1. Call options and 2. Put Options

It is vital to know who has the Right to transact vs. who may be obliged to transact in order to determine the direction of cash flows at expiry. The person who takes the long position has the rights while the person who shorts is obliged if any obligations arises. The long call has the right to buy the underlying assets at strike price while the short call has obligation to sell the underlying assets at strike price. The long put has the right to sell the underlying assets at strike price while the short put has obligation to buy the underlying assets at strike price. The person who

shorts the options contract receive the premium and the person who long the options contract has to pay the premium while entering into the options contract. This premium is also known as price of options contract. It is important to know that what are the factors affecting the price or premium of options contracts in derivatives market.

## 7.4 Factors Affecting Options Pricing:

There are six factors or variables affecting the price of a stock option contract:

**1.** The current stock price, $S_0$

**2.** The strike price, $K$

**3.** The time to expiration, $T$

**4.** The volatility of the stock price, σ

**5.** The risk-free interest rate, $r$

**6.** The dividends that are expected to be paid.

In this section, we consider what happens to option prices when there is a change to one of these factors, with all the other factors remaining fixed. The results are summarized in Table.

| Variable | $c$ | $p$ | $C$ | $P$ |
|---|---|---|---|---|
| $S_0$ | + | − | + | − |
| $K$ | − | + | − | + |
| $T$ | ? | ? | + | + |
| σ | + | + | + | + |
| $r$ | + | − | + | − |
| $D$ | − | + | − | + |

**Note:** + indicates that an increase in the variable causes the option price to increase or stay the same;

- indicates that an increase in the variable causes the option price to decrease or stay the same;

? indicates that the relationship is uncertain

C apital C and P refers to American options while small c and p refers to European options

It is very important to understand the impact of each factor on price of option contract for better analysis of pricing of options contracts.

**1. Current stock price:**

Calls becomes more valuable as stock price increases. If a call option is exercised at some future time, the payoff will be the amount by which the stock price exceeds the strike price. If the stock price increasing, call becomes more in the money and the intrinsic value of premium goes up. If current stock price goes down, the value of call options decreases as the call has less intrinsic value. What is effect on value of puts? You can think in exactly opposite way. Value of Put decreases as the stock price increases because the put option contract becomes out of the money and has no intrinsic value.

**2. Strike Price:**

Calls becomes less valuable as strike price increases and Puts become more valuable as strike price increases. Strike price or Exercise prices are affecting the options prices exactly opposite to current or spot prices. Increase in strike price leading the calls towards out of the money with less or no intrinsic value of calls and vice versa. Increase in strike price leading the puts towards in the money with high intrinsic value of puts and vice versa.

**3. Time to expiration:**

Calls and puts both become more valuable as time to expiration increases. The owner of the long-life option has all the exercise opportunities open to the owner of the short-life option—and more. The long-life option must therefore always be worth at least as much as the short-life option. However, European options prices are uncertain with respect to time to expiry.

**4. Volatility:**

Volatility is a measure of uncertainty about future stock price movements. Calls and puts both become more valuable as volatility increases. Why? Because there is risk protection with profit potential in all options contract. As volatility increases, the chance that the stock will do very well or very poorly increases. For the owner of a stock, these two outcomes tend to offset each other. However, this is not so for the owner of a call or put. The owner of a call benefits from price increases but has limited downside risk in the event of price decreases because the most the owner can lose is the price of the option. Similarly, the owner of a put benefits from price decreases, but has limited downside risk in the event of price increases. The values of both calls and puts therefore increase as volatility increases.

**5. Risk-Free Interest Rate:**

The risk-free interest rate affects the price of an option in a less clear-cut way. As interest rates in the economy increase, the expected return required by investors from the stock tends to increase. In addition, the present value of any future cash flow received by the holder of the option decreases. The combined impact of these two effects is to increase the value of call options and decrease the value of put options.

**6. Amount of Future Dividends:**

Dividends have the effect of reducing the stock price on the ex-dividend date. This is bad news for the value of call options and good news for the value of put options. Consider a dividend whose ex-dividend date is during the life of an

option. The value of the option is negatively related to the size of the dividend if the option is a call and positively related to the size of the dividend if the option is a put.

## 7.5 Boundaries For Option Prices

Options prices are to be understood with the similar argument of no arbitrage. In this section, we will discuss that option price must be in the range of lower and upper bounds. If option price cross this boundaries, there will be arbitrage opportunities. There are profitable opportunities for arbitrageurs if an option price is above the upper bound or below the lower bound.

We assume that there are some market participants, such as large investment banks, for which the following assumptions are true:

1. There are no transaction costs.
2. All trading profits (net of trading losses) are subject to the same tax rate.
3. Borrowing and lending are possible at the risk-free interest rate.

We assume that these market participants are prepared to take advantage of arbitrage opportunities as they arise. We will use the following notation for discussion purpose.

$S_0$: Current stock price

K: Strike price of option

T : Time to expiration of option

$S_T$ : Stock price on the expiration date

r: Continuously compounded risk-free rate of interest

c: Value of European call option to buy one share

p: Value of European put option to sell one share

## 7.6 Upper Bounds for European Call and Put Options (No Dividends)

European call option gives the holder the right to buy one share of a stock for a certain price. No matter what happens, the option can never be worth more than the stock. Hence, the stock price is an upper bound to the option price:

$$C <= S_0$$

If these relationships were not true, an arbitrageur could easily make a riskless profit by buying the stock and selling the call option.

European put option gives the holder the right to sell one share of a stock for K. we know that at maturity the option cannot be worth more than K. It follows that it cannot be worth more than the present value of K today

$$p <= Ke^{-rT}$$

If this were not true, an arbitrageur could make a riskless profit by writing the option and investing the proceeds of the sale at the risk-free interest rate.

## 7.7 Lower Bounds for European Call Options (No Dividends)

A lower bound for the price of a European call option on a non-dividend-paying stock is $S_0 - Ke^{-rT}$

Suppose that

$c = 3$ $S_0 = 20$

$T = 1$ $r = 10\%$

$K = 18$ $D = 0$

Is there an arbitrage opportunity if call premium is 3? I mean does the call premium is too low i.e. lower than lower boundary?

Applying formula, $S_0 - Ke^{-rT}$ hence $20 - 18\,e^{-0.1} = 3.71$

The current premium of 3 is less than 3.71 hence it is showing arbitrage opportunity.

Buy the call and short the stock.

- Cash flow = 20 – 3 = 17.

Invest 17 @ 10% p.a.

- At end of T =1, this grows to $17e^{0.1} = 18.79$.

At end of T =1 if stock price is greater than 18, exercise the option & close the short position.

- Make profit of 18.79 – 18 = 0.79.

If stock price is less than 18, say 17, then buy the stock from open market & close the short position.

- Make profit of 18.79 – 17 = 1.79.

Hence, the call premium cannot be less than lower bound.

## 7.8 Lower Bounds for European Put Options (No Dividends)

A lower bound for the price of a European put option on a non-dividend-paying stock is $Ke^{-rT} - S_0$

Suppose that

$p = 1$ $S_0 = 37$

$T = 0.5$ $r = 5\%$

$K = 40$ $D = 0$

Is there an arbitrage opportunity if put premium is 1? I mean does the put premium is too low i.e. lower than lower boundary?

Applying formula, $Ke^{-rT} - S_0$ hence, $40e^{-0.05*0.5} - 37 = 2.01$

The current premium of 1 is less than 2.01 hence it is showing arbitrage opportunity.

Borrow 38 @ 5% p.a. for 0.5 years.

Buy one put and one stock.

After 0.5 years you have to pay:

- $38e^{0.05*0.05} = 38.96$

If stock price is below 40, exercise the option for 40 and repay the loan.

- Make profit of 40 – 38.96 = 1.04.

If stock price is above 40, say 41, discard the option sell the stock in open market for 41and repay the loan.

- Make profit of 41 – 38.96 = 2.04.

Hence, the put premium cannot be less that lower bound.

## 7.9 Put-Call Parity

We now derive an important relationship between the prices of European put and call options that have the same strike price and time to maturity. Consider the following two portfolios.

Consider the following 2 portfolios:

- Portfolio A: European call on a stock + PV of the strike price in cash
- Portfolio C: European put on the stock + the stock

Both are worth MAX($S_T$ , $K$ ) at the maturity of the options. They must therefore be worth the same today. This means that

$$c + Ke^{-rT} = p + S_0$$

If this were not the case, an arbitrageur could buy the less expensive portfolio and sell the more expensive one. Because the portfolios are guaranteed to cancel each other out at time T, this trading strategy would lock in an arbitrage profit equal to the difference in the values of the two portfolios. This relationship is known as put–call parity. It shows that the value of a European call with a certain exercise price and exercise date can be deduced from the value of a European put with the same exercise price and exercise date and vice versa.

To illustrate the arbitrage opportunities when put call parity equation does not hold, suppose that

| | |
|---|---|
| $p$ = 2.25 | c = 3 |
| $S_0$ = 31 | $K$ = 30 |
| $T$ = 3 months | $r$ = 10% |
| | $D$ = 0 |

Let us check for the arbitrage opportunity,

Buy the call & short the stock as well as the put.

- Cash inflow of - 3 + 2.25 + 31 = 30.25.

Invest 30.25 @ 10% p.a. for 3 months.

- This will grow to $30.25e^{0.1*0.25} = 31.02$.

If after expiration, stock price is above 30, exercise the call i.e. buy one share for 30 and close the short position.

- Make profit of 31.02 – 30 = 1.02.

If after expiration, stock price is below 30, counterparty will exercise the put and you will have to buy one share for 30 and close the short position.

- Again make profit of 31.02 – 30 = 1.02.

What is the message?

- Call price is too low relative to put price hence Put call parity does not hold.

## 7.10 Black-Scholes Model of Option Pricing

The Black-Scholes model estimates the theoretical value of options contract and it is currently used in market. It's a differential equation that's widely used to price options contracts. The Black-Scholes model requires five input variables: the strike price of an option, the current stock price, the time to expiration, the risk-free rate, and the volatility. The Black-Scholes model is usually accurate but it makes certain assumptions list below that can lead to predictions that deviate from real-world results.

- Markets are random because market movements can't be predicted.
- No dividends are paid out during the life of the option.
- The option is European and can only be exercised at expiration.
- The returns of the underlying asset are normally distributed.
- The risk-free rate and volatility of the underlying asset are known and constant.
- There are no transaction costs in buying the option.

The mathematics involved in the formula are complicated and can be intimidating but you don't have to know or even understand the math to use Black-Scholes modeling in your strategies. Options traders have access to a variety of online options calculators and many trading platforms boast robust options analysis tools that include indicators and spreadsheets that perform the calculations and output the options pricing values. The Black-Scholes call option formula is calculated by multiplying the stock price by the cumulative standard normal probability distribution function. The net present value (NPV) of the strike price multiplied by the cumulative standard normal distribution is then subtracted from the resulting value of the previous calculation.

$$c = S_0\ N(d_1) - K\ e^{-rT} N(d_2)$$

$$p = K\ e^{-rT}\ N(-d_2) - S_0\ N(-d_1)$$

$$\text{where} \quad d_1 = \frac{\ln(S_0 / K) + (r + \sigma^2 / 2)T}{\sigma\sqrt{T}}$$

$$d_2 = \frac{\ln(S_0 / K) + (r - \sigma^2 / 2)T}{\sigma\sqrt{T}} = d_1 - \sigma\sqrt{T}$$

$N(x)$ is the probability that a normally distributed variable with a mean of zero and a standard deviation of 1 is less than $x$.

Let us divide the model into two parts.

Part A $S[N(d_1)]$ is the expected benefit from acquiring the stock:

- $S$ is the current stock price and the discounted value of the expected stock price at any future point.
- $N(d_1)$ is a pseudo-probability.
  - It is the probability of the option being in the money at expiration, adjusted for the depth the option is in the money
- Part B $Ke^{-rt}[N(d_2)]$ is the present value of the exercise price on the expiration day:
- $N(d_2)$ is the actual probability the option will be in the money on expiration day

Let us understand the same with hypothetical data set

What is the price of a European call option on a non-dividend-paying stock when the stock price is 52, the strike price is 50, the risk-free interest rate is 12% per annum, the volatility is 30% per annum, and the time to maturity is 3 months?

$S_0$ - Stock price= 52,

X - Strike price= 50,

r - interest rate = 0.12,

T- Time to expiry = 0.25,

σ - Volatility= 0.30.

$d_1 = (\ln (52/50) + (0.12 + 0.3^2/2)0.25 ) / (0.30*0.25^{0.5} ) = 0.5365$

$d_2 = d_1 - 0.30*0.25^{0.5} = 0.3865$

Price of European Call is:

$52\ N(0.5365) - 50\ e^{-0.12*0.25}\ N(0.3865)$

$= 52 * 0.7042 - 50\ e^{-0.03} * 0.6504 =$ **5.06**

**Note:** $N(0.5365)$ and $N(0.3865)$ values are to be calculated from N(x) tables

## ❖ Exercise

1. What is a lower bound for the price of a 4-month call option on a non-dividend-paying stock when the stock price is INR28, the strike price is INR25, and the risk-free interest rate is 8% per annum?
2. What is a lower bound for the price of a 1-month European put option on a non-dividend-paying stock when the stock price is INR12, the strike price is INR15, and the risk-free interest rate is 6% per annum?
3. What is the price of a European put option on a non-dividend-paying stock when the stock price is 69, the strike price is 70, the risk-free interest rate is 5% per annum, the volatility is 35% per annum, and the time to maturity is 6 months?

# UNIT-8 OPTION TRADING STRATEGIES

**8.1 Introduction**

**8.2 Option Strategies**

**8.2.1 Covered Call Strategy**

**8.2.2 Long Straddle Strategy**

**8.2.3 Long Strangle Strategy**

**8.2.4 Long Call Strategy**

**8.2.5 Protective Calls**

**8.3 Levels of Trading**

❖ **Exercise**

## 8.1 Introduction

Understanding options trading strategies is essential for any options trader. This complex area of options trading offers a wide variety of strategies, each with unique characteristics and the potential for profit. These strategies involve combining multiple positions based on the same underlying security into one overall position, creating different types of options spreads. While straightforward strategies exist, many are complex and involve several components. Although detailed knowledge of every strategy is not necessary, familiarity with them increases the likelihood of consistent success and profitability.

In this section, detailed information is provided on commonly used options trading strategies along with advice on selecting a suitable strategy by considering relevant factors. The aim is to help you learn about various options trading strategies and how to choose the right one based on several factors. Before understanding this chapter, it is important to have a solid understanding of options trading, the functioning of the market, and its components which are provided in earlier chapters of the book. If you feel you lack the necessary knowledge, it's advisable to review some of the earlier content first. Due to the abundance of strategies, choosing the right strategy at the right time isn't always straightforward. However, the choices and timing ultimately determine your level of success. Successful options trading is not solely about forecasting the price movement of an underlying security and trading the relevant options accordingly. One's aim should be to maximize profits based on the capital you have to invest and the level of risk you are willing to take. To achieve this, it's essential to have a solid understanding of the different strategies and the factors to consider when deciding which ones to use and when.

Additionally, the bullish strategies are designed for generating profits when the price of an underlying security rises, while bearish strategies are utilized to profit from downward movements in price. Lastly, for traders wishing to capitalize in neutral or

volatile market conditions, specific strategies are available to address these specific trading environments.

## 8.2 OPTION STRATEGIES

8.2.1 Covered Call Strategy

8.2.2 Long Straddle Strategy

8.2.3 Long Strangle Strategy

8.2.4 Long Call Strategy

8.2.5 Protective Calls

### 8.2.1 Covered Call Strategy

The covered call strategy is a commonly used options strategy where an investor holds a long position in an asset and writes (sells) call options on that same asset in an attempt to generate income. This strategy is typically used when the investor has a neutral view on the asset and expects the price to remain stable for a short period.

- **Key Points:**
  I. Covered call is a neutral strategy suitable for beginners and involves a single transaction, which is writing call options.
  II. This strategy can be implemented with a low trading level and provides some protection if the price of the underlying asset falls.
- **When to use the Covered Call Strategy**:
  I. It is primarily used to profit when the owned stock remains neutral (neither goes up nor down in price).
  II. It can be used when you have a neutral outlook on your owned stock but prefer not to sell it.
  III. It can also help reduce losses if the stock price falls, although it's not as effective for significant price drops.
  IV. The protective put is a better choice for protection against a substantial fall in stock price.
- **Establishing the Covered Call**:

The covered call can be established by buying the stock and writing the options contracts. However, it's typically used when you already own the stock. To establish a covered call, you write enough calls to cover the shares you own. Typically, the calls

are written at a strike slightly higher than the current share price. - It's common to choose an expiration date that is close, usually the nearest month, to benefit from time decay and a shorter period for the stock to move in price.

**Example: (Note that hypothetical prices are used instead of real market data, and commission costs are disregarded for simplicity)**

- Let's say you own 100 shares of Company X stock at INR 50 (starting point), believe the price won't move, and out-of-the-money calls with a INR 52 strike are trading at INR 1. You can write one call options contract and receive a credit of INR 100.

❖ **Profit & Loss Potential**

- If the Company X stock is trading at INR 52 at expiration, the written options would expire worthless, resulting in a INR 100 profit.

- if the price drops to INR 49, the loss would be covered. However, if it falls below INR 49, there would be no additional returns from the options. It can be argued that these losses would be incurred simply by owning the shares anyway, and the covered call does provide something in return. Nevertheless, it's important to note that this may not be a suitable strategy if significant drops in the share value are expected.

- if the price increases above INR 52, the written calls could be assigned, and you would be obliged to sell the stock you own at the INR 52 strike price.

The strategy also returns a profit if the stock price remains the same or reach to a price which is lower than the strike of the written options. In both cases, the written calls would expire worthless, and you would keep the credit as profit.

The profit potential is summarized with several scenarios, including maximum profit, profit when the price of the underlying stock remains stable or increases, and the calculation of profit per share owned/option written. It's worth noting that some argue that any profit from an increase in the stock price would have been made even without the covered call strategy and should not be included in the profit calculations.

❖ **Potential Risks**

When using this strategy, there are two primary risks. First, it provides minimal protection in case the stock value decreases. Any losses resulting from a drop in the underlying stock's value will only be compensated by the credit received for writing the options.

In the example mentioned above, the second main risk is that no further profits can be made if the stock price rises above the options' strike price. In the example provided, although this would still result in a profit, it would have been higher if the stock had been held without applying the covered call. Therefore, this may not be the best strategy if there's an expectation of a significant increase in the stock price.

Nevertheless, the "buy to close" order can be used at any point if you anticipate a higher than expected increase in price.

❖ **Summary**

The covered call is a simple and effective strategy to apply if you own stock that you believe will remain relatively stable in price for a period. There are no significant costs associated with its implementation, and it allows you to generate returns if your stock price remains steady. The main drawbacks are that it can restrict potential profits if the price rises unexpectedly high and does not provide protection against a price decline.

### 8.2.2 Long Straddle Strategy

The long straddle strategy is also known as buy straddle. This is one of the simplest options spreads designed to profit from a volatile market. It can generate returns when a security's price makes significant moves in either direction, eliminating the need to predict the price movement.

It involves two transactions - purchasing call options and purchasing put options. This strategy is suitable for beginners as it's simple to comprehend, and losses are limited. This strategy requires low trading level.

**When to Apply a Long Straddle?**

The long straddle is perfect for volatile markets because it can potentially generate unlimited profits if a security's price makes a significant move. Therefore, it should be considered when expecting substantial price fluctuations in a security, without being certain of the direction. It's a low-risk strategy and straightforward, making it suitable for beginner traders without the need for a high trading level.

**How to Apply a Long Straddle?**

The long straddle strategy involves buying both a long call and a long put using at-the-money options contracts. This means purchasing at-the-money calls and an equal number of at-the-money puts, usually at the same time. Both sets of contracts should have the same expiration date to maximize the potential for profit from significant price movements.

Choosing a longer expiration date allows ample time for the security's price to move, increasing the potential for significant profits. A shorter expiration date means there's less time for significant price movement, but the options contracts are cheaper. This can allow for potential profit from smaller price movements. This is a debit spread, incurring an upfront cost. If exact at-the-money options are unavailable, the closest strike to the security's current trading price should be purchased.

**Example: (Note that hypothetical prices are used instead of real market data, and commission costs are disregarded for simplicity)**

a. Company X's stock is priced at INR 50, and there is an expectation of a significant price movement, but uncertainty about the direction.

b. At-the-money calls (strike INR 50) are priced at INR 2 (premium). A single contract (100 options) is purchased at a cost of INR 200. This represents **Transaction A.**

c. At-the-money puts (strike INR 50) are also priced at INR 2. Another contract is purchased for INR 200. This represents **Transaction B.**

d. The long straddle is established for a payment of INR 400.

❖ **Profit & Loss Potential**

One can achieve unlimited profits from each transaction of the long straddle if the underlying security's price (e.g., Company X stock) makes a significant move in either direction. The maximum loss is limited to the amount one spent on the options. The strategy will be profitable overall as long as one leg generates enough return to cover the cost of both options.

A stagnant price or very little movement will result in an overall loss for a long straddle strategy. However, the loss is limited to the total premium paid for the options, while the potential profits are unlimited. Here are the potential outcomes in different scenarios, along with formulas for calculating potential profits, losses, and break-even points:

- If the market price for Company X stock is INR 50 at expiration, both the call and put options will expire worthless. This would result in a total loss of the initial investment of INR 400.

- If the market price for Company X stock is INR 52 at expiration, the call options in transaction A will be worth INR 2 each (INR 200 total), while the put options in transaction B will expire worthless. The INR 200 value of the calls will partially offset the initial investment of INR 400, resulting in a total loss of INR 200.

- If the Company X stock is trading at INR 56 at expiration, the calls in transaction A will be worth INR 6 each (INR 600 total) while the puts in transaction B will expire worthless. The INR 600 value of the calls will cover the INR 400 initial investment, resulting in a INR 200 profit overall.

- If the Company X stock is trading at INR 47 at expiration, the calls in transaction A will expire worthless while the puts in transaction B will be worth INR 3 each (INR 300 total). The INR 300 value of the puts will partially offset the INR 400 initial investment, resulting in a total loss of INR 100.

- If the market price of Company X stock is INR 42 at expiration, the call options in transaction A will expire worthless, while the put options in transaction B will be worth around INR 8 each (INR 800 total). The INR 800 value of the puts will cover the initial investment of INR 400, resulting in an overall profit of INR 400. The maximum profit potential remains unlimited.

Profit is made when the Price of Underlying asset is greater than (Strike of transaction A + Price of Each Option in transaction A + Price of Each Option in transaction B), or when the Price of Underlying asset is less than (Strike of transaction B – (Price of Each Option in transaction A + Price of Each Option in transaction B)).

❖ **Break Even Point**

There is an upper break-even point and a lower break-even point.

- The Upper Break-Even Point is equal to (Strike of transaction A + Price of Each Option in transaction A + Price of Each Option in transaction B)

- The Lower Break-Even Point is (Strike of transaction B – (Price of Each Option in transaction A + Price of Each Option in transaction B)).

The long straddle will result in a loss if the Price of Underlying Asset is less than the Upper Break-Even Point and greater than the Lower Break-Even Point. The maximum loss is limited to the initial net debit.

You have the option to close the long straddle position early at any time by selling the options, without waiting until the expiration. If it looks like the security's price will not move significantly in either direction, you can close the position early to limit losses and recover any remaining extrinsic value and intrinsic value in the options. Additionally, if the position is profitable, you can close it early to lock in those profits.

❖ **Summary**

The long straddle is a suitable strategy when expecting a significant price movement in a security, but uncertain about the direction. This is one of the simplest options trading strategies, with relatively easy-to-understand calculations. It has few disadvantages and offers unlimited profit potential with limited losses.

### 8.2.3 Long Strangle Strategy

The long strangle is also known as Buy Strangle. It is a simple options trading strategy used to potentially profit from a volatile market outlook. It offers potential profits regardless of the direction of the security's price movement, provided that the movement is significant. This popular strategy is known for its simplicity and relatively low upfront cost.

The long strangle involves two transactions—buying calls and buying puts—making it easy to understand with low commission costs. This makes it an attractive strategy for beginner traders without requiring high level of trading.

**When to Use a Long Strangle:**

The long strangle is a strategy designed for volatile markets, aiming to profit from significant price movements in either direction. It involves buying out-of-the-money call and put options with the same expiration date but different strike prices. This setup allows you to benefit from large price swings, whether the stock goes up or down. It is best used when anticipating a significant price movement in a security but uncertain about the direction. This strategy has limited risk, is easy to understand, and requires a low trading level, making it ideal for traders of all experience levels.

When considering the long strangle strategy, it is important to select the appropriate out-of-the-money contracts, typically best if they are just out of the money. It is crucial to ensure that the strike prices for the two transactions are equally distanced from the current trading price of the underlying security. This balance helps maximize the potential for profit from significant price movements in either direction. Since the long strangle is a debit spread, there's an initial cost involved. You can reduce the cost by purchasing contracts with a shorter expiration period, but this also limits the time for the underlying security's price to move. On the other hand, buying contracts with a longer expiration period will be slightly more expensive, yet it provides a better opportunity for profitability.

**Example: (Note that hypothetical prices are used instead of real market data, and commission costs are disregarded for simplicity)**

a. Company X share is currently priced at INR 50, and you anticipate a significant price movement, without being sure of the direction.
b. You purchase 1 contract of out-of-the-money calls (strike INR 51) for INR 1.50 each, totaling INR 150. This becomes **Transaction A**. - Additionally, you purchase 1 contract of out-of-the-money puts (strike INR 49) for INR 1.50 each, another INR 150, and this is **Transaction B**.
c. This creates a long strangle for a payment of INR 300.

❖ **Profit & Loss Potential:**

The long strangle has the potential to yield unlimited profits if the price of the underlying security experiences a substantial movement in either direction. Following a significant movement, one of the transaction will result in a substantial profit, while the other transaction will only cost you the amount spent on the options. As long as the profits from one transaction surpass the loss from the other, the spread will generate an overall profit. If the underlying security does not experience a price movement, or only moves minimally, it will result in a loss.

Potential outcomes are outlined for Company X stock's price at expiration, including corresponding formulas.

- If the price of Company X shares remains at INR 50 at expiration, both the call and put options will expire worthless. This will result in a loss of your initial investment of INR 300.

- If the price of Company X shares is INR 52 at expiration, the call options in transaction A will be worth INR 1 each (INR 100 total), while the put options in transaction B will expire worthless. The INR 100 value of the calls will partially offset your initial investment of INR 300, resulting in a total loss of INR 200.

- If the price of Company X shares is INR 56 at expiration, the call options in transaction A will be worth INR 5 each (INR 500 total), while the put options in transaction B will expire worthless. The INR 500 value of the calls will cover your initial investment of INR 300, resulting in an overall profit of INR 200.

- If the price of Company X share is at INR 47 at expiration, then the calls in transaction A will expire worthless while the puts in transaction B will be worth INR 2 each (INR 200 total). The INR 200 value of the puts will partially offset the INR 300 initial investment and you will lose a total of INR 100.

- If the price of Company X share is at INR 42 at expiration, then the calls in transaction A will expire worthless while the puts in transaction B will be around INR 7 each (INR 700 total). The INR 700 value of the puts will cover the INR 300 initial investment and return a INR 400 profit overall.

❖ **Break Even Point**

- Upper Break-Even Point = Strike of transaction A + Price of Each Option in transaction A + Price of Each Option in transaction B)

- Lower Break-Even Point = Strike of transaction B – (Price of Each Option in transaction A + Price of Each Option in transaction B)

❖ **Summary**

In sum, the long strangle is a simple strategy offering the potential to benefit from significant price movements in either direction. With relatively low commissions and straightforward calculations, it presents unlimited profit potential while capping losses. This makes it a strategy that could be used by novice traders.

### 8.2.4 Long Call Strategy

The long call strategy, also referred to as buying call options, is a simple yet versatile options trading strategy involving a single transaction. It is well suited for both beginners and experienced traders and enables the potential for unlimited profits through leverage while constraining potential losses. This strategy is particularly favorable for a bullish market outlook and entails an upfront cost in the form of a net debit. It is well-suited for low trading levels and is typically employed when

anticipating a substantial increase in the price of an asset with options contracts, although it can also be utilized for other purposes.

This approach offers numerous benefits and relatively few drawbacks. Arguably the most significant advantage is the ability to earn profit from an increase in the price of the underlying security while limiting losses if it falls. The use of calls also provides inherent leverage, allowing for profits comparable to owning the underlying security without requiring as much capital investment.

It is an ideal strategy for traders with limited funds or, alternatively, for those with substantial capital seeking potentially higher returns than direct investment in the underlying security. Simplicity is a major advantage, especially for beginners. It is easier to calculate potential profits compared to more complex strategies, and there are fewer transactions, resulting in lower commission costs. There is no margin required, and the maximum loss is known from the start. The strategy can also be easily modified into an alternative one should the outlook change.

The main disadvantage is the lack of protection against a decrease in the value of the underlying stock. There is a risk of losing the entire investment in the strategy if the calls expire out of the money. Additionally, the strategy is exposed to the negative effects of time decay on the extrinsic value of calls as time passes.

### ❖ When to Use the Long Call

The long call trading strategy is primarily employed when an individual anticipates a bullish market, signaling an expected increase in a security's value, especially over a short period. Nevertheless, it can also be beneficial even if the security is projected to rise more gradually, despite the impact of time decay. There are multiple rationales for opting for the long call strategy. It boasts straightforwardness, offering uncomplicated calculations, and serves as a leveraged alternative to direct asset investment, potentially yielding greater returns. Moreover, the downside risk is confined, and the strategy allows for flexibility in choosing the risk-to-reward ratio by selecting the strike price of the options contracts.

### ❖ How to Use the Long Call?

The strategy involves a singular transaction, wherein calls on the anticipated security are procured using the buy to open order. There is the option to choose between American style or European style contracts, taking into account the differences in flexibility and cost. Other considerations include selecting the expiration date and strike price. Short-term contracts are suitable for rapidly rising securities, while longer-term contracts may be necessary for securities expected to take longer to ascend. The long call strategy reaps profits when the value of the underlying security increases. This profit can be realized by selling the calls at a higher price or by exercising them to acquire the underlying security at the strike price and profiting from selling it at the current trading price. Although selling the calls is the more common choice, there are circumstances where acquiring the underlying security may be advantageous. The maximum loss of this strategy is constrained to the net debit paid during its

implementation, which results in contracts expiring worthless if the underlying security fails to exceed the strike price.

**Example: (Note that hypothetical prices are used instead of real market data, and commission costs are disregarded for simplicity)**

a. Company X stock is priced at INR 50, and you anticipate its appreciation in value.

b. At-the-money calls on Company X stock (strike price INR 50) are trading at INR 2.

c. You acquire 1 call contract (each covering 100 options) for an investment of INR 200.

❖ **Profit & Loss Potential**

- If Company X stock rises to INR 52 at expiration. Your contracts will be worth approximately what you paid for them, resulting in a breakeven at expiry. You could exercise them to purchase 100 shares at INR 50 each and sell them for a profit, hold onto them if you anticipate further price increases, or sell the contracts just before expiration.

- If Company X stock rises to INR 55 at expiration. Your contracts will be valued at around INR 500, leading to a profit of approximately INR 300 when considering your initial investment of INR 200. You could choose to exercise or sell them before expiration for a profit.

- If Company X stock falls or does not increase by expiration. Your contracts would expire worthless, resulting in the loss of your initial investment which is INR 200.

Keep in mind that you are not obligated to hold your options until expiration. Their value will increase as the price of Company X stock rises, allowing you to sell them for a profit at any time if you wish. Similarly, if the price of Company X stock is falling or stable, you could sell them to recoup any remaining extrinsic value and minimize potential losses.

❖ **Break-Even Calculation**

- Break-even point is when "Price of Underlying Security = (Strike Price + Price of Option)"

❖ **Summary**

This straightforward strategy is ideal for expecting a significant and rapid increase in the price of a security. It is simple and well-suited for beginners, serving as an entry point for options trading. The potential profits are theoretically unlimited,

while the potential losses are limited to the amount invested in the calls during the trade.

### 8.2.5 Protective Calls

Protective calls is an essential options trading strategy that plays a vital role in managing and preserving profits from holding short stock position. This strategy come into play when an existing stock position has yielded a profit, and there is a desire to keep the position open without realizing the profit immediately, while also seeking protection against the position reversing. To elaborate, a protective call is employed in the opposite scenario, offering a way to maintain a short position in a stock that has decreased in value, while safeguarding against the potential for it to increase in value again. A more comprehensive understanding of this strategy can be gained by delving into the reasons for using it with advantages and disadvantages, as well as the best practices for their implementation. This strategy is essentially hedging tools commonly adopted by stock traders who are keen on safeguarding profits from a possible position reversal without closing the position.

This strategy offers the advantage of keeping a profitable position open for the possibility of further gains while ensuring that the existing profits are not lost. However, a key disadvantage is the cost associated with implementing these strategies, which can impact the overall profit margin. Moreover, an often overlooked advantage of these strategies is their potential to be converted into a synthetic straddle in times of market volatility, offering traders a versatile option. For those using a protective call, purchasing call options with a few months until expiration and a strike price equal to the current trading price of the stock, via a buy to open order, can effectively protect an open short stock position in profit. In essence, protective calls is not speculative tool but rather serve as effective hedging mechanisms, demonstrating the versatility of options contracts. Without options, a stock trader seeking to protect profits from an open position would likely have to close that position, risking potential missed profits if the stock were to continue moving favorably.

The protective call is useful when the trader holds a short stock position where the stock has fallen in value and wants to protect against the stock rising up again.

**Example: (Note that hypothetical prices are used instead of real market data, and commission costs are disregarded for simplicity)**

a. You short sell 100 shares of Company X at INR 100, Transaction A

b. To cover the above position, you buy a call option with a strike price of INR 105, expiring in one month, at a premium of INR 3 per share, Transaction B

❖ **Profit & Loss Potential**

- If company's stock prices decrease to INR 90**,** You can buy back the shares at INR 90, making a INR 10 per share profit on your short position. The call option expires worthless, so your total profit is INR 7 per share (INR 10 gain - INR 3 premium) INR 700 in total.

- If company's stock prices increase to INR 110, You are obligated to buy back the shares at the current market price of INR 110. You exercise the call option, allowing you to buy the stock at INR 105 instead of INR 110. Your loss is limited to INR 8 per share (INR 5 loss on the stock plus the INR 3 premium) INR 800 on total.

The above strategy is designed to limit the risk of an adverse move in a short position. The maximum loss is limited to the difference between the short sale price and the strike price of the call, plus the premium paid for the call option. It also allows for profit if the stock price declines, minus the cost of the call option premium. However, the potential profit is reduced by the premium paid.

## 8.3 Levels of Trading

Option trading from your d-mat account is not as simple as one trades in cash and future market. It is not up to the investor to make whatever trades he/she wants but up to the brokers as they are responsible for the risks involved. Hence, there are different trading levels which are helpful to brokers to control the level of risks associated with option strategies. The more complex strategies with unlimited risks, higher the trading level is allowed to investors. The level of trading is not only upgraded with the complexity of the strategy but also with the amount of starting capital and the age of trading by an investor in the option market.

Trading levels, also known as approval levels, serve as a protective measure for both brokers and their customers. Regulated options brokers have a responsibility to act in the best interests of their clients. This includes ensuring that customers only engage in trading activities that align with their experience and financial capacity.

Investors and traders sometimes adopt high-risk strategies without fully understanding the risks or having the necessary capital. If these strategies fail, brokers could be held liable. To mitigate this risk, brokers evaluate their customers and assign them appropriate trading levels. This assessment ensures that customers can only execute transactions that match their experience and funding levels. By doing so, both the customer and the broker are shielded from excessive risk exposure.

There are four option trading which are explained as below.

### 8.3.1 Level 1 Options Trading

The first level of options trading primarily involves selling option premiums on existing shares, such as trading covered calls. This level is typically suited for those with limited experience in options trading with limited capital.

❖ **Key Characteristics:**

a. **Limited Risk:** The risks are minimized because the options are hedged with shares. The main concern is if the short options enter in-the-money by the expiration date, leading to the shares being called from the options writer.

b. **Income Generation:** The strategies within Level 1 are designed for investors aiming to generate income by selling options on their open positions. While

this can cap the upside potential of a stock trade, it allows for profit generation if the options do not go in-the-money before expiration.

This level of trading includes the Strategies like Buy-Writes, Unwinds, Covered Calls, Covered Puts, Call Options. These strategies are the simplest forms of options trading and carry the lowest risk. For example, a contract might grant the right to sell your stock at a predetermined strike price.

### 8.3.2 Level 2 Options Trading

Level 2 options trading involves buying option contracts that limit the risk to the price paid for the contract. This level is characterized by its ability to cap the risk of a trade.

❖ **Key Characteristics:**

a. **Risk Limitation:** The primary feature of Level 2 is that it limits the risk of a trade. The worst-case scenario is losing the cost of the contract, which is predetermined when the trader enters the contract. Options at this level can expire worthless, making them an all-or-nothing situation.

b. **Trader Responsibility**: All the risk is borne by the options trader, especially in long option positions.

Many individuals start at this level due to its simplicity and low barriers to entry. Traders can engage in directional speculation with call or put options, with losses limited to the capital invested in the options. This level of trading includes the Strategies like Long Puts, Long Calls, Long Straddles, Long Strangles

### 8.3.3 Level 3 Options Trading

The next level of options trading encompasses all the strategies from Levels 1 and 2, with the added capability of trading debit spreads. This allows investors to engage in more complex strategies involving multiple leg options, such as long strangles and long straddles.

❖ **Key Characteristics:**

**a. Complex Strategies:** Debit spreads involve both short and long options, enabling more sophisticated trading strategies.

**b. Risk Limitation:** The risk is confined to the capital invested in the spread. However, Level 3 trading requires sufficient capital for margin accounts and option hedges.

Unlike Levels 1 and 2, Level 3 options trading has higher entry barriers due to the need for more capital and the complexity of the strategies involved. Third level includes the Strategies like Iron Butterflies, Iron Condors, Ratio Spreads, Option Spreads.

### 8.3.4 Level 4 Options Trading

Level 4, also known for buying and writing naked options, represents the highest level of options trading. This level involves the highest risk among all options trading levels, exposing both option traders and brokers to significant risk.

❖ **Key Characteristics:**

a. **High Risk, High Reward:** While Level 4 options trading carries the highest risk, it also offers the potential for the highest returns. Traders can sell option contracts short without hedging, which can lead to unlimited losses if the underlying stock moves against the option writer.

b. **Elevated Risk Exposure:** Both parties, the option traders and the brokers, face elevated levels of risk.

This level includes the Strategies like Uncovered Calls, Uncovered Puts, Short Straddles, Short Strangles, Naked Calls

**Increasing Your Trading Level with Your Broker**

There is no guaranteed method to secure an increased trading level with your broker. While some brokers may periodically review accounts and automatically upgrade them if deemed appropriate, this is relatively rare. Typically, you would need to contact your broker directly to request an upgrade. The decision to upgrade your trading level is entirely at the discretion of the brokerage firm.

Having a solid trading history and a reasonable amount of funds in your account can improve your chances of being upgraded. However, it ultimately depends on the broker's assessment of your trading experience and financial situation.

## ❖ Exercise

### ✓ Theoretical questions

1. Explain the applicability of Covered Call Strategy with example
2. When to use and how to use the Long Straddle Strategy?
3. Discuss Long Strangle Strategy with example
4. Write a note on: Long Call Strategy
5. Protective Calls is used to protect against the stock rising up again – briefly explain
6. Write about different levels of trading in detail
7. Difference between level 1 and level 4 trading

### ✓ MCQs

1. What is a covered call?

   A. A call option purchased by an investor holding the underlying asset
   B. A call option covered by government protection
   C. A call option that guarantees a profit
   **D. A call option sold by an investor holding the underlying asset**

2. Which of the following investment strategies has unlimited profit potential?

   A. Writing a call
   B. Bull spread
   **C. Covered Call**
   D. Long Call

3. The _____strategy is designed to limit the risk of an adverse move in a short position

A. Covered Call
B. Long Call
**C. Protective Calls**
D. None of the above

4. Breakeven point in Long call strategy is _____

A. Price of Underlying Security = (Strike Price - Price of Option)

B. **Price of Underlying Security = (Strike Price + Price of Option)**

C. Price of Underlying Security = (Strike Price - Price of Option)

D. None of the above

5. Long Straddle strategy involves _____ transaction

A. 1
B. **2**
C. 3
D. 4

6. Long strangle is also known as _____

A. Put Strangle
B. Buy Call
C. Sell put
**D. Buy strangle**

7. Which level of trading involves highest risk?

A. Level 1
B. Level 3
**C. Level 4**
D. Level 2

8. It is up to investor to determine the trading level in option market.

A. True
**B. False**

9. Trading Level 1 is allocated to _____

A. Beginners
B. Having less capital
C. Less knowledgeable about options
**D. All of the above**

10. The long straddle combines the long call and long put by using _____options contracts

**A. At-the-money**
B. Out of the money
C. Call money
D. All of the above

✓ **Terminologies**

1. **Call**
   An option contract that gives the buyer the right to buy the underlying assets at a specified price for a certain fixed period of time.

2. **At – the – money (ATM)**
   When the strike price is equal to the market price of underlying asset, an option is known as at the money.

3. **In – the - money (ITM)**
   A. When the strike price is less than the market price of underlying asset, an option is known as in the money for call option.

   B. When the strike price is greater than the market price of underlying asset, an option is known as in the money for put option.

4. **Out – of - the - money (OTM)**

   A. When the strike price is greater than the market price of underlying asset, an option is known as in the money for call option.
   B. When the strike price is less than the market price of underlying asset, an option is known as in the money for put option.

5. **Premium**

   The price that a buyer of call/put option has to pay to seller of the option for an option contract.

6. **Strike Price/ Exercise price**

   The price at which the buyer and seller is entering in the contract.

7. **Volatility**

   The fluctuation in the market price of underlying asset.

8. **Long Position**

   A person creates a position in option market wherein he/she is buyer of the specified contract.

# UNIT-9 INTERNEST RATE FUTURES

**9.1 Introduction**

**9.2 How does interest rate affect futures?**

**9.3 Features of interest rate futures**

**9.4 Types of interest futures**

**9.5 Advantages & Limitations of Interest Rate Futures**

**9.6 Keywords**

❖ **Exercise**

## 9.1 Introduction

An interest rate is the percentage charged by lenders to borrowers for using money or the percentage earned by savers on their deposits. It is usually expressed as an annual percentage of the principal amount.

❖ **Types of Interest Rates:**

1. Nominal Interest Rate: The stated rate that does not account for inflation.
2. Real Interest Rate: The rate adjusted for inflation, reflecting actual purchasing power: Real Interest Rate = Nominal Interest Rate − Inflation Rate\text {Real Interest Rate} = \text{Nominal Interest Rate} - \text{Inflation Rate} Real Interest Rate = Nominal Interest Rate − Inflation Rate
3. Fixed Interest Rate: Remains constant throughout the loan or investment term.
4. Variable Interest Rate: Fluctuates based on benchmarks or market conditions (e.g., LIBOR, SOFR).

❖ **Role of Interest Rates:**

- Borrowing Costs: Determines the cost of loans or mortgages.
- Investment Returns: Influences returns on bonds or savings.
- Monetary Policy: Central banks adjust rates to control inflation and economic growth.

❖ **Interest Rate Futures**

An **interest rate future** is a standardized financial derivative contract where two parties agree to buy or sell a debt instrument at a predetermined price on a specified future date. These contracts are primarily used to hedge against or speculate on changes in interest rates. The underlying assets in such contracts are usually government securities, such as treasury bills, bonds, or interbank deposit rates (e.g., Eurodollar).

The **price of an interest rate future** is inversely related to interest rate movements. When interest rates rise, the price of the futures contract falls, and vice versa. This inverse relationship allows market participants to manage the risk of interest rate fluctuations. For example, if a company expects interest rates to rise, it can sell interest rate futures to offset potential increases in borrowing costs.

For instance, A trader predicts interest rates will rise. They sell an interest rate futures contract, expecting its price to drop. If rates rise as expected, the futures' price falls, allowing the trader to profit by selling high and buying back low. These are mainly used by/in:

1. **Hedging**:
    - Companies can use futures to safeguard against rising interest rates on loans.
    - Bondholders can protect against losses when rates increase and bond prices fall.
2. **Speculation**: Traders can predict and profit from changes in interest rate movements.

❖ **Key Features:**

1. **Standardization**: These contracts are traded on exchanges with fixed contract sizes, expiration dates, and specifications.
2. **Leverage**: Futures require only a margin deposit, offering exposure to larger contract values.
3. **Mark-to-Market**: Gains or losses are settled daily.

## 9.2 How Does Interest Rate Affects Futures?

Interest rates have a significant impact on the pricing and behavior of futures contracts, particularly interest rate futures. The relationship between interest rates and futures is a critical tool for both hedging and speculation, with futures prices serving as a barometer for expected interest rate movements. Interest rates have an **inverse relationship** with the price of interest rate futures. In simple terms, when interest rates rise, the price of an interest rate future typically falls, and when interest rates fall, the price of the future generally rises.

❖ **Why this Happens:**

Interest rate futures are essentially contracts predicting future interest rates. The market expects that, as rates move, the underlying debt instruments (like bonds) will either gain or lose value. Futures traders base their strategies on those expected changes, making interest rate futures an important tool for hedging or speculating on future interest rate movements. Here's how they affect futures:

❖ **Inverse Relationship**:

- Interest Rate Futures: The price of an interest rate future moves inversely to changes in interest rates. This means that when interest rates rise, the price

of interest rate futures falls, and when interest rates fall, the price of these futures rises.

- This inverse relationship exists because futures contracts are based on underlying debt instruments (such as bonds or treasury bills). As interest rates increase, the value of these instruments decreases (because future payments are worth less in present value terms). Therefore, futures prices decline as rates go up and increase when rates go down.

**Example**:

- If a trader anticipates that interest rates will rise, they may sell an interest rate futures contract to lock in current prices before rates increase. When interest rates do rise, the value of the futures contract drops, and the trader can buy back the contract at a lower price, realizing a profit.

- Conversely, if a trader expects interest rates to decrease, they might buy futures contracts, expecting the price of the underlying debt instruments to increase as rates fall.

**Impact on Hedging**:

- Hedgers (e.g., banks, corporations, or investors) use interest rate futures to manage exposure to interest rate fluctuations. If they expect interest rates to rise, they may sell futures to hedge against potential increases in borrowing costs or falling bond prices.

- Conversely, if they expect interest rates to fall, they may buy futures to hedge against future gains in bond prices.

**Market Sentiment**:

- Interest rate futures are also used to gauge market sentiment about future rate changes. Futures prices reflect the expectations of market participants about the direction of interest rates, as influenced by economic conditions, central bank policies, and inflation expectations.

**Example:**

<u>Scenario: Rising Interest Rates</u>

**Initial Situation:**

- The current interest rate is 6%.

- The futures price for a 10-year GOI bond is ₹1,00,000.

- A trader expects the Reserve Bank of India (RBI) to increase the repo rate to 6.5%, causing bond prices to fall.

- The trader sells one interest rate futures contract at ₹1,00,000 (takes a short position).

**What Happens:**

- After an RBI policy meeting, the repo rate increases to 6.5%.

- New GOI bonds are issued at a higher interest rate, making the existing bonds with lower yields less attractive.
- As a result, the price of the underlying 10-year bond falls.
- The futures price also falls, say, to ₹98,000.

**Profit Calculation:**

- Futures Sell Price (Short Position): ₹1,00,000
- Futures Buy Price (to close position): ₹98,000
- Profit: ₹1,00,000 - ₹98,000 = ₹2,000

Scenario: Falling Interest Rates

**Initial Situation:**

- Current interest rate: 6%.
- Futures price: ₹1,00,000.
- A trader expects the RBI to reduce the repo rate to 5.5%, which would make bonds more attractive.
- The trader buys one interest rate futures contract at ₹1,00,000 (takes a long position).

**What Happens:**

- The RBI reduces the repo rate to 5.5%.
- Lower interest rates make older bonds with higher yields more attractive.
- The price of the underlying bond increases, and the futures price rises to ₹1,02,000.

**Profit Calculation:**

- Futures Buy Price (Long Position): ₹1,00,000
- Futures Sell Price (to close position): ₹1,02,000
- Profit: ₹1,02,000 - ₹1,00,000 = ₹2,000

## 9.3 Features Of Interest Rate Futures

Following features make interest rate futures a valuable tool for risk management, hedging, and speculation in financial markets, particularly in countries like India where interest rates can fluctuate based on the decisions of the Reserve Bank of India (RBI).

### 1. Standardized Contracts

Interest rate futures are standardized contracts traded on exchanges (such as the National Stock Exchange of India (NSE) or Multi Commodity Exchange

(MCX)). The contract terms, including size, maturity, and settlement process, are set by the exchange, ensuring uniformity across all contracts.

**2. Underlying Asset**

The underlying asset for interest rate futures is typically a debt instrument (e.g., government bonds, treasury bills, or interbank lending rates). In India, the underlying asset could be Government of India (GOI) bonds or short-term instruments like Treasury Bills.

**3. Inverse Relationship with Interest Rates**

Interest rate futures have an inverse relationship with interest rates:

- When interest rates rise, the price of the futures contract falls.
- When interest rates fall, the price of the futures contract rises. This relationship reflects how bond prices react to interest rate changes.

**4. Settlement**

Interest rate futures can be settled either through:

- Cash settlement: No physical delivery of the underlying asset. Instead, the contract is settled by paying the difference between the contract price and the market price at maturity.
- Physical delivery (less common for interest rate futures): Involves delivery of the actual bonds, but this is rare in most markets for interest rate futures.

**5. Leverage**

Futures contracts require only a small margin deposit (typically a percentage of the total contract value), which gives traders leverage. This allows traders to control a large contract value with a smaller upfront investment, amplifying both potential gains and losses.

**6. Mark-to-Market**

Interest rate futures are subject to mark-to-market daily. This means the value of the contract is adjusted to reflect the latest market prices, and gains or losses are settled at the end of each trading day. Traders may need to deposit additional funds (called margin calls) if the market moves against them.

**7. Contract Size**

Each interest rate futures contract represents a specified amount of the underlying asset. For instance, in the case of Indian Government Bonds, each contract might represent a notional value of ₹1,00,000 or a standard bond size.

**8. Expiration Dates**

Interest rate futures have a fixed expiration date. The contracts may be available for different time frames, such as one month, three months, or a year. Traders must either settle or roll over their position before the contract expires.

**9. Hedging and Speculation**

- Hedging: Investors or companies use interest rate futures to protect against interest rate movements that could affect their portfolio or liabilities (e.g., companies with floating-rate loans).
- Speculation: Traders can use interest rate futures to profit from their predictions of future interest rate movements.

**10. Liquidity**

Interest rate futures tend to be highly liquid, especially those tied to government securities or widely traded benchmarks (like the Indian 10-year bond or Eurodollar futures). This ensures ease of entry and exit from positions.

**11. Risk and Reward**

Interest rate futures carry substantial market risk because of their leverage and the sensitivity of bond prices to interest rate movements. However, they can be highly rewarding for those who accurately predict the direction of interest rates.

## 9.4 Types Of Interest Rate Futures

Interest rate futures come in various types based on the underlying assets or benchmarks they track. Below is a detailed discussion of the common types of interest rate futures, along with examples relevant to India and globally.

**1. Short-Term Interest Rate Futures (STIRs)**

These futures contracts are based on short-term interest rates or instruments maturing within a year.

- Underlying Asset: Short-term instruments like Treasury bills, interbank lending rates (e.g., LIBOR, SOFR), or short-term government securities.
- Purpose: Hedging or speculating on short-term rate movements.
- Example:
    - Global: Eurodollar futures (based on 3-month USD LIBOR).
    - India: Futures on 91-day Treasury Bills traded on the NSE.
        - Suppose an investor anticipates the 91-day T-Bill yield to increase. They short a T-Bill futures contract to profit from a rise in interest rates (since the price of the T-Bill futures will fall).

**2. Long-Term Interest Rate Futures (LTIRs)**

These contracts are based on long-term interest rates, typically linked to government bonds with maturities of 10 years or more.

- Underlying Asset: Long-term government securities (e.g., 10-year bonds).
- Purpose: Used to hedge or speculate on long-term interest rate movements.

- Example:
    - India: Futures on the 10-Year Government of India Bond.
        - An institutional investor holding a portfolio of long-term bonds may use these futures to hedge against rising interest rates. If the RBI hikes rates, bond prices fall, but gains from the futures' short position will offset losses.

**3. Eurodollar Futures**

These are futures contracts based on the 3-month Eurodollar deposit rate, which reflects USD interest rates in the international market.

- Underlying Asset: Eurodollar deposits (USD deposits held in foreign banks).
- Purpose: Commonly used to manage exposure to USD interest rate changes.
- Example:
    - A U.S.-based financial institution uses Eurodollar futures to hedge against rising USD borrowing costs.

**4. Treasury Bond Futures**

These futures are tied to the price of long-term government bonds (often 20 or 30 years).

- Underlying Asset: Long-term Treasury bonds.
- Purpose: Popular among investors and traders looking to manage exposure to long-term debt prices.
- Example:
    - Global: U.S. Treasury bond futures on the Chicago Mercantile Exchange (CME).
        - A trader expecting U.S. Treasury bond prices to drop due to rising interest rates can sell Treasury bond futures to profit from the decline.

**5. Federal Funds Futures**

These contracts track the Federal Reserve's overnight federal funds rate, which influences short-term borrowing costs in the U.S.

- Underlying Asset: Effective federal funds rate.
- Purpose: Used to predict and hedge against changes in U.S. monetary policy.
- Example:
    - A trader speculating that the Fed will raise rates in its next meeting can take a short position in federal funds futures to profit if rates rise.

**6. Repo Rate Futures (India-Specific)**

These futures are based on the Reserve Bank of India's repo rate, which is the rate at which banks borrow short-term funds from the RBI.

- Underlying Asset: RBI repo rate.
- Purpose: Allows banks and financial institutions to hedge against changes in the repo rate, which directly affects borrowing costs.
- Example:
    - A bank expects the RBI to hike the repo rate in the next policy review. It sells repo rate futures to offset the increased cost of borrowing.

**7. OIS (Overnight Index Swap) Futures**

These futures are based on overnight interest rate swaps, commonly used to hedge short-term interest rate risk.

- Underlying Asset: OIS rates.
- Purpose: Banks and financial institutions use OIS futures to manage funding costs.
- Example:
    - In India, OIS futures may be used to hedge against changes in the overnight MIBOR (Mumbai Interbank Offer Rate).

## 9.5 Advantages & Limitations of Interest Rate Futures

**Merits of Interest Rate Futures:**

1. **Hedging Against Interest Rate Risk:**

   Interest rate futures provide an effective tool for hedging against the risk of interest rate fluctuations, allowing businesses, investors, and institutions to protect their portfolios or liabilities from adverse changes in rates. Example: A company with a floating-rate loan can sell interest rate futures to lock in current interest rates and mitigate the risk of future rate increases.

2. **Leverage:**

   Futures contracts allow traders to control a larger position with a smaller margin deposit. This offers the potential for higher returns with relatively lower upfront capital. Example: A trader can take a position in interest rate futures with a fraction of the contract's total value, potentially multiplying gains from small price movements.

3. **Liquidity:**

   Interest rate futures, especially those tied to major government bonds or short-term instruments, are highly liquid, meaning they can be easily

bought or sold in the market without significant price impact. Example: Futures based on U.S. Treasury bonds or Indian 10-year GOI bonds are actively traded, providing ample opportunities for entry and exit.

4. **Transparency and Standardization:**

   Interest rate futures are traded on regulated exchanges (like the NSE or MCX in India), ensuring standardized contracts with transparent pricing, reducing counterparty risk. Example: Standardized terms (contract size, expiration, etc.) allow participants to trade with confidence in the fair pricing of the instruments.

5. **Risk Management for Financial Institutions:**

   Banks and other financial institutions can use interest rate futures to manage their balance sheet exposure to fluctuating interest rates, ensuring stability in cash flows. Example: A bank expecting the RBI to raise interest rates can use interest rate futures to offset potential declines in the value of its bond portfolio.

❖ **Demerits of Interest Rate Futures:**

1. **Potential for High Losses (Leverage Risk):**

   While leverage can amplify profits, it can also increase potential losses if the market moves against a position. Traders can lose more than their initial margin if they are not careful. Example: A trader using leverage to buy long futures contracts expecting falling rates could face substantial losses if rates rise instead.

2. **Complexity and Understanding:**

   Interest rate futures require a deep understanding of how interest rates affect bond prices and the futures market. Inexperienced traders may find it difficult to predict price movements and may take incorrect positions. Example: A new investor might mistake the relationship between futures prices and interest rate movements, resulting in losses from misjudging market trends.

3. **Daily Mark-to-Market Requirements:**

   Interest rate futures are subject to daily mark-to-market and margin calls. If a trader's position goes against them, they may be required to deposit additional funds (margin calls), which can create cash flow issues. Example: A trader holding long futures contracts might face margin calls if interest rates rise unexpectedly, forcing them to deposit additional funds or close their position at a loss.

4. **Limited Profit Potential (for Hedgers):**

   While interest rate futures are great for hedging, they may limit the profit potential for the hedger. If the market moves in the favor of the hedger, the futures position might offset the potential upside. Example: A bondholder who uses futures to hedge against rising interest rates might not benefit fully from a bond price rise if rates fall as expected.

5. **Transaction Costs:**

   While futures are generally liquid, the transaction costs (such as brokerage fees and exchange fees) can add up, especially if positions are frequently opened and closed. Example: Frequent trading of interest rate futures may result in high transaction costs, eating into any potential profits.

6. **Short-Term Focus:**

   Interest rate futures are often more suitable for short-term positions or speculations, which may not be ideal for long-term investors seeking sustained exposure to interest rate movements. Example: A long-term investor in government bonds may not find interest rate futures helpful if their strategy focuses on buy-and-hold rather than short-term market movements.

## 9.6 Keywords

**1. Interest Rate Futures**

A standardized financial derivative contract where parties agree to trade a debt instrument at a predetermined price on a future date, used for hedging or speculation.

**2. Underlying Asset**

The financial instrument (e.g., government bonds, T-bills) upon which an interest rate futures contract is based, determining its value and behavior.

**3. Hedging**

A risk management strategy that involves taking an opposite position in futures to protect against adverse interest rate movements.

**4. Speculation**

Trading futures contracts to profit from anticipated changes in interest rates, without holding the underlying asset.

**5. Leverage**

A feature of futures allowing traders to control a large notional value with a small margin deposit, amplifying potential gains and losses.

**6. Mark-to-Market**

The daily adjustment of futures contracts to reflect current market prices, ensuring gains or losses are settled each trading day.

**7. Standardization**

Futures contracts have uniform terms like size, expiration, and settlement, facilitating easy and transparent trading on exchanges.

**8. Inverse Relationship**

Interest rate futures move inversely to interest rates; when rates rise, the futures price falls, and vice versa.

**9. Margin Call**

A demand by brokers for additional funds when market movements erode the margin deposited, ensuring sufficient collateral for the position.

**10. Liquidity**

The ease of buying or selling futures contracts due to their active trading on exchanges, ensuring minimal price impact and better trade execution.

❖ **EXERCISE**

- **Multiple Choice Questions:**

1. What is the primary purpose of interest rate futures?

a) To invest in stocks
b) To hedge against or speculate on interest rate movements
c) To purchase physical bonds
d) To increase the value of cash holdings

Answer: b) To hedge against or speculate on interest rate movements

2. Which of the following is typically the underlying asset for interest rate futures?

a) Real estate properties
b) Commodities like gold
c) Debt instruments such as government bonds or treasury bills
d) Company stocks

Answer: c) Debt instruments such as government bonds or treasury bills

3. What does the term "mark-to-market" refer to in the context of interest rate futures?

a) The daily adjustment of contract values to reflect current market prices
b) The price set for the contract at inception
c) The payment made at the end of the contract
d) The interest rate applied to the underlying asset

Answer: a) The daily adjustment of contract values to reflect current market prices

4. Which of the following best describes leverage in interest rate futures?

a) The ability to borrow money from the exchange
b) Using a small margin to control a large notional value of a contract
c) The interest rate that determines the futures contract price
d) The profit made from buying bonds

Answer: b) Using a small margin to control a large notional value of a contract

5. What happens to the price of interest rate futures when interest rates rise?

a) The price of the futures rises
b) The price of the futures remains unchanged
c) The price of the futures falls
d) The futures contract becomes invalid

Answer: c) The price of the futures falls

6. What is the key difference between hedging and speculation in the context of interest rate futures?

a) Hedging is focused on short-term profits, while speculation focuses on long-term losses
b) Hedging protects against risk, while speculation aims to profit from price movements
c) Hedging is based on equity, while speculation is based on bonds
d) Hedging involves buying bonds, while speculation involves selling bonds

Answer: b) Hedging protects against risk, while speculation aims to profit from price movements.

7. Which of the following is a potential risk of using leverage in interest rate futures?

a) Increased liquidity
b) Amplification of both potential gains and losses
c) The contract becoming less standardized
d) Low transaction costs

Answer: b) Amplification of both potential gains and losses

8. Which term refers to a situation where additional funds are required by brokers due to adverse market movements in futures contracts?

a) Profit taking
b) Margin call
c) Cash settlement
d) Roll-over

Answer: b) Margin call

9. What does the inverse relationship between interest rates and futures prices mean?

a) As interest rates rise, futures prices also rise
b) As interest rates rise, futures prices fall
c) As interest rates fall, futures prices remain unchanged
d) Futures prices are not affected by interest rate movements

Answer: b) As interest rates rise, futures prices fall

10. Which of the following is NOT a typical use of interest rate futures?

a) Hedging against fluctuations in interest rates
b) Speculating on future interest rate movements

c) Buying and holding government bonds
d) Managing exposure to interest rate risk in portfolios

Answer: c) Buying and holding government bonds

- **True or False**

1. Interest rate futures are contracts that allow investors to buy or sell an underlying asset at a fixed price on a future date.
   **Answer:** True

2. Leverage in interest rate futures allows traders to control a large position with a small upfront margin, which increases both potential profits and losses.
   **Answer:** True

3. The price of interest rate futures moves in the same direction as interest rates; when rates rise, futures prices rise as well.
   **Answer:** False (The price of interest rate futures moves inversely to interest rates.)

4. Mark-to-market is the process of adjusting the futures contract value to reflect current market conditions, and gains or losses are settled daily.
   **Answer:** True

5. Interest rate futures are used exclusively for speculative purposes and not for hedging against interest rate risk.
   **Answer:** False (They are used for both speculation and hedging.)

- **Fill in the Blanks:**

1. Interest rate futures are typically based on underlying assets like _____ or treasury bills.

   **Answer:** government bonds

2. _____ is a process that involves adjusting the value of futures contracts daily based on market movements.

   **Answer:** Mark-to-market

3. A trader can use interest rate futures to hedge against changes in _____ rates.

   **Answer:** interest

4. Interest rate futures typically require a margin deposit, which allows traders to control a large position with a smaller _____.

   **Answer:** investment

5. The relationship between interest rates and the price of interest rate futures is _____, meaning that as interest rates rise, futures prices fall.

   **Answer:** inverse

# UNIT-10 INTEREST RATE SWAPS AND CURRENCY SWAPS

**10.1 Introduction**

**10.2 Origin of Interest Rate Swaps**

**10.3 Types of Interest Rate Swaps and Currency Swaps**

**10.4 Types of Contracts**

**10.5 Difference Between Interest Rate Swaps and Currency Swaps**

**10.6 Keywords**

❖ **Exercise**

## 10.1. Introduction:

It will be interesting to explain the meaning of derivatives with a practical example. Suppose you are driving a car and suddenly car tank turns empty, you drive to the nearest petrol pump for a refuel. The electronic fuel meter displays the volume of petrol being filled, along with the amount you need to pay. But do you know that the price of petrol changes from time to time. Have you ever wondered how they arrive at that price? The price you pay for petrol depends on the current price of crude oil. So, one could say that petrol has no value or worth of its own. Its value is derived from the prevailing rates for crude oil.

Derivatives are financial instruments whose value is derived from an underlying asset or a group of assets. These assets range from stocks, bonds, commodities, currencies, interest rates, or market indices. The derivatives market is a financial marketplace where derivative contracts are bought and sold. Derivatives have reshaped financial markets, offered diverse risk management tools while introduced complexities that demand prudent oversight. Various types of derivatives include futures, options, swaps, and forwards.

A swap is an agreement for a financial exchange in which one of the two parties promises to make, with an established frequency, a series of payments, in exchange for receiving another set of payments from the other party. These flows normally respond to interest payments based on the nominal amount of the swap. Swaps involve the exchange of cash flows or assets between two parties, often used to manage interest rates or currency risks. Swaps are highly customizable contracts that allow parties to tailor the terms to their specific needs and risk management strategies.

Swaps are widely used for hedging against various risks like interest rates, currency, commodity prices, and credit risks. Swaps are predominantly traded over the counter, they are privately negotiated between parties, offering flexibility in terms and conditions. Swaps are commonly used by businesses and investors to manage risk,

hedge against interest or currency exchange fluctuations, or speculate on future market movements. Swaps are typically traded over-the-counter (OTC), meaning they are not traded on an exchange but are negotiated directly between the parties involved. As such, swaps can be highly customizable and tailored to the specific needs of the parties involved.

Currency swaps can be used to manage currency risk, allowing companies or investors to hedge against fluctuations in exchange rates. Interest rate swaps are often used to manage interest rate risk, allowing companies or investors to hedge against changes in interest rates.

## 10.2. Origin of Interest Rate Swaps:

In 1981, IBM and the World Bank made the first swap, a currency transaction. The World Bank borrows money to lend funds to developing countries for mainly construction projects. It was little challenging for the World Bank as interest rates were very high with the Federal Funds rate at 17%, the Swiss key rate at 8%, and the West German key rate at 12%. Similarly, per laws in both countries, the World Bank had reached its borrowing cap in Switzerland and West Germany.

At the same time, IBM held a large amount of debt priced in Swiss Francs and German Marks. To help one another out, the World Bank borrowed $290 million in U.S. markets and swapped those U.S. Dollar obligations in exchange for taking on IBM's Swiss Franc and German Mark obligations; swaps were born.

## 10.3 Types of Interest Rate Swaps and Currency Swaps

Interest Rate Swaps (IRS): Exchange of fixed-rate and floating-rate interest payments. One party pays a fixed interest rate while the other pays a floating (variable) rate. Interest rate swaps are commonly used to hedge against interest rate risk or to modify the cash flow structure.

Currency Swaps: Two parties exchange a principal amount and interest payments in different currencies. Currency swaps help manage currency exposure and can be used to obtain better borrowing rates in different markets.

Commodity Swaps: Exchanging cash flows based on the future price of a commodity. These are utilized to hedge against commodity price fluctuations. Producers enter a commodity swap to lock in a fixed price for future production, ensuring predictable revenue regardless of market fluctuations.

Credit Default Swaps (CDS): Financial derivatives transfer credit risk between two parties. The buyer of the swap pays a premium to the seller and receives protection in case of a credit event, like a default, on the underlying asset.

Equity Swap: In an equity swap, two parties agree to exchange cash flows based on the performance of a stock or equity index. This can be used to manage risk or to take a view of the future performance of the stock or index.

Difference between currency and interest rate swaps:

❖ **Definition:**

- Currency swaps: The currency swap is a method that involves exchanging the cash flows that are generated from two currencies in order to hedge against the fluctuations in the exchange rate.
- Interest rate swaps: The interest rate swaps deal with the exchange of cash flows between two parties generated at two rates of interest.

❖ **Type of contract:**

- Currency swap: Currency swaps are foreign exchange agreements between the two parties.
- Interest rate swap: Interest rate swaps are financial derivative contracts between two parties.

❖ **Focus:**

- Currency swap: The main focus of the currency swaps involves the exchange of any amount in one currency to another currency.
- Interest rate swap: The main focus of the interest rate swaps involves the exchanging of interest payments between different parties.

## 10.4 Types of Contracts:

1. **Fixed-for-Fixed Swap** – A contract where two parties exchange fixed interest rate payments in different currencies.
2. **Fixed-for-Floating Swap** – A contract where one party pays a fixed interest rate, and the other pays a floating interest rate.
3. **Floating-for-Floating Swap** – A contract where both parties exchange floating rate payments based on different benchmarks.
4. **Notional Principal Swap** – The principal amount remains unchanged, and only interest payments are exchanged.
5. **Amortizing Swap** – The notional amount decreases over time, typically used in loans or bonds.
6. **Accreting Swap** – The notional principal increases over time, often linked to project financing.
7. **Basis Swap** – Involves exchanging two different floating interest rates, such as LIBOR vs. EURIBOR.
8. **Callable Swap** – The payer has the right to terminate the swap before maturity.
9. **Putable Swap** – The receiver has the right to end the swap contract early.
10. **Cross-Currency Swap** – Exchange of principal and interest payments in different currencies.

## 10.5. Difference Between Interest Rate Swaps and Currency Swaps:

| Feature | Interest Rate Swap | Currency Swap |
|---|---|---|
| **Definition** | Exchange of interest rate payments without exchanging principal. | Exchange of principal and interest payments in different currencies. |
| **Principal Exchange** | No exchange of principal. | Principal is exchanged at the start and end of the contract. |
| **Types of Rates** | Fixed-for-fixed, fixed-for-floating, floating-for-floating. | Usually fixed-for-fixed but can include floating rates. |
| **Purpose** | To manage interest rate risk. | To manage currency risk and foreign exchange exposure. |
| **Example** | A company swaps a fixed-rate loan for a floating-rate loan. | A US company swaps its USD debt for a European company's EUR debt. |

## 10.6. Keywords:

1. **Interest Rate Swap** – A financial contract where two parties exchange interest payments on a notional amount without exchanging principal.
2. **Currency Swap** – A contract where two parties exchange principal and interest payments in different currencies.
3. **Fixed Interest Rate** – A constant interest rate paid over the life of a loan or swap.
4. **Floating Interest Rate** – An interest rate that changes based on a benchmark like LIBOR or SOFR.
5. **Notional Principal** – The hypothetical amount on which interest payments are calculated but not exchanged.
6. **LIBOR (London Interbank Offered Rate)** – A common benchmark for floating interest rates in swap contracts.
7. **SOFR (Secured Overnight Financing Rate)** – A benchmark rate replacing LIBOR for floating-rate swaps.
8. **Counterparty** – The other party in a swap agreement, usually a bank or corporation.
9. **Hedging** – Using swaps to protect against interest rate or currency fluctuations.
10. **Speculation** – Using swaps to profit from changes in interest rates or currency exchange rates.
11. **Settlement Date** – The date on which interest payments are exchanged in a swap contract.
12. **Arbitrage** – The practice of profiting from differences in interest rates or currency values between markets.

13. **Basis Swap** – A swap that involves exchanging two floating rates, each based on different benchmarks.
14. **Swap Spread** – The difference between the swap rate and the corresponding government bond yield.
15. **Derivative** – A financial instrument whose value depends on an underlying asset, such as interest rates or currency values.

## ❖ Exercise:

### 1. Multiple Choice Questions (MCQs)

1. What is the main purpose of an **interest rate swap**?
   a) Exchange of different currencies
   b) Hedging or reducing interest rate risk
   c) Directly lending money to another company
   d) Speculating on stock prices
2. In a **fixed-for-floating swap**, what type of interest payments are exchanged?
   a) Fixed for fixed
   b) Floating for floating
   c) Fixed for floating
   d) Principal for interest
3. **What is exchanged in a** currency swap**?**
   a) Only interest payments
   b) Only principal
   c) Both principal and interest payments
   d) Stocks and bonds
4. Which of the following is **NOT** a feature of interest rate swaps?
   a) No principal exchange
   b) Exchange of interest payments
   c) Exchange of currencies
   d) Use of fixed or floating rates
5. **What is the role of a swap dealer in a swap contract?**
   a) To regulate interest rates
   b) To match counterparties and facilitate the swap
   c) To determine stock prices
   d) To issue corporate bonds

### 2. Fill in the Blanks:

1. _____ is the process of using swaps to reduce exposure to interest rate or currency risks.
2. In a currency swap, both principal and _____ payments are exchanged between two parties.
3. The _____ rate is the benchmark interest rate used to determine floating payments in swap contracts.

4. _____ swaps involve exchanging two floating interest rates based on different benchmarks.
5. A _____ swap is a financial derivative where two parties exchange interest rate payments based on a notional amount.

**3. Write down the answer of following questions.**

1. Write a note of derivatives contract.
2. Write a note on swap contract.
3. Explain the types of swaps in detail
4. Write down the difference between currency swap and interest rate swap

**4. Explain the following terms**

- Derivatives
- Currency swap
- Interest rate swap
- OTC
- Swap
- Commodity swap
- Credit default swap
- Equity swap

❖ **Answers**

**MCQs:**

**1.** b) Hedging or reducing interest rate risk

**2.** c) Fixed for floating

**3.** c) Both principal and interest payments

**4.** c) Exchange of currencies

**5.** b) To match counterparties and facilitate the swap

**Fill in the Blanks:**

1. Hedging
2. Interest
3. Floating
4. Basis
5. Interest rate

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## યુનિવર્સિટી ગીત

સ્વાધ્યાયઃ પરમં તપઃ
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સ્વાધ્યાયઃ પરમં તપઃ

શિક્ષણ, સંસ્કૃતિ, સદ્‌ભાવ, દિવ્યબોધનું ધામ
ડૉ. બાબાસાહેબ આંબેડકર ઓપન યુનિવર્સિટી નામ;
સૌને સૌની પાંખ મળે, ને સૌને સૌનું આભ,
દશે દિશામાં સ્મિત વહે હો દશે દિશે શુભ-લાભ.

અભણ રહી અજ્ઞાનના શાને, અંધકારને પીવો ?
કહે બુદ્ધ આંબેડકર કહે, તું થા તારો દીવો;
શારદીય અજવાળા પહોંચ્યાં ગુર્જર ગામે ગામ
ધ્રુવ તારકની જેમ ઝળહળે એકલવ્યની શાન.

સરસ્વતીના મયૂર તમારે ફળિયે આવી ગહેકે
અંધકારને હડસેલીને ઉજાસના ફૂલ મહેંકે;
બંધન નહીં કો સ્થાન સમયના જવું ન ઘરથી દૂર
ઘર આવી મા હરે શારદા દૈન્ય તિમિરના પૂર.

સંસ્કારોની સુગંધ મહેંકે, મન મંદિરને ધામે
સુખની ટપાલ પહોંચે સૌને પોતાને સરનામે;
સમાજ કેરે દરિયે હાંકી શિક્ષણ કેરું વહાણ,
આવો કરીયે આપણ સૌ
ભવ્ય રાષ્ટ્ર નિર્માણ...
દિવ્ય રાષ્ટ્ર નિર્માણ...
ભવ્ય રાષ્ટ્ર નિર્માણ

**DR. BABASAHEB AMBEDKAR OPEN UNIVERSITY**
(Established by Government of Gujarat)
'Jyotirmay' Parisar,
Sarkhej-Gandhinagar Highway, Chharodi, Ahmedabad-382 481
**Website : www.baou.edu.in**