Indian Capital Market

Part A: Indian Capital Market

1. Overview of Indian Financial System

Efficient financial systems are indispensable for speedy economic development. The more vibrant and efficient the financial system in a country is, the greater is its efficiency of capital formation. If the institutional structure of the financial system is diversified and broad based, the financial system will be more active and vibrant.

The overall macro level policies of the government, scope of services and operations of financial intermediaries, global outlook regarding the economy, diversity in investment avenues, income and saving levels of households and business and overall regulatory setup affect the process of capital formation in the country. They facilitate conversion of savings into investments by overcoming the geographical and technical limitations.

Classifications of Indian Financial Market

(a) On the basis of period of the investment avenues: On the basis of the above criteria, financial market can be bifurcated among Capital Market and Money Market.

Money market is the market wherein short term instruments i.e. instruments which have a maturity period of less than 365 days (less than 1 year) traded. The common instruments available in the money market are Treasury Bills, Commercial Papers, Certificate of Deposits, Repurchase agreements and other instruments which have a maturity period of less than one year.
Conversely, capital markets are used for long-term assets, which are any assets with maturity tenor greater than one year. Capital markets include equity (stock) and debt (bond) market.

(b) On the basis of regulatory architecture: From the view point of regulatory set up the Indian financial system can be classified in the following categories:

- Banking Sector regulated by Reserve Bank of India (RBI)
- Securities Market regulated by Securities & Exchange Board of India (SEBI)
- Commodities Market regulated by Forward Market Commission (FMC)
- Pension Schemes regulated by Pension Fund Regulatory Authority of India (PFRDA)
- Insurance Sector regulated by Insurance Regulatory and Development Authority of India (IRDA)

2. Basics of Capital Markets (Need, Evolution and Constituents)

Capital markets are financial markets for the buying and selling of long-term debt or equity backed securities. The primary role of the capital market is to raise long-term funds for governments, banks, and corporations while providing a platform for the trading of securities. This fundraising is regulated by the performance of the stock and bond markets within the capital market. The member organizations of the capital market may issue stocks and bonds in order to raise funds. Investors can then invest in the capital market by purchasing those stocks and bonds. The capital market, therefore, functions as a link between savers and investors. It plays an important role in mobilizing the savings and diverting them in productive investment. In this way, capital market plays a vital role in transferring the financial resources from surplus and wasteful areas to deficit and productive areas, thus increasing the productivity and prosperity of the country and promotes the process of economic growth in the country.

Financial market regulators, such as the Securities Exchange Board of India (SEBI) and The Securities and Exchange Commission (SEC) in US oversee the capital markets in their jurisdictions to protect investors against fraud, among other duties.

Capital market is the heart of any economy through which the savings are channelized into effective long-term investments. A developed and vibrant Capital Market will immensely contribute towards speedy economic growth and development. A well-developed Capital market is beneficial both for the investor as well as for the corporate sector and it is the most important parameter for evaluating the health of any economy. It is an engine for economic growth, providing an efficient means of resource mobilization and allocation.

The Indian capital market is one of the oldest capital markets in the world. It dates back to the 18th century when the securities of the East India Company were traded in Mumbai and Kolkata. However, the orderly growth of the capital market began with the setting up of The Stock Exchange of Bombay in July 1875 and Ahmedabad Stock Exchange in 1884.
Eventually, 19 other Stock Exchanges sprang up in various parts of the country. The evolution-cum development of Indian capital market may be reviewed under two phases:

(i) Indian Capital Market – Before 1990’s

(ii) Indian Capital Market – After 1990’s

2.1 Indian Capital Market – Before 1990’s: India’s Capital Market was dormant till the mid – 1980’s. The long term financing needs of the corporate sector were met by the Development Financial Institutions (DFI’s) namely IDBI, IFCI, ICICI as well as by other investment institutions like LIC, UTI, GIC etc. Working capital needs were met by the Commercial Banks through an elaborate network of bank branches spread all over the country. Capital Market activities were limited, mainly due to the easy availability of loans from banks and financial institutions and administered structure of interest rates. However, three important legislations, namely, Capital Issues (Control) Act 1947, Securities Contracts (Regulation) Act, 1956, and Companies Act, 1956 (Now, Companies Act, 2013) were enacted to provide suitable legal framework for the development of capital market in India. The pricing of the primary issues was decided by the Office of the Controller of Capital Issues. A few stock exchanges, dominated by Bombay Stock Exchange (BSE), provided the trading platforms for the secondary market transactions under an open outcry system.

2.2 Indian Capital Market – After 1990’s: The Indian capital markets have witnessed a major transformation and structural change during the past two and a half decades, since the early 1990’s. The Financial Sector Reforms in general and the Capital Market Reforms in particular were initiated in India in a big way from 1991 – 1992 onward. These reforms have been aimed at improving market efficiency, enhancing transparency, checking unfair trade practices and bringing the Indian capital market up to the International Standards. The Capital Issues (Control) Act, 1947 was repealed in May 1992, and the office of the Controller of Capital Issues was abolished in the same year. The National Stock Exchange (NSE) was incorporated in 1992 and was given recognition as a Stock Exchange in April 1993. It has been playing a lead role as a change agent in transforming the Indian Capital Market to its present form.

The Securities and Exchange Board of India (SEBI) was set up in 1988 and acquired the statutory status in 1992. Since 1992, SEBI has emerged as an autonomous and independent statutory body with definite mandate such as: (a) to protect the interests of investors in securities, (b) to promote the development of securities market, and (c) to regulate the securities market. In order to achieve these objectives, SEBI has been exercising power under: (a) Securities and Exchange Board of India Act, 1992, (b) Securities Contracts (Regulation) Act, 1956, (c) Depositories Act, 1996 and delegated powers under the (d) Companies Act, 2013. Indian Capital Market has made commendable progress since the inception of SEBI and has been transformed into one of the most dynamic capital markets of the world.
2.3 Functions of the capital market: The major functions of capital market are:

1. To mobilize resources for investments.
2. To facilitate buying and selling of securities.
3. To facilitate the process of efficient price discovery.
4. To facilitate settlement of transactions in accordance with the predetermined time schedules.

2.4 Major constituents of the capital market

1. SEBI (Regulator)
2. Stock Exchanges
3. Clearing Corporations (CCs)/ Clearing Houses (CHs)
4. Depositories and depository participants
5. Custodians
6. Stock-brokers and their Sub-Brokers
7. Mutual Funds
8. Merchant Bankers
9. Credit Rating Agencies
10. Financial Institutions
11. Foreign Institutional Investors
12. Non-banking Institutions
13. Issuers/ Registrar and Transfer Agents
14. Investors

3. Segments of Capital Markets

The capital markets are relatively long term (greater than one-year maturity) financial instruments (e.g. bonds and stocks). Their role can be summarized as follows:

(a) The Capital Market is the indicator of the inherent strength of the economy.
(b) It is the largest source of funds with long and indefinite maturity for companies and thereby enhances the capital formation in the country.
(c) It offers a number of investment avenues to investors.
(d) It helps in channeling the savings pool in the economy towards optimal allocation of capital in the country.
The securities / capital market is divided into two parts, namely, primary and secondary stock market. The relationship between these parts of the markets provides an insight into its organization.

3.1 Primary Market: A market where new securities are bought and sold for the first time is called the New Issues market or the IPO market. In other words, the first public offering of equity shares or convertible securities by a company, which is followed by the listing of a company’s shares on a stock exchange, is known as an initial public offering (IPO). The Primary market also includes issue of further capital by companies whose shares are already listed on the stock exchange.

3.2 Secondary Market: A market in which an investor purchases a security from another investor rather than the issuer, subsequent to the original issuance in the primary market. So, it can be stated that secondary markets are the stock exchanges and the over-the-counter market. When the securities are transferred from one holder to another, that trading is said to be in secondary market.

3.3 Differences between Primary and Secondary Market

<table>
<thead>
<tr>
<th>Basis</th>
<th>Primary Market</th>
<th>Secondary Market</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nature of Securities</td>
<td>The primary market deal with new securities, that is, securities, which were not previously available and are, therefore, offered to the investing public for the first time</td>
<td>The secondary market is a market for old securities, i.e. securities which have been issued already and granted stock exchange quotation. The stock exchanges, therefore, provide a regular and continuous market for buying and selling of securities.</td>
</tr>
<tr>
<td>Nature of financing</td>
<td>Primary market provides additional funds to the issuing companies either for starting a new enterprise or for the expansion or diversification of the existing one and, therefore, its contribution to company financing is direct.</td>
<td>The secondary market can in no circumstance supply additional funds since the company is not involved in the transaction. This, however, does not mean that the stock markets do not have relevance in the process of transfer of resources from savers to investors. Their role regarding the supply of capital is indirect. The existence of secondary markets provides institutional facilities for the continuous purchase and sale of securities and lends liquidity and marketability thus, playing an important part in the process.</td>
</tr>
</tbody>
</table>
5.6 Strategic Financial Management

### Organisational Differences

<table>
<thead>
<tr>
<th>Primary market</th>
<th>Secondary Markets</th>
</tr>
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<tr>
<td>is not rooted in any particular spot and has no geographical existence. The primary market has neither any tangible form of any administrative organizational setup like that of stock exchanges, nor is it subjected to any centralized control and administration for the consummation of its business. It is recognized only by the services that it renders to the issuer of the securities and investor of the securities.</td>
<td>have physical existence in the form of stock exchanges located in a particular geographical area.</td>
</tr>
</tbody>
</table>

### 3.4 Similarities between Primary and Secondary Market:

Some of the similarities between them are follows:

(a) **Listing:** The securities issued in the primary market are invariably listed on a recognized stock exchange for dealings in them. Further trading in secondary market can also be carried out only via a stock exchange platform. The listing on stock exchanges provides liquidity as well as marketability to the securities and facilitates discovery of prices for them.

(b) **Control By Stock Exchanges:** Via the mechanism of Listing Agreement between the issuer companies and the stock exchange the stock exchanges exercise considerable control over the new issues as well securities already listed on the stock exchange. Exchanges ensure that there is continuous compliance by the issuer company of the clauses provided in the Listing Agreement.

### 3.5 Interrelationship between Primary Markets and Secondary Markets:

The markets for new and old securities are, economically, an integral part of a single market – the capital market. Their mutual interdependence from the economic point of view has following two dimensions.

- One, the quantum of trading and the participation of the investors in stock exchange i.e. in secondary market has a significant bearing on the level of activity in the primary market and, therefore, its responses to capital issues.
- Secondly, dimension of the mutual interdependence is the fact that the level of activity in primary market has a direct impact on the level of activity in secondary market. As more and more companies issue their securities in the market, investment options for investors increase which leads to a wider participation by investors in the secondary market.

### 4. Participants in Capital Market

- **Investors:** Investors are the lifeline of any capital markets. A vibrant capital market the capital market should be capable enough to attract the savings of investors. Investors
belong to various categories such as Retail Investors, Institutional Investors like mutual funds, insurance companies and Foreign Portfolio Investors.

- **Stock Exchange**: Stock Exchange is a place where securities issued by issuer companies are listed and traded. The term is synonymously used for secondary market.

- **Depository**: A depository is an organisation which holds securities (like shares, debentures, bonds, government securities, mutual fund units etc.) of investors in electronic form at the request of the investors through a registered Depository Participant. It also provides services related to transactions in securities. In India there are two depositories namely National Securities Depository Limited (NSDL) and Central Depository Services (India) Limited (CDSL).

- **Intermediaries**: Intermediaries are those entities which offer various services in relation to the capital markets. There are various categories of intermediaries such as stock brokers, merchant bankers, underwriters etc.

### 5. Stock Market and its Operations

The stock exchanges are meant to facilitate mobilisation of resources by companies. Their effective regulation is required for protecting the interests of investors and safeguarding their developmental role.

The Securities Contracts (Regulation) Act 1956 along with the Securities Contracts (Regulation) Rules 1957 has been the main laws to regulate the securities market in India. As per the Securities Contracts (Regulations) Act, 1956 a stock exchange is defined as "an association, organisation or body of individuals whether incorporated or not, established for the purpose of assisting, regulating and controlling business in buying, selling and dealing in securities". A look at the powers given stock exchanges in India to make and enforce by-laws under the Act and the rules reveals that Indian Stock Exchanges have been envisaged as self regulatory organisations.

#### 5.1 Growth of Stock Exchanges:

The history of Stock Exchanges in India goes back to the eighteenth century, when securities of the East India Company were transacted. There were 50-60 brokers led by the legendary Premchand Roychand. They formed the backbone of share floatation by East India Company and a few commercial banks. Corporate shares made their entry in the 1830s and assumed significance with the enactment of the Companies Act in the 1850s. The Bombay Stock Exchange, the oldest stock exchange in India was established in 1875 under the name, Share and Stockbrokers Association.

The stock exchanges are tightly regulated as self-regulatory organizations (SROs) under the Act. In addition to ordinary regulatory powers over the stock exchanges, the Central Government and/or SEBI may nominate up to three members to the board of each stock exchange [Section 4(2) (iii) of the SC (R) Act, 1956 and Section 10 of SC(R) Rules, 1957]. The government and/or the agency have the authority to make, approve and amend the byelaws of the stock exchanges [Section 4(1)(a) & 8 of the SC(R) Act, 1956]. In return, the stock exchanges have been granted a strong disciplinary authority (as well as obligations) over their member stockbrokers.
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5.1.1 Leading Stock Exchanges in India: The two leading stock exchanges in India are Bombay Stock Exchange (BSE) and National Stock Exchange (NSE). A brief about them is as under:

(a) Bombay Stock Exchange Limited: It is the oldest stock exchange in Asia and was established as "The Native Share & Stock Brokers Association" in 1875. It is the first stock exchange in the country to obtain permanent recognition in 1956 from the Government of India under the Securities Contracts (Regulation) Act, 1956. The Exchange's pivotal and pre-eminent role in the development of the Indian capital market is widely recognized and its index, SENSEX, is tracked worldwide. Earlier an Association of Persons (AOP), the Exchange is now a demutualised and corporatized entity incorporated under the provisions of the Companies Act, 1956, pursuant to the BSE (Corporatisation and Demutualisation) Scheme, 2005 notified by the Securities and Exchange Board of India (SEBI).

The Exchange has a nation-wide reach. The systems and processes of the Exchange are designed to safeguard market integrity and enhance transparency in operations.

The Exchange provides an efficient and transparent market for trading in equity, debt instruments and derivatives. The BSE's On Line Trading System (BOLT) is a proprietary system of the Exchange and is BS 7799-2-2002 certified. The surveillance and clearing & settlement functions of the Exchange are ISO 9001:2000 certified.

(b) National Stock Exchange: Report of the High Powered Study Group on Establishment of New Stock Exchanges, recommended promotion of a National Stock Exchange by financial institutions (FIs) to provide access to investors from all across the country on an equal footing. It was incorporated in November 1992 as a tax-paying company unlike other stock exchanges in the country.


It uses satellite communication technology to energise participation from around 320 cities spread all over the country. NSE can handle up to 6 million trades per day in Capital Market segment.

NSE is one of the largest interactive VSAT based stock exchanges in the world. It supports more than 3000 VSATs. The NSE- network is the largest private wide area network in the country and the first extended C- Band VSAT network in the world. Currently more than 9000 users are trading on the real time-online NSE application. There are over 15 large computer systems which include non-stop fault-tolerant computers and high end UNIX servers, operational under one roof to support the NSE applications. This coupled with the nation wide VSAT network makes NSE the country's largest Information Technology user.

5.1.2 Stock Exchanges Abroad: With the increasing globalisation and liberalization, the prices of securities on Indian stock exchanges are influenced by stock exchanges abroad. Under this heading we have tried to give a brief introduction of the major stock exchanges abroad.
(a) **New York Stock Exchange (NYSE):** The New York Stock Exchange was established more than 200 years ago in 1792. NYSE is the world’s foremost securities marketplace.

Each day on the NYSE trading floor an auction takes place. Open bid and offers are managed on The Trading Floor by Exchange members acting on behalf of institutions and individual investors. Buy and sell orders for each listed security meet directly on the trading floor in assigned locations. Prices are determined through supply and demand. Stocks buy and sell orders funnel through a single location, ensuring that the investor, no matter how big or small, is exposed to a wide range of buyers and sellers.

(b) **Nasdaq:** Nasdaq is known for its growth, liquidity, depth of market and the world’s most powerful, forward-looking technologies. All these make Nasdaq choice of the leading companies worldwide. Since its inception in 1971, Nasdaq has steadily outpaced the other major markets to become the fastest-growing stock market in the U.S. Nasdaq is a screen-based market, operating in an efficient, highly competitive electronic trading environment.

As the market for Nasdaq's largest and most actively traded securities, the Nasdaq National Market lists more than 4,000 securities. To be listed on the National Market, a company must satisfy stringent financial, capitalization, and corporate governance standards. Nasdaq National Market companies include some of the largest, best known companies in the world.

In contrast to traditional floor-based stock markets, Nasdaq has no single specialist through which transactions pass. Nasdaq's market structure allows multiple market participants to trade stock through a sophisticated computer network linking buyers and sellers from around the world. Together, these participants help ensure transparency and liquidity for a company's stock while maintaining an orderly market and functioning under tight regulatory controls.

(c) **London Stock Exchange:** Its history goes back to 1760 when 150 brokers kicked out of the Royal Exchange for rowdiness formed a club at Jonathan’s Coffee House to buy and sell shares. In 1773, members voted to change the name to Stock Exchange and 2000 shareholders voted it to become a public limited company and thus London Stock Exchange plc was formed. Dealing in shares is conducted via an off-market trading facility operated by Cazenove and Co.

London Stock Exchange provides a range of services for companies and investors:

(i) **Company Services** - It provides a number of markets which allow companies large and small to raise capital, and a range of services to increase the profile of the companies.

(ii) **Trading Services** - It gives market users access to a well-developed trading environment with a proven record of stability and flexibility.

(iii) **Information Services** - It provides high quality real-time price information to market users worldwide, as well as historical and reference data.

Supporting these activities, the exchange regulates the markets to give protection to investors and companies and to maintain its reputation for high standards and integrity. In addition, in partnership with others, it helps to track the performance of the markets through various indices.
5.2 Characteristics of Stock Exchanges in India: Traditionally, a stock exchange has been an association of individual members called member brokers (or simply members or brokers), formed for the express purpose of regulating and facilitating the buying and selling of securities by the public and institutions at large. A stock exchange in India operates with due recognition from the Government under the Securities & Contracts (Regulations) Act, 1956. Corporate membership of stock exchanges has also been introduced lately. As you know, there are at present 20 stock exchanges in India. The largest among them being the Bombay Stock Exchange which alone accounts for over 80% of the total volume of transactions in shares in the country.

A stock exchange is typically governed by a board, consisting of directors. Some Members of the Board are nominated by the Government. Government nominees include representatives of the Ministry of Finance, as well as some public representatives, who are expected to safeguard the interest of investors in the functioning of the exchanges. The board is headed by a President, who is an elected member, usually nominated by the government, from among the elected members. The Executive Director, who is appointed by the stock exchange with government approval, is the operational chief of the stock exchange. His duty is to ensure that the day-to-day operations of the stock exchange are carried out in accordance with the rules and regulations governing its functioning. Securities and Exchanges Board of India (SEBI) has been set up in Mumbai by the Government to oversee the orderly development of stock exchanges in the country. All companies wishing to raise capital from the public are required to list their securities on at least one stock exchange. Thus, all ordinary shares, preference shares and debentures of publicly held companies are listed in one or more stock exchanges. Stock exchanges also facilitate trading in the securities of the public sector companies as well as government securities.

5.3 Functions of Stock Exchanges: The Stock Exchange is a market place where investors buy and sell securities. Functions of the stock exchanges can be summarized as follows:

(a) Liquidity and Marketability of Securities: The basic function of the stock market is the creation of a continuous market for securities, enabling them to be liquidated, where investors can convert their securities into cash at any time at the prevailing market price. It also provides investors the opportunity to change their portfolio as and when they want to change, i.e., they can at any time sell one security and purchase another, thus giving them marketability.

(b) Fair Price Determination: This market is almost a perfectly competitive market as there are large number of buyers and sellers. Due to nearly perfect information, active bidding take place from both sides. This ensures the fair price to be determined by demand and supply forces.

(c) Source for Long term Funds: Corporates, Government and public bodies raise funds from the equity market. These securities are negotiable and transferable. They are traded and change hands from one investor to the other without affecting the long-term availability of funds to the issuing companies.
(d) **Helps in Capital Formation:** There is a nexus between the savings and the investments of the community. The savings of the community are mobilized and channeled by stock exchanges for investment into those sectors and units which are favoured by the community at large, on the basis of such criteria as good return, appreciation of capital, and so on. It is the preference of investors for individual units as well as industry groups, which is reflected in the share price, that decides the mode of investment. Stock exchanges render this service by arranging for the preliminary distribution of new issues of capital, offered through prospectus, as also offers for sale of existing securities, in an orderly and systematic manner. They themselves administer the same, by ensuring that the various requisites of listing (such as offering at least the prescribed minimum percentage of capital to the public, keeping the subscription list open for a minimum period of days, making provision for receiving applications at least at the prescribed centres, allotting the shares against applications on a fair and unconditional basis) are duly complied with. Members of stock exchanges also assist in the flotation of new issues by acting (i) as brokers, in which capacity they, inter alia, try to procure subscription from investors spread all over the country, and (ii) as underwriters. Stock exchanges also provide a forum for trading in rights shares of companies already listed, thereby enabling a new class of investors to take up a part of the rights in the place of existing shareholders who renounce their rights for monetary considerations.

(e) **Reflects the General State of Economy:** The performance of the stock markets reflects the boom and depression in the economy. It indicates the general state of the economy to all those concerned, who can take suitable steps in time. The Government takes suitable monetary and fiscal steps depending upon the state of the economy.

### 5.4 Basics of Stock Market Indices

**5.4.1 Stock Market Index:** It is representative of the entire stock market. Movements of the index represent the average returns obtained by investors in the stock market. A base year is set along with a basket of base shares. The change in the market price of these shares is calculated on a daily basis. The shares included in the index are those shares which are traded regularly in high volume. In case the trading in any share stops or comes down then it gets excluded and another company's shares replaces it.

Each stock exchange has a flagship index like in India, Sensex of BSE and Nifty of NSE and outside India is Dow Jones, FTSE etc.

**5.4.2 Concept behind Fluctuations of Index:** Stocks are valued by discounting future earnings of a company; therefore, stock indices reflect expectation about future performance of the companies listed in the stock market or performance of the industrial sector. When the index goes up, the market thinks that the future returns will be higher than they are at present and vice versa.

Stock prices are sensitive to Company specific news and Country specific news (which includes budget, elections, government policies, wars and so on)

**5.4.3 Computation of Index:** Following steps are involved in calculation of index on a particular date:
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- Calculate market capitalization of each individual company comprising the index.
- Calculate the total market capitalization by adding the individual market capitalization of all companies in the index.
- Computing index of next day requires the index value and the total market capitalization of the previous day and is computed as follows:

\[
\text{Index Value} = \frac{\text{Index on Previous Day \times Total market capitalisation for current day}}{\text{Total capitalisation of the previous day}}
\]

- It should also be noted that Indices may also be calculated using the price weighted method. Here the share price of the constituent companies form the weights. However, almost all equity indices world-wide are calculated using the market capitalization weighted method.

6. Settlement and Settlement Cycles

6.1 Rolling Settlement Cycle: SEBI introduced a new settlement cycle known as the 'rolling settlement cycle'. Rolling settlement is basically settlement of transaction in stock market in a certain number of days after the trade is agreed.

Rolling settlement has been explained with the help of following table:

<table>
<thead>
<tr>
<th>Activity</th>
<th>Description of Activities</th>
<th>Day</th>
<th>Timings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trading</td>
<td>Trading by investors</td>
<td>T day</td>
<td></td>
</tr>
<tr>
<td>Clearing</td>
<td>National Securities Clearing Corporation Ltd. (NSCCL) confirms the trade from stock exchange. Then, NSCCL process and download obligation files to brokers.</td>
<td>T + 1</td>
<td>By 1.30 P.M.</td>
</tr>
<tr>
<td>Settlement</td>
<td>Pay-in of securities and funds to NSCCL. NSCCL gives pay out of securities and funds.</td>
<td>T + 2</td>
<td>By 10.30 A.M.</td>
</tr>
</tbody>
</table>

The above chart has been explained in the following paragraphs:

Trading Day (T Day)

T stands for trading. Trading can be done during the entire day i.e. from 9.00 A.M. to 3.30 P.M. Trading can be done on any working day (except Saturday and Sunday and other holidays as intimated by the stock exchange from time to time). During the trading process,
one investor buys the shares and other investor purchases the shares. After the execution of trading, the buyer receives the shares and the seller receives money for the shares he parted.

**Clearing Activities (T+1 day)**

Clearing is a process of determination of obligations, after which obligations are discharged by settlement. On the T+1 day i.e. one day after the trading day, first of all, the National Securities Clearing Corporation Ltd. (NSCCL) confirms the trade executed during the day from the Stock Exchange which helps it to determine the obligation of each member (broker) in terms of funds and securities. After that, the netting of obligations is done. This entire process of determining the obligation is done by the custodians/clearing corporation which works under the NSCCL. Once the netting of obligation is done, all the files are processed and downloaded so that each broker knows what he has to pay-in and receive.

**Netting explained**

Suppose, an investor buys 100 shares @ ₹ 2000 each on Monday and sell those shares @ 2500 each on the same day. His net obligation in terms of funds and securities will be calculated on Tuesday. In terms of securities, his net obligation is nil as he has sold all the shares he bought. So, he will neither receive nor give any security. On the other hand, his net monetary obligations will be calculated taking into account his buying and selling amount. In this case, the net amount he is receiving is ₹ 50000 (100 shares x ₹ 2500 – 100 shares x ₹ 2000). This pay-in and pay-out of funds are calculated on T+2 day i.e. on Wednesday.

**Settlement Activities (T+2 Day)**

On the second working day i.e. T+2 day, all the brokers has to pay-in the required funds and securities to the NSCCL by 10.30 A.M. giving the required instructions to the respective clearing banks and members on the same day. Moreover, by 1.30 on the same day, brokers get the required funds through the NSCCL. This is called pay-out of funds.

**Pay-in and pay-out of funds explained**

Pay-in of funds take place when NSCCL gives the required funds to the clearing corporation by giving instructions to the clearing bank which credits the account of clearing corporation and debit the accounts of clearing bank. This is called pay-in of funds. After that, the NSCCL gives electronic instructions to the clearing banks to credit accounts of clearing members and debit accounts of the clearing corporation. This is called pay-out of funds and this completes the settlement cycle.

**Pay-in and pay-out of securities explained**

Pay-in of securities means that shares that the shareholder wants to sell are picked up from their Demat account and transferred to the broker's account. All these shares are then delivered to the clearing corporation. In pay-out of securities, the shares that the investor wants to buy are received from the clearing corporation and then transferred to the broker's
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account. After that, the shares are transferred from the broker’s account to the buyer’s demat account.

6.2 Advantages of Rolling Settlements: In rolling settlements, payments are quicker than in weekly settlements. Thus, investors benefit from increased liquidity. From an investor's perspective, rolling settlement reduces delays. This also reduces the tendency for price trends to get exaggerated. Hence, investors not only get a better price but can also act at their leisure.

7. Clearing Houses

Clearing house is an exchange-associated body charged with the function of ensuring (guaranteeing) the financial integrity of each trade. Orders are cleared by means of the clearinghouse acting as the buyer to all sellers and the seller to all buyers. Clearing houses provide a range of services related to the guarantee of contracts, clearance and settlement of trades, and management of risk for their members and associated exchanges.

In April 1995, the NSE set up the National Securities Clearing Corporation Limited (NSCCL), its wholly owned subsidiary, to undertake clearing and settlement at the exchange. It started operations from April 1996. The NSCCL undertakes the counter party risk of each member and guarantees settlement. Settlement guarantee is a guarantee provided by the clearing corporation for the settlement of all trading of products in the stock exchange. The organizations linked with Clearing Corporation in the clearing and settlement process are discussed as below:

(a) Custodians/Clearing Members: NSCCL takes trading information from the exchange and pass the trade details to custodians/clearing members. Custodians confirm the obligations of the parties by netting.

(b) Clearing Banks: They act as a link between clearing corporation and clearing member. Every clearing member is required to maintain a clearing account with one of the clearing banks. A clearing bank has to enter into an agreement with the NSCCL and clearing member and open clearing account with the depository.

(c) Depositories: They hold securities in dematerialized form for the investors in their beneficiary account. Every clearing member is required to maintain a clearing pool account with the depositories.

The clearing banks, on receiving electronic instructions from the NSCCL, debit accounts of clearing banks and credit accounts of the clearing corporation. This is termed as pay-in of funds and securities. The NSCCL, after providing for shortages of funds and securities, sends electronic instructions to the depositories and clearing banks to credit accounts of clearing members and debit accounts of the clearing corporation. Thus, the settlement cycle is completed once the pay out of funds and securities is done.
7.1 Role of Clearing Houses

- It ensures adherence to the system and procedures for smooth trading.
- It minimises credit risks by being a counter party to all trades.
- It involves daily accounting of all gains or losses.
- It ensures delivery of payment for assets on the maturity dates for all outstanding contracts.
- It monitors the maintenance of speculation margins.

7.2 Working of Clearing House: The clearinghouse acts as the medium of transaction between the buyer and the seller. Every contract between a buyer and a seller is substituted by two contracts so that clearing house becomes the buyer to every seller and the seller to every buyer. In a transaction where P sells futures to R, R is replaced by the clearinghouse and the risk taken by P becomes insignificant. Similarly, the credit risk of R is taken over by the clearing house; thus, the credit risk is now assumed by the clearing house rather than by individuals. The credit risk of the clearing house is then minimised by employing some deposits as collaterals by both, buyers and sellers. These deposits, known as margins, are levied on each transaction depending upon the volatility of the instrument and adjusted everyday for price movements. Margins, which normally are in form of cash or T-bills, can be categorised into the following types: -

- **Initial Margins on Securities**: It is paid by purchasers and short sellers, generally function as a security for loan, and is similar to a down payment required for the purchase of a security.
- **Initial Margins on Derivatives**: It refers to funds paid as guarantee to ensure that the party to the transaction will perform its obligation under the contract. Initial margin on derivatives is designed to cover future changes that may occur in the value.
- **Maintenance Margins**: It refers to the value over and above the initial margin, which must be maintained in a margin account at all times after the initial margin requirement, if any, is satisfied.
- **Variation Margin**: It refers to funds that are required to be deposited in, or paid out of, a margin account that reflects changes in the value of the relevant instrument.

7.3 Trading Procedures: Clients have to open an account with a member of the exchange. When they want to trade in futures, they instruct members to execute orders in their account. The trade details are reported to the clearing house. If a member of the exchange is also a member of clearing house, then he directly deposits the margins with the clearing house. If he is not a member then he should route all transactions through a clearing member for maintaining margins.

8. IPO through Stock Exchange On-line System (e-IPO)

A company proposing to issue capital to public through the on-line system of the stock exchange for offer of securities has to comply with the additional requirements as given by
SEBI. They are applicable to the fixed price issue as well as for the fixed price portion of the book-built issues. The issuing company would have the option to issue securities to public either through the on-line system of the stock exchange or through the existing banking channel. For E-IPO the company should enter into agreement with the stock-exchange(s) and the stock exchange would appoint SEBI registered stockbrokers of the stock exchange to accept applications. The brokers and other intermediaries are required to maintain records of (a) orders received, (b) applications received, (c) details of allocation and allotment, (d) details of margin collected and refunded and (e) details of refund of application money.

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Part B : Capital Market Instruments

9. Capital Market Instruments

In the following sections we will discuss some of the important capital market instruments including futures and options.

The capital markets are relatively for long term (greater than one year maturity) financial instruments (e.g. bonds and stocks). It is the largest source of funds with long and indefinite maturity for companies and thereby enhances the capital formation in the country. The following instruments are available for investors in the capital market:-

- Shares (Equity and preference)
- Debentures/ Bonds
- Depository Receipts (ADR’s, GDR’s and IDR’s)
- Derivatives

Here, we will briefly go through the equity and preference shares, debentures, ADR and GDR and largely confine ourselves to different types of derivatives as they are one of the most complex and evolving instruments in the capital market.

9.1 Shares: Share is a type of security, which signifies ownership in a corporation and represents a claim on the part of the corporation’s assets and earnings. It is a share in the ownership of a company. As one acquires more stock, his or her ownership stake in the company becomes greater.

There are two main types of shares, equity shares and preference shares. Equity share usually entitles the owner to vote at shareholders’ meetings and to receive dividends. Preference shares generally do not have voting rights, but have a prior preference on assets and earnings of the company than the equity shares. For example, owners of Preference shares receive dividends before equity shareholders and have priority in the event of a company going bankrupt and is liquidated.

9.1.1 Basic Features of Shares:-

(1) Being a shareholder of a public company does not mean you have a say in the day-to-day running of the business. Instead, one vote per share to elect the board of directors at annual meetings is the extent to which you have a say in the company.
(2) Profits are sometimes paid out in the form of dividends. The more shares you own, the larger the portion of the profits you get. In case of bankruptcy and liquidation, you'll receive what's left after all the creditors have been paid.

(3) Another extremely important feature of share is its limited liability, which means that, as an owner of a share, you are not personally liable if the company is not able to pay its debts. Other companies such as partnerships are set up so that if the partnership goes bankrupt the creditors can come after the partners (shareholders) personally and sell off their house, car, furniture, etc.

(4) Companies issue shares to raise capital as it does not require the company to pay back the money after a certain time period (other than redeemable preference shares) or make interest payments continuously. Equity shares can be held by the company till perpetuity.

(5) Equity shares are traded on the cash segment of the capital market. The investors in equity shares make money via dividends or through capital appreciation in the price of the shares. Equity shares are very high risk instruments with no guaranteed returns. There is always a risk of downside in the value of equity investments.

(6) Shares are traded at market value on stock exchanges. Market Value per share is the current price at which the share is traded. For actively traded stocks (liquid stocks), market price quotations are readily available due to continuous demand and supply for those shares. However for inactive stocks (illiquid stocks) that have very thin markets, prices are very difficult to obtain. Even when obtainable, the information may reflect only the sale of a few shares and not typify the market value of the firm as a whole. Market value per share of an equity share is generally a function of the expectations of the market about the future earnings of the company and the perceived risk on the part of investors.

9.1.2 Issue Mechanism: The success of an issue depends, partly, on the issue mechanism. The methods by which new issues are made are: (i) Public issue through prospectus, (ii) Tender/Book building, (iii) Offer for sale (iv) Placements (v) Rights issue.

(i) Public Issue through Prospectus: Under this method, the issuing companies themselves offer directly to general public a fixed number of shares at a stated price, which in the case of new companies is invariably the face value of the securities, and in the case of existing companies, it may sometimes include a premium amount, if any. Another feature of public issue is that generally the issues are underwritten to ensure success arising out of unsatisfactory public response. Transparency and wide distribution of shares are its important advantages.

The foundation of the public issue method is a prospectus, the minimum contents of which are prescribed by the Companies Act, 1956. It also provides both civil and criminal liability for any misstatement in the prospectus. Additional disclosure requirements are also mandated by the SEBI.
A serious drawback of public issue, as a method to raise capital through the sale of securities, is that it is a highly expensive method. The cost of flotation involves underwriting expenses, brokerage, and other administrative expenses.

(ii) Tender / Book building: When a company plans for raising of funds from the market, the book building method is one such way to raise more funds. After accepting the free pricing mechanism by the SEBI, the Book building process has acquired too much significance and has opened a new lead in development of capital market.

A company can use the process of book building to fine tune its price of issue. When a company employs book building mechanism, it does not pre-determine the issue price (in case of equity shares) or interest rate (in case of debentures) and invite subscription to the issue. Instead it starts with an indicative price band (or interest band) which is determined through consultative process with its merchant banker and asks its merchant banker to invite bids from prospective investors at different prices (or different rates). Those who bid are required to pay the full amount. Based on the response received from investors the final price is selected. The merchant banker (called in this case Book Runner) has to manage the entire book building process. Investors who have bid a price equal to or more than the final price selected are given allotment at the final price selected. Those who have bid for a lower price will get their money refunded.

A company making an initial public offer of equity shares through the book-building mechanism can avail of the green shoe option (GSO) for stabilising the post-listing price of its shares. The GSO means an option of allocating shares in excess of the shares included in the public issue and operating a post listing price stabilising mechanism through a stabilising agent (SA). The concerned issuing company should seek authorisation for the possibility of allotment of further issues to the SA at the end of the stabilising period together with the authorisation for the public issue in the general meeting of its shareholders. It should appoint one of the lead book runners as the SA who would be responsible for price stabilisation process. The SA should enter into an agreement with the issuer company prior to the filling of the offer document with SEBI, clearly stating all the terms and conditions relating to GSO including fees charged/expenses to be incurred by him for this purpose. He should also enter into an agreement with the promoter(s) who would lend their shares, specifying the maximum number of shares that may be borrowed from their promoters. But in no case exceeding 15% of the total issue size. The details of these two agreements should be disclosed in the draft red herring prospectus, red herring prospectus and final prospectus.

To stabilise the post listing prices of the shares, the SA would determine the timing of buying them, the quantity to be bought, the prices at which to be bought and so on. In case the SA does not buy shares to the extent of their over allotment from the market, the issuer company should allot shares to the extent of the shortfall in dematerialised form to the GSO Demat account within 5 days of the closure of the stabilisation period. Those would be returned to the promoters by the SA in lieu of those borrowed from them and the GSO Demat account would be closed.

In an issue of securities to the public through a prospectus, the option for 100% book building is available to any issuer company. Reservation for firm allotment to the extent of the
percentage specified in the relevant SEBI guidelines can be made only to promoters, permanent employees of the issuer company and in the case of new company to the permanent employees of the promoting company. It can also be made to shareholders of the promoting companies, in the case of new company and shareholders of group companies in the case of existing company either on a competitive basis or on a firm allotment basis. The issuer company should appoint eligible merchant bankers as book runner(s) and their names should be mentioned in the draft prospectus. The lead merchant banker should act as the lead book runner and the other eligible merchant bankers are termed as co-book runner.

The greatest advantage of the book building process are:

(a) This allows for price and demand discovery.

(b) The cost of issue is much less than the other traditional methods of raising capital.

(c) In book building, the demand for shares is known before the issue closes. In fact, if there is not much demand, the issue may be deferred and can be rescheduled after having realized the situation of the market.

(iii) **Offer for Sale:** Another method by which securities can be issued is by means of an offer for sale. Under this method, instead of the issuing company itself offering its shares, directly to the public, it offers through the intermediary of issuing houses/merchant banks/investment banks or firms of stockbrokers. The modus operandi of the offer of sale is akin to the public issue method. Moreover, the issues are underwritten to avoid the possibility of the issue being left largely in the hands of the issuing houses. But the mechanism adopted is different. The sale of securities with an offer for sale method is done in two stages.

In the first stage, the issuing company sells the securities enbloc to the issuing houses or stockbrokers at an agreed fixed price and the securities, thus acquired by the sponsoring institutions, are resold, in the second stage, by the issuing houses to the ultimate investors. The securities are offered to the public at a price higher than the price at which they were acquired from the company. The difference between the sale and the purchase price, technically called as turn, represents the remuneration of the issuing houses.

Apart from being expensive, like the public issue method, it suffers from another serious shortcoming. The securities are sold to the investing public usually at a premium. The margin between the amount received by the company and the price paid by the public does not become additional funds, but it is pocketed by the issuing houses or the existing shareholders.

(iv) **Placement Method:** Yet another method to float new issues of capital is the placing method defined by London Stock Exchange as "sale by an issue house or broker to their own clients of securities which have been previously purchased or subscribed". Under this method, securities are acquired by the issuing houses, as in offer for sale method, but instead of being subsequently offered to the public, they are placed with the clients of the issuing houses, both individual and institutional investors. Each issuing house has a list of large private and institutional investors who are always prepared to subscribe to any securities which are issued in this manner. Its procedure is the same with the only difference of ultimate investors.

In this method, no formal underwriting of the issue is required as the placement itself amounts to underwriting since the issuing houses agree to place the issue with their clients.
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The main advantage of placing, as a method issuing new securities, is its relative cheapness. There is a cost cutting on account of underwriting commission, expense relating to applications, allotment of shares and the stock exchange requirements relating to contents of the prospectus and its advertisement. This method is generally adopted by small companies with unsatisfactory financial performances.

Its weakness arises from the point of view of distribution of securities. As the securities are offered only to a select group of investors, it may lead to the concentration of shares into a few hands who may create artificial scarcity of scrips in times of hectic dealings in such shares in the market.

(v) Rights Issue: This method can be used only by the existing companies. In the case of companies whose shares are already listed and widely-held, shares can be offered to the existing shareholders. This is called rights issue. Under this method, the existing shareholders are offered the right to subscribe to new shares in proportion to the number of shares they already hold. This offer is made by circular to ‘existing shareholders’ only. The chief merit of right issue is that it is an inexpensive method.

9.1.2 Preference Shares: These shares form part of the share capital of the company which carry a preferential right to be paid in case a company goes bankrupt or is liquidated. They do not have voting rights but have a higher claim on the assets and earnings of the company. A preference share may also sometimes be convertible partly/fully into equity shares/debentures at a certain ratio during a specified period.

9.2 Debentures/ Bonds: A bond is a long-term debt security. It represents “debt” in that the bond buyer actually lends the face amount to the bond issuer. The certificate itself is evidence of a lender-creditor relationship. It is a “security” because unlike a car loan or home-improvement loan, the debt can be bought and sold in the open market. In fact, a bond is a loan intended to be bought and sold. Debt securities with maturities below one year are called bills, notes or other terms. Usually the bond have a duration of 5 years or more. Since bonds are intended to be bought and sold, all the certificates of a bond issue contain a master loan agreement. This agreement between issuer and investor (or creditor and lender), called the ‘bond indenture” or “deed of trust,” contains all the information you would normally expect to see in any loan agreement, including the following:

- **Amount of the Loan**: The “face amount” “par value” or “principal” is the amount of the loan - the amount that the bond issuer has agreed to repay at the bond’s maturity.

- **Rate of Interest**: Bonds are issued with a specified “coupon” or “nominal” rate, which is determined largely by market conditions at the time of the bond’s primary offering. Once determined, it is set contractually for the life of the bond. The amount of the interest payment can be easily calculated by multiplying the rate of interest (or coupon) by the face value of the bond. For instance, a bond with a face amount of ₹ 1000 and a coupon of 8% pays the bondholder ₹ 80 a year.

- **Schedule or Form of Interest Payments**: Interest is paid on most bonds at six-month intervals, usually on either the first or the fifteenth of the month. The ₹ 80 of annual
interest on the bond in the previous example would probably be paid in two installments of ₹ 40 each.

- **Term:** A bond’s maturity or the length of time until the principal is repaid varies greatly but is always more than five years. Debt that matures in less than a year is a “money market instrument” - such as commercial paper or bankers’ acceptances. A “short-term bond,” on the other hand, may have an initial maturity of five years. A “long-term bond” typically matures in 20 to 40 years. The maturity of any bond is predetermined and stated in the trust indenture.

- **Call Feature (if any):** A “call feature,” if specified in the trust indenture, allows the bond issuer to “call in” the bonds and repay them at a predetermined price before maturity. Bond issuers use this feature to protect themselves from paying more interest than they have to for the money they are borrowing. Companies call in bonds when general interest rates are lower than the coupon rate on the bond, thereby retiring expensive debt and refinancing it at a lower rate.

Suppose IDBI had issued 6 years ₹ 1000 bonds in 1998 @14% pa. But now the current interest rate is around 9% to 10%. If the issuer wants to take advantage of the call feature in the bond’s indenture it will call back the earlier issued bonds and reissue them @9% p.a. The sale proceeds of this new issue will be used to pay the old debt. In this way IDBI now enjoys a lower cost for its borrowed money.

Some bonds offer “call protection”; that is, they are guaranteed not to be called for five to ten years. Call features can affect bond values by serving as a ceiling for prices. Investors are generally unwilling to pay more for a bond than its call price, because they are aware that the bond could be called at a lower call price. If the bond issuer exercises the option to call bonds, the bond holder is usually paid a premium over par for the inconvenience.

- **Refunding:** If, when bonds mature, the issuer does not have the cash on hand to repay bondholders; it can issue new bonds and use the proceeds either to redeem the older bonds or to exercise a call option. This process is called refunding.

**Note:** The valuation aspects of Bond/Debenture have been covered in forthcoming chapter of Security Analysis.

10. Derivatives

Derivative is a product whose value is to be derived from the value of one or more basic variables called bases (underlying assets, index or reference rate). The underlying assets can be Equity, Forex, and Commodity.

The underlying has a marketable value which is subject to market risks. The importance of underlying in derivative instruments is as follows:

- All derivative instruments are dependent on an underlying to have value.
- The change in value in a forward contract is broadly equal to the change in value in the underlying.
In the absence of a valuable underlying asset the derivative instrument will have no value.

On maturity, the position of profit/loss is determined by the price of underlying instruments. If the price of the underlying is higher than the contract price the buyer makes a profit. If the price is lower, the buyer suffers a loss.

Main users of Derivatives are as follows:

<table>
<thead>
<tr>
<th>Users</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Corporation</td>
<td>To hedge currency risk and inventory risk</td>
</tr>
<tr>
<td>(b) Individual Investors</td>
<td>For speculation, hedging and yield enhancement.</td>
</tr>
<tr>
<td>(c) Institutional Investor</td>
<td>For hedging asset allocation, yield enhancement and to avail arbitrage opportunities.</td>
</tr>
<tr>
<td>(d) Dealers</td>
<td>For hedging position taking, exploiting inefficiencies and earning dealer spreads.</td>
</tr>
</tbody>
</table>

Before discussing the different derivatives, you should understand the various risks associated with them. The different types of derivative risks are:

(a) **Credit risk:** Credit risk is the risk of loss due to counterparty’s failure to perform on an obligation to the institution. Credit risk in derivative products comes in two forms:

   (i) **Pre-settlement risk:** It is the risk of loss due to a counterparty defaulting on a contract during the life of a transaction. The level of exposure varies throughout the life of the contract and the extent of losses will only be known at the time of default.

   (ii) **Settlement risk:** It is the risk of loss due to the counterparty's failure to perform on its obligation after an institution has performed on its obligation under a contract on the settlement date. Settlement risk frequently arises in international transactions because of time zone differences. This risk is only present in transactions that do not involve delivery versus payment and generally exists for a very short time (less than 24 hours).

(b) **Market risk:** Market risk is the risk of loss due to adverse changes in the market value (the price) of an instrument or portfolio of instruments. Such exposure occurs with respect to derivative instruments when changes occur in market factors such as underlying interest rates, exchange rates, equity prices, and commodity prices or in the volatility of these factors.

(c) **Liquidity risk:** Liquidity risk is the risk of loss due to failure of an institution to meet its funding requirements or to execute a transaction at a reasonable price. Institutions involved in derivatives activity face two types of liquidity risk: market liquidity risk and funding liquidity risk.
(i) **Market liquidity risk:** It is the risk that an institution may not be able to exit or offset positions quickly, and in sufficient quantities, at a reasonable price. This inability may be due to inadequate market depth in certain products (e.g. exotic derivatives, long-dated options), market disruption, or inability of the bank to access the market (e.g. credit down-grading of the institution or of a major counterparty).

(ii) **Funding liquidity risk:** It is the potential inability of the institution to meet funding requirements, because of cash flow mismatches, at a reasonable cost. Such funding requirements may arise from cash flow mismatches in swap books, exercise of options, and the implementation of dynamic hedging strategies.

(d) **Operational risk:** Operational risk is the risk of loss occurring as a result of inadequate systems and control, deficiencies in information systems, human error, or management failure.

(e) **Legal risk:** Legal risk is the risk of loss arising from contracts which are not legally enforceable (e.g. the counterparty does not have the power or authority to enter into a particular type of derivatives transaction) or documented correctly.

(f) **Regulatory risk:** Regulatory risk is the risk of loss arising from failure to comply with regulatory or legal requirements.

(g) **Reputation risk:** Reputation risk is the risk of loss arising from adverse public opinion and damage to reputation.

The basic differences between Cash and the Derivative market are enumerated below:

(a) In cash market tangible assets are traded whereas in derivative market contracts based on tangible or intangibles assets like index or rates are traded.

(b) In cash market, we can purchase even one share whereas in Futures and Options minimum lots are fixed.

(c) Cash market is more risky than Futures and Options segment because in “Futures and Options” risk is limited upto 20%.

(d) Cash assets may be meant for consumption or investment. Derivative contracts are for hedging, arbitrage or speculation.

(e) The value of derivative contract is always based on and linked to the underlying security. However, this linkage may not be on point-to-point basis.

(f) In the cash market, a customer must open securities trading account with a securities depository whereas to trade futures a customer must open a future trading account with a derivative broker.
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(g) Buying securities in cash market involves putting up all the money upfront whereas buying futures simply involves putting up the margin money.

(h) With the purchase of shares of the company in cash market, the holder becomes part owner of the company. While in future it does not happen.

The most important derivatives are forward, futures and options. Here we will discuss derivatives as financial derivatives and embedded derivatives.

10.1 Forward Contract: Consider a Punjab farmer who grows wheat and has to sell it at a profit. The simplest and the traditional way for him is to harvest the crop in March or April and sell in the spot market then. However, in this way the farmer is exposing himself to risk of a downward movement in the price of wheat which may occur by the time the crop is ready for sale.

In order to avoid this risk, one way could be that the farmer may sell his crop at an agreed-upon rate now with a promise to deliver the asset, i.e., crop at a pre-determined date in future. This will at least ensure to the farmer the input cost and a reasonable profit.

Thus, the farmer would sell wheat forward to secure himself against a possible loss in future. It is true that by this way he is also foreclosing upon him the possibility of a bumper profit in the event of wheat prices going up steeply. But then, more important is that the farmer has played safe and insured himself against any eventuality of closing down his source of livelihood altogether. The transaction which the farmer has entered into is called a forward transaction and the contract which covers such a transaction is called a forward contract.

A forward contract is an agreement between a buyer and a seller obligating the seller to deliver a specified asset of specified quality and quantity to the buyer on a specified date at a specified place and the buyer, in turn, is obligated to pay to the seller a pre-negotiated price in exchange of the delivery.

This means that in a forward contract, the contracting parties negotiate on, not only the price at which the commodity is to be delivered on a future date but also on what quality and quantity to be delivered and at what place. No part of the contract is standardized and the two parties sit across and work out each and every detail of the contract before signing it.

For example, in case a gold bullion forward contract is being negotiated between two parties, they would negotiate each of the following features of the contract:

- the weight of the gold bullion to be delivered,
- the fineness of the metal to be delivered,
- the place at which the delivery is to be made,
- the period after which the delivery is to be made, and
- the price which the buyer would pay.

Suppose a buyer L and a seller S agrees to do a trade in 100 tolas of gold on 31 Dec 2013 at ₹ 30,000/tola. Here, ₹ 30,000/tola is the ‘forward price of 31 Dec 2013 Gold’. The buyer L is said to be long and the seller S is said to be short. Once the contract has been entered into, L
is obligated to pay ₹ 30 lakhs on 31 Dec 2013, and take delivery of 100 tolas of gold. Similarly, S is obligated to be ready to accept ₹ 30 lakhs on 31 Dec 2013, and give 100 tolas of gold in exchange.

10.2 Future Contract: A futures contract is an agreement between two parties that commits one party to buy an underlying financial instrument (bond, stock or currency) or commodity (gold, soybean or natural gas) and one party to sell a financial instrument or commodity at a specific price at a future date. The agreement is completed at a specified expiration date by physical delivery or cash settlement or offset prior to the expiration date. In order to initiate a trade in futures contracts, the buyer and seller must put up "good faith money" in a margin account. Regulators, commodity exchanges and brokers doing business on commodity exchanges determine margin levels.

Suppose A buyer “B” and a Seller “S” enter into a 5,000 kgs corn futures contract at ₹ 5 per kg. Assuming that on the second day of trading the settlement price (settlement price is generally the representative price at which the contracts trade during the closing minutes of the trading period and this price is designated by a stock exchange as the settlement price). In case the price movement during the day is such that the price during the closing minutes is not the representative price, the stock exchange may select a price which it feels is close to being a representative price, e.g., average of the high and low prices which have occurred during a trading day) of March corn is ₹ 5.20 per kg. This price movement has led to a loss of ₹ 1,000 to S while B has gained the corresponding amount.

Thus, the initial margin account of S gets reduced by ₹ 1,000 and that of B is increased by the same amount. While the margin accounts, also called the equity of the buyer and the seller, get adjusted at the end of the day in keeping with the price movement, the futures contract gets replaced with a new one at a price which has been used to make adjustments to the buyer and seller’s equity accounts. In this case, the settlement price is ₹ 5.20, which is the new price at which next day’s trading would start for this particular futures contract. Thus, each future contract is rolled over to the next day at a new price. This is called marking-to-market.

Difference between forward and future contract is as follows:

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Features</th>
<th>Forward</th>
<th>Futures</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Trading</td>
<td>Forward contracts are traded on personal basis or on</td>
<td>Futures Contracts are traded in a competitive arena.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>telephone or otherwise.</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Size of Contract</td>
<td>Forward contracts are individually tailored and have no</td>
<td>Futures contracts are standardized in terms of quantity</td>
</tr>
<tr>
<td></td>
<td></td>
<td>standardized size.</td>
<td>or amount as the case may be.</td>
</tr>
<tr>
<td>3.</td>
<td>Organized exchanges</td>
<td>Forward contracts are traded in an over the counter</td>
<td>Futures contracts are traded on organized exchanges</td>
</tr>
<tr>
<td></td>
<td></td>
<td>market.</td>
<td>with a designated physical location.</td>
</tr>
<tr>
<td>4.</td>
<td>Settlement</td>
<td>Forward contracts settlement takes place on the date</td>
<td>Futures contracts settlements are made daily via.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>agreed</td>
<td>Exchange’s</td>
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</tbody>
</table>
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<table>
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<tbody>
<tr>
<td>5.</td>
<td>Delivery date</td>
<td>Forward contracts may be delivered on the dates agreed upon and in terms of actual delivery.</td>
</tr>
<tr>
<td>6.</td>
<td>Transaction costs</td>
<td>Cost of forward contracts is based on bid – ask spread.</td>
</tr>
<tr>
<td>7.</td>
<td>Marking to market</td>
<td>Forward contracts are not subject to marking to market.</td>
</tr>
<tr>
<td>8.</td>
<td>Margins</td>
<td>Margins are not required in forward contract.</td>
</tr>
<tr>
<td>9.</td>
<td>Credit risk</td>
<td>In forward contract, credit risk is born by each party and, therefore, every party has to bother for the creditworthiness.</td>
</tr>
</tbody>
</table>

10.3 Pricing/ Valuation of Forward/ Future Contracts: The difference between the prevailing spot price of an asset and the futures price is known as the basis, i.e.,

\[
\text{Basis} = \text{Spot price} - \text{Futures price}
\]

In a normal market, the spot price is less than the futures price (which includes the full cost-of-carry) and accordingly the basis would be negative. Such a market, in which the basis is decided solely by the cost-of-carry is known as a Contango market.

Basis can become positive, i.e., the spot price can exceed the futures price only if there are factors other than the cost of carry to influence the futures price. In case this happens, then basis becomes positive and the market under such circumstances is termed as a backwardation market or inverted market.

Basis will approach zero towards the expiry of the contract, i.e., the spot and futures prices converge as the date of expiry of the contract approaches. The process of the basis approaching zero is called convergence.

The relationship between futures prices and cash prices is determined by the cost-of-carry. However, there might be factors other than cost-of-carry, especially in stock futures in which
there may be various other returns like dividends, in addition to carrying costs, which may influence this relationship.

The cost-of-carry model in for futures, is as under:

Future price = Spot price + Carrying cost – Returns (dividends, etc).

Let us take an example to understand this relationship.

Example

The price of ACC stock on 31 December 2010 was ₹ 220 and the futures price on the same stock on the same date, i.e., 31 December 2010 for March 2011 was ₹ 230. Other features of the contract and related information are as follows:

Time to expiration - 3 months (0.25 year)

Borrowing rate - 15% p.a.

Annual Dividend on the stock - 25% payable before 31.03. 2011

Face Value of the Stock - ₹ 10

Based on the above information, the futures price for ACC stock on 31 December 2010 should be:

\[
= 220 + (220 \times 0.15 \times 0.25) – (0.25 \times 10) = 225.75
\]

Thus, as per the 'cost of carry' criteria, the futures price is ₹ 225.75, which is less than the actual price of ₹ 230 on 31 March 2011. This would give rise to arbitrage opportunities and consequently the two prices will tend to converge.

How Will The Arbitrager Act?

He will buy the ACC stock at ₹ 220 by borrowing the amount @ 15% for a period of 3 months and at the same time sell the March 2011 futures on ACC stock. By 31st March 2011, he will receive the dividend of ₹ 2.50 per share. On the expiry date of 31st March, he will deliver the ACC stock against the March futures contract sales.

The arbitrager's inflows/outflows are as follows:

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sale proceeds of March 2011 futures</td>
<td>₹ 230.00</td>
</tr>
<tr>
<td>Dividend</td>
<td>₹ 2.50</td>
</tr>
<tr>
<td><strong>Total (A)</strong></td>
<td>₹ 232.50</td>
</tr>
<tr>
<td>Pays back the Bank</td>
<td>₹ 220.00</td>
</tr>
<tr>
<td>Cost of borrowing</td>
<td>₹ 8.25</td>
</tr>
<tr>
<td><strong>Total (B)</strong></td>
<td>₹ 228.25</td>
</tr>
<tr>
<td>Balance (A) – (B)</td>
<td>₹ 4.25</td>
</tr>
</tbody>
</table>

Thus, the arbitrager earns ₹ 4.25 per share without involving any risk.
In financial forward contracts, the cost of carry is primarily the interest cost.

Let us take a very simple example of a fixed deposit in the bank. ₹ 100 deposited in the bank at a rate of interest of 10% would be come ₹ 110 after one year. Based on annual compounding, the amount will become ₹ 121 after two years. Thus, we can say that the forward price of the fixed deposit of ₹ 100 is ₹ 110 after one year and ₹ 121 after two years.

As against the usual annual, semi-annual and quarterly compounding, which the reader is normally used to, continuous compounding are used in derivative securities. In terms of the annual compounding, the forward price can be computed through the following formula:

\[ A = P \left(1 + \frac{r}{100}\right)^t \]

Where, \(A\) is the terminal value of an amount \(P\) invested at a rate of interest of \(r\) % p.a. for \(t\) years.

However, in case there are multiple compounding in a year, say \(n\) times per annum, then the above formula will read as follows:

\[ A = P \left(1 + \frac{r}{n}\right)^{nt} \]

And in case the compounding becomes continuous, i.e., more than daily compounding, the above formula can be simplified mathematically and rewritten as follows:

\[ A = Pe^{rn} \]

Where \(e\), called epsilon, is a mathematical constant and has a value of 2.72. This function is available in all mathematical calculators and is easy to handle.

The above formula gives the future value of an amount invested in a particular security now. In this formula, we have assumed no interim income flow like dividends etc

**Example**

Consider a 3 month maturity forward contract on a non-dividend paying stock. The stock is available for ₹ 200. With compounded continuously risk-free rate of interest (CCRRI) of 10 % per annum, the price of the forward contract would be:

\[ A = 200 \times e^{0.25(0.10)} = ₹ 205.06 \]

In case there is cash income accruing to the security like dividends, the above formula will read as follows:

\[ A = (P-I)e^{nr} \]

Where \(I\) is the present value of the income flow during the tenure of the contract.

**Example**

Consider a 4 month forward contract on 500 shares with each share priced at ₹ 75. Dividend @ ₹ 2.50 per share is expected to accrue to the shares in a period of 3 months. The CCRRI is 10% p.a. The value of the forward contract is as follows:

\[ \text{Dividend proceeds} = 500 \times 2.50 = 1250 = 1250e^{0.075} = 1219.13 \]
Value of forward contract = \((500 \times 75 – 1219.13) e^{(4/12)(0.10)}\)
\[ = 36280.87 \times e^{0.033} \]
\[ = \₹ 37498.11 \]

However, in case the income accretion to the securities is in the form of percentage yield, \(y\), as in the case of stock indices arising on account of dividend accruals to individual stocks constituting the index, the above formula will read as follows:

\[ A = Pe^{n(r – y)} \]

**Example**

Consider the following:

- Current value of index: 1400
- Dividend yield: 6%
- CCRRI: 10%

To find the value of a 3 month forward contract.

\[ A = Pe^{n(r – y)} \]
\[ = 1400 \times e^{(3/12)(0.10 – 0.06)} = \₹ 1,414 \]

**Correlation between Forward and Futures Prices**

For contracts of the same maturity, the forward and futures contracts tend to have the same value subject to the interest rates remaining fixed. In case the interest rates are fluid, the value of a futures contract would differ from that of a forward contract because the cash flows generated from marking to the market in the case of the former would be available for reinvestment at variable rates on a day-to-day basis. However, market imperfections like transaction costs, taxes and asset indivisibilities bring futures prices close enough to the forward prices to safely assume the two prices to be practically the same.

**10.4 Types of futures contracts**

**10.4.1 Single Stock Futures**: A single stock futures contract is an agreement to buy or sell shares or stock such as Microsoft, Intel, ITC, or Tata Steel at a point in the future. The buyer has an obligation to purchase shares or stock and the seller has an obligation to sell shares or stock at a specific price at a specific date in the future. Thus a stock futures contract is a standardized contract to buy or sell a specific stock at a future date at an agreed price. Single-stock futures contracts are completed via offset or the delivery of actual shares at expiration. Margin on a single-stock futures contract is expected normally to be 20% of notional value.

Each Stock Future contract is standardized and includes basic specifications.

The terms of the contract call for delivery of the stock by the seller at some time specified in the future. However, most contracts are not held to expiration. The contracts are standardized, making them highly liquid. To get out of an open long (buying) position, the investor simply
takes an offsetting short position (sells). Conversely, if an investor has sold (short) a contract and wishes to close it out, he or she buys (goes long) the offsetting contract.

**10.4.2 Index Futures:** A contract for stock index futures is based on the level of a particular stock index such as the S&P 500 or the Dow Jones Industrial Average or NIFTY or BSE sensex. The agreement calls for the contract to be bought or sold at a designated time in the future. Just as hedgers and speculators buy and sell futures contracts based on future prices of individual stocks they may—for mostly the same reasons—buy and sell such contracts based on the level of a number of stock indexes.

Stock index futures may be used to either speculate on the equity market’s general performance or to hedge a stock portfolio against a decline in value. Unlike commodity futures or individual stocks, stock index futures are not based on tangible goods, thus all settlements are in cash. Because settlements are in cash, investors usually have to meet liquidity or income requirements to show that they have money to cover their potential losses.

Stock index futures are traded in terms of number of contracts. Each contract is to buy or sell a fixed value of the index. The value of the index is defined as the value of the index multiplied by the specified monetary amount. In Nifty 50 futures contract traded at the National Stock Exchange, the contract specification states:

1 Contract = 50 units of Nifty 50 * Value of Nifty 50

If we assume that Nifty 50 is quoting at 8000, the value of one contract will be equal to ₹ 4,00,000 (50*8000). The contract size of 50 units of Nifty 50 in this case is fixed by National Stock Exchange where the contract is traded.

**Example**

Consider the following:

- Current value of index - 1400
- Dividend yield - 6%
- CCRRI - 10%

To find the value of a 3 month forward contract.

\[ A = P_0 e^{(r-y)F} \]

\[ = 1400 \times e^{(0.10 - 0.06)(3/12)} = ₹ 1,414 \]

**10.4.3 Trading Mechanism in Stock Futures:** While trading in futures contracts (both stock as well as futures) both buyers and sellers of the contract have to deposit an initial margin with their brokers based on the value of contract entered. The rules for calculation of margins to be deposited with the brokers are framed by the stock exchanges.

Another major feature regarding the margin requirements for stock as well index futures is that the margin requirement is continuous. Every business day, the broker will calculate the margin requirement for each position. The investor will be required to post additional margin funds if the account does not meet the minimum margin requirement.
The investor can square off his position in the futures contract before expiry or wait till expiry date when the contracts will automatically stand as squared off at the closing price on the expiry date. In Indian stock market the expiry date is the last Thursday of the relevant month to which the future contract belongs.

**Example – Margin Requirements**

In a stock future contract on ITC stock at ₹ 120, both the buyer and seller have a margin requirement of 20% or ₹ 2400. If ITC stock goes up to ₹ 122, the account of the long contract is credited with ₹ 200 (₹ 122-₹ 120 = ₹ 2 X 100 = ₹ 200) and the account of the seller (seller) is debited by the same ₹ 200. This indicates that investors in futures must be very vigilant - they must keep close track of market movements.

**10.4.4 Purpose of Trading in Futures:** Trading in futures is for two purposes namely:

(a) Speculation and

(b) Hedging

(a) Speculation – For simplicity we will assume that one contract= 100 units and the margin requirement is 20% of the value of contract entered. Brokerage and transaction costs are not taken into account.

**Example- Going Long on a Single Stock Futures Contract**

Suppose an investor is bullish on McDonald's (MCD) and goes long on one September stock future contract on MCD at ₹ 80. At some point in the near future, MCD is trading at ₹ 96. At that point, the investor sells the contract at ₹ 96 to offset the open long position and makes a ₹ 1600 gross profit on the position.

This example seems simple, but let's examine the trades closely. The investor's initial margin requirement was only ₹ 1600 (₹ 80 x 100 = ₹ 8,000 x 20% = ₹ 1600). This investor had a 100% return on the margin deposit. This dramatically illustrates the leverage power of trading futures. Of course, had the market moved in the opposite direction, the investor easily could have experienced losses in excess of the margin deposit.

The pay off table for the above transaction can be depicted as follows:-

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Details</th>
<th>Inflow/(outflow)(In ₹)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Payoff - Margin (Refundable at maturity)</td>
<td>₹ 8000 x 20% = ₹ 1600</td>
<td>(₹ 1600)</td>
</tr>
<tr>
<td>Pay off upon squaring off the contract</td>
<td>Profit (₹ 96 - ₹ 80)x100=₹ 1600</td>
<td>₹ 3200</td>
</tr>
<tr>
<td>Net Payoff</td>
<td></td>
<td>₹ 1600</td>
</tr>
</tbody>
</table>

**Example- Going Short on a Single Stock Futures Contract**

An investor is bearish in Kochi Refinery (KR) stock for the near future and goes short an August stock future contract on KR at ₹ 160. KR stock performs as the investor had guessed
and drops to ₹ 140 in July. The investor offsets the short position by buying an August stock future at ₹ 140. This represents a gross profit of ₹ 20 per share, or a total of ₹ 2,000.

Again, let's examine the return the investor had on the initial deposit. The initial margin requirement was ₹ 3,200 (₹ 160 x 100 = ₹ 16,000 x 20% = ₹ 3,200) and the gross profit was ₹ 2,000. The return on the investor's deposit was more than 60% - a terrific return on a short-term investment.

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Details</th>
<th>Inflow/(outflow)(In ₹)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Payoff - Margin (Refundable at maturity)</td>
<td>₹ 160x100x20% = ₹ 3200</td>
<td>(₹ 3200)</td>
</tr>
<tr>
<td>Pay off upon squaring off the contract</td>
<td>Profit (₹ 160 - ₹ 140) x 100 = ₹ 2000 Initial Margin= ₹ 3200</td>
<td>₹ 5200</td>
</tr>
<tr>
<td>Net Payoff</td>
<td></td>
<td>₹ 2000</td>
</tr>
</tbody>
</table>

**Example - Going Long on an Index Futures Contract**

Suppose an investor has a bullish outlook for Indian market for the month of October 2014. He will go for a long position on October 2014 Nifty Index Future Contract. Assuming that he enters into long positions when Nifty is trading at 8000 and one month later he squares off his position when the value of Nifty rises to 8500 his payoff will be as under. (Assuming that one contract= 50 units of Nifty and margin requirement is 20% of the value of the contract)

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Details</th>
<th>Inflow/(outflow)(In ₹)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Payoff - Margin (Refundable at maturity)</td>
<td>(8000x 50x20%)=₹ 80,000</td>
<td>(₹ 80,000)</td>
</tr>
<tr>
<td>Pay off upon squaring off the contract</td>
<td>Profit (8500- 8000)x50= ₹ 25,000 Initial Margin= ₹ 80,000</td>
<td>₹ 1,05,000</td>
</tr>
<tr>
<td>Net Payoff</td>
<td></td>
<td>₹ 25,000</td>
</tr>
</tbody>
</table>

**Example - Going Short on an Index Futures Contract**

Suppose an investor has a bearish outlook for Indian banking sector for the month of October 2014. He will go for a short position for one October 2014 Bank Nifty Future Contract. Assuming that he enters into short positions when Bank Nifty is trading at 25000 and one month later he squares off his position when the value of Bank Nifty declines to 24000 his payoff will be as under. (Assuming that one contract=10 units of Bank Nifty and margin requirement is 20% of the value of the contract)

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Details</th>
<th>Inflow/(outflow)(In ₹)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Payoff – Margin (Refundable at maturity)</td>
<td>(25000x 10x20%)=₹ 50,000</td>
<td>(₹ 50,000)</td>
</tr>
<tr>
<td>Pay off upon squaring</td>
<td>Profit(25000-24000)x10= ₹ 10,000</td>
<td>₹ 60,000</td>
</tr>
</tbody>
</table>
(b) Hedging – Hedging is the practice of taking a position in one market to offset and balance against the risk adopted by assuming a position in a contrary or opposing market or investment. In simple language, hedging is used to reduce any substantial losses/gains suffered by an individual or an organization.

To hedge, the investor takes a stock future position exactly opposite to the stock position. That way, any losses on the stock position will be offset by gains on the future position.

Example- Using single stock future as a Hedge

Consider an investor who has bought 100 shares of Tata Steel (TS) at ₹ 300. In July, the stock is trading at ₹ 350. The investor is happy with the unrealized gain of ₹ 50 per share but is concerned that in a stock as volatile as TS, the gain could be wiped out in one bad day. The investor wishes to keep the stock at least until September, however, because of an upcoming dividend payment.

To hedge, the investor sells a ₹ 350 September stock future contract - whether the stock rises or declines, the investor has locked in the ₹ 50-per-share gain. In September on maturity date of the futures contract (last Thursday of September), the investor sells the stock at the market price and buys back the future contract.

The pay-off at various price levels of Tata Steel is as under:

<table>
<thead>
<tr>
<th>Particulars</th>
<th>September Closing price of Tata Steel= ₹ 300</th>
<th>September Closing price of Tata Steel= ₹ 350</th>
<th>September Closing price of Tata Steel= ₹ 400</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Payoff</td>
<td>₹ 300x100 = ₹ 30000</td>
<td>₹ 300x100 = ₹ 30000</td>
<td>₹ 300x100 = ₹ 30000</td>
</tr>
<tr>
<td>Cost of scrip in cash market</td>
<td>₹ 350x100x20% = ₹ 7000</td>
<td>₹ 350x100x20% = ₹ 7000</td>
<td>₹ 350x100x20% = ₹ 7000</td>
</tr>
<tr>
<td>Margin Payment on futures contract</td>
<td>₹ 37000</td>
<td>₹ 37000</td>
<td>₹ 37000</td>
</tr>
<tr>
<td>Total Initial Payoff (outflow)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pay-off at maturity (September end)</td>
<td>Sale proceeds of TS in cash market= ₹300x 100 = ₹ 30000</td>
<td>Sale proceeds of TS in cash market= ₹350x 100 = ₹ 35000</td>
<td>Sale proceeds of TS in cash market= ₹400x 100 = ₹ 40000</td>
</tr>
</tbody>
</table>
5.34 Strategic Financial Management

<table>
<thead>
<tr>
<th>Total Pay-off at maturity (Inflow)</th>
<th>Margin refund on futures contract = ₹ 7000</th>
<th>Margin refund on futures contract = ₹ 7000</th>
<th>Margin refund on futures contract = ₹ 7000</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Gain on futures contract(inflow) = (₹ 350-₹ 300)x100 = -₹ 5000</td>
<td>No profit /loss on futures contract = (₹ 350-₹ 350)x100 = ₹ 0</td>
<td>Loss on futures contract(outflow) = (₹ 350-₹ 400)x100 = -₹ 5000</td>
</tr>
<tr>
<td></td>
<td>₹ 42000</td>
<td>₹ 42000</td>
<td>₹ 42000</td>
</tr>
</tbody>
</table>

Net Payoff
- ₹ 5000
- ₹ 5000
- ₹ 5000

Hence it can be observed in the above table that in any case the investor has locked in a profit of ₹ 5000 via hedging.

In a similar manner as illustrated above index futures can also be used as a hedge. The difference would be that instead of single stock futures the investor would enter into a position into a Index Futures Contract according to the risk potential of the investor.

10.4.5 Marking to Market: It implies the process of recording the investments in traded securities (shares, debt-instruments, etc.) at a value, which reflects the market value of securities on the reporting date. In the context of derivatives trading, the futures contracts are marked to market on periodic (or daily) basis. Marking to market essentially means that at the end of a trading session, all outstanding contracts are repriced at the settlement price of that session. Unlike the forward contracts, the future contracts are repriced every day. Any loss or profit resulting from repricing would be debited or credited to the margin account of the broker. It, therefore, provides an opportunity to calculate the extent of liability on the basis of repricing. Thus, the futures contracts provide better risk management measure as compared to forward contracts.

Suppose on 1st day we take a long position, say at a price of ₹ 100 to be matured on 7th day. Now on 2nd day if the price goes up to ₹ 105, the contract will be repriced at ₹ 105 at the end of the trading session and profit of ₹ 5 will be credited to the account of the buyer. This profit of ₹ 5 may be drawn and thus cash flow also increases. This marking to market will result in three things – one, you will get a cash profit of ₹ 5; second, the existing contract at a price of ₹ 100 would stand cancelled; and third you will receive a new futures contract at ₹ 105. In essence, the marking to market feature implies that the value of the futures contract is set to zero at the end of each trading day.

10.4.6 Advantages of Stock Index Futures Trading over Stock Futures Trading: Stock index futures are most popular financial derivatives over stock futures due to following reasons:

1. It adds flexibility to one’s investment portfolio. Institutional investors and other large equity holders prefer this instrument in terms of portfolio hedging purpose. The stock systems do not provide this flexibility and hedging.
2. It creates the possibility of speculative gains using leverage. Because a relatively small amount of margin money controls a large amount of capital represented in a stock index contract, a small change in the index level might produce a profitable return if one is right about the direction of the market. Speculative gains in stock futures are limited but liabilities are greater.

3. Stock index futures are the most cost efficient hedging device whereas hedging through individual stock futures is costlier.

4. Stock index futures cannot be easily manipulated whereas individual stock price can be exploited more easily.

5. Since, stock index futures consists of many securities, so being an average stock, is much less volatile than individual stock price. Further, it implies much lower capital adequacy and margin requirements in comparison of individual stock futures. Risk diversification is possible under stock index future than in stock futures.

6. One can sell contracts as readily as one buys them and the amount of margin required is the same.

7. In case of individual stocks the outstanding positions are settled normally against physical delivery of shares. In case of stock index futures they are settled in cash all over the world on the premise that index value is safely accepted as the settlement price.

8. It is also seen that regulatory complexity is much less in the case of stock index futures in comparison to stock futures.

9. It provides hedging or insurance protection for a stock portfolio in a falling market.

Futures also have **disadvantages**. These include:

- **Risk**: An investor who is long in a stock can only lose what he or she has invested. In a stock future contract, there is the risk of losing significantly more than the initial investment (margin deposit).
- **No Stock-holder Privileges**: The future owner has no voting rights and no rights to dividends.
- **Requires Continued Vigilance on part of the investor**: Stock Futures are investments that require investors to monitor their positions more closely than many would like to do. Because future accounts are marked to the market every business day, there is the possibility that the brokerage firm might issue a margin call, requiring the investor to decide whether to quickly deposit additional funds or liquidate the position.

**10.4.7 Uses/Advantages of Stock Index Futures**: Investors can use stock index futures to perform myriad tasks. Some common uses are:

1. Investors commonly use stock index futures to change the weightings or risk exposures of their investment portfolios. A good example of this is investors who hold equities from two or more countries. Suppose these investors have portfolios invested in 60 percent U.S. equities and 40 percent Japanese equities and want to increase their systematic risk
in the U.S. market and reduce these risks to the Japanese market. They can do this by buying U.S. stock index futures contracts in the indexes underlying their holdings and selling Japanese contracts (in the Nikkei Index).

(2) Stock index futures also allow investors to separate market timing from market selection decisions. For instance, investors may want to take advantage of perceived immediate increases in an equity market but are not certain which securities to buy; they can do this by purchasing stock index futures. If the futures contracts are bought and the present value of the money used to buy them is invested in risk-free securities, investors will have a risk exposure equal to that of the market. Similarly, investors can adjust their portfolio holdings at a more leisurely pace. For example, assume the investors see that they have several undesirable stocks but do not know what holdings to buy to replace them. They can sell the unwanted stocks and, at the same time, buy stock index futures to keep their exposure to the market. They can later sell the futures contracts when they have decided which specific stocks they want to purchase.

(3) Investors can also make money from stock index futures through index arbitrage, also referred to as program trading. Basically, arbitrage is the purchase of a security or commodity in one market and the simultaneous sale of an equal product in another market to profit from pricing differences. Investors taking part in stock index arbitrage seek to gain profits whenever a futures contract is trading out of line with the fair price of the securities underlying it. Thus, if a stock index futures contract is trading above its fair value, investors could buy a basket of about 100 stocks composing the index in the correct proportion—such as a mutual fund comprised of stocks represented in the index—and then sell the expensively priced futures contract. Once the contract expires, the equities could then be sold and a net profit would result. While the investors can keep their arbitrage position until the futures contract expires, they are not required to. If the futures contract seems to be returning to fair market value before the expiration date, it may be prudent for the investors to sell early.

(4) Investors often use stock index futures to hedge the value of their portfolios. Provide hedging or insurance protection for a stock portfolio in a falling market. To implement a hedge, the instruments in the cash and futures markets should have similar price movements. Also, the amount of money invested in the cash and futures markets should be the same. To illustrate, while investors owning well-diversified investment portfolios are generally shielded from unsystematic risk (risk specific to particular firms), they are fully exposed to systematic risk (risk relating to overall market fluctuations). A cost-effective way for investors to reduce the exposure to systematic risk is to hedge with stock index futures, similar to the way that people hedge commodity holdings using commodity futures. Investors often use short hedges when they are in a long position in a stock portfolio and believe that there will be a temporary downturn in the overall stock market. Hedging transfers the price risk of owning the stock from a person unwilling to
accept systematic risks to someone willing to take the risk.

To carry out a short hedge, the hedger sells a futures contract; thus, the short hedge is also called a "sell-hedge."

Example

Consider investors who own portfolios of securities valued at $1.2 million with a dividend of 1 percent. The investors have been very successful with their stock picks. Therefore, while their portfolios' returns move up and down with the market, they consistently outperform the market by 6 percent. Thus, the portfolio would have a beta of 1.00 and an alpha of 6 percent. Say that the investors believe that the market is going to have a 15 percent decline, which would be offset by the 1 percent received from dividends. The net broad market return would be -14 percent but, since they consistently outperform the market by 6 percent, their estimated return would be -8 percent. In this instance, the investors would like to cut their beta in half without necessarily cutting their alpha in half. They can achieve this by selling stock index futures. In this scenario, the S&P 500 index is at 240. The contract multiplier is $500, and therefore each contract represents a value of $120,000. Since the investors want to simulate the sale of half of their $1.2 million portfolios, they must sell five contracts (5 × $120,000 = $600,000). Thus, their portfolios would be affected by only half of the market fluctuation. While the investors could protect their portfolios equally well by selling half of their shares of stock and buying them again at short time later, using a short hedge on stock index futures is much cheaper than paying the capital gains tax plus the broker commissions associated with buying and selling huge blocks of stock.

At the extreme, stock index futures can theoretically eliminate the effects of the broad market on a portfolio. Perfect hedges are very unusual because of the existence of basis risk. The basis is the difference between the existing price in the futures market and the cash price of the underlying securities. Basis risk occurs when changes in the economy and the financial situation have different impacts on the cash and futures markets.

(5) Stock index futures add flexibility to his or her portfolio as a hedging and trading instrument.

(6) Create the possibility of speculative gains using leverage. Because a relatively small amount of margin money controls a large amount of capital represented in a stock index contract, a small change in the index level might produce a profitable return on one's investment if he or she is right about the market's direction.

(7) Maintain one's stock portfolio during stock market corrections. One may not need "insurance" for all the time, but there are certain times when one would like less exposure to stocks. Yet, one doesn't want to sell off part of a stock portfolio that has taken him or her a long time to put together and looks like a sound, long-term investment program.
One of the major advantages of futures markets, in general, is that one can sell contracts as readily as he or she can buy them and the amount of margin required is the same. Mutual funds do not specialize in bear market approaches by short selling stocks but, and also it is not possible for individuals to short sell stocks in a falling market to make money.

Transfer risk quickly and efficiently. Whether one is speculating, looking for insurance protection (hedging), or temporarily substituting futures for a later cash transaction, most stock index futures trades can be accomplished quickly and efficiently. Many mutual funds require investors to wait until the end of the day to see at what price they were able to purchase or sell shares. With today's volatility, once-a-day pricing may not give one the maneuverability to take positions at exactly the time he or she wants. Stock index futures give individual the opportunity to get into or out of a position whenever he or she wants.

10.4.8 The Indian Scenario: In India, trading of NSE Nifty 50, CNX Stock Index and S&P CNX Nifty Index have become really popular.

(a) S&P CNX Nifty Index Futures: The NSE Nifty futures contract is a forward contract, which was traded on the National Stock Exchange (NSE) on June 12, 2000. The index futures contracts are based on the popular market benchmark S&P CNX Nifty index.

(i) Trading cycle: S&P CNX Nifty futures contracts have a maximum of 3-month trading cycle - the near month (one), the next month (two) and the far month (three). A new contract is introduced on the trading day following the expiry of the near month contract. The new contract will be introduced for a three month duration. This way, at any point in time, there will be 3 contracts available for trading in the market i.e., one near month, one mid month and one far month duration respectively.

(ii) Expiry day: S&P CNX Nifty futures contracts expire on the last Thursday of the expiry month. If the last Thursday is a trading holiday, the contracts expire on the previous trading day.

(iii) Trading Parameters/ Contract size: The value of the future contract may not be less than 2 lakhs at the time of introduction. The permitted lot size for future and option contract is the same for given underlying or such lot size as may be stipulated by Exchange from time to time.

Price steps: The price step in respect of S&P CNX Nifty futures contracts is Re.0.05.

Base Prices: Base price of S&P CNX Nifty futures contracts on the first day of trading would be theoretical futures price. The base price of the contracts on subsequent trading days would be the daily settlement price of the futures contracts.

Price bands: There are no day minimum/maximum price ranges applicable for S&P CNX Nifty futures contracts. However, in order to prevent erroneous order entry by trading members, operating ranges are kept at +/- 10 %.

Quantity freeze: Quantity Freeze for S&P CNX Nifty futures contracts would be 15,000 units or greater.
**Order type/Order book/Order attribute:** The different order types may be Regular lot order, Stop loss order, Immediate or cancel and Spread order.

(b) **S&P CNX NSE Nifty 50 Index:** It is a well diversified 50 stock index accounting for 24 sectors of the economy. The total traded value of all Nifty stocks is about 50% of the traded value of all stocks on the NSE. Nifty stocks represent about 60% of the total market capitalisation.

You can trade the 'entire stock market' instead of individual securities.

Index Futures are:
- Highly liquid
- Large intra-day price swings
- High leverage
- Low initial capital requirement
- Lower risk than buying and holding stocks
- Just as easy to trade the short side as the long side
- Only have to study one index instead of 100's of stocks

Index futures are settled in cash and therefore all problems related to bad delivery, forged, fake certificates, etc can be avoided. Since the index consists of many securities (50 securities) it is very difficult to manipulate the index.

You are required to pay a small fraction of the value of the total contract as margins. This means that trading in Stock Index Futures is a leveraged activity since the investor is able to control the total value of the contract with a relatively small amount of margin.

[Source: NSE Website]

### 11. Options

An Option may be understood as a privilege, sold by one party to another, that gives the buyer the right, but not the obligation, to buy (call) or sell (put) any underlying say stock, foreign exchange, commodity, index, interest rate etc. at an agreed-upon price within a certain period or on a specific date regardless of changes in underlying’s market price during that period.

The various kinds of stock options include put and call options, which may be purchased in anticipation of changes in stock prices, as a means of speculation or hedging. A put gives its holder an option to sell, or put, shares to another party at a fixed price even if the market price declines. A call gives the holder an option to buy, or call for, shares at a fixed price even if the market price rises.

#### 11.1 Stock Options:

Stock options involve no commitments on the part of the buyers of the option contracts individual to purchase or sell the stock and the option is usually exercised only if the price of the stock has risen (in case of call option) or fallen (in case of put option)
above the price specified at the time the option was given. One important difference between
corporation stocks and options is that stocks give you a small piece of ownership in the company, while
options are just contracts that give you the right to buy or sell the stock at a specific price by a
specific date. Investing in options provide limited risk, high potential reward and smaller
amount of capital required to control the same number of shares which can be done via
investing through cash market.

11.2 Stock Index Option: It is a call or put option on a financial index. Investors trading
index options are essentially betting on the overall movement of the stock market as
represented by a basket of stocks.

Index options can be used by the portfolio managers to limit their downside risk. Suppose the
value of the index is \( S \). Consider a manager in charge of a well-diversified portfolio which has
a \( \beta \) of 1.0 so that its value mirrors the value of the index. If for each 100\( S \) rupees in the
portfolio, the manager buys one put option contract with exercise price \( X \), the value of the
portfolio is protected against the possibility of the index falling below \( X \). For instance, suppose
that the manager’s portfolio is worth \( £ 10,00,000 \) and the value of the index is 10000. The
portfolio is worth 100 times the index. The manager can obtain insurance against the value of
the portfolio dropping below \( £ 900,000 \) in the next two months by buying 1 put option contracts
with a strike price of \( £ 9000 \). To illustrate how this would work, consider the situation where
the index drops to 8500. The portfolio will be worth \( £ 850000 \) (100 x 8500). However, the
payoff from the options will be 1 x (\( £ 9000 – £ 8500 \)) x 100 = \( £ 50000 \), bringing the total value
of the portfolio up to the insured value of \( £ 9,00,000 \).

11.3 Parties to the Options: There are always two types of entities for an option
transaction buyer and a seller (also known as writer of the option). So, for every call or put
option purchased, there is always someone else selling/buying it. When individuals sell
options, they effectively create a security that didn't exist before. This is known as writing an
option and explains one of the main sources of options, since neither the associated company
nor the options exchange issues options. When you write a call, you may be obligated to sell
shares at the strike price any time before the expiration date. When you write a put, you may
be obligated to buy shares at the strike price any time before expiration. The price of an
option is called its premium. The buyer of an option cannot lose more than the initial premium
paid for the contract, no matter what happens to the underlying security. So, the risk to the
buyer is never more than the amount paid for the option. The profit potential, on the other
hand, is theoretically unlimited.

11.4 Premium for Options: In return for the premium received from the buyer, the seller of
an option assumes the risk of having to deliver (if a call option) or taking delivery (if a put
option) of the shares of the stock. Unless that option is covered by another option or a position
in the underlying stock (opposite to the position taken via selling the option contracts), the
seller's loss can be unlimited, meaning the seller can lose much more than the original premium received.

11.5 Types of Options: You should be aware that there are two basic styles of options: American and European. An American, or American-style, option can be exercised at any time between the date of purchase and the expiration date. Most exchange-traded options are American style and all stock options are American style. A European, or European-style, option can only be exercised on the expiration date. In Indian Market options are European style options.

11.6 Pay-off scenarios: The possible pay-off under various scenarios is as follows:

(i) Pay-off for a Call Buyer: Also, called Long Call. For example, Mr. X buys a call option at strike price of ₹ 40 in exchange of a premium of ₹ 5. In case if actual price of the stock at the time of exercise is less than ₹ 40, Mr. X would not exercise his option his loss would be ₹ 5. Mr. X would exercise his option at any price above ₹ 40. In such situation his loss would start reducing and at the price of ₹ 45 there will be Break Even at the price of ₹ 45.

(ii) Pay-off for a Call Seller: Also, called Short Call. The pay-off profile of Call Seller shall be the mirror image of the Long Call as shown below in dotted line.
(iii) Pay-off for a Put Buyer: Also, called Long Put. For example, Mr. X buys a put option at strike price of ₹ 40 in exchange of a premium of ₹ 5. In case if actual price of the stock at the time of exercise is less than ₹ 40, Mr. X would exercise his option his gain would be (Spot Price – Exercise Price – Premium). Mr. X would exercise his option at any price below ₹ 40. The break-even Break Even price will be ₹ 35 and Mr. X would not exercise his option for any price above ₹ 40.

(iv) Pay-off for a Put Seller: Also, called Short Put. The pay-off profile of Put Seller shall be the mirror image of the Long Put as shown below in dotted line.
11.7 Comparison with Single Stock Futures: Investing in stock futures differs from investing in equity options contracts in several ways:

- **Nature**: In options, the buyer of the options has the right but not the obligation to purchase or sell the stock. However, while going in for a long futures position, the investor is obligated to square off his position at or before the expiry date of the futures contract.

- **Movement of the Market**: Options traders use a mathematical factor, the delta that measures the relationship between the options premium and the price of the underlying stock. At times, an options contract's value may fluctuate independently of the stock price. By contrast, the future contract will much more closely follow the movement of the underlying stock.

- **The Price of Investing**: When an options investor takes a long position, he or she pays a premium for the contract. The premium is often called a sunk cost. At expiration, unless the options contract is in the money, the contract is worthless and the investor has lost the entire premium. Stock future contracts require an initial margin deposit and a specific maintenance level of cash for mark to market margin.

11.8 Option Valuation Techniques: We have already been introduced to characteristics of both European and American Options. Assuming a European Call Option on a non-dividend paying stock it is easy to see that its value at expiration date shall either be zero or the difference between the market price and the exercise price, whichever is higher. It may be noted that the value of an Option cannot be negative. An investor is required to pay a premium for acquiring such an Option. In case this premium is less than the value of the Option, the investor shall make profits; however, in case the premium paid is more than the value, the investor shall end up losing money. Note that, while measuring these gains or losses, Time Value of Money and Transaction Costs have been ignored. The opposite picture emerges for the Writer.

**The Value of an Option with one period to expire**: Simply speaking, the theoretical value of an Option should be the difference between the current stock price and the exercise price. In case the stock price is less than the exercise price the theoretical value shall be zero.
However, as long as there is time to expiration it is possible for a zero theoretical value Option to have some actual positive Market value. This is because there may be a possibility of the stock price rising at which point of time the Option may be exercised advantageously.

11.8.1 Binomial Model: The binomial model breaks down the time to expiration into potentially a very large number of time intervals, or steps. This requires the use of probability and future discrete projections through which a tree of stock prices is initially produced working forward from the present to expiration.

To facilitate understanding we shall restrict ourselves to a European Option having a one year time branching process where at the end of the year there are only two possible values for the common stock. One is higher and the other lower than the current value. Assume that the probability of the two values to materialize is known. In such a situation, a hedged position can be established by buying the stock and by writing Options. This shall help offset price movements. At each step, it is assumed that the stock price will either move up or down. The pricing of the Options should be such that the return equals the risk-free rate.

The above mentioned is an example of Binomial Distribution. When the number of high and low value projections for the concerned stock are numerous, the tree shall represent all possible paths that the stock price could take during the life of the option.

At the end of the tree - i.e. at expiration of the option - all the terminal option prices for each of the final possible stock prices are known as they simply equal their intrinsic values.

The big advantage the binomial model has over the Black-Scholes model is that it can be used to accurately price American options. This is because with the binomial model it's possible to check at every point in an option's life (i.e. at every step of the binomial tree) for the possibility of early exercise (e.g. where, due to e.g. a dividend, or a put being deeply in the money the option price at that point is less than its intrinsic value).

Where an early exercise point is found it is assumed that the option holder would elect to exercise, and the option price can be adjusted to equal the intrinsic value at that point. This then flows into the calculations higher up the tree and so on.

Illustration 1

Following is a two-period tree for a share of stock in CAB Ltd.:

<table>
<thead>
<tr>
<th>Now</th>
<th>S1</th>
<th>One Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>33.00</td>
<td>36.30</td>
</tr>
<tr>
<td>27.00</td>
<td>29.70</td>
<td>24.30</td>
</tr>
</tbody>
</table>

Using the binomial model, calculate the current fair value of a regular call option on CAB Stock with the following characteristics: $X = ₹ 28$, Risk Free Rate = 5 percent. You should also indicate the composition of the implied riskless hedge portfolio at the valuation date.
Solution

\[ u = \frac{33.00}{30.00} = 36.30 \frac{33.00}{30.00} = 1.10 \quad d = \frac{27.00}{30.00} = 24.30 \frac{27.00}{30.00} = 0.90 \]

\[ r = (1 + 0.05)^{1/2} = 1.0247 \]

\[ p = \frac{r - d}{u - d} = \frac{0.1247}{0.20} = 0.6235 \]

\[ C_{uu} = \max[0, 36.30 - 28] = 8.30 \]
\[ C_{ud} = \max[0, 29.70 - 28] = 1.70 \]
\[ C_{dd} = \max[0, 24.30 - 28] = 0 \]

\[ Cu = \left( \frac{0.6235}{1.025} \right)(8.30) + \left( \frac{0.3765}{1.025} \right)(1.70) = 5.175 + 0.064 = 5.815/1.025 = 5.675 \]

\[ Cd = \left( \frac{0.6235}{1.025} \right)(1.70) + \left( \frac{0.3765}{1.025} \right)(0.00) = 1.05995 = 1.0340 \]

\[ Co = \left( \frac{0.6235}{1.025} \right)(5.675) + \left( \frac{0.3765}{1.025} \right)(1.0340) = 3.538 + 3.895 = 3.83 \]

\[ h = \frac{(33.00 - 27.00)}{(1.03 - 5.68)} = 6.00/4.65 = 1.29 \]

11.8.2 Risk Neutral Method: The "risk-neutral" technique can also be used to value derivative securities. It was developed by John Cox and Stephen Ross in 1976. The basic argument in the risk neutral approach is that since the valuation of options is based on arbitrage and is therefore independent of risk preferences; one should be able to value options assuming any set of risk preferences and get the same answer as by using Binomial Model. This is a simple model.

Example

Suppose the price of the share of Company X is ₹ 50. In one year it is expected either to go up to ₹ 60 or go down to ₹ 40. The risk free rate of interest is 5%.

Let p be the probability that the price will increase then (1-p) will be probability of price decrease. The value of the stock today must be equal to the present value of the expected price after one year discounted at risk-free rate as follows:
5.46 Strategic Financial Management

On solving we shall get the value of \( p = 0.65 \). With this value we can find out the present value of the expected payout as follows:

\[
10(0.65) + 0(1-0.65) = 6.19
\]

It may however be noted that the discounting can also be made on daily basis as shown in following illustration.

**Illustration 2**

The current market price of an equity share of Penchant Ltd is ₹ 420. Within a period of 3 months, the maximum and minimum price of it is expected to be ₹ 500 and ₹ 400 respectively. If the risk free rate of interest be 8% p.a., what should be the value of a 3 months Call option under the “Risk Neutral” method at the strike rate of ₹ 450? Given \( e^{0.02} = 1.0202 \)

**Solution**

Let the probability of attaining the maximum price be \( p \)

\[
(500 - 420) \times p + (400 - 420) \times (1-p) = 420 \times (e^{0.02} - 1)
\]

or, \( 80p - 20(1-p) = 420 \times 0.0202 \)

or, \( 80p - 20 + 20p = 8.48 \)

or, \( 100p = 28.48 \)

\( p = 0.2848 \)

The value of Call Option in ₹ = \( \frac{0.2848 \times (500 - 450)}{1.0202} = \frac{0.2848 \times 50}{1.0202} = 13.96 \)

**11.8.3 Black-Scholes Model:** The Black-Scholes model is used to calculate a theoretical price of an Option. The Black-Scholes price is nothing more than the amount an option writer would require as compensation for writing a call and completely hedging the risk of buying stock. The important point is that the hedger's view about future stock prices is irrelevant. Thus, while any two investors may strongly disagree on the rate of return they expect on a stock they will, given agreement to the assumptions of volatility and the risk-free rate, always agree on the fair value of the option on that underlying asset. This key concept underlying the valuation of all derivatives -- that fact that the price of an option is independent of the risk preferences of investors -- is called risk-neutral valuation. It means that all derivatives can be valued by assuming that the return from their underlying assets is the risk-free rate.

The model is based on a normal distribution of underlying asset returns.

The following assumptions accompany the model:

1. European Options are considered,
The original formula for calculating the theoretical option price (OP) is as follows:

\[ OP = S N(d_1) - X e^{-rt} N(d_2) \]

Where:

\[ d_1 = \frac{\ln \left( \frac{S}{X} \right) + \left( r + \frac{\sigma^2}{2} \right) t}{\sigma \sqrt{t}} \]
\[ d_2 = d_1 - \sigma \sqrt{t} \]

The variables are:

- \( S \) = current stock price
- \( X \) = strike price of the option
- \( t \) = time remaining until expiration, expressed as a percent of a year
- \( r \) = current continuously compounded risk-free interest rate
- \( \sigma \) = annual volatility of stock price (the standard deviation of the short-term returns over one year)

\( \ln \) = natural logarithm
\( N(x) \) = standard normal cumulative distribution function
\( e \) = the exponential function

**Understanding the formula**

\( N(d_1) \) represents the hedge ratio of shares of stock to Options necessary to maintain a fully hedged position.

Consider the Option holder as an investor who has borrowed an equivalent amount of the exercise price at interest rate \( r \). \( X e^{-rt} N(d_2) \) represents this borrowing which is equivalent to the present value of the exercise price times an adjustment factor of \( N(d_2) \)

The main advantage of the Black-Scholes model is speed -- it lets you calculate a very large number of option prices in a very short time.
The Black-Scholes model has one major limitation that it cannot be used to accurately price options with an American-style exercise as it only calculates the option price at one point of time -- at expiration. It does not consider the steps along the way where there could be the possibility of early exercise of an American option.

Illustration 3

(i) The shares of TIC Ltd. are currently priced at ₹ 415 and call option exercisable in three months’ time has an exercise rate of ₹ 400. Risk free interest rate is 5% p.a. and standard deviation (volatility) of share price is 22%. Based on the assumption that TIC Ltd. is not going to declare any dividend over the next three months, is the option worth buying for ₹ 25?

(ii) Calculate value of aforesaid call option based on Black Scholes valuation model if the current price is considered as ₹ 380.

(iii) What would be the worth of put option if current price is considered ₹ 380.

(iv) If TIC Ltd. share price at present is taken as ₹ 408 and a dividend of ₹ 10 is expected to be paid in the two months time, then, calculate value of the call option.

Solution

(i) Given: TIC Ltd. Current Price = ₹ 415

Exercise rate = 400

Risk free interest rate is = 5% p.a.

SD (Volatility) = 22%

Based on the above bit is calculated value of an option based on Black Scholes Model:

\[ d_1 = \frac{\ln\left(\frac{415}{400}\right) + \left[0.05 + \frac{1}{2}(0.22)^2\right] \times 0.25}{0.22 \sqrt{25}} = \frac{0.03681}{0.11} = 0.33465 \]

\[ d_2 = \frac{\ln\left(\frac{415}{400}\right) + \left[0.05 - \frac{1}{2}(0.22)^2\right] \times 0.25}{0.22 \sqrt{25}} = \frac{0.03681}{0.11} = 0.33465 \]

\[ N(d_1) = N(0.33465) = 1 - 0.372 = 0.628 \]

\[ N(d_2) = N(0.33465) = 1 - 0.372 = 0.628 \]

\[ \text{Value of Option} = 415 \times 0.628 \times e^{-0.05 \times 0.25} \times 0.628 = 287.512 \times 0.628 = 287.512 - 257.916 = ₹ 29.59 \]

NB : N(0.33465) can also be find as under :
Step 1: From table of area under normal curve find the area of variable 0.39 i.e. 0.6517.

Step 2: From table of area under normal curve find the area of variable 0.40.

Step 3: Find out the difference between above two variables and areas under normal curve.

Step 4: Using interpolation method find out the value of 0.00327. Which is as follows:

\[
\frac{0.0037}{0.01} \times 0.00327 = 0.0012
\]

Step 5: Add this value, computed above to the N(0.39). Thus N (0.39327) = 0.6517 + 0.0012 = 0.6529

Since market price of ₹ 25 is less than ₹ 27.60 (Block Scholes Valuation model) indicate that option is underpriced, hence worth buying.

(ii) If the current price is taken as ₹ 380 the computations are as follows:

\[
d_1 = \frac{\ln(\frac{380}{400}) + \left[0.05 + \frac{1}{2}(0.22)^2\right] \times 0.25}{0.22 \sqrt{0.25}} = \frac{-0.05129 + 0.01855}{0.11} = -0.297636
\]

\[
d_2 = \frac{\ln(\frac{380}{400}) + \left[0.05 - \frac{1}{2}(0.22)^2\right] \times 0.25}{0.22 \sqrt{0.25}} = \frac{-0.05129 + 0.00645}{0.11} = -0.407666
\]

\[
V_o = V_s \cdot N(d_1) - \frac{E}{e^{rt}} \cdot N(d_2)
\]

N(d_1) = N(-0.297636) = .3830

N(d_2) = N(-0.407666) = .3418

\[
380 \times (0.3830) - \frac{400}{e^{0.05} \times 0.25} \times (0.3418)
\]

\[
145.54 - \frac{400}{1.012578} \times (0.3418) = 145.54 - 138.4397 = ₹ 7.10
\]

(iii) Value of call option = ₹ 7.10

Current Market Value = ₹ 415

Present Value of Exercise Price = \[
\frac{400}{10125} = 395.06
\]

\[
V_p = -V_s + V_o + PV(E)
\]

\[
V_p = -380 + 7.10 + 395.06 = 22.16 = ₹ 22.16 \text{ Ans}
\]
(iv) Since dividend is expected to be paid in two months' time we have to adjust the share price and then use Black Scholes model to value the option:

Present Value of Dividend (using continuous discounting) = Dividend × $e^{-rt}$

\[
= ₹ 10 \times e^{-0.05 \times 0.1666} = ₹ 10 \times e^{-0.008333}
\]

\[
= ₹ 9.917 \text{ (Please refer Exponential Table)}
\]

Adjusted price of shares is ₹ 408 – 9.917 = ₹ 398.083

This can be used in Black Scholes model

\[
\begin{align*}
N(d_1) &= \Phi \left( \frac{\ln \left( \frac{398.083}{400} \right) + \left[ 0.05 + \frac{1}{2} (0.22)^2 \right] \times 0.25}{0.22 \times \sqrt{0.25}} \right) = \Phi \left( -0.00480 + 0.01855 \right) = 0.125 \\
N(d_2) &= \Phi \left( \frac{\ln \left( \frac{398.083}{400} \right) + \left[ 0.05 + \frac{1}{2} (0.22)^2 \right] \times 0.25}{0.22 \times \sqrt{0.25}} \right) = \Phi \left( -0.00480 + 0.00645 \right) = 0.015
\end{align*}
\]

Value of Option = 398.083 \times (0.5498) - \frac{400}{e^{(0.05 \times 0.25)}} \times (0.5060)

\begin{align*}
218.866 &- \frac{400}{e^{0.125}} \times (0.5060) = 218.866 - 199.8858 = ₹ 18.98
\end{align*}

11.9 Greeks: The Greeks are a collection of statistical values (expressed as percentages) that give the investor a better overall view of how a stock has been performing. These statistical values can be helpful in deciding what options strategies are best to use. The investor should remember that statistics show trends based on past performance. It is not guaranteed that the future performance of the stock will behave according to the historical numbers. These trends can change drastically based on new stock performance.

Before we discuss these statistical measures let us discuss the factors that affects the value of option as these statistical measures are related to changes in these factors.

Factors Affecting Value of an Option

There are a number of different mathematical formulae, or models, that are designed to compute the fair value of an option. You simply input all the variables (stock price, time, interest rates, dividends and future volatility), and you get an answer that tells you what an option should be worth. Here are the general effects the variables have on an option's price:
(a) **Price Movement of the Underlying**: The value of calls and puts are affected by changes in the underlying stock price in a relatively straightforward manner. When the stock price goes up, calls should gain in value and puts should decrease. Put options should increase in value and calls should drop as the stock price falls.

(b) **Time till expiry**: The option's future expiry, at which time it may become worthless, is an important and key factor of every option strategy. Ultimately, time can determine whether your option trading decisions are profitable. To make money in options over the long term, you need to understand the impact of time on stock and option positions.

With stocks, time is a trader's ally as the stocks of quality companies tend to rise over long periods of time. But time is the enemy of the options buyer. If days pass without any significant change in the stock price, there is a decline in the value of the option. Also, the value of an option declines more rapidly as the option approaches the expiration day. That is good news for the option seller, who tries to benefit from time decay, especially during that final month when it occurs most rapidly.

(c) **Volatility in Stock Prices**: Volatility can be understood via a measure called statistical (sometimes called historical) volatility, or SV for short. SV is a statistical measure of the past price movements of the stock; it tells you how volatile the stock has actually been over a given period of time.

But to give you an accurate fair value for an option, option pricing models require you to put in what the future volatility of the stock will be during the life of the option. Naturally, option traders don't know what that will be, so they have to try to guess. To do this, they work the options pricing model "backwards" (to put it in simple terms). After all, you already know the price at which the option is trading; you can also find the other variables (stock price, interest rates, dividends, and the time left in the option) with just a bit of research. So the only missing number is future volatility, which you can calculate from the equation.

(d) **Interest Rate**: Another feature which affects the value of an Option is the time value of money. The greater the interest rates, the present value of the future exercise price are less.

Now let us discuss these measures:

**11.9.1 Delta**: A by-product of the Black-Scholes model is the calculation of the delta. It is the degree to which an option price will move given a small change in the underlying stock price. For example, an option with a delta of 0.5 will move half a rupee for every full rupee movement in the underlying stock.

A deeply out-of-the-money call will have a delta very close to zero; a deeply in-the-money call will have a delta very close to 1.

The formula for a delta of a European call on a non-dividend paying stock is:

\[ \text{Delta} = N(d_1) \]  

(see Black-Scholes formula above for \(d_1\))

Call deltas are positive; put deltas are negative, reflecting the fact that the put option price and the underlying stock price are inversely related. The put delta equals the call delta - 1.
The delta is often called the hedge ratio: If you have a portfolio short ‘n’ options (e.g. you have written n calls) then n multiplied by the delta gives you the number of shares (i.e. units of the underlying) you would need to create a riskless position - i.e. a portfolio which would be worth the same whether the stock price rose by a very small amount or fell by a very small amount. In such a "delta neutral" portfolio any gain in the value of the shares held due to a rise in the share price would be exactly offset by a loss on the value of the calls written, and vice versa.

Note that as the delta changes with the stock price and time to expiration the number of shares would need to be continually adjusted to maintain the hedge. How quickly the delta changes with the stock price are given by gamma.

In addition to delta there are some other "Greeks" which some find useful when constructing option strategies.

11.9.2 Gamma: It measures how fast the delta changes for small changes in the underlying stock price. i.e. the delta of the delta. If you are hedging a portfolio using the delta-hedge technique described under "Delta", then you will want to keep gamma as small as possible, the smaller it is the less often you will have to adjust the hedge to maintain a delta neutral position. If gamma is too large, a small change in stock price could wreck your hedge. Adjusting gamma, however, can be tricky and is generally done using options.

11.9.3 Theta: The change in option price given a one day decrease in time to expiration. Basically, it is a measure of time decay. Unless you and your portfolio are travelling at close to the speed of light the passage of time is constant and inexorable. Thus, hedging a portfolio against time decay, the effects of which are completely predictable, would be pointless.

11.9.4 Rho: The change in option price given a one percentage point change in the risk-free interest rate. It is sensitivity of option value to change in interest rate. Rho indicates the absolute change in option value for a one percent change in the interest rate. For example, a Rho of .060 indicates the option’s theoretical value will increase by .060 if the interest rate is decreased by 1.0.

11.9.5 Vega: Sensitivity of option value to change in volatility. Vega indicates an absolute change in option value for a one percent change in volatility. For example, a Vega of .090 indicates an absolute change in the option’s theoretical value will increase by .090 if the volatility percentage is increased by 1.0 or decreased by .090 if the volatility percentage is decreased by 1.0. Results may not be exact due to rounding. It can also be stated as the change in option price given a one percentage point change in volatility. Like delta and gamma, Vega is also used for hedging.

11.10 Options Strategies: Although there can be many possible option strategies, however, some of the important strategies are as follows:

11.10.1. Calendar Spreads: The calendar spread refers to a family of spreads involving options of the same underlying stock, same strike prices, but different expiration months. They can be created with either all calls or all puts. Also known as time spread or horizontal spread. The idea behind the calendar spread is to sell time, which is why calendar spreads are also known as time spreads.
**Meaning of Spread:** As per Investopedia, spread is a position consisting of the purchase of an option and the sale of another option on the same underlying security within different strike or expiration date.

Various types of calendar spreads which can be applied under various market scenarios are described as under:-

**Bullish Market Scenario**

- **Bull Call Spread:** The bull call spread option trading strategy is employed when the options trader thinks that the price of the underlying asset will go up moderately in the near term. Bull call spreads can be implemented by buying an at-the-money call option while simultaneously writing a higher striking out-of-the-money call option. By shorting the out-of-the-money call, the options trader reduces the cost of establishing the bullish position but forgoes the chance of making a large profit in the event that the underlying asset price skyrockets. The bull call spread option strategy is also known as the bull call debit spread as a debit is taken upon entering the trade.

- **Bull Put Spread:** The bull put spread option trading strategy is employed when the options trader thinks that the price of the underlying asset will go up moderately in the near term. The bull put spread options strategy is also known as the bull put credit spread as a credit is received upon entering the trade. Bull put spreads can be implemented by selling a higher striking in-the-money put option and buying a lower striking out-of-the-money put option on the same underlying stock with the same expiration date.

- **Bull Calendar Spread:** Using calls, the bull calendar spread strategy can be setup by buying long term slightly out-of-the-money calls and simultaneously writing an equal number of near month calls of the same underlying security with the same strike price. The options trader applying this strategy is bullish for the long term and is selling the near month calls with the intention to ride the long term calls for free.

- **Diagonal Bull Call Spread:** The diagonal bull call spread strategy involves buying long term calls and simultaneously writing an equal number of near-month calls of the same underlying stock with a higher strike. This strategy is typically employed when the options trader is bullish on the underlying stock over the longer term but is neutral to mildly bullish in the near term.

**Bearish Market Scenario**

- **Bear Call Spread:** The bear call spread option trading strategy is employed when the options trader thinks that the price of the underlying asset will go down moderately in the near term. The bear call spread option strategy is also known as the bear call credit spread as a credit is received upon entering the trade. Bear call spreads can be implemented by buying call options of a certain strike price and selling the same number of call options of lower strike price on the same underlying security expiring in the same month.

- **Bear Put Spread:** The bear put spread option trading strategy is employed when the options trader thinks that the price of the underlying asset will go down moderately in the near term.
Bear put spreads can be implemented by buying a higher striking in-the-money put option and selling a lower striking out-of-the-money put option of the same underlying security with the same expiration date.

By shorting the out-of-the-money put, the options trader reduces the cost of establishing the bearish position but forgoes the chance of making a large profit in the event that the underlying asset price plummets. The bear put spread options strategy is also known as the bear put debit spread as a debit is taken upon entering the trade.

- **Diagonal Bear Put Spread:** The diagonal bear put spread strategy involves buying long-term puts and simultaneously writing an equal number of near-month puts of the same underlying stock with a lower strike.

  This strategy is typically employed when the options trader is bearish on the underlying stock over the longer term but is neutral to mildly bearish in the near term.

**11.10.2 Straddles:** An options strategy with which the investor holds a position in both a call and put with the same strike price and expiration date. Straddles are a good strategy to pursue if an investor believes that a stock’s price will move significantly but is unsure as to which direction. The stock price must move significantly if the investor is to make a profit. As shown in the diagram below, should only a small movement in price occur in either direction, the investor will experience a loss. As a result, a straddle is extremely risky to perform.

  Additionally, on stocks that are expected to jump, the market tends to price options at a higher premium, which ultimately reduces the expected payoff should the stock move significantly. This is a good strategy if you think there will be a large price movement in the near future but is unsure of which way that price movement will be. It has one common strike price. In India straddles are mostly used by traders on Index Options during major political events such as general elections or annual budget when they expect a major movement in the Index but are not sure of the direction in which the Index would move.

**Pay off Diagram for Straddle:**

Suppose XYZ stock is trading at $40 in June. An options trader enters a long straddle by buying a JUL 40 put for $200 and a JUL 40 call for $200. The net debit taken to enter the trade is $400, which is also his maximum possible loss.

If XYZ stock is trading at $50 on expiration in July, the JUL 40 put will expire worthless but the JUL 40 call expires in the money and has an intrinsic value of $1000 (Assuming of lot of option contract contains 100 shares of XYZ). Subtracting the initial debit of $400, the long straddle trader’s profit comes to $600.

On expiration in July, if XYZ stock is still trading at $40, both the JUL 40 put and the JUL 40 call expire worthless and the long straddle trader suffers a maximum loss which is equal to the initial debit of $400 taken to enter the trade.
11.10.3 Strangle: The strategy involves buying an out-of-the-money call and an out-of-the-money put option. A strangle is generally less expensive than a straddle as the contracts are purchased out of the money. Strangle is an unlimited profit, limited risk strategy that is taken when the options trader thinks that the underlying stock will experience significant volatility in the near term. It has two different strike prices.

Suppose XYZ stock is trading at $40 in June. An options trader executes a strangle by buying a JUL 35 put for $100 and a JUL 45 call for $100. The net debit taken to enter the trade is $200, which is also his maximum possible loss.

If XYZ stock rallies and is trading at $50 on expiration in July, the JUL 35 put will expire worthless but the JUL 45 call expires in the money and has an intrinsic value of $500 (Assuming one lot of option contract has 50 shares). Subtracting the initial debit of $200, the options trader's profit comes to $300.

On expiration in July, if XYZ stock is still trading at $40, both the JUL 35 put and the JUL 45 call expire worthless and the options trader suffers a maximum loss which is equal to the initial debit of $200 taken to enter the trade.

11.10.4. Butterfly Spreads: The butterfly spread is a neutral strategy that is a combination of a bull spread and a bear spread. It is a limited profit, limited risk options strategy. There are
3 striking prices involved in a butterfly spread and it can be constructed using calls or puts. This strategy has limited risk and limited profit.

**Types of Butterfly Spreads**

(i) *Long Call Butterfly:* - Long butterfly spreads are entered when the investor thinks that the underlying stock will not rise or fall much by expiration. Using calls, the long butterfly can be constructed by buying one lower striking *in-the-money call*, writing two *at-the-money* calls and buying another higher striking *out-of-the-money call*. A resulting net debit is taken to enter the trade.

(ii) *Short Call Butterfly:* - Using calls, the short call butterfly can be constructed by selling one lower strike price in-the-money call, buying two at-the-money calls and selling another higher strike price out-of-the-money call, giving the trader a net credit to enter the position.

(iii) *Long Put Butterfly:* - The long put butterfly spread is a limited profit, limited risk options trading strategy that is taken when the options trader thinks that the underlying security will not rise or fall much by expiration. There are 3 *strike prices* involved in a long put butterfly spread and it is constructed by buying one lower strike price put, selling two at-the-money puts and buying another higher strike price put for a net debit.

(iv) *Short Put Butterfly:* - The short put butterfly is a neutral strategy like the long put butterfly but bullish on volatility. It is a limited profit, limited risk options strategy. There are 3 *strike prices* involved in a short put butterfly and it can be constructed by selling one lower strike price *out-of-the-money put*, buying two *at-the-money* puts and selling another higher strike price *in-the-money put*, giving the options trader a net credit to put on the trade.

(v) *Iron Butterfly:* - The iron butterfly spread is a limited risk, limited profit trading strategy that is structured for a larger probability of earning a smaller limited profit when the underlying stock is perceived to have a low volatility. To setup an iron butterfly, the options trader buys a lower strike price *out-of-the-money put*, sells a middle strike price *at-the-money put*, sells a middle strike *at-the-money call* and buys another higher strike *out-of-the-money call*. This results in a net credit to enter into the trade.

(vi) *Reverse Iron Butterfly:* - The reverse (short) iron butterfly is a limited risk, limited profit options trading strategy that is designed to make a profit when the underlying stock price makes a sharp move either up or down. To setup a reverse iron butterfly, the options trader sells a lower strike price *out-of-the-money put*, buys a middle strike price *at-the-money put*, buys another middle strike price *at-the-money call* and sells another higher strike price *out-of-the-money call*. There will be a net debit taken to enter into the trade.

12. **Commodity Derivatives**

As defined by the “Chicago Board of Trade”, Commodity is something that has an economic value and can be used for commerce. This can be sold or purchased and movable. Broadly, commodities can be classified in the following two categories:

(i) *Hard Commodities*
(ii) Soft Commodities

While hard commodities are mined from the ground or extracted from other natural resources, soft commodities are mainly agricultural commodities.

Examples of hard commodities are precious metals such as gold, silver as well as base metals i.e. copper, nickels, aluminum, steel etc. Energy products such as crude oil, natural gas heating gas and coal all fall in this category.

Examples of soft commodities are cereals and pulses, spices, cotton, oilseed, rubber etc.

Trading in commodity derivatives first started to protect farmers from the risk of the value of their crop going below the cost price of their produce. Derivative contracts were offered on various agricultural products like cotton, rice, coffee, wheat, pepper etc.

The first organized exchange, the Chicago Board of Trade (CBOT) -- with standardized contracts on various commodities -- was established in 1848. In 1874, the Chicago Produce Exchange - which is now known as Chicago Mercantile Exchange (CME) was formed.

CBOT and CME are two of the largest commodity derivatives exchanges in the world.

12.1 Necessary Conditions to Introduce Commodity Derivatives:

The commodity characteristic approach defines feasible commodities for derivatives trading based on an extensive list of required commodity attributes. It focuses on the technical aspects of the underlying commodity. The following attributes are considered crucial for qualifying for the derivatives trade: 1) a commodity should be durable and it should be possible to store it; 2) units must be homogeneous; 3) the commodity must be subject to frequent price fluctuations with wide amplitude; supply and demand must be large; 4) supply must flow naturally to market and there must be breakdowns in an existing pattern of forward contracting.

The first attribute, durability and storability, has received considerable attention in commodity finance, since one of the economic functions often attributed to commodity derivatives markets is the temporal allocation of stocks. The commodity derivatives market is an integral part of this storage scenario because it provides a hedge against price risk for the carrier of stocks.

Since commodity derivatives contracts are standardized contracts, this approach requires the underlying product to be homogeneous, the second attribute, so that the underlying commodity as defined in the commodity derivatives contract corresponds with the commodity traded in the cash market. This allows for actual delivery in the commodity derivatives market.

The third attribute, a fluctuating price, is of great importance, since firms will feel little incentive to insure themselves against price risk if price changes are small. A broad cash market is important because a large supply of the commodity will make it difficult to establish dominance in the market place and a broad cash market will tend to provide for a continuous and orderly meeting of supply and demand forces.

The last crucial attribute, breakdowns in an existing pattern of forward trading, indicates that cash market risk will have to be present for a commodity derivatives market to come into existence. Should all parties decide to eliminate each and every price fluctuation by using cash forward contracts for example, a commodity derivatives market would be of little interest.
A commodity derivative must reflect the commercial movement of a commodity both loosely and broadly enough, so that price distortions will not be a result of specifications in the contract. To warrant hedging, the contract must be as close a substitute for the cash commodity as possible. Hedging effectiveness is an important determinant in explaining the success of commodity derivatives and as a result considerable attention has been paid to the hedging effectiveness of commodity derivatives.

The total set of customer needs concerning commodity derivatives is differentiated into instrumental needs and convenience needs (see Figure 1). Customers will choose that “service-product” (futures, options, cash forwards, etc.) which best satisfy their needs, both instrumental and convenience, at an acceptable price.

**Instrumental needs**
- price risk reduction (hedging)

**Convenience needs**
- efficient clearing
- flexibility

**Figure 1**
Instrumental needs are the hedgers’ needs for price risk reduction. Hedgers wish to reduce, or, if possible, eliminate portfolio risks at low cost. The instrumental needs are related to the core service of the commodity derivatives market, which consists of reducing price variability to the customer. Not only do hedgers wish to reduce price risk, they also desire flexibility in doing business, easy access to the market, and an efficient clearing system. These needs are called convenience needs. They deal with the customer’s need to be able to use the core service provided by the exchange with relative ease. The extent to which the commodity derivatives exchange is able to satisfy convenience needs determines the process quality. The service offering is not restricted to the core service, but has to be complemented by so-called peripheral services.

**12.2 Investing in Commodity Derivatives:** Commodity derivatives, which were traditionally developed for risk management purposes, are now growing in popularity as an investment tool. Most of the trading in the commodity derivatives market is being done by people who have no need for the commodity itself.

They just speculate on the direction of the price of these commodities, hoping to make money if the price moves in their favour.

The commodity derivatives market is a direct way to invest in commodities rather than investing in the companies that trade in those commodities.

For example, an investor can invest directly in a steel derivative rather than investing in the shares of Tata Steel. It is easier to forecast the price of commodities based on their demand...
and supply forecasts as compared to forecasting the price of the shares of a company which depend on many other factors than just the demand and supply of the products they manufacture and sell or trade in.

Also, derivatives are much cheaper to trade in as only a small sum of money is required to buy a derivative contract.

Let us assume that an investor buys a tonne of soybean for ₹ 8,700 in anticipation that the prices will rise to ₹ 9,000 by June 30, 2013. He will be able to make a profit of ₹ 300 on his investment, which is 3.4%. Compare this to the scenario if the investor had decided to buy soybean futures instead.

Before we look into how investment in a derivative contract works, we must familiarise ourselves with the buyer and the seller of a derivative contract. A buyer of a derivative contract is a person who pays an initial margin to buy the right to buy or sell a commodity at a certain price and a certain date in the future.

On the other hand, the seller accepts the margin and agrees to fulfill the agreed terms of the contract by buying or selling the commodity at the agreed price on the maturity date of the contract.

Now let us say the investor buys soybean futures contract to buy one tonne of soybean for ₹ 8,700 (exercise price) on November 30, 2013. The contract is available by paying an initial margin of 10%, i.e. ₹ 870. Note that the investor needs to invest only ₹ 870 here.

On November 30, 2013, the price of soybean in the market is, say, ₹ 9,000 (known as Spot Price -- Spot Price is the current market price of the commodity at any point in time).

The investor can take the delivery of one tonne of soybean at ₹ 8,700 and immediately sell it in the market for ₹ 9,000, making a profit of ₹ 300. So the return on the investment of ₹ 870 is 34.5%. On the contrary, if the price of soybean drops to ₹ 8,400 the investor will end up making a loss of 34.5%.

If the investor wants, instead of taking the delivery of the commodity upon maturity of the contract, an option to settle the contract in cash also exists. Cash settlement comprises exchange of the difference in the spot price of the commodity and the exercise price as per the futures contract.

At present, the option of cash settlement lies only with the seller of the contract. If the seller decides to make or take delivery upon maturity, the buyer of the contract has to fulfill his obligation by either taking or making delivery of the commodity, depending on the specifications of the contract.

In the above example, if the seller decides to go for cash settlement, the contract can be settled by the seller by paying ₹ 300 to the buyer, which is the difference in the spot price of the commodity and the exercise price. Once again, the return on the investment of ₹ 870 is 34.5%.

The above example shows that with very little investment, the commodity futures market offers scope to make big bucks. However, trading in derivatives is highly risky because just as there are high returns to be earned if prices move in favour of the investors, an unfavourable move results in huge losses.
The most critical function in a commodity derivatives exchange is the settlement and clearing of trades. Commodity derivatives can involve the exchange of funds and goods. The exchanges have a separate body to handle all the settlements, known as the clearing house.

For example, the holder of a futures contract to buy soybean might choose to take delivery of soya bean rather than closing his position before maturity. The function of the clearing house or clearing organisation, in such a case, is to take care of possible problems of default by the other party involved by standardising and simplifying transaction processing between participants and the organisation.

Certain special characteristics/benefits of Commodity derivatives trading are:

- To complement investment in companies that use commodities;
- To invest in a country’s consumption and production;
- No dividends, only returns from price increases.

In spite of the surge in the turnover of the commodity exchanges in recent years, a lot of work in terms of policy liberalisation, setting up the right legal system, creating the necessary infrastructure, large-scale training programs, etc. still needs to be done in order to catch up with the developed commodity derivative markets.

12.3 Commodity Market: Commodity markets in a crude early form are believed to have originated in Sumer where small baked clay tokens in the shape of sheep or goats were used in trade. Sealed in clay vessels with a certain number of such tokens, with that number written on the outside, they represented a promise to deliver that number.

In modern times, commodity markets represent markets where raw or primary products are exchanged. These raw commodities are traded on regulated, commodity exchanges in which they are bought and sold in standardized contracts.

Some of the advantages of commodity markets are:

- Most money managers prefer derivatives to tangible commodities;
- Less hassle (delivery, etc);
- Allows indirect investment in real assets that could provide an additional hedge against inflation risk.

12.4 Commodity Futures: Almost all the commodities were allowed to be traded in the futures market from April 2003. To make trading in commodity futures more transparent and successful, multi-commodity exchanges at national level were also conceived and these next generation exchanges were allowed to start futures trading in commodities on-line.

The process of trading commodities is also known as futures trading. Unlike other kinds of investments, such as stocks and bonds, when you trade futures, you do not actually buy anything or own anything. You are speculating on the future direction of the price in the commodity you are trading. This is like a bet on future price direction. The terms "buy" and "sell" merely indicate the direction you expect future prices will take.
If, for instance, you were speculating in corn, you would buy a futures contract if you thought the price would be going up in the future. You would sell a futures contract if you thought the price would go down. For every trade, there is always a buyer and a seller. Neither person has to own any corn to participate. He must only deposit sufficient capital with a brokerage firm to insure that he will be able to pay the losses if his trades lose money.

On one side of a transaction may be a producer like a farmer. He has a field full of corn growing on his farm. It won't be ready for harvest for another three months. If he is worried about the price going down during that time, he can sell futures contracts equivalent to the size of his crop and deliver his corn to fulfill his obligation under the contract. Regardless of how the price of corn changes in the three months until his crop will be ready for delivery, he is guaranteed to be paid the current price.

On the other side of the transaction might be a producer such as a cereal manufacturer who needs to buy lots of corn. The manufacturer, such as Kellogg, may be concerned that in the next three months the price of corn will go up, and it will have to pay more than the current price. To protect against this, Kellogg can buy futures contracts at the current price. In three months Kellogg can fulfill its obligation under the contracts by taking delivery of the corn. This guarantees that regardless of how the price moves in the next three months, Kellogg will pay no more than the current price for its commodity.

In addition to agricultural commodities, there are futures for financial instruments and intangibles such as currencies, bonds and stock market indexes. Each futures market has producers and consumers who need to hedge their risk from future price changes. The speculators, who do not actually deal in the physical commodities, are there to provide liquidity. This maintains an orderly market where price changes from one trade to the next are small.

Rather than taking delivery or making delivery, the speculator merely offsets his position at some time before the date set for future delivery. If price has moved in the right direction, he will profit. If not, he will lose.

Advantages of Commodity Futures

Some of the advantages of commodity futures are:

- Easiest and cheapest way to invest in commodities
- 3 Major Categories like Agricultural products (soft commodities) –fibers, grains, food, livestock; Energy – crude oil, heating oil, natural gas; and Metals – copper, aluminum, gold, silver, platinum

12.5 Commodity Swaps: Producers need to manage their exposure to fluctuations in the prices for their commodities. They are primarily concerned with fixing prices on contracts to sell their produce. A gold producer wants to hedge his losses attributable to a fall in the price of gold for his current gold inventory. A cattle farmer wants to hedge his exposure to changes in the price of his livestock.
End-users need to hedge the prices at which they can purchase these commodities. A university might want to lock in the price at which it purchases electricity to supply its air conditioning units for the upcoming summer months. An airline wants to lock in the price of the jet fuel it needs to purchase in order to satisfy the peak in seasonal demand for travel.

Speculators are funds or individual investors who can either buy or sell commodities by participating in the global commodities market. While many may argue that their involvement is fundamentally destabilizing, it is the liquidity they provide in normal markets that facilitates the business of the producer and of the end-user.

Why would speculators look at the commodities markets? Traditionally, they may have wanted a hedge against inflation. If the general price level is going up, it is probably attributable to increases in input prices. Or, speculators may see tremendous opportunity in commodity markets. Some analysts argue that commodity markets are more technically-driven or more likely to show a persistent trend.

**12.5.1 Types of Commodity Swaps:** There are two types of commodity swaps: fixed-floating or commodity-for-interest.

(a) **Fixed-Floating Swaps:** They are just like the fixed-floating swaps in the interest rate swap market with the exception that both indices are commodity based indices.

General market indices in the international commodities market with which many people would be familiar include the S&P Goldman Sachs Commodities Index (S&P GSCI) and the Commodities Research Board Index (CRB). These two indices place different weights on the various commodities so they will be used according to the swap agent’s requirements.

(b) **Commodity-for-Interest Swaps:** They are similar to the equity swap in which a total return on the commodity in question is exchanged for some money market rate (plus or minus a spread).

**12.5.2 Valuing Commodity Swaps:** In pricing commodity swaps, we can think of the swap as a strip of forwards, each priced at inception with zero market value (in a present value sense). Thinking of a swap as a strip of at-the-money forwards is also a useful intuitive way of interpreting interest rate swaps or equity swaps.

Commodity swaps are characterized by some peculiarities. These include the following factors for which we must account:

(i) The cost of hedging;

(ii) The institutional structure of the particular commodity market in question;

(iii) The liquidity of the underlying commodity market;

(iv) Seasonality and its effects on the underlying commodity market;

(v) The variability of the futures bid/offer spread;

(vi) Brokerage fees; and

(vii) Credit risk, capital costs and administrative costs.
Some of these factors must be extended to the pricing and hedging of interest rate swaps, currency swaps and equity swaps as well. The idiosyncratic nature of the commodity markets refers more to the often limited number of participants in these markets (naturally begging questions of liquidity and market information), the unique factors driving these markets, the inter-relations with cognate markets and the individual participants in these markets.

12.6 Hedging with Commodity Derivatives: Many times when using commodity derivatives to hedge an exposure to a financial price, there is not one exact contract that can be used to hedge the exposure. If you are trying to hedge the value of a particular type of a refined chemical derived from crude oil, you may not find a listed contract for that individual product. You will find an over-the-counter price if you are lucky.

They look at the correlation (or the degree to which prices in the individual chemical trade with respect to some other more liquid object, such as crude oil) for clues as to how to price the OTC product that they offer you. They make assumptions about the stability of the correlation and its volatility and they use that to "shade" the price that they show you.

Correlation is an un-hedgable risk for the OTC market maker, though. There is very little that he can do if the correlation breaks down.

For example, if all of a sudden the price for your individual chemical starts dropping faster than the correlation of the chemical's price with crude oil suggests it should, the OTC dealer has to start dumping more crude oil in order to compensate.

It is a very risky business. The OTC market maker's best hope is to see enough "two-way" business involving end-users and producers so that his exposure is "naturally" hedged by people seeking to benefit from price movement in either direction.

Commodity swaps and commodity derivatives are a useful and important tool employed by most leading energy, chemical and agricultural corporations in today's world.

13. Embedded Derivatives

An embedded derivative is a derivative instrument that is embedded in another contract - the host contract. The host contract might be a debt or equity instrument, a lease, an insurance contract or a sale or purchase contract. Derivatives require being marked-to-market through the income statement, other than qualifying hedging instruments. This requirement on embedded derivatives are designed to ensure that mark-to-market through the income statement cannot be avoided by including - embedding - a derivative in another contract or financial instrument that is not marked-to-market through the income statement.

A coal purchase contract may include a clause that links the price of the coal to a pricing formula based on the prevailing electricity price or a related index at the date of delivery. The coal purchase contract, which qualifies for the executory contract exemption, is described as the host contract, and the pricing formula is the embedded derivative. The pricing formula is an embedded derivative because it changes the price risk from the coal price to the electricity price.
An embedded derivative that modifies an instrument's inherent risk (such as a fixed to floating interest rate swap) would be considered closely related. Conversely, an embedded derivative that changes the nature of the risks of a contract is not closely related.

Most equity- or commodity-linked features embedded in a debt instrument will not be closely related. This includes puts that force the issuer to reacquire an instrument based on changes in commodity price or index, equity or commodity indexed interest or principal payments and equity conversion features. Puts or calls on equity instruments at specified prices (that is, not market on date of exercise) are seldom closely related, neither are calls, puts or prepayment penalties on debt instruments. Credit derivatives embedded in a host debt instrument are seldom closely related to it.

The economic characteristics and risks of an embedded derivative are closely related to the economic characteristics and risks of the host contract when the host contract is a debt instrument and the embedded derivative is an interest rate floor or a cap out of the money when the instrument is issued. An entity would not account for the embedded derivative separately from the host contract. The same principle applies to caps and floors in a sale or purchase contract.

Closely related- Examples of embedded derivatives that need not be separated
- A derivative embedded in a host lease contract is closely related to the host contract if the embedded derivative comprises contingent rentals based on related sales;
- An inflation index term in a debt instrument as long as it is not leveraged and relates to the inflation index in the economic environment in which the instrument is denominated or issued;
- Not closely related- Examples of embedded derivatives that must be separated
- Equity conversion feature embedded in a debt instrument e.g. investment in convertible bonds;
- Option to extend the term of a debt instrument unless there is a concurrent adjustment of the interest rate to reflect market prices;
- Equity-indexed interest embedded in a debt instrument.
14. Introduction to Over-the-Counter (OTC) Derivatives

As you are aware that a derivative is a risk-shifting agreement, the value of which is derived from the value of an underlying asset. The underlying asset could be a physical commodity, an interest rate, a company’s stock, a stock index, a currency, or virtually any other tradable instrument upon which two parties can agree. One of the categories of derivatives is known as OTC derivatives.

Derivatives are traded in two kinds of markets: exchanges and OTC markets. An OTC derivative is a derivative contract which is privately negotiated. OTC trades have no anonymity, and they generally do not go through a clearing corporation. Every derivative product can either be traded on OTC (i.e., through private negotiation), or on an exchange. In one specific case, the jargon demarcates this clearly: OTC futures contracts are called ‘forwards’ (or exchange-traded forwards are called ‘futures’). In other cases, there is no such distinguishing notation. There are ‘exchange-traded options’ as opposed to ‘OTC options’, but they are both called options.

15. OTC Interest Rate Derivatives

OTC interest rate derivatives include instruments such as forward rate agreements (FRAs), interest rate swaps, caps, floors, and collars. Like exchange-traded interest rate derivatives such as interest rate futures and futures options, OTC interest rate derivatives set terms for the exchange of cash payments based on changes in market interest rates. An FRA is a forward contract that sets terms for the exchange of cash payments based on changes in the London Interbank Offered Rate (LIBOR); interest rate swaps provide for the exchange of payments based on differences between two different interest rates; and interest rate caps, floors, and collars are option-like agreements that require one party to make payments to the other when a stipulated interest rate, most often a specified maturity of LIBOR, moves outside of some predetermined range.

The over-the-counter market differs from futures markets in a number of important respects. Whereas futures and futures options are standardized agreements that trade on organized exchanges, the OTC market is an informal market consisting of dealers, or market makers, who trade price information and negotiate transactions over electronic communications networks. Although a great deal of contract standardization exists in the over-the-counter market, dealers active in this market customise agreements to meet the specific needs of their customers. And unlike futures markets, where futures exchange clearinghouses guarantee contract performance through a system of margin requirements combined with the daily settlement of gains or losses, counterparties to OTC derivative agreements must bear some default or credit risk.

The rapid growth and energized pace of innovation in the market for interest rate derivatives since 1981, the date of the first widely publicized swap agreement, has proven truly phenomenal. The advent of trading in interest rate swaps was soon followed by FRAs, caps,
floors, collars, as well as other hybrid instruments such as forward swaps, options on swaps (swaptions), and even options on options (captions).

15.1 Forward Rate Agreements: A Forward Rate Agreement (FRA) is an agreement between two parties through which a borrower/lender protects itself from the unfavourable changes to the interest rate. Unlike futures FRAs are not traded on an exchange thus are called OTC product. Following are main features of FRA.

- Normally it is used by banks to fix interest costs on anticipated future deposits or interest revenues on variable-rate loans indexed to LIBOR.
- It is an off Balance Sheet instrument.
- It does not involve any transfer of principal. The principal amount of the agreement is termed "notional" because, while it determines the amount of the payment, actual exchange of the principal never takes place.
- It is settled at maturity in cash representing the profit or loss. A bank that sells an FRA agrees to pay the buyer the increased interest cost on some "notional" principal amount if some specified maturity of LIBOR is above a stipulated "forward rate" on the contract maturity or settlement date. Conversely, the buyer agrees to pay the seller any decrease in interest cost if market interest rates fall below the forward rate.
- Final settlement of the amounts owed by the parties to an FRA is determined by the formula

\[
\text{Payment} = \frac{(N)(RR - FR)(dtm/DY)}{[1 + RR(dtm/DY)]} \times 100
\]

Where,

- \(N\) = the notional principal amount of the agreement;
- \(RR\) = Reference Rate for the maturity specified by the contract prevailing on the contract settlement date; typically LIBOR or MIBOR
- \(FR\) = Agreed-upon Forward Rate; and
- \(dtm\) = maturity of the forward rate, specified in days (FRA Days)
- \(DY\) = Day count basis applicable to money market transactions which could be 360 or 365 days.

If \(LIBOR > FR\) the seller owes the payment to the buyer, and if \(LIBOR < FR\) the buyer owes the seller the absolute value of the payment amount determined by the above formula.

- The differential amount is discounted at post change (actual) interest rate as it is settled in the beginning of the period not at the end.

Thus, buying an FRA is comparable to selling, or going short, a Eurodollar or LIBOR futures contract.
Example
Suppose two banks enter into an agreement specifying:

- a forward rate of 5 percent on a Eurodollar deposit with a three-month maturity;
- a $1 million notional principal; and settlement in one month.

Such an agreement is termed a 1x4 FRA because it fixes the interest rate for a deposit to be placed after one month and maturing four months after the date the contract is negotiated.

If the three-month LIBOR is 6 percent on the contract settlement date, the seller would owe the buyer the difference between 6 and 5 percent interest on $1 million for a period of 90 days.

Every 1 basis point change in the interest rate payable on a principal of $1 million for a 90-day maturity changes interest cost by $25, so that the increase in the interest cost on a three-month Eurodollar deposit over the specified forward rate in this case is $25 x 100 basis points = $2,500.

The $2,500 difference in interest costs calculated above is discounted back three months using the actual three-month LIBOR prevailing on the settlement date.

Thus, if 90-day LIBOR turns out to be 6 percent on the contract maturity date the buyer would receive $2,463.05 = $2,500/[1 + 0.06(90/360)].

15.2 Interest Rate Swaps: A swap is a contractual agreement between two parties to exchange, or "swap," future payment streams based on differences in the returns to different securities or changes in the price of some underlying item. Interest rate swaps constitute the most common type of swap agreement. In an interest rate swap, the parties to the agreement, termed the swap counterparties, agree to exchange payments indexed to two different interest rates. Total payments are determined by the specified notional principal amount of the swap, which is never actually exchanged. Financial intermediaries, such as banks, pension funds, and insurance companies, as well as non-financial firms use interest rate swaps to effectively change the maturity of outstanding debt or that of an interest-bearing asset.

Swaps grew out of parallel loan agreements in which firms exchanged loans denominated in different currencies. Although some swaps were arranged in the late 1970s, the first widely publicized swap took place in 1981 when IBM and the World Bank agreed to exchange interest payments on debt denominated in different currencies, an arrangement known as a currency swap. The first interest rate swap in the world was a 1982 agreement in which the Student Loan Marketing Association (Sallie Mae) of US swapped the interest payments on an issue of intermediate-term, fixed-rate debt for floating-rate payments indexed to the three-month Treasury bill yield. The interest rate swap market has grown rapidly since then.

15.2.1 Swap Dealers: Early interest rate swaps were brokered transactions in which financial intermediaries with customers interested in entering into a swap would seek counterparties for the transaction among their other customers. The intermediary collected a brokerage fee as compensation, but did not maintain a continuing role once the transaction was completed. The contract was between the two ultimate swap users, who exchanged payments directly.
Today the market has evolved into more of a dealer market dominated by large international commercial and investment banks. Dealers act as market makers that stand ready to become counterparty to different swap transactions before a customer for the other side of the transaction is located. A swap dealer intermediates cash flows between different customers, or "end users," becoming a middleman to each transaction. The dealer market structure relieves end users from the need to monitor the financial condition of many different swap counterparties. Because dealers act as middlemen, end users need only be concerned with the financial condition of the dealer, and not with the creditworthiness of the ultimate end user of the instrument.

Figure 2 illustrates the flow of payments between two swap end users through a swap dealer. Unlike brokers, dealers in the over-the-counter market do not charge a commission. Instead, they quote two-way "bid" and "asked" prices at which they stand ready to act as counterparty to their customers in a derivative instrument. The quoted spread between bid and asked prices allows an intermediary to receive a higher payment from one counter party than is paid to the other.

### 15.2.2 Swap Market Conventions:

There are many different variants of interest rate swaps. The most common is the fixed/floating swap in which a fixed-rate payer makes payments based on a long-term interest rate to a floating-rate payer, who, in turn, makes payments indexed to a short-term money market rate to the fixed-rate payer. A fixed/floating swap is characterized by:

- a fixed interest rate;
- a variable or floating interest rate which is periodically reset;
- a notional principal amount upon which total interest payments are based; and
- the term of the agreement, including a schedule of interest rate reset dates (that is, dates when the value of the interest rate used to determine floating-rate payments is determined) and payment dates.

The fixed interest rate typically is based on the prevailing market interest rate for Treasury securities with a maturity corresponding to the term of the swap agreement. The floating rate is most often indexed to three- or six-month LIBOR, in which case the swap is termed a "generic" or "plain vanilla" swap, but can be indexed to almost any money market rate such as the Treasury bill, commercial paper, federal funds, or prime interest rate. The maturity, or "tenor," of a fixed/floating interest rate swap can vary between 1 and 15 years. By convention, a fixed-rate payer is designated as the buyer and is said to be long the swap, while the floating-rate payer is the seller and is characterized as short the swap.
15.2.3 Timing of Payments: A swap is negotiated on its "trade date" and takes effect two days later on its initial "settlement date." If the agreement requires the exchange of cash at the outset, as in the case of a "no-par" swap, the transaction takes place on the initial settlement date. Interest begins accruing on the "effective date" of the swap, which usually coincides with the initial settlement date. (Forward swaps, in which the effective date of the swap is deferred, are an exception to this rule.) Floating-rate payments are adjusted on periodic "reset dates" based on the prevailing market-determined value of the floating-rate index, with subsequent payments made on a sequence of payment dates (also known as settlement dates) specified by the agreement. Typically, the reset frequency for the floating-rate index is the term of the interest rate index itself. For example, the floating rate on a generic swap indexed to the six-month LIBOR would, in most cases, be reset every six months with payment dates following six months later. The floating rate can be reset more frequently, however, as in the case of swaps indexed to Treasury bill rates, which are reset weekly.

Fixed interest payment intervals can be three months, six months, or one year. Semiannual payment intervals are most common because they coincide with the intervals between interest payments on Treasury bonds. Floating-rate payment intervals need not coincide with fixed-rate payment intervals, although they often do. When payment intervals coincide, it is common practice to exchange only the net difference between the fixed and floating payments.

15.2.4 Price Quotation: The price of a fixed/floating swap is quoted in two parts: a fixed interest rate and an index upon which the floating interest rate is based. The floating rate can be based on an index of short-term market rates (such as a given maturity of LIBOR) plus or minus a given margin, or set to the index "flat"—that is, the floating interest rate index itself with no margin added. The convention in the swap market is to quote the fixed interest rate as an All-In-Cost (AIC), which means that the fixed interest rate is quoted relative to a flat floating-rate index.

The AIC typically is quoted as a spread over Treasury securities with a maturity corresponding to the term of the swap. For example, a swap dealer might quote a price on a three-year generic swap at an All-In-Cost of "72-76 flat," which means the dealer stands ready to "buy" the swap (that is, enter into the swap as a fixed-rate payer) at 72 basis points over the prevailing three-year interest rate on Treasuries while receiving floating-rate payments indexed to a specified maturity of LIBOR with no margin, and "sell" (receive fixed and pay floating) if the other party to the swap agrees to pay 76 basis points over Treasury securities. Bid-asked spreads in the swap market vary greatly depending on the type of agreement. The spread can be as low as 3 to 4 basis points for a two- or three-year generic swap, while spreads for nonstandard, custom-tailored swaps tend to be much higher.

15.2.5 The Generic Swap (Plain Vanilla Swap): As an example of the mechanics of a simple interest rate swap, consider the example of a generic swap. Fixed interest payments on a generic swap typically are based on a 30/360 day-count convention, meaning that they are calculated assuming each month has 30 days and the quoted interest rate is based on a 360-day year. Given an All-In-Cost of the swap, the semiannual fixed-rate payment would be:
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(N)(AIC)(180/360),

Where,

N denotes the notional principal amount of the agreement.

Floating-rate payments are based on an actual/360-day count, meaning that interest payments are calculated using the actual number of days elapsed since the previous payment date, based on a 360-day year. Let \( d_t \) denote the number of days since the last settlement date. Then, the floating-rate payment is determined by the formula:

\( (N)(LIBOR)(d_t/360). \)

Example

Suppose a dealer quotes an All-In-Cost for a generic swap at 10 percent against six-month LIBOR flat. If the notional principal amount of the swap is $1 million, then the semiannual fixed payment would be

\[ 50,000 = (1,000,000)(0.10)(180/360). \]

Suppose that the six-month period from the effective date of the swap to the first payment date (sometimes also termed a settlement date) comprises 181 days and that the corresponding LIBOR was 8 percent on the swap's effective date. Then, the first floating-rate payment would be

\[ 40,222.22 = (1,000,000)(0.08)(181/360). \]

Often a swap agreement will call for only the net amount of the promised payments to be exchanged. In this example, the fixed-rate payer would pay the floating-rate payer a net amount of

\[ 9,777.78 = 50,000.00 - 40,222.22. \]

A payment frequency "mismatch" occurs when the floating-rate payment frequency does not match the scheduled frequency of the fixed-rate payment. Mismatches typically arise in the case of swaps that base floating-rate payments on maturities shorter than the six-month payment frequency common for fixed-rate payments.

Day-count Conventions: A wide variety of day-count conventions are used in the swap market. Fixed payments can be quoted either on an actual/365 (bond equivalent) basis or on an actual/360 basis. Floating-rate payments indexed to private-sector interest rates typically follow an actual/360 day-count convention commonly used in the money market. Floating-rate payments tied to Treasury bill rates are calculated on an actual/365 basis.

15.2.6 Non-Generic Swaps: An interest rate swap that specifies an exchange of payments based on the difference between two different variable rates is known as a "basis swap." For example, a basis swap might specify the exchange of payments based on the difference between LIBOR and the prime rate. Other interest rate swaps include the forward swap, in which the effective date of the swap is deferred; the swaption, which is an option on an interest rate swap; and puttable and callable swaps, in which one party has the right to cancel the swap at certain times. This list is far from exhaustive—many other types of interest rate swaps are currently traded, and the number grows with each year.
15.2.7 Swap Valuation: Interest rate swaps can be viewed as implicit mutual lending arrangements. A party to an interest rate swap implicitly holds a long position in one type of interest-bearing security and a short position in another. Swap valuation techniques utilize this fact to reduce the problem of pricing an interest rate swap to a straightforward problem of pricing two underlying hypothetical securities having a redemption or face value equal to the notional principal amount of the swap.

15.2.8 Non-Par Swaps: In most cases swaps are priced so that the initial value of the agreement is zero to both counterparties; that is, so that the value of both hypothetical component securities is just equal to the notional principal amount of the swap. Occasionally, however, a swap may be priced such that one party owes money to the other at initial settlement, resulting in a "non par" swap. Non par swaps are used to offset existing positions in swaps entered into in previous periods where interest rates have changed since the original swap was negotiated, or in cases where a given cash flow needs to be matched exactly. Valuation methods for non-par swaps are somewhat more involved than the simple case discussed above.

15.2.9 The Effect of Changes in Market Interest Rates on Swap Values: A change in market interest rates affects the value of a fixed/floating swap in much the same way that it affects the value of a corporate bond with a comparable maturity. To see why, note that a change in market interest rates will have no effect on the value of the hypothetical variable-rate note implicit in a fixed/floating swap on interest rate reset dates. Therefore, on reset dates a change in market interest rates will affect the value of the swap only through its effect on the value of the hypothetical fixed-rate bond. Since an increase in interest rates lowers the value of the bond, it increases the value of the swap position for a fixed-rate payer to the same degree it would increase the value of a short position in a fixed-rate bond.

Between interest rate reset dates the amount of the next payment due on the variable-rate note is predetermined. Thus, a change in market interest rates affects the values of both the hypothetical variable-rate note and the hypothetical fixed-rate bond. The change in the value of the variable-rate note partially offsets the change in the value of the fixed-rate note in this case. As a general rule the price behavior of a fixed/floating interest rate swap will approximate the price behavior of a fixed-rate note with a maturity equal to the term of the swap less the maturity of the variable interest rate. For example, a two-year generic swap indexed to six-month LIBOR will approximate the behavior of a fixed-rate bond with a term to maturity of between 18 and 24 months, depending on the amount of time since the last interest rate reset date.

The value of a fixed/floating swap generally changes over time when the term structure of interest rates is upward-sloping. Only when the term structure is flat and market interest rates remain unchanged will the value of an interest rate swap remain unchanged over the life of the agreement.

Illustration 4

Explain the concept of interest rate swap by giving appropriate examples.
Solution

Lockwood Company has a high credit rating. It can borrow at a fixed rate of 10% or at a variable interest rate of LIBOR + 0.3%. It would like to borrow at a variable rate. Thomas Company has a lower credit rating. It can borrow at a fixed rate of 11% or at a variable rate of LIBOR + 0.5%. It would like to borrow at a fixed rate. Using the principle of comparative advantage, both parties could benefit from a swap arrangement, whereby:

(i) Lockwood Company borrows at a fixed rate of 10%
(ii) Thomas Company borrows at a variable rate of LIBOR + 0.5%
(iii) The parties agree a rate for swapping their interest commitments, with perhaps:

Thomas Company paying a fixed rate of 10.1% to Lockwood Company.

The outcome would be

<table>
<thead>
<tr>
<th></th>
<th>Lockwood Company</th>
<th>Thomas Company</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Borrows at</strong></td>
<td>10%</td>
<td>LIBOR + 0.5%</td>
</tr>
<tr>
<td><strong>Receives from</strong></td>
<td>(10.1%)</td>
<td>LIBOR</td>
</tr>
<tr>
<td><strong>Pays to</strong></td>
<td>LIBOR</td>
<td>10.1%</td>
</tr>
<tr>
<td><strong>Net interest cost</strong></td>
<td>LIBOR – 0.1%</td>
<td>10.6%</td>
</tr>
</tbody>
</table>

(a saving of 0.4%)

In this example, both companies benefit from lower costs.

15.3 Swaptions: An interest rate swaption is simply an option on an interest rate swap. It gives the holder the right but not the obligation to enter into an interest rate swap at a specific date in the future, at a particular fixed rate and for a specified term. For an up-front fee (premium), the customer selects the strike rate (the level at which it enters the interest rate swap agreement), the length of the option period, the floating rate index (Prime, LIBOR, C.P.), and tenor. The term swaption is typically referred to options on interest rate swaps.

The buyer and seller of the swaption agree on the strike rate, length of the option period (which usually ends on the starting date of the swap if swaption is exercised), the term of the swap, notional amount, amortization, and frequency of settlement.

Swaptions are designed to give the holder the benefit of the agreed upon strike rate if the market rates are higher, with the flexibility to enter into the current market swap rate if they are lower. Like any other option, if the swaption is not exercised by maturity it expires worthless.
There are two types of swaption contracts:

- A **fixed rate payer swaption** gives the owner of the swaption the right but not the obligation to enter into a swap where they pay the fixed leg and receive the floating leg.
- A **fixed rate receiver swaption** gives the owner of the swaption the right but not the obligation to enter into a swap in which they will receive the fixed leg, and pay the floating leg.

Swaptions fall into three main categories, depending upon the exercise rights of the buyer:

(a) European Swaptions give the buyer the right to exercise only on the maturity date of the option.

(b) American Swaptions, on the other hand, give the buyer the right to exercise at any time during the option period.

(c) Bermudan Swaptions give the buyer the right to exercise on specific dates during the option period.

15.3.1 **Principal Features of Swaptions:** Following are main principles of Swaptions.

(a) A swaption is effectively an option on a forward-start IRS, where exact terms such as the fixed rate of interest, the floating reference interest rate and the tenor of the IRS are established upon conclusion of the swaption contract. The underlying instrument on which a swaption is based is a forward start IRS.

(b) A 3-month into 5-year swaption would therefore be seen as an option to enter into a 5-year IRS, 3 months from now. It is also important for the calculation of the premium, whether the swaption is a ‘payer swaption’ or a ‘receiver swaption’ type.

(c) The ‘option period’ refers to the time which elapses between the transaction date and the expiry date. The fixed rate of interest on the swaption is called the strike rate.

(d) The swaption premium is expressed as basis points. These basis points are applied to the nominal principal of the forward-start IRS. A borrower would amortise the premium over the life of the option if the swaption is entered into for the reasons of hedging an underlying borrowing.

(e) Swaptions can be cash-settled; therefore at expiry they are marked to market off the applicable forward curve at that time and the difference is settled in cash. If forward swap rates fall, a fixed rate receiver swaption will increase in value in marking such a swaption to market, and a fixed-rate payer swaption will decrease in value. In the event of the swaption being cash-settled, the counterparties end up without actually transacting an IRS with each other.

15.3.2 **Example of a Swaption:** Suppose X Ltd. is expected to have $1,000,000 in US$ available to invest for a 3-year period. X wants to protect itself against falling interest rates and guarantee a minimum return of 5%. At the same time, it wants to be able to take
advantage of any possible rise in interest rates. Company buys a Swaption from a Bank at a rate of 5% for a 3-month period.

Now let us see how the Swaption would work in following two situations:

(a) In 3 months' time the Interest-Rate Swap rate for 3 years is at 4.5%. X uses Swaption and asks bank to provide itself with an Interest-Rate Swap for this period at the agreed rate of 5%. Thus 5% return for the time left is protected. (Alternatively X could ask Bank to pay a compensation equal to a margin of 0.5% for the same period.)

(b) In 3 months' time the Interest-Rate Swap rate for 3 years is at 5.4%. X do not want to use your Swaption and instead deposit its funds at the market rate of 5.4%. In these circumstances the Swaption protected X against falling interest rates and also allowed it to take advantage of the rise in rates.

15.3.3 Pricing of Swaptions: The pricing methodology depends upon setting up a model of probability distribution of the forward zero-coupon curve which goes a Market process.

The market standard tool for pricing swaptions is to simulate the route taken by the modified Black model. This is because of its ease of use and market acceptance. However, the modified Black formula has been subject to extensive criticism from various sources over the years. Newer models, such as the Ho-Lee, Heath-Jarrow-Merton and Hull-White models, are called arbitrage-free models and are designed to avoid arbitrage possibilities due to changes in the yield curve. Some of the newer models also make the volatility itself a stochastic term.

15.3.4 Uses of Swaptions: Following are main uses of Swaptions:

(a) Swaptions can be applied in a variety of ways for both active traders as well as for corporate treasurers. Swap traders can use them for speculation purposes or to hedge a portion of their swap books. The attraction of swaptions for corporate treasurers is that the forward element in all swaptions provides the attractions of the forward-start swap, and to the owner of the put or call, also the flexibility to exercise or not, as may be considered appropriate. It is therefore a valuable tool when a borrower has decided to do a swap but is not sure of the timing.

(b) Swaptions have become useful tools for hedging embedded optionality which is common to the natural course of many businesses. Certainly, embedded optionality is present whenever products are sold on a 'sale-and-leaseback' basis, where the counterparty to a lease contract has the right to either to extend a lease for a five-year period or terminate a lease after an initial five-year period. The leasing company may be exposed where the lease income is less than the cost of funding the asset which is being leased. By entering into a 5-year swaption, the leasing company is able to protect itself against the lessee exercising their option to extend the lease. If the lessee decides not to extend, the swap will remain unexercised. A huge advantage of the swaption is that the leasing company could potentially still benefit from entering into a swaption originally if the forward swap rates have moved in his favour during the option period. In any event, the leasing
company has immunised itself against loss and bought itself reasonable flexibility, whilst only paying the premium at the start.

Swaptions are useful to borrowers targeting an acceptable borrowing rate. By paying an upfront premium, a holder of a payer's swaption can guarantee to pay a maximum fixed rate on a swap, thereby hedging his floating-rate borrowings. The borrower is therefore allowed to remain in low floating-rate funds while at the same time being assured of protection should rates increase expectedly (i.e. when the yield curve is positive) or unexpectedly (i.e. when the yield curve is flat or negative).

Swaptions are also useful to those businesses tendering for contracts. Businesses need to settle the question whether to commit to borrowings in the future in their own currency in terms of a tender on a future project. A business would certainly find it useful to bid on a project with full knowledge of the borrowing rate should the contract be won.

Swaptions also provide protection on callable/putable bond issues. Also, the perception of the value of the embedded call inherent in a callable bond issue often differs between investors and professional option traders, therefore allowing arbitrage. A callable bond issue effectively endows the borrower with an embedded receiver's swaption, which he can sell to a bank and use the premium to reduce his cost of funds. The more innovative borrowers can use this arbitrage opportunity to their advantage in order to bring down their funding cost.

15.4 Interest Rate Caps: The buyer of an interest rate cap pays the seller a premium in return for the right to receive the difference in the interest cost on some notional principal amount any time a specified index of market interest rates rises above a stipulated "cap rate." The buyer bears no obligation or liability if interest rates fall below the cap rate, however. Thus, a cap resembles an option in that it represents a right rather than an obligation to the buyer.

Caps evolved from interest rate guarantees that fixed a maximum level of interest payable on floating-rate loans. The advent of trading in over-the-counter interest rate caps dates back to 1985, when banks began to strip such guarantees from floating-rate notes to sell to the market. The leveraged buyout boom of the 1980s spurred the evolution of the market for interest rate caps. Firms engaged in leveraged buyouts typically took on large quantities of short-term debt, which made them vulnerable to financial distress in the event of a rise in interest rates. As a result, lenders began requiring such borrowers to buy interest-rate caps to reduce the risk of financial distress. More recently, trading activity in interest rate caps has declined as the number of new leveraged buyouts has fallen. An interest rate cap is characterized by:

- a notional principal amount upon which interest payments are based;
- an interest rate index, typically some specified maturity of LIBOR;
- a cap rate, which is equivalent to a strike or exercise price on an option; and
- the period of the agreement, including payment dates and interest rate reset dates.
Payment schedules for interest rate caps follow conventions in the interest rate swap market. Payment amounts are determined by the value of the index rate on a series of interest rate reset dates. Intervals between interest rate reset dates and scheduled payment dates typically coincide with the term of the interest rate index. Thus, interest rate reset dates for a cap indexed to six-month LIBOR would occur every six months with payments due six months later. Cap buyers typically schedule interest rate reset and payment intervals to coincide with interest payments on outstanding variable-rate debt. Interest rate caps cover periods ranging from one to ten years with interest rate reset and payment dates most commonly set either three or six months apart.

If the specified market index is above the cap rate, the seller pays the buyer the difference in interest cost on the next payment date. The amount of the payment is determined by the formula

\[ (N) \max(0, r - r_c)(d_t /360), \]

where \( N \) is the notional principal amount of the agreement, \( r_c \) is the cap rate (expressed as a decimal), and \( d_t \) is the number of days from the interest rate reset date to the payment date. Interest rates quoted in cap agreements follow money market day-count conventions, so that payment calculations assume a 360-day year.

Figure 3 depicts the payoff to the buyer of a one-period interest rate cap. If the index rate is above the cap rate, the buyer receives a payment of \((N)( r - r_c)(d_t /360)\), which is equivalent to the payoff from buying an FRA.\(^1\) Otherwise, the buyer receives no payment and loses the premium paid for the cap. Thus, a cap effectively gives its buyer the right, but not the obligation, to buy an FRA with a forward rate equal to the cap rate. Such an agreement is known as a call option. A one-period cap can be viewed as a European call option on an FRA with a strike price equal to the cap rate \( r_c \).\(^2\) More generally, multi-period Caps, which specify a series of future interest rate reset and payment dates, can be viewed as a bundle of European call options on a sequence of FRAs.

**Figure 3- The Payoff to Buying a One-Period Interest Rate Cap**

\(^1\) One difference between the payoff to an FRA and the payoff to an in-the-money cap is that an FRA pays the present value of the change in interest payable on the notional principal at settlement (which corresponds to the reset date of a cap), while payments on caps are deferred. The value of the payment has the same present value in both cases, however, so
that the comparison between the payoff to a cap and a call option on an FRA remains accurate.

2 A European option can be exercised only on its expiration date. Similarly, a cap buyer can only "exercise" his option if the index rate is above the cap rate on the interest rate reset date, so that the interest rate reset date corresponds to the expiration date on a European-style option.

Example
Consider a one-year interest rate cap that specifies a notional principal amount of $1 million and a six-month LIBOR cap rate of 5 percent. Assume the agreement covers a period starting January 15 through the following January 15 with the interest rate to be reset on July 15. The first period of a cap agreement typically is excluded from the agreement, so the cap buyer in this example will be entitled to a payment only if the six-month LIBOR exceeds 5 percent on the July 15 interest rate reset date. Suppose that six-month LIBOR is 5.5 percent on July 15. Then, on the following January 15 (184 days after the July 15 reset date) the seller will owe the buyer

\[ \$2,555.56 = (\$1,000,000)(0.055 - 0.050)(184/360). \]

Comparison of Caps and Futures Options: A one-period cap can be compared to a put option on a Eurodollar futures contract. To see why, note that the payoff at expiration to a put option on Eurodollar futures is

\[ (N) \max(0, K - F)(90/360), \]

Where,

- \( N \) is the notional principal amount of the agreement ($1 million for a Eurodollar futures option),
- \( K \) is the strike price, and
- \( F \) is the price of the underlying futures contract.

The price index used for Eurodollar futures can be written as \( F = 100 - r \), where \( r \) is the three-month LIBOR implied by the futures price. Now, write \( K = 100 - r_c \), where \( r_c \) is the futures interest rate implied by the strike price \( K \). Then, the payoff at expiration to a Eurodollar futures option can be expressed as

\[ (N) \max[0,100 - r_c - (100 - r)](90/360) = (N) \max(0, r - r_c)(90/360). \]

Where,

- \( N \) is the notional principal amount of the agreement,
- \( r_c \) is the cap rate, \( r \) is the floor rate, and
- \( d_t \) is the term of the index in days.

15.5 Interest Rate Floors: It is an OTC instrument that protects the buyer of the floor from losses arising from a decrease in interest rates. The seller of the floor compensates the buyer with a pay off when the interest rate falls below the strike rate of the floor.
The payment received by the buyer of an interest rate floor is determined by the formula

\[(N) \times \max(0, r_f - r)(d_t/360),\]

Where,

- \(N\) is the notional principal amount of the agreement,
- \(r_f\) is the floor rate or strike price, and
- \(d_t\) is the number of days from the last interest rate reset date to the payment date.

Figure 4 depicts the payoff to a one-period floor as a function of the value of the underlying index rate. If the index rate is below the floor rate on the interest rate reset date the buyer receives a payment of \((N)(r_f - r)(d_t/360)\), which is equivalent to the payoff from selling an FRA at a forward rate of \(r_f\). On the other hand, if the index rate is above the floor rate the buyer receives no payment and loses the premium paid to the seller. Thus, a floor effectively gives the buyer the right, but not the obligation, to sell an FRA, which makes it equivalent to a European put option on an FRA. More generally, a multi-period floor can be viewed as a bundle of European-style put options on a sequence of FRAs maturing on a succession of future maturity dates.

**Comparison of Floors and Futures Options:** Purchasing a one-period interest rate floor yields a payoff closely resembling that of a long Eurodollar futures call option. The payoff to a call option on a Eurodollar futures contract is \((N) \times \max(0, F - K)(90/360)\).

Where,

- \(F = 100 - r\) is the index price of the underlying futures contract, and
- \(K\) is the strike price.

As before, write \(K = 100 - r_k\). Then, the payoff to a Eurodollar futures call option can be expressed in terms of the underlying interest rate as

\[(N) \times \max(0, r_k - r)(90/360),\]

which is the same as the payoff to a one-period interest rate floor indexed to 90-day LIBOR with a floor rate equal to \(r_k\). The one noteworthy difference between the two instruments is that a Eurodollar futures option can be exercised at any time, while a floor resembles a European put option in that it is not exercisable until the date of payment.
option that can only be exercised on its expiration date. Like caps, interest rate floors settle in arrears, whereas a futures option settles on its expiration date.

15.6 Interest Rate Collars: The buyer of an interest rate collar purchases an interest rate cap while selling a floor indexed to the same interest rate. Borrowers with variable-rate loans buy collars to limit effective borrowing rates to a range of interest rates between some maximum, determined by the cap rate, and a minimum, which is fixed by the floor strike price; hence, the term "collar." Although buying a collar limits a borrower's ability to benefit from a significant decline in market interest rates, it has the advantage of being less expensive than buying a cap alone because the borrower earns premium income from the sale of the floor that offsets the cost of the cap. A zero-cost collar results when the premium earned by selling a floor exactly offsets the cap premium.

The amount of the payment due to or owed by a buyer of an interest rate collar is determined by the expression

\[(N) \left[ \max(0, r - r_c) - \max(0, r_f - r) \right] \left( \frac{d_t}{360} \right), \]

Where,

- \(N\) is the notional principal amount of the agreement,
- \(r_c\) is the cap rate,
- \(r_f\) is the floor rate, and
- \(d_t\) is the term of the index in days.

Figure 5 illustrates the payoff to buying a one-period zero-cost interest rate collar. If the index interest rate \(r\) is less than the floor rate \(r_f\) on the interest rate reset date, the floor is in-the-money and the collar buyer (who has sold a floor) must pay the collar counterparty an amount equal to \((N)( r_f - r)(d_t/360)\). When \(r\) is greater than \(r_f\) but less than the cap rate \(r_c\), both the floor and the cap are out-of-the-money and no payments are exchanged. Finally, when the index is above the cap rate the cap is in-the-money and the buyer receives \((N)( r - r_c)(d_t/360)\).

**Figure 5- The Payoff to Buying a One-Period, Zero-Cost Collar**

Figure 6 illustrates a special case of a zero-cost collar that results from the simultaneous purchase of a one-period cap and sale of a one-period floor when the cap and floor rates are equal. In this case the combined transaction replicates the payoff of an FRA with a forward interest rate equal to the cap/floor rate. This result is a consequence of a property of option prices known as put-call parity.
More generally, the purchase of a cap and sale of a floor with the same notional principle, index rate, strike price, and reset dates produces the same payout stream as an interest rate swap with an All-In-Cost equal to the cap or floor rate. Since caps and floors can be viewed as a sequence of European call and put options on FRAs, buying a cap and selling a floor with the same strike price and interest rate reset and payment dates effectively creates a sequence of FRAs, all with the same forward rate. But note that an interest rate swap can be viewed as a sequence of FRAs, each with a forward rate equal to the All-In-Cost of the swap. Therefore, put-call parity implies that buying a cap and selling a floor with the same contract specifications results in the same payment stream that would be obtained by buying an interest rate swap.

15.7 Hedging Uses of Interest Rate Collars: Figure 7 illustrates the effect that buying a one-period, zero-cost collar has on the exposure to changes in market interest rates faced by a firm with outstanding variable-rate debt. The first panel depicts the firm's inherent or unhedged interest exposure, while the second panel illustrates the effect that buying a collar has on interest expense. Finally, the third panel combines the borrower's inherent exposure with the payoff to buying a collar to display the effect of a change in market interest rates on a hedged borrower's interest expense. Note that changes in market interest rates can only affect the hedged borrower's interest expense when the index rate varies between the floor and cap rates. Outside this range, the borrower's interest expense is completely hedged.
Thus, it can be summarized that in an interest rate option, the underlying asset is related to the change in an interest rate. In an interest rate cap, for example, the seller agrees to compensate the buyer for the amount by which an underlying short-term rate exceeds a specified rate on a series of dates during the life of the contract. In an interest rate floor, the seller agrees to compensate the buyer for a rate falling below the specified rate during the contract period. A collar is a combination of a long (short) cap and short (long) floor, struck at different rates. Finally, a swap option (swaption) gives the holder the right—but not the obligation—to enter an interest rate swap at an agreed upon fixed rate until or at some future date.

15.8 Caps and Floors Versus Swaptions: For caps/floors, the relevant stochastic variable is the implied forward rate for each time bucket. Comparatively, the underlying stochastic variable for swaptions would be the forward-starting swap. It is also important to note that a swaption will actually only have one date of exercise compared to a cap (which is essentially a series of separate call options on forward rates). Although the cash flow dates will be similar, each caplet in a cap should be treated independently. Once a swaption is exercised, all the cash flows on the underlying IRS of the swaption will occur. There is consequently quite a big difference between a 2-year cap on 3-month instrument (a total of 7 options) and a 3-month swaption on an 18-month forward-start IRS (only a single option). This difference is reflected in the fact that swaptions attract a lower premium.

Where swaptions are used to hedge a borrowing, it would appear at first glance that the cost of the premium of swaptions would cancel any benefit. This would be the case if the hedge were priced entirely off the forward curve, as is the case when caps are used. The volatility element in the cap premium is determined by taking into account the consideration of each time bucket. As pointed out, a swaption is however an option on a forward start IRS. The volatility curve is therefore drawn around the swap and not the forward curve. The swap curve will always be below the forward curve as long as the two curves are positive. This relationship results from the fact that the swap rate is the one fixed rate that causes the sum of the net present values of the fixed cash flows to equal the sum of the net present values of the floating flows.

Another difference between the instruments is the fact that once a swaption is exercised, the holder has entered into a swap. This swap will have been entered into at a favourable rate, but the holder can still lose money if the rates move against him. When a cap is exercised, the holder can never lose money.

15.9 The Indian Scenario: The OTC derivatives markets have witnessed rather sharp growth over the last few years, which have accompanied the modernization of commercial and investment banking and globalisation of financial activities. The recent developments in information technology have contributed to a great extent to these developments. While both exchange-traded and OTC derivative contracts offer many benefits, the former have rigid
structures compared to the latter. It has been widely discussed that the highly leveraged institutions and their OTC derivative positions can lead to turbulence in financial markets.

The OTC derivatives markets have the following features compared to exchange-traded derivatives.

The management of counter-party (credit) risk is decentralized and located within individual institutions. There are no formal centralized limits on individual positions, leverage, or margining. There are no formal rules for risk and burden-sharing. There are no formal rules or mechanisms for ensuring market stability and integrity, and for safeguarding the collective interests of market participants, and the OTC contracts are generally not regulated by a regulatory authority and the exchange’s self-regulatory organization, although they are affected indirectly by national legal systems, banking supervision and market surveillance.