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Indian Capital Market

Learning Objectives

After going through the chapter student will be able to understand:

- Overview of Indian Financial System
- Capital Markets/ Securities Markets
- Stock Market and its operations
- Settlement and Settlement Cycles
- Clearing House
- Green Shoe Option
- 100% Book Building Process
- Various Capital Market Instruments
- Commodity Derivatives including hedging with Commodity Derivatives
- OTC Derivatives including FRAs, Interest Rate Swaps, Swaptions and Interest Rate Collars and Caps.

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, the greater is its efficiency of capital formation. The more diversified and broad based the institutional structure of the financial system, the more active and vibrant is the financial system.

The nature and scope of financial intermediaries, their investment policies and operations affect the process of capital formation in the country. They facilitate the flow of savings into investments by overcoming the geographical and technical limitations.

Broadly Indian Financial Market consists of Capital Market, Money Market and the Debt Market. The organized part of the Indian financial system can be classified from the point of view of regulatory authority as:

- Reserve Bank of India (RBI) regulating Commercial Banks, Foreign Exchange Markets, Financial Institutions and Primary Dealers. Commercial banks include Public Sector

Banks, Private Banks and Foreign Banks. Financial Institutions may be of all India level like IDBI, IFCI, ICICI, NABARD or sectoral financial institutions like EXIM, TFCIL etc. Primary Dealers are registered participants of the wholesale debt market and bid at auctions for Government Debt, treasury bills.

- Securities and Exchange Board of India (SEBI) regulating Primary Market, Secondary Market, Derivatives Market and market intermediaries like Mutual Funds, Brokers, Merchant Banks, depositories.

2. Capital Markets/Securities Market

The capital markets are relatively for 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.

2.1 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.

There are different types of intermediaries operating in the capital market. They play a crucial role in the development of capital market by providing a variety of services. These intermediaries *viz.,* merchant bankers, brokers, bankers to issues, debenture trustees, portfolio managers, registrars to issues and share transfer agents, etc., are regulated by SEBI.

2.2 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 traded from that first holder to another, the issues trade in these secondary markets.

2.3 Differences between Primary and Secondary Markets

(a) *Nature of Securities:* The primary markets deal with new securities, that is, securities, which were not previously available and are, therefore, offered to the investing public for the first time. The stock market, on the other hand, 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.

(b) *Nature of Financing:* Another aspect is the nature of their contribution to industrial financing. 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. In contrast, the secondary markets 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.

(c) *Organisational Differences:* The stock exchanges have physical existence and are located in a particular geographical area. The primary market 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 lenders and borrowers of capital funds at the time of any particular operation.

2.4 Similarities between Primary and Secondary Markets: 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. The practice of listing of new issues on the stock market is of immense utility to the potential investors who can be sure that should they receive an allotment of new issues, they will subsequently be able to dispose them off any time.

(b) *Control:* The stock exchanges exercise considerable control over the organization of new issues. In terms of regulatory framework related to dealings in securities, the new issues of securities which seek stock quotation/listing have to comply with statutory rules as well as regulations framed by the stock exchanges with the object of ensuring fair dealings in them. If the new issues do not conform to the prescribed stipulations, the stock exchanges would refuse listing facilities to them.

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 behavior of the stock exchanges has a significant bearing on the level of activity in the primary market and, therefore, its responses to capital issues.
- Second dimension of the mutual interdependence of the two parts of the market is that the prices of new issues are influenced by the price movements on the stock market.

3. Stock Market and Its Operations

Secondary markets are also referred to as Stock Exchanges. They are a part of capital market. The stock exchange is one of the most important institutions in the Capital Market, which includes term lending institutions, banks, investors, companies, and just about anybody and everybody who are engaged in providing long-term capital, whether share capital or debt capital, to the industrial sector.

To state simply it is a place where the securities issued by the Government, public bodies and Joint Stock Companies are traded.

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".

3.1 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. 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. There are twenty Stock Exchanges in the country at present out of which only eight have been given permanent recognition; others need to apply every year for recognition.

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.

3.1.1 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 corporatised 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. 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 proprietory 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.

On its recognition as a stock exchange under the Securities Contracts (Regulation) Act, 1956 in April 1993, NSE commenced operations in the Wholesale Debt Market (WDM) segment in June 1994. The Capital Market (Equities) segment commenced operations in November 1994 and operations in Derivatives segment commenced in June 2000.

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.

3.1.2 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.

3.2 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.

3.3 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 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.

3.4 Basics of Stock Market Indices

3.4.1 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 changes 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.

3.4.2 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)

3.4.3 Computation of Index: Following steps are involved in calculation of index on a particular date:

- 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:

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

- It should also be noted that Indices may also be calculated using the price weighted method. Here the share 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.

4. Settlement and Settlement Cycles

4.1 Rolling Settlement Cycle: SEBI introduced a new settlement cycle known as the 'rolling settlement cycle'. This cycle starts and ends on the same day and settlement takes place on the 'T+X' days where X is 2 days, which is the business days from the date of the transactions. Thus unlike periodic settlement cycle in a rolling settlement the decision has to be made at the conclusion of the trading session, on the same day.

4.2 NSE Settlement Cycle: The NSE follows a T+2 rolling settlement cycle. In this settlement for all trade executed on trading day i.e. T day. The obligations are determined on T+1 day and settlement on T+2 basis i.e. on the 2nd working day.

4.3 BSE Settlement Cycle: The BSE settlement cycle is similar to that of the NSE T+2 i.e. rolling settlement.

4.4 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.

5. 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.

5.1 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.

5.2 Working: 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.

5.3 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.

6. 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.

Part B : Capital Market Instruments

7. 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. It offers a number of investment avenues to investors. The capital market instruments are the vehicles between the companies and the investors. Stock market is the vehicle and SEBI is the driver.

These instruments are of two types namely primary market and secondary market instruments. Apart from derivative instruments, the following are the major mediums of approaching capital markets:

- Equity Shares
- Preference Shares
- Debentures/ Bonds
- ADRs
- GDRs
- Derivatives

Here, we will briefly go through the equity and preference shares, debentures, ADRs and GDRs and largely confine ourselves to different types of derivatives.

7.1 Equity Shares: Equity 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. It represents a claim on the company's assets and earnings. 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 higher claim on assets and earnings than the equity shares. For example, owners of Preference shares receive dividends before equity shareholders and have priority in the event that a company goes bankrupt and is liquidated.

A holder of shares (a shareholder) has a claim to a part of the corporation's assets and earnings. In other words, a shareholder is an owner of a company. Ownership is determined by the number of shares a person owns relative to the number of outstanding shares. For example, if a company has 1,000 shares of shares outstanding and one person owns 100 shares, that person would own and have claim to 10% of the company's assets

A share is represented by a share certificate and it is a proof of ownership. These records are kept electronically in a demat form. This is done to make the shares easier to trade.

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.

The importance of being a shareholder is that you are entitled to a portion of the company's profits and have a claim on assets. 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.

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.

Why does a company issue shares? Why would the founders share the profits with thousands of people when they could keep profits to themselves? The reason is that at some point every company needs to raise money. To do this, companies can either borrow it from somebody or raise it by selling part of the company, which is known as issuing shares. A company can borrow by taking a loan from a bank or by issuing bonds. Both methods fit under the umbrella of debt financing. On the other hand, issuing shares is called equity financing. Issuing shares is advantageous for the company because it does not require the company to pay back the money or make interest payments along the way. All that the shareholders get in return for their money is the hope that the shares will someday be worth more than what they paid for them.

It is important that you understand the distinction between a company financing through debt and financing through equity. When you buy a debt investment such as a bond, you are guaranteed the return of your money (the principal) along with promised interest payments. This isn't the case with an equity investment. By becoming an owner, you assume the risk of the company not being successful - just as a small business owner isn't guaranteed a return, neither is a shareholder.

It must be emphasized that there are no guarantees when it comes to individual shares. Some companies pay out dividends, but many others do not. And there is no obligation to pay out dividends even for those firms that have traditionally given them. Without dividends, an investor can make money on a stock only through its appreciation in the open market. On the downside, any stock may go bankrupt, in which case your investment is worth nothing.

Market Value: Market value per share is the current price at which the share is traded. For actively traded shares, market price quotations are readily available. For the many inactive shares that have thin markets, prices are 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. The market value of an equity share will usually differ from its book value and its liquidating value. Market value per share of an equity share is a function of the current and expected future dividends of the company and the perceived risk of the share on the part of investors.

7.1.1 Rights of Equity Shareholders

(i) Right to Income: Equity shareholders, on the other hand, have no legal recourse to a company for not distributing profits. Only if management, the board of directors, or both are engaged in fraud may shareholders take their case to court and possibly force the company to pay dividends.

(ii) Voting Rights: The equity shareholders of a company are its owners and they are entitled to elect a board of directors. In a large corporation, shareholders usually exercise only indirect control through the board of directors they elect. The board, in turn, selects the management, and management actually controls the operations of the company. In a sole proprietorship,

partnership, or small corporation, the owners usually control the operation of the business directly.

(iii) Proxies and Proxy Contests: Equity shareholders are entitled to one vote for each share that they own. It is usually difficult, both physically and financially, for most shareholders to attend a corporation's annual meetings. Because of this, many shareholders vote by means of a proxy, a legal document by which shareholders assign their right to vote to another person.

(iv) Voting Procedures: Depending on the corporate charter, the board of directors is elected under either a majority-rule voting system or a cumulative voting system. Under the majority-rule system, shareholders have one vote for each share that they own, and they must vote for each director position that is open. Under a cumulative voting system, a shareholder is able to accumulate votes and cast them for less than the total number of directors being elected. The total number of votes for each shareholder is equal to the number of shares the stockholder times the number of directors being elected.

7.1.2 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.

In India, there are two options for book building process. (a) 100% of net offer to public through the book building route. (b) 75% of net offer to public through book building process and 25% through the fixed price portion.

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 issuer company should compulsorily offer an additional 10% of the issue size offered to the public through the prospectus.

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 realised the temper 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.

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.

7.1.2 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.

7.2 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. It is "long-term" by definition; in order to be called a bond. The term must be longer than five years. Debt securities with maturities under five years are called bills, notes or other terms. 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.

7.2.1 Yields: There are number of methods for calculating yields. But the most common method is the Yield to Maturity (YTM). Although this is another name of IRR. The formula is as follows:

$$YTM = \frac{\text{Coupon Rate} + \text{Prorated Discount}}{(\text{Face Value} + \text{Purchase Price})/2}$$

7.2.2 Determinants of Bond Prices: While Yield To Maturity (YTM) enables traders and investors to compare debt securities with different coupon rates and terms to maturity. It does not determine price. Bond prices depend on a number of factors such as the ability of the issuer to make interest and principal payments and how the bond is collateralized. An across-the-board factor that affects bond prices is the level of prevailing interest rates.

Illustration 1

Suppose a 8% ₹ 1000 bond had 5 years left to maturity when it was purchased for ₹ 800. The prevailing interest rate (on other investment vehicles) was about 8%. Further assume that current prevailing interest rates are about 9%. Why should investors buy a five-year old bond yielding 8% when they can buy a newly issued 9% bond?

Solution

The only way the holder of an 8% bond can find a buyer is to sell the bond at a discount, so that its yield to maturity is the same as the coupon rate on new issues. Let's say interest rates increase from 8% to 10%. With 15 years to maturity, an 8% bond has to be priced so that the discount, when amortized over 15 years has a yield to maturity of 10%. That discount is a little under ₹ 200:

$$YTM = \frac{Coupon\ Rate + Prorated\ Discount}{(Face\ Value + Purchase\ Price)/2} = \frac{₹\ 80 + (₹\ 200/15\ years)}{(₹\ 1,000 + ₹\ 800)/2} = \frac{₹\ 93.33}{₹\ 900} = 10.4\%.$$

The 8% bond with 15 years to maturity must sell at a little over ₹ 800 to compete with 10% bonds. The possibility that interest rates will cause outstanding bond issues to lose value is called "Interest rate risk." Yet there is an upside to this risk. If interest rates decline during the five years that the 8% bond is outstanding, the holder could sell it for enough of a premium to make its YTM rate equal to the lower yields of recent issues. For instance, should Interest rates decline to 7%, the price of the 8% bond with 15 years to maturity will increase by about ₹ 100.

7.3 American Depository Receipt (ADRs): An American Depository Receipt (ADR) is a negotiable receipt which represents one or more depository shares held by a US custodian bank, which in turn represent underlying shares of non-US issuer held by a custodian in the home country. ADR is an attractive investment to US investors willing to invest in securities of non US issuers for following reasons:

- ADRs provide a means to US investors to trade the non-US company's shares in US dollars. ADR is a negotiable receipt (which represents the non US share) issued in US capital market and is traded in dollars. The trading in ADR effectively means trading in underlying shares.
- ADRs facilitates share transfers. ADRs are negotiable and can be easily transferred among the investors like any other negotiable instrument. The transfer of ADRs automatically transfers the underlying share.
- The transfer of ADRs does not involve any stamp duty and hence the transfer of underlying share does not require any stamp duty.
- The dividends are paid to the holders of ADRs in U.S. dollars.

A non U.S. issuer has to work with its US investment bankers, US depository bank, US and non US legal counsel and independent accountant to prepare the registration documents and offering materials.

The listing of such an issue is done on the NYSE or AMEX to enable trading. Quotations on NASDAQ can also be used for trading purposes. Any requirement with respect to Blue Sky Law, if not exempted, has to be fulfilled.

Specified document and information must be provided to NASDAQ to enable it to review the terms of the offering and determine whether the underwriting arrangements are fair and reasonable. The filing documents with NASDAQ are the responsibility of managing underwriter.

7.4 Global Depository Receipts (GDRs): Global Depository Receipts are negotiable certificates with publicly traded equity of the issuer as underlying security. An issue of depository receipts would involve the issuer, issuing agent to a foreign depository. The depository, in turn, issues GDRs to investors evidencing their rights as shareholders. Depository receipts are denominated in foreign currency and are listed on an international exchange such as London or Luxembourg. GDRs enable investors to trade a dollar

denominated instrument on an international stock exchange and yet have rights in foreign shares.

The principal purpose of the GDR is to provide international investors with local settlement. The issuer issuing the shares has to pay dividends to the depository in the domestic currency. The depository has to then convert the domestic currency into dollars for onward payment to receipt holders. GDRs bear no risk of capital repayment.

GDRs are also issued with warrants attached to them. Warrants give the investors an option to get it converted into equity at a later date. Warrants help the issuer to charge some premium on the GDRs sold and it also helps to increase the demand of the GDR issue. The other advantage to the issuer is that it will not have to pay dividends on the warrants till the conversion option is exercised. The disadvantage to the issuer lies in delayed receipt of full proceeds from the issue and in case the conversion option is not exercised the expected proceeds will not be realised.

7.5 Derivatives: A derivative is a financial instrument which derives its value from some other financial price. This 'other financial price' is called the underlying.

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

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.

7.5.1 Financial Derivatives: Under financial derivatives, the discussion would cover stock futures, stock options, index futures and index options along with their pricing techniques.

7.5.1.1 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 standardised 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 S ₹ 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.

7.5.1.2 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 settle price (settle 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 settle 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 settle 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.

7.5.1.3 Stock Futures Contract: A 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 standardised

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.

(a) Trading Basics: When an investor has a long margin account in stock, he or she is borrowing part of the money to buy stock, using the stock as collateral.

In a Stock Future contract, the margin deposit is more of a good faith deposit, which is held by the brokerage firm toward the settlement of the contract. The margin requirement in a stock future applies to both buyers and sellers. The 20% requirement represents both the initial and maintenance requirement.

Another major difference in the margin requirements for stock 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.

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 stock futures must be very vigilant - they must keep close track of market movements.

(b) Speculation – For simplicity we'll be using one contract and the basic 20%. Commissions and transaction fees are not taken into account.

Example- Going Long on Future Contract

Suppose an investor is bullish on McDonald's (MCD) and goes long 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.

Example- Going Short on Future 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.

(c) Hedging - 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. However, this is only a temporary solution because the future will expire.

Example- Using stock index 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 August, the investor sells the stock at the market price and buys back the future contract.

Consider the following figure:

September Price	*Value of 100 Shares*	*Gain or Loss on SF*	*Net Value*
₹ 300	₹ 30000	+₹ 5000	₹ 35000
₹ 350	₹ 35000	0	₹ 35000
₹ 400	₹ 40000	-₹ 5000	₹ 35000

Until the expiration of the stock future in September, the investor will have a net value of the hedged position of ₹ 35000. The negative side of this is that if the stock dramatically increases, the investor is still locked in at ₹ 350 per share.

(d) Advantages of Futures Trading Vs. Stock Trading: Compared to directly trading stocks, stock futures provide several major advantages:

- *Leverage*: Compared to buying stock on margin, investing in futures is less costly. An investor can use leverage to control more stock with a smaller cash outlay.
- *Ease of Shorting*: Taking a short position in futures is simpler, less costly and may be executed at any time - there is no requirement for an uptick
- *Flexibility*: Future investors can use the instruments to speculate, hedge, spread or for use in a large array of sophisticated strategies.

Stock 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.
- *Required Vigilance*: 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.

7.5.1.4 Stock Index Futures: Trading in stock index futures contracts was introduced by the Kansas City Board of Trade on February 24, 1982.

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 and options based on a future price of corn, foreign currency, etc, 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. Generally, these contracts expire within one year. Unlike commodity futures, however, 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 the S&P 500 futures contract traded at the Chicago Mercantile Exchange (CME), the contract specification states:

1 Contract = $250 * Value of the S&P 500

If we assume that the S&P 500 is quoting at 1,000, the value of one contract will be equal to $250,000 (250*1,000). The monetary value - $250 in this case - is fixed by the exchange where the contract is traded.

7.5.1.4.1 Mechanics of Trading: Like most other financial instruments, futures contracts are traded on recognised exchanges. In India, both the NSE and the BSE have introduced index futures in the S&P CNX Nifty and the BSE Sensex. The operations are similar to that of the stock market, the exception being that, in index futures, the marking-to-market principle is followed, that is, the portfolios are adjusted to the market values on a daily basis.

Stock index futures have some special institutional features. First, settlement, even on the delivery date, is in cash. The seller simply delivers to the buyer the cash difference between the closing level of the underlying index and the futures price. This cash settlement feature is adopted because it is impractical to deliver all the stocks in the index in their correct proportions. Indeed, for some contracts, cash delivery is not just an alternative, but a necessity; for example, when the underlying variable is not an asset at all but just a number,

such as the CPI or the Weather Index.

In stock index futures contracts, there are two parties directly involved. One party (the short position) must deliver to a second party (the long position) an amount of cash equaling the contract's dollar multiplier (₹ multiplier in Indian market) multiplied by the difference between the spot price of a stock market index underlying the contract on the day of settlement (IP_{spot}) and the contract price on the date that the contract was entered (CP_0).

If an investor sells a six-month NYSE (New York Stock Exchange) Composite futures contract (with a multiplier of $500 per index point) at 444 and, six, months later, the NYSE Composite Index closes at 445, the short party will receive $500 in cash from the long party.

Similarly, if an investor shorts a one-year futures contract at 442 and the index is 447 on the settlement day one year later (assuming that the multiplier is at $500), the short seller has to pay the long holder $2,500.

Thus, positive differences are paid by the seller and received by the buyer. Negative differences are paid by the buyer and received by the seller.

Second, determination of its futures price depends on an estimate of the remaining cash dividends on the underlying index through delivery. Estimating cash dividends is not difficult over a one-year horizon since cash dividends for individual stocks are largely predictable from a firm's past behaviour, and because the law of large numbers tends to cause errors in individual predictions to wash out.

7.5.1.4.2 Buying and Selling Stock Index Futures: When an investor opens a futures position, he or she does not pay the entire amount of the equity underlying the futures contract. The investor is required to put up only a small percentage of the value of the contract as a margin. A margin is the amount of money required for investors to give to their brokers to maintain their futures contracts. Unlike margins paid for stock purchases, margins paid for stock index futures are not purchases or sales of actual securities. Instead, they represent agreements to pay or receive the difference in price between the index underlying the contract on the day of settlement (IP_{spot}) and the contract price on the date that the contract was entered (CP_0).

If the index moves against the sellers, they will be required to add to the margin amount. Known as a maintenance or variation margin, it is the minimum level to which investors' account equity can fall before they receive a margin call. When investors' equity in a stock index futures account falls below the maintenance level, they receive a margin call for enough money to bring the account up to the initial margin level. This margin requirement mandates that holders of futures positions settle their realized and unrealized profits and losses in cash on a daily basis. These profits and losses are derived by comparing the trade price against the daily settlement price of the futures contract. The settlement price is broadcast by the exchanges soon after the markets close; it represents the pricing of the last 30 seconds of the day's trading. Depending on the position of the portfolio, margins are forced upon investors.

7.5.1.4.3 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 to 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.

(8) 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.

(9) 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.

7.5.1.4.4 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.

(a) 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.

(b) 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.

(c) 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]

7.5.1.5 Stock Options: A Stock 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) a stock at an agreed-upon price within a certain period or on a specific date regardless of changes in its 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. The option may be purchased or sold or may be granted to an individual by the company as in an employee stock option. Here they are given by a corporation in an attempt to motivate an employee or officer to continue with the corporation or to improve corporate productivity in a manner which will cause the price of the corporation's stock to rise and thereby increase the value of the option. Stock options involve no commitments on the part of the individual to purchase the stock and the option is usually exercised only if the price of the stock has risen above the price specified at the time the option was given.

One important difference between 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. It is important to remember that there are always two sides for every option transaction: a buyer and a seller. 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.

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, the seller's loss can be open-ended, meaning the seller can lose much more than the original premium received.

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.

Note that options are not available at just any price. In international market stock options are generally traded with strike prices in intervals of $2.50 up to $30 and in intervals of $5 above that. Also, only strike prices within a reasonable range around the current stock price are generally traded. Far in or out-of-the-money options might not be available. All stock options expire on a certain date, called the expiration date.

A more complex type of security than the stocks with which they are associated, options can be used in a wide variety of strategies, from conservative to high risk. They can also be tailored to meet expectations that go beyond a simple 'the stock will go up' or 'the stock will go down'.

When most stock traders first begin using options, it is usually to purchase a call or a put for directional trading, which traders practice when they are confident that a stock price will move in a particular direction and they open an option position to take advantage of the expected movement. These traders may decide to try investing in options rather than the stock itself because of the limited risk, high potential reward and smaller amount of capital required to control the same number of shares of stock.

If your outlook is positive (bullish), buying a call option creates the opportunity to share in the upside potential of a stock without having to risk more than a fraction of its market value. If you are bearish (anticipate a downward price movement), buying a put lets you take advantage of a fall in the stock price without the large margin needed to short a stock. There are many different kinds of option strategies that can be constructed, but the success of any strategy depends on the trader's thorough understanding of the two types of options: the put and the call. Furthermore, taking full advantage of options requires changing how you think. Those option traders who still think solely in terms of market direction may appreciate the flexibility and leverage options offer, but these traders are missing some of the other opportunities that options provide. Besides moving up or down, stocks can move sideways or trend only modestly higher or lower for long periods of time. They can also make substantial moves up or down in price, then reverse direction and end up back where they started. These kinds of price movements cause headaches for stock traders but give option traders the

unique and exclusive opportunity to make money even if the stock goes nowhere. In the landscape of options you have three shifting parameters that affect an option's price: price of the stock, time and volatility. Changes in any one of these three variables will affect the value of your options. Calendar spreads, straddles, strangles and butterflies are some of the strategies designed to profit from those types of situations.

Comparison with Equity Options: Investing in stock futures differs from investing in equity options contracts in several ways:

- *Nature:* In a long options position, the investor has the right but not the obligation to purchase or deliver stock. In a long future position, the investor is obligated to deliver the stock.
- *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 wasting asset. 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.

7.5.1.6 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. Options on the S&P 500 are some of the most actively traded options in the world.

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 β of 1.0 so that its value mirrors the value of the index. If for each 100S 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.

7.5.1.7 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 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:* 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:* The beginning point of understanding volatility is 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 effects the value of an Option is the time value of money. The greater the interest rates, the present value of the future exercise price is less.

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

Basis = Spot price – 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 financial futures in which there may be carry-returns like dividends, in addition to carrying costs, which may influence this relationship.

The cost-of-carry model in financial futures, thus, is

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

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

= 220 + (220 x 0.15 x 0.25) – (0.25 x 10*) = 225.75

* Face value of the stock.

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:

Sale proceeds of March 2011 futures		₹ 230.00
Dividend		₹ 2.50
	Total (A)	₹ 232.50
Pays back the Bank		₹ 220.00
Cost of borrowing		₹ 8.25
Total (B)		₹ 228.25
Balance (A) – (B)		₹ 4.25

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:

$$A=P\ (1+r/100)^{t}$$

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:

$$A = P\ (1+r/n)^{nt}$$

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

$$A = Pe^{r\,n}$$

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. It may also be mentioned here that while taking up the examples on valuation, we shall discuss these in the context of forward contracts and later show how forward and futures prices correlate and converge.

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:

Dividend proceeds	=	$500 \times 2.50 = 1250$
	=	$1250e^{-(3/12)(0.10)} = 1219.13$
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.

$A = Pe^{n(r-y)}$

$= 1400 \times e^{(3/12)(0.10-.06)} =$ ₹ 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.

Illustration 2

Let us illustrate the pricing of 90-day futures contract on a stock that pays ₹1.50 dividend on 50th day. The current stock price is ₹100. The yield on risk-free assets is 10% pa on simple interest rate basis (or 9.53% p.a. continuous compounding basis). The inputs are thus: S = 50; r = 0.0953; T = 0.246575 year (or 90 days); t = 0.136986 year (50 days).

Solution

$$F = 100e^{0.0953 \times 0.246575} - 1.50e^{-0.0953 \times 0.136986} = 100.82$$

Let $x = 100e^{0.0953 \times 0.246575} = 100\, e^{0.02349859}$

Then

log x = log 100 + 0.02349859 × log e

log x = 10 + 0.02349859 × 0.43429

log x = 10 + 0.0102053 = 10.0102053

Antilog (log x) = Antilog 10.0102053

x = 102.30

Similarly for $1.50 e^{-0.0953 \times 0.136986}$

Let $Y = 1.50 e^{-0.0953 \times 0.136986}$

Then log Y = log 1.50 – 0.0953 × 0.136986 × log e

log Y = 0.176091 – 0.013055 × 0.43429

log Y = 0.176091 – 0.00567 = 0.170421

Antilog (log Y) = Antilog (0.170421)

Y= 1.48 (Approx.)

Readers may check that if the stock pays no cash dividend during futures life, the futures price would be higher at 102.38. If the cash dividend amount is higher at ₹ 3, then the futures price would be 99.42, which is lower than current spot price.

7.5.3 Option Valuation Techniques: The Value of an Option at Expiration Date: 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.*

(a) 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 an 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.

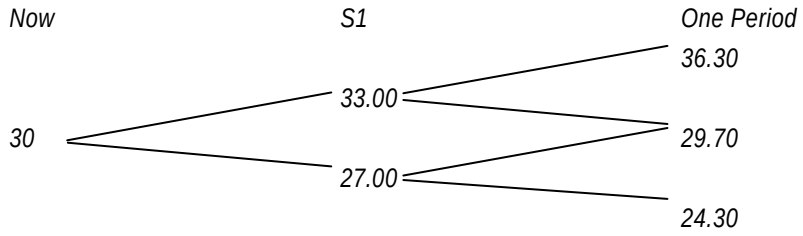
At the end of the tree - i.e. at expiration of the option - all the terminal option prices for each of the final possible stock prices are known as they simply equal their intrinsic values.

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 3

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



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 (per sub period). You should also indicate the composition of the implied riskless hedge portfolio at the valuation date.

Solution

u = 33.00/30.00 = 36.30/33.00 = 1.10 d = 27.00/30.00 = 24.30/27.00 = 0.90

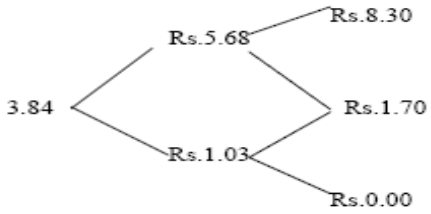
$r = (1 + .05)^{1/2} = 1.0247$

$$p = \frac{r - d}{u - d} = \frac{1.0247 - 0.90}{1.10 - 0.90} = 0.1247/0.20 = 0.6235$$

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



$$C_U = \frac{(0.6235)(8.30)+(0.3765)(1.70)}{1.025} = \frac{5.175+.064}{1.025} = 5.815/1.025 = ₹\ 5.675$$

$$C_d = \frac{(0.6235)(1.70)+(0.3765)(0.00)}{1.025} = \frac{1.05995}{1.025} = ₹\ 1.0340$$

$$C_o = \frac{(0.6235)(5.675)+(0.3765)(1.0340)}{1.025} = \frac{3.538+3895}{1.025} = ₹\ 3.83$$

h = (33.00 – 27.00)/(1.03 – 5.68) = 6.00/4.65 = 1.29

(b) 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 model 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 ₹ 50. 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:

$$50 = \frac{60p+40(1-p)}{1.05}$$

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:

$$\frac{10(0.65)+0(1-0.65)}{1.05} = 6.19$$

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

Illustration 4

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 ₹ = $\frac{0.2848 \times (500 - 450)}{1.0202} = \frac{0.2848 \times 50}{1.0202} = 13.96$

(c) 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,
2. No transaction costs,
3. Short term interest rates are known and are constant,
4. Stocks do not pay dividend,
5. Stock price movement is similar to a random walk,
6. Stock returns are normally distributed over a period of time, and
7. The variance of the return is constant over the life of an Option.

The original formula for calculating the theoretical option price (OP) is as follows:

$$OP = SN(d_1) - Xe^{-rt}N(d_2)$$

Where:

$$d_1 = \frac{\ln\left(\frac{S}{X}\right) + \left(r + \frac{v^2}{2}\right)t}{v\sqrt{t}}$$

$$d_2 = d_1 - v\sqrt{t}$$

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

v = 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. $Xe^{-rt}N(d_2)$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 5

(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 Block 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 Block Scholes Model:

$$_1 = \frac{l_n\left(\frac{415}{400}\right) + \left[.05 + \frac{1}{2}(.22)^2\right].25}{.22\sqrt{.25}} = \frac{.03681 + .01855}{.11} = .5032727$$

$$d_2 = \frac{l_n\left(\frac{415}{400}\right) + \left[.05 - \frac{1}{2}(.22)^2\right].25}{.22\sqrt{.25}} = \frac{.03681 + .00645}{.11} = .3932727$$

$N(d_1) = N(.50327) = 1 - .3072 = .6928$

$N(d_2) = N(.39327) = 1 - .3471 = .6529$

$$\text{Value of Option} = 415(.6928) - \frac{400}{e^{(.05)(.25)}}(.6529)$$

$$= 287.512 - \frac{400}{1.012578}(.6529) = 287.512 - 257.916 = ₹\ 29.60$$

NB : N(0.39327) 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:

$$d_1 = \frac{l_n\left(\frac{380}{400}\right) + \left[.05 + \frac{1}{2}(.22)^2\right].25}{.22\sqrt{.25}} = \frac{-0.05129 + .01855}{.11} = -0.297636$$

$$d_2 = \frac{l_n\left(\frac{380}{400}\right) + \left[.05 - \frac{1}{2}(.22)^2\right].25}{.22\sqrt{.25}} = \frac{-0.05129 + .00645}{.11} = -0.407666$$

$$V_0 = V_s N(d_1) - \frac{E}{e^{rt}} N(d_2)$$

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

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

$$380\ (.3830) - \frac{400}{e^{(.05)(.25)}} \times (.3418)$$

$$145.54 - \frac{400}{1012578}\ (.3418) = 145.54 - 138.4397 = ₹\ 7.10$$

(iii) Value of call option = ₹ 7.10

Current Market Value = ₹ 415

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

$V_p = -V_s + V_s + PV\ (E)$

$V_p = -380 + 7.10 + 395.06 = 22.16 =$ ₹ 22.16 Ans

(iv) Since dividend is expected to be paid in two months time we have to adjust the share price and then use Block Scholes model to value the option:

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

$= ₹\ 10 \times e^{-.05 \times .1666}$

$= ₹\ 10 \times e^{-.008333}$

= ₹ 9.917 (Please refer Exponential Table)

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

This can be used in Block Scholes model

$$d_1 = \frac{l_n\left(\frac{398.083}{400}\right) + \left[.05 + \frac{1}{2}(.22)^2\right].25}{.22\sqrt{.25}} = \frac{-.00480 + .01855}{.11} = .125$$

$$d_2 = \frac{\ln\left(\frac{398.083}{400}\right) + \left[.05 - \frac{1}{2}(.22)^2\right].25}{.22\sqrt{.25}} = \frac{-.00480 + .00645}{11} = .015$$

$N(d_1) = N(.125) = .5498$

$N(d_2) = N(.015) = .5060$

$$\text{Value of Option} = 398.0\ 83\ (.5498) - \frac{400}{e^{(.05)(.25)}}(.5060)$$

$$218.866 - \frac{400}{e^{.0125}}(.5060)$$

$$218.866 - \frac{400}{1.012578}(.5060) = 218.866 - 199.8858 = ₹\ 18.98$$

Illustration 6

We have been given the following information about XYZ company's shares and call options:

Current share price	=	*₹ 165*
Option exercise price	=	*₹ 150*
Risk free interest rate	=	*6%*
Time to option expiry	=	*2 years*
Volatility of share price (Standard deviation)	=	*15%*

Calculate value of the option.

Solution

Applying Black Scholes Model

$$d_1 = \frac{\ln\left(\frac{165}{150}\right) + \left[.06 + \frac{1}{2}(.15)^2\right]2}{.15\sqrt{2}} = \frac{.095310 + .1425}{.212132} = 1.12104$$

$$d_2 = \frac{\ln\left(\frac{165}{150}\right) + \left[.06 - \frac{1}{2}(.15)^2\right]2}{.15\sqrt{2}} = \frac{.095310 + .0975}{.212132} = .9089$$

$N(d_1) = N\ (1.12104) = .8688$

$N(d_2) = N(.9089) = .8161$

$$\text{Value of Option} = V_s\ N(d_1) - \frac{E}{e^{rt}}\ N(d_2) = 165 \times (.8688) - \frac{150}{e^{(.06)(2)}}(.8161)$$

$$143.352 - \frac{150}{e^{.12}}(.8161)$$

$$143.352 - \frac{150}{1.127497}(.8161) = 143.352 - 108.5723 = ₹\ 34.779 = ₹\ 34.78$$

(d) 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.

(i) *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:

Delta = $N(d_1)$ (see Black-Scholes formula above for d1)

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.

(ii) *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 -- unlike delta, it can't be done by buying or selling the underlying asset as the gamma of the underlying asset is, by definition, always zero so more or less of it won't affect the gamma of the total portfolio.

(iii) *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

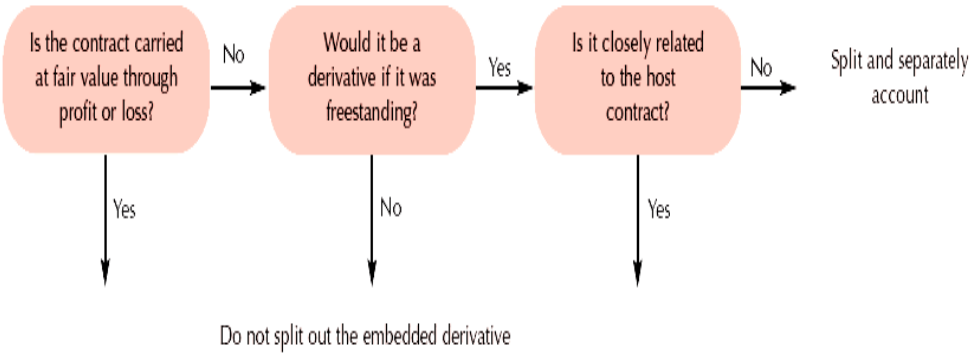
the speed of light the passage of time is constant and inexorable. Thus, hedging a portfolio against time decay, the effects of which are completely predictable, would be pointless.

(iv) *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.

(v) *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.

7.5.4 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 to be 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

Fair Valuing Embedded Derivatives: Embedded derivatives that are separated from the host contract are accounted for at fair value with changes in fair value taken through the income statement. Published price quotations in an active market are normally the best evidence of fair value.

Valuation techniques are used to determine the fair value of the derivative if there is no active market that matches the exact terms of the embedded derivative.

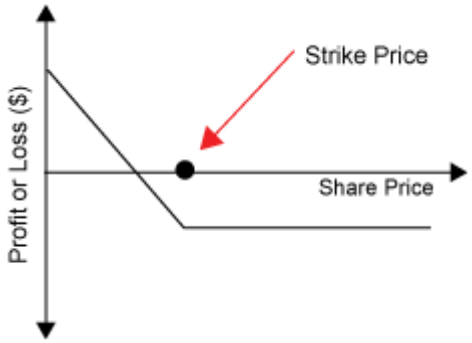
In the case of option derivatives (e.g. puts & calls), the embedded derivatives should be separated from the host contract and valued based on the stated terms of the option. It is assumed that an option derivative will not normally have a fair value of zero initial recognition. In the case of non-option derivatives, the embedded derivatives should be separated from the host contract based on its stated and implied terms and is assumed to have a fair value of zero at initial recognition.

7.5.5 Glossary

Call: An option contract giving the owner the right (but not the obligation) to buy a specified amount of an underlying security at a specified price within a specified time. A call becomes more valuable as the price of the underlying asset (stock) appreciates.

Put: An option contract giving the owner the right, but not the obligation, to sell a specified amount of an underlying asset at a set price within a specified time. The buyer of a put option estimates that the underlying asset will drop below the exercise price before the expiration date.

Put Payoff: The possible payoff for a holder of a put option contract is illustrated by the following diagram:



When an individual purchases a put, they expect the underlying asset will decline in price. They would then profit by either selling the put options at a profit, or by exercising the option. If an individual writes a put contract, they are estimating the stock will not decline below the exercise price, and will not increase significantly beyond the exercise price.

Example

Consider if an investor purchased one put option contract for 100 shares of ABC Co. for ₹ 1, or ₹ 100 (₹ 1*100). The exercise price of the shares is ₹ 10 and the current ABC share price is ₹ 12. This contract has given the investor the right, but not the obligation, to sell shares of ABC at ₹ 10.

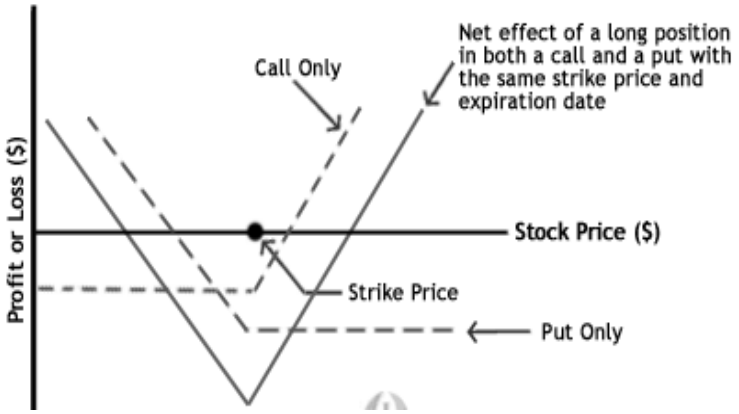
If ABC shares drop to ₹ 8, the investor's put option is in-the-money and he can close his option position by selling his contract on the open market. On the other hand, he can purchase 100 shares of ABC at the existing market price of ₹ 8, then exercise his contract to sell the shares for ₹ 10. Excluding commissions, his total profit for this position would be ₹ 100 [100*(₹ 10 – ₹ 8 – ₹ 1)]. If the investor already owned 100 shares of ABC, this is called a "married put" position and serves as a hedge against a decline in share price.

Leverage: The amount of debt used to finance a firm's assets. A firm with significantly more debt than equity is considered to be highly leveraged. If an investor uses leverage to make an investment and the investment moves against the investor, his or her loss is much greater than it would have been if the investment had not been leveraged - leverage magnifies both gains and losses. In the business world, a company can use leverage to try to generate shareholder wealth, but if it fails to do so, the interest expense and credit risk of default destroys shareholder value. Leverage can be created through options, futures, margin and other financial instruments. For example, say you have ₹ 1,000 to invest. This amount could be invested in 10 shares of NTPC stock, but to increase leverage, you could invest ₹ 1,000 in five options contracts. You would then control 500 shares instead of just 10.

Most companies use debt to finance operations. By doing so, a company increases its leverage because it can invest in business operations without increasing its equity. For example, if a company formed with an investment of ₹ 5 million from investors, the equity in the company is ₹ 5 million - this is the money the company uses to operate. If the company uses debt financing by borrowing ₹ 20 million, the company now has ₹ 25 million to invest in business operations and more opportunity to increase value for shareholders.

Sideways: A situation where stock prices change little over a specific period of time. Consequently, traders who follow trends when making their investment decisions will tend to perform poorly during a sideways market.

Calendar Spreads: Also known as "horizontal price movement" or "flat market" involving the simultaneous purchase and sale of two options of the same type, having the same strike price, but different expiration dates. An example of this would be the purchase of a Dec 20 call and the sale of a June 20 call. This strategy is used to profit from a change in the price difference as the securities move closer to maturity. Also referred to as "time spread".



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 above, 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.

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. It has two different strike prices. For example, imagine a stock currently trading at ₹ 50 a share. To employ the strangle option strategy a trader enters into two option positions, one call and one put. Say the call is for ₹ 55 and costs ₹ 300 (₹ 3.00 per option x 100 shares) and the put is for ₹ 45 and costs ₹ 285 (₹ 2.85 per option x 100 shares). If the

price of the stock stays between ₹ 45 and ₹ 55 over the life of the option the loss to the trader will be ₹ 585 (total cost of the two option contracts). The trader will make money if the price of the stock starts to move outside the range. Say that the price of the stock ends up at ₹ 35. The call option will expire worthless and the loss will be ₹ 300 to the trader. The put option however has gained considerable value, it is worth ₹ 715 (₹ 1,000 less the initial option value of ₹ 285). So the total gain the trader has made is ₹ 415.

For example, let's say you believe your favourite diamond mining company is going to release its latest results in three weeks time, but you have no idea whether the news will be good or bad. This would be a good time to enter into a straddle, because when the results are released the stock is likely to be more sharply higher or lower.

Let's assume the price is currently at ₹ 15 and we are currently in April 13. Suppose the price of the ₹ 15 call option for June 13 has a price of ₹ 2. The price of the ₹ 15 put option for June 06 has a price of ₹ 1. A straddle is achieved by buying both the call and the put for a total of ₹ 300: (₹ 2 + ₹ 1) x 100 = 300. The investor in this situation will gain if the stock moves higher (because of the long call option) or if the stock goes lower (because of the long put option). Profits will be realized as long as the price of the stock moves by more than ₹ 3 per share in either direction. A strangle is used when the investor believes the stock has a better chance of moving in a certain direction, but would still like to be protected in the case of a negative move. For example, let's say you believe the mining results will be positive, meaning you require less downside protection. Instead of buying the put option with the strike price of ₹ 15, may be you should look at buying the ₹ 12.50 strike that has a price of ₹ 0.25. In this case, buying this put option will lower the cost of the strategy and will also require less of an upward move for you to break even. Using the put option in this strangle will still protect the extreme downside, while putting you, the investor, in a better position to gain from a positive announcement.

Butterflies: An option strategy combining a bull and bear spread. It uses three strike prices. The lower two strike prices are used in the bull spread, and the higher strike price in the bear spread. Both puts and calls can be used. This strategy has limited risk and limited profit.

Volatility: A variable in option-pricing formula showing the extent to which the return of the underlying asset will fluctuate between now and the option's expiration. Volatility, as expressed as a percentage coefficient within option-pricing formulas, arises from daily trading activities. In other words, volatility refers to the amount of uncertainty or risk about the size of changes in a security's value. A higher volatility means that a security's value can potentially be spread out over a larger range of values. This means that the price of the security can change dramatically over a short time period in either direction. Whereas a lower volatility would mean that a security's value does not fluctuate dramatically, but changes in value at a steady pace over a period of time.

One measure of the relative volatility of a particular stock to the market is its beta. A beta approximates the overall volatility of security's returns against the returns of a relevant benchmark (usually the NIFTY or BSE index). For example, a stock with a beta value of 1.1 has historically moved 110% for every 100% move in the benchmark, based on price level.

Conversely, a stock with a beta of 0.9 has historically moved 90% for every 100% move in the underlying index.

Part C: Commodity Derivatives

8. Introduction

Trading in 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, et cetera.

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

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

9. 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.

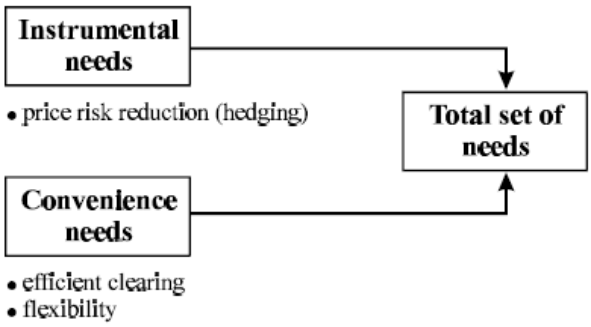


FIGURE 1

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

10. The Indian Scenario

Commodity derivatives have had a long and a chequered presence in India. The commodity derivative market has been functioning in India since the nineteenth century with organised trading in cotton through the establishment of Cotton Trade Association in 1875. Over the years, there have been various bans, suspensions and regulatory dogmas on various contracts. There are nearly 100 commodities available for trade. National Commodity and Derivatives Exchange (NCDEX) is the largest commodity derivatives exchange.

It is only in the last decade that commodity derivatives exchanges have been actively encouraged. But, the markets have suffered from poor liquidity and have not grown to any significant level, till recently.

However, presently four national commodity exchanges are operational; National Multi-Commodity Exchange of India (NMCE), Indian Commodity Exchange (ICEX), National Commodity and Derivatives Exchange (NCDEX) and Multi Commodity Exchange (MCX).

(a) *National Commodity & Derivatives Exchange Limited (NCDEX):* It is a professionally

managed online multi commodity exchange promoted by ICICI Bank Limited (ICICI Bank), Life Insurance Corporation of India (LIC), National Bank for Agriculture and Rural Development (NABARD) and National Stock Exchange of India Limited (NSE). Punjab National Bank (PNB), CRISIL Limited (formerly the Credit Rating Information Services of India Limited), Indian Farmers Fertiliser Cooperative Limited (IFFCO), Canara Bank and Goldman Sachs by subscribing to the equity shares have joined the initial promoters as shareholders of the Exchange. NCDEX is the only commodity exchange in the country promoted by national level institutions.

NCDEX is a public limited company incorporated on April 23, 2003 under the Companies Act, 1956. It commenced its operations on December 15, 2003.

It is a nation-level, technology driven de-mutualized on-line commodity exchange with an independent Board of Directors and professionals not having any vested interest in commodity markets. It is committed to provide a world-class commodity exchange platform for market participants to trade in a wide spectrum of commodity derivatives driven by best global practices, professionalism and transparency.

It is regulated by Forward Market Commission in respect of futures trading in commodities. Besides, NCDEX is subjected to various laws of the land like the Companies Act, Stamp Act, Contracts Act, Forward Commission (Regulation) Act and various other legislations, which impinge on its working. It is located in Mumbai and offers facilities to its members in more than 550 centres throughout India.

(b) *Multi Commodity Exchange (MCX):* MCX is an independent and de-mutualised multi commodity exchange. It has permanent recognition from the Government of India for facilitating online trading, clearing and settlement operations for commodities futures market across the country. It spans across 1770 cities and towns across India.

MCX offers a wide spectrum of opportunities to a large cross section of participants including producers/ processors, traders, corporate, regional trading centre, importers, exporters, co-operatives and industry associations amongst others. It offers trading in more than 30 commodity futures contracts. Headquartered in the financial capital of India, Mumbai, MCX is led by an expert management team with deep domain knowledge of the commodities futures market.

Being a nation-wide commodity exchange having state-of-the-art infrastructure, offering multiple commodities for trading with wide reach and penetration, MCX is well placed to tap the vast potential poised by the commodities market.

The key shareholders of MCX are Financial Technologies (I) Ltd., State Bank of India and it's associates, National Bank for Agriculture and Rural Development (NABARD), National Stock Exchange of India Ltd. (NSE), Fid Fund (Mauritius) Ltd. - an affiliate of Fidelity International, Corporation Bank, Union Bank of India, Canara Bank, Bank of India, Bank of Baroda, HDFC Bank and SBI Life Insurance Co. Ltd.

(c) *Indian Commodity Exchange (ICEX):* It is a screen based on-line derivatives exchange for commodities. It has robust assaying and warehousing facilities in order to facilitate deliveries. It has Reliance Exchange Next Ltd. as anchor investor and has MMTC Ltd., India

Bulls Financial Services Ltd., Indian Potash Ltd., KRIBHCO and IDFC among others, as its partners.

The head office is located in Mumbai and has regional offices spread across the country which covers agri belt, with a vision to encourage participation of farmers, traders and actual users to hedge their positions against the wide price fluctuations.

It provides the widest range of benchmark future products available on any exchange, covering all major commodities. It offers future trading in Agriculture Commodities, Bullions, Base Metals and Energy.

(d) *National Multi-Commodity Exchange of India (NMCE):* It is the first de-mutualised Electronic Multi-Commodity Exchange of India being granted the National status on a permanent basis by the Government of India and operational since 26th November 2002.

It is promoted by commodity-relevant public institutions, viz., Central Warehousing Corporation (CWC), National Agricultural Cooperative Marketing Federation of India (NAFED), Gujarat Agro-Industries Corporation Limited (GAICL), Gujarat State Agricultural Marketing Board (GSAMB), National Institute of Agricultural Marketing (NIAM), and Neptune Overseas Limited (NOL) and Punjab National Bank (PNB).

NMCE is unique in many other respects. It is a zero-debt company; following widely accepted prudent accounting and auditing practices. It has robust delivery mechanism making it the most suitable for the participants in the physical commodity markets. The exchange does not compromise on its delivery provisions to attract speculative volume. Public interest rather than commercial interest guide the functioning of the Exchange. It has also established fair and transparent rule-based procedures and demonstrated total commitment towards eliminating any conflicts of interest. It is the only Commodity Exchange in the world to have received ISO 9001:2000 certification from British Standard Institutions (BSI).

The onset of these exchanges and the introduction of futures contracts on new commodities by the Forwards Market Commission have triggered significant levels of trade. Now the commodities futures trading in India is all set to match the volumes on the capital markets.

11. 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 soyabean 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. 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.

12.1 Indirect Methods of Investment

- Futures contracts;
- Bonds indexed on a commodity's price;
- Stocks of companies producing a commodity.

12.2 Motivations for Passive Investment

- Risk-diversification benefits;
- Positive correlation between commodity prices and inflation (stocks and bonds have a negative correlation to inflation);
- Option for Collateralized position in futures contracts;

- Long in futures;
- Same amount invested in T-bills or another similar government security.

12.3 Motivations for Active Investment

- Commodities are good investments during periods of economic growth;
- Active investors choose various specific commodities depending on view of the economy.

13. 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

14. 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.

14.1 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&PGSCI) 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).

14.2 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.

15. 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.

How do the OTC traders hedge this risk?

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 unhedgeable 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.

Part D : OTC Derivatives

16. 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. Here we will discuss the derivatives traded on the 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.

17. 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).

18. 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

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

  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 360or 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)].

19. 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.

19.1 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.

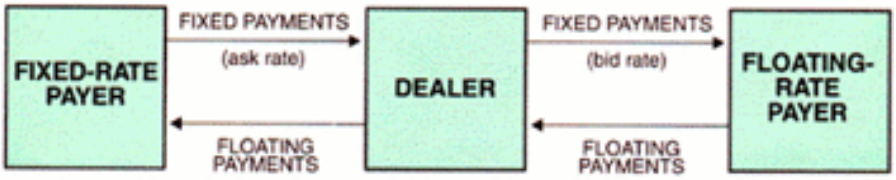
Today the market has evolved into more of a dealer market dominated by large international commercial and investment banks. Dealers act as market makers that stand ready to become

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 other 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.

FIGURE 2

The Dealer Market for Interest Rate Swaps



19.2 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.

19.3 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.

19.4 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.

19.5 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:

(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.

19.6 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.

19.7 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.

19.8 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.

19.9 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 7

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

Lockwood Company	
Borrows at	10%
Receives from Thomas Company	(10.1%)
Pays to Thomas Company	LIBOR
Net interest cost	LIBOR – 0.1% (a saving of 0.4%)
Thomas Company	
Borrows at	LIBOR + 0.5%
Receives from Lockwood Company	(LIBOR)
Pays to Lockwood Company	10.1%
Net interest cost	10.6% (a saving of 0.4%)

In this example, both companies benefit from lower costs.

20. Swaptions

Swaptions first came into vogue in the mid-1980s in the US on the back of structured bonds tagged with a callable option issued by borrowers. With a callable bond, a borrower issues a fixed-rate bond which he may call at par from the investor at a specific date(s) in the future. In return for the issuer having the right to call the bond issue at par, investors are offered an enhanced yield. Bond issuers often issue an IRS in conjunction with the bond issue in order to change their interest profile from fixed to floating. Swaptions are then required by the issuer as protection to terminate all or part of the original IRS in the event of the bonds being put or called.

In addition to providing protection on a callable bond issue, it is found that swaptions can be useful to achieve a particular overall interest rate or yield on a borrowing.

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 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. A swaption gives the buyer the right but not the obligation to pay (receive) a fixed rate on a given date and receive (pay) a

floating rate index. It is 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. The converse is true if the holder of the swaption receives the fixed rate under the swap agreement. If the strike rate of the swap is more favorable than the prevailing market swap rate then the swaption will be exercised and counterparties enter into an interest rate swap as detailed in the swaption agreement. Unlike ordinary swaps, a swaption not only hedges the buyer against downside risk, it also lets the buyer take advantage of any upside benefits. Like any other option, if the swaption is not exercised by maturity it expires worthless.

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.

Example

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 use Swaption and ask 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.

20.1 Principal Features of Swaptions: 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. 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 fixed 'payer' or a 'receiver' type. A fixed-rate payer swaption gives the buyer of the option the opportunity to lock into a fixed rate through an IRS on an agreed future date. Such a swaption can therefore be seen as a call option on a forward swap rate.

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. The simplest type of swaption available is an option to pay or receive fixed-rate money against receiving or paying floating-rate money. They are usually European style options. As such, at maturity of the swaption, one can decide whether to exercise the swap or to let the swaption lapse unexercised - all rights incurred by the holder will then terminate. The underlying instrument on which a swaption is based is a forward-start IRS.

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.

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. Marking to market of a swaption depends on the strike rate of the swap and the relationship of the strike price to the underlying, where the underlying is the forward start IRS. The intrinsic value would therefore be related to a swap with a start date that coincides with the expiry date of the option. 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 - the advantage here being an effective management of credit limits. The inherent credit element of swaption pricing can therefore be lessened to a certain extent.

20.2 Pricing of Swaptions: The pricing methodology depends upon setting up a model of probability distribution of the forward zero-coupon curve which ungoes 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.

20.3 Uses of Swaptions: 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.

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.

21. 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

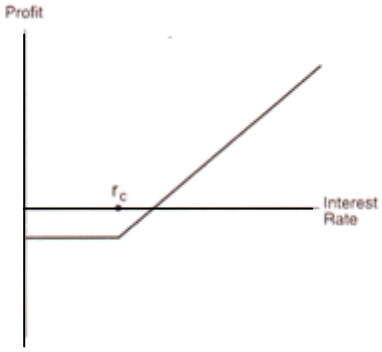
$(N) \max(0, r - r_c)(d_t /360)$,

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).

21.1 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 $K = 100 - r_k$, where r_k 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

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

Where,

N is the notional principal amount of the agreement,

r_c is the cap rate, r_f is the floor rate, and

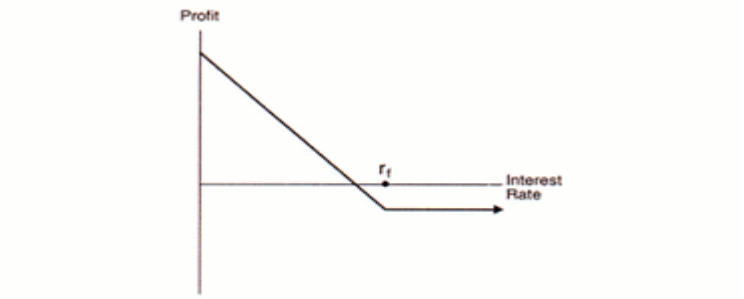
d_t is the term of the index in days.

22. 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.

FIGURE 4

The Payoff to Buying a One-Period Interest Rate Floor



The payment received by the buyer of an interest rate floor is determined by the formula

$$(N) \max(0, r_f - r)(d_t/360),$$

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) 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

$$(N) \max(0, r_k - r)(90/360),$$

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 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.

23. 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

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

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

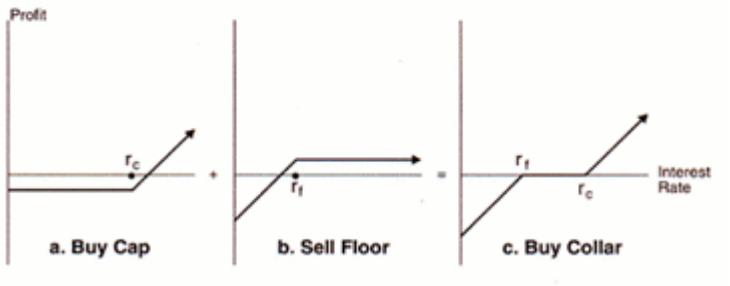
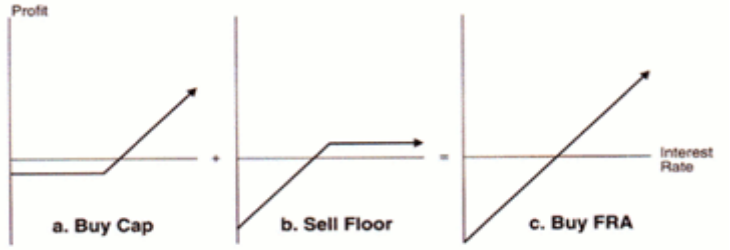


Figure 6 illustrates a special case of a zero-cost collar that results from the simultaneous purchase of a one-period cap and sale of a one-period floor when the cap and floor rates are equal. In this case the combined transaction replicates the payoff of an FRA with a forward interest rate equal to 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.

FIGURE 6

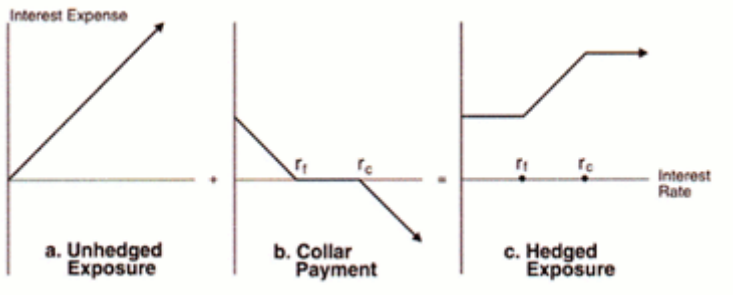
Put-Call Parity



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.

FIGURE 7

The Effect of Buying an Interest Rate Collar on Interest Expense



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.

24. 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 has 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.

25. The Indian Scenario

The OTC derivatives markets have witnessed rather sharp growth over the last few years, which has 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.

Summary

PART A: INDIAN CAPITAL MARKET

Capital Markets/Securities Market

The capital markets are relatively for long term (greater than one year maturity) financial instruments (e.g. bonds and stocks). There are two types of capital markets. A market where new securities are bought and sold for the first time is called the New Issues market or the IPO market or the Primary Market whereas 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 is called the Secondary Market.

Stock Market and its Operations

The stock exchange is one of the most important institutions in the Capital Market, which includes term lending institutions, banks, investors, companies, and just about anybody and everybody who are engaged in providing long-term capital, whether share capital or debt capital, to the industrial sector. It is a place where the securities issued by the Government, public bodies and Joint Stock Companies are traded.

Growth of Stock Exchanges: The Bombay Stock Exchange, the oldest stock exchange in India was established in 1875. There are twenty Stock Exchanges in the country at present, out of which only eight have been given permanent recognition; others need to apply every year for recognition. The leading stock exchanges in India are Bombay Stock Exchange (BSE) and National Stock Exchange (NSE) while New York Stock Exchange, Nasdaq and London Stock Exchange are the major exchanges abroad.

Functions of Stock Exchanges: The major functions of the stock exchanges can be summarized as follows:

(a) Liquidity and Marketability of Securities

(b) Fair Price Determination

(c) Source for Long term Funds

(d) Helps in Capital Formation

(e) Reflects the General State of Economy

Basics of Stock Market Indices

Stock Market Index is a representative of the entire stock market. Movements of the index represent the average returns obtained by investors in the stock market. 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.

Following steps are involved in calculation of index on a particular date:

- 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:

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

- It may also be calculated using the price weighted method. Here the share the share price of the constituent companies form the weights.

Settlement and Settlement Cycles

SEBI introduced a new settlement cycle known as the 'rolling settlement cycle'. The NSE follows a T+2 rolling settlement cycle. In this settlement for all trade executed on trading day i.e. T day. The obligations are determined on T+1 day and settlement on T+2 basis i.e. on the 2nd working day. The BSE settlement cycle is also similar to that of the NSE T+2 i.e. rolling settlement.

The advantages of rolling settlements are that the Payments are quicker, increased liquidity, Reduced delays, and the tendency for price trends to get exaggerated also gets reduced.

Clearing Houses

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.

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, which normally are in form of cash or T-bills, can be categorised into 4 types namely Initial Margins on Securities, Initial Margins on Derivatives, Maintenance Margins and Variation Margin.

For trading, 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.

IPO Through Stock Exchange on-line System (E-IPO)

In addition to other requirements for public issue as given in SEBI guidelines wherever applicable, 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 in this regard. They are applicable to the fixed price issue as well as for the fixed price portion of the book-built issues.

PART B : CAPITAL MARKET INSTRUMENTS

Capital Market Instruments

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. These instruments are of two types namely primary market and secondary market instruments. The major mediums of approaching capital markets are Equity Shares, Preference Shares, Debentures/ Bonds, ADRs, GDRs, and Derivatives.

Stock/Equity Shares: Stock 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. There are two main types of stock: equity and preference shares. Equity shares entitle the owner to

vote at shareholders' meetings and to receive dividends. Preference shares generally do not have voting rights, but have higher claim on assets and earnings than the common shares.

There are many ways in which equity shares are issued:

(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.

(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. It can be 100% or 75% book-building process. The Green Shoe Option (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).

(iii) 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 issue houses/merchant banks/investment banks or firms of stockbrokers.

(iv) Placement Method: Under this method, securities are acquired by the issue houses, as in offer for sale method, but instead of being subsequently offered to the public, they are placed with the clients of the issue houses, both individual and institutional investors.

(v) Rights Issue: 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.

II. Preference Shares: These shares from 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.

III. 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. It is a “security” because the debt can be bought and sold in the open market. An 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.

There are number of methods for calculating yields. But the most common method is the Yield to Maturity (YTM). The formula is as follows:

$$YTM = \frac{\text{Coupon Rate} + \text{Prorated Discount}}{(\text{Face Value} + \text{Purchase Price})/2}$$

Yield To Maturity (YTM) enables traders and investors to compare debt securities with different coupon rates and terms to maturity. It does not determine price. Bond prices depend on a number of factors such as the ability of the issuer to make interest and principal payments and how the bond is collateralized.

IV. American Depository Receipt (ADRs): ADR is a negotiable receipt which represents one or more depository shares held by a US custodian bank, which in turn represent underlying shares of non-US issuer held by a custodian in the home country.

V. Global Depository Receipts (GDRs): They are negotiable certificates with publicly traded equity of the issuer as underlying security. An issue of depository receipts would involve the issuer, issuing agent to a foreign depository. Depository receipts are denominated in foreign currency and are listed on an international exchange such as London or Luxembourg.

VI. Derivatives: It is a financial instrument which derives its value from some other financial price. This 'other financial price' is called *the underlying*.

The different types of derivatives risks are credit risk, market risk, liquidity risk, operation risk, legal risk, regulatory risk and reputational risk.

Financial Derivatives

Under financial derivatives, the discussion would cover stock futures, stock options, index futures and index options along with their pricing techniques.

1. Forward Contract: It 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.

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.

3. Stock Futures Contract: It is a standardised contract to buy or sell a specific stock at a future date at an agreed price. The underlying is a stock. 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.

4. Stock 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. 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. Stock index futures are traded in terms of number of contracts. Each contract is to buy or sell a fixed value of the index.

In index futures, the marking-to-market principle is followed, that is, the portfolios are adjusted to the market values on a daily basis.

Investors can use stock index futures to perform myriad tasks. Some common uses are:

- To speculate on changes in specific markets;
- To separate market timing from market selection decisions;
- To take part in index arbitrage, whereby the investors seek to gain profits whenever a futures contract is trading out of line with the fair price of the securities underlying it.

- Using Indexes to Hedge Portfolio Risk. Aside from the above uses of indexes, investors often use stock index futures to hedge the value of their portfolios.
- Add flexibility to one's investment portfolio. Stock index futures add flexibility to his or her portfolio as a hedging and trading instrument.
- Create the possibility of speculative gains using leverage.
- Maintain one's stock portfolio during stock market corrections.
- Sell as easily as one can buy.
- Transfer risk quickly and efficiently.

5. Stock Options: It 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) a stock at an agreed-upon price within a certain period or on a specific date regardless of changes in its market price during that period. The various kinds of stock options include put and call options. 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. The option may be purchased or sold or may be granted to an individual by the company as in an employee stock option.

American options can be exercised anytime between the date of purchase and the expiration date. European options may only be redeemed at the expiration date. Most exchange-traded stock options are American.

6. Stock Index Option: 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. Options on the S&P 500 are some of the most actively traded options in the world.

7. Factors Affecting Value of an Option: Some of the factors are:

(a) *Price of the Underlying:* The value of calls and puts are affected by changes in the underlying stock price in a relatively straightforward manner.

(b) *Time:* The option's future expiry, at which time it may become worthless, is an important and key factor of every option strategy.

(c) *Volatility:* To give 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.

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

Valuation of Forward and Future Contracts

The difference between the prevailing spot price of an asset and the futures price is known as the basis, i.e.,

Basis = Spot price – Futures price

The relationship between futures prices and cash prices is determined by the cost-of-carry. The cost-of-carry model in financial futures is

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

There are different formulae for computing the forward price based on annual compounding, multiple compounding and continuous compounding.

Option Valuation Techniques

(a) Binomial Model: It 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.

(b) Risk Neutral Method: 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.

(c) 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 model is based on a normal distribution of underlying asset returns.

The original formula for calculating the theoretical option price (OP) is as follows:

$$OP = SN(d_1) - Xe^{-rt}N(d_2)$$

Where:

$$d_1 = \frac{\ln\left(\frac{S}{X}\right) + \left(r + \frac{v^2}{2}\right)t}{v\sqrt{t}}$$

$$d_2 = d_1 - v\sqrt{t}$$

(d) Greeks: They are a collection of statistical values (expressed as percentages) that give the investor a better overall view of how a stock has been performing.

(i) *Delta:* A by-product of the Black-Scholes model is the calculation of the delta: the degree to which an option price will move given a small change in the underlying stock price.

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

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.

(ii) *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.

(iii) *Theta:* The change in option price given a one day decrease in time to expiration.

Basically it is a measure of time decay.

(iv) *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.

(v) *Vega:* Sensitivity of option value to change in volatility. Vega indicates an absolute change in option value for a one percent change in volatility.

Embedded Derivatives: An Embedded derivative is a derivative instrument that is embedded in another contract – the host contract. The host contract may be a debt or equity instrument, lease, insurance contract or a sale or purchase contract.

PART C: COMMODITY DERIVATIVES

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

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

Necessary Conditions to Introduce Commodity Derivatives

The following attributes are considered crucial for qualifying for the derivatives trade:

- a commodity should be durable and it should be possible to store it;
- units must be homogeneous;
- the commodity must be subject to frequent price fluctuations with wide amplitude; supply and demand must be large;
- supply must flow naturally to market and there must be breakdowns in an existing pattern of forward contracting.

The Indian Scenario

The commodity derivative market has been functioning in India since the nineteenth century with organised trading in cotton through the establishment of Cotton Trade Association in 1875.

There are nearly 100 commodities available for trade.

In the year 2003, four national commodity exchanges became operational; National Multi-Commodity Exchange of India (NMCE), National Board of Trade (NBOT), National Commodity and Derivatives Exchange (NCDEX) and Multi Commodity Exchange (MCX).

Investing in Commodity Derivatives

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

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.

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

Commodity Market

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.

Commodity Futures

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.

Commodity Swaps

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&PGSCI) and the Commodities Research Board Index (CRB).

(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).

Valuing Commodity Swaps

Commodity swaps are characterized by some unique features like

- The cost of hedging
- The institutional structure of the particular commodity market in question
- The liquidity of the underlying commodity market
- Seasonality and its effects on the underlying commodity market

- The variability of the futures bid/offer spread
- Brokerage fees
- Credit risk, capital costs and administrative costs.

PART D: OTC DERIVATIVES

An over the counter (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.

OTC Interest Rate Derivative

OTC interest rate derivatives include instruments such as forward rate agreements (FRAs), interest rate swaps, caps, floors, and collars.

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. 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.
- More generally, final settlement of the amounts owed by the parties to an FRA is determined by the formula:

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

Interest Rate Swaps

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.

1. Swap Dealers: A swap dealer intermediates cash flows between different customers, or "end users," becoming a middleman to each transaction.

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.

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.

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.

5. The Generic Swap (Plain Vanilla Swap): It is a simple interest rate swap, consider the example of a generic swap.

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."

7. Swap Valuation: Interest rate swaps can be viewed as implicit mutual lending arrangements wherein one party holds long position while another short position. 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.

8. Non-Par Swaps: 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.

9. The Effect of Changes in Market Interest Rates on Swap Values : 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.

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.

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.

1. Pricing of Swaptions: 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.

2. Uses of Swaptions: Swaptions can be applied in a variety of ways for both active traders as well as for corporate treasurers for hedging as well as speculations purposes.

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.

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

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

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 floors strike rate. The payment received by the buyer of an interest rate floor is:

$(N) \max(0, r_f - r) (d_t/360)$

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.