COURSE MATERIAL

ON

DERIVATIVES & RISK MANAGEMENT

COURSE FACILITATOR

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INTRODUCTION

RISK: Risk is a condition in which there is a possibility of an adverse deviation from a desired outcome that is expected or hoped for.

Uncertainty: uncertainty refers to a state of mind characterised by doubt, based on a lack of knowledge about what will or will not happen in the future. The existence of risk creates uncertainty on the part of individuals when that risk is recognised.

Types of risk:

Objective Risk : Objective risk is defined as the relative variation of actual loss from the expected loss. Suppose 10,000 cars are insured with an insurance company and 1% of these (i.e. 100 cars) will meet with an accident each year. But it does not mean that 100 cars are exactly meet with an accident. It may be plus or minus of 100. However, it can be proven that over a long period of time, the deviation of the number of claim in a year from 100 will, on the average be 10. Thus there is a variation of 10 claims from the expected number of 100 or a variation of 1%. This relative variation of actual loss from expected loss is known as objective risk. This decreases as the number of exposures increase

Subjective Risk: - Subjective risk can be defined as the degree of uncertainty perceived by an individual. It can therefore vary from one person to another. Ex. A person in a drunken state might drive home. He is uncertain whether he will reach home safely or would be caught by the police. The mental uncertainty is called as subjective risk. Two persons in the same situation may have different perceptions of the risks and show markedly different attitudes and responses towards the risks. Further, perceptions of risk can be affected by prior experience. If, in the example above, the drunkard had been booked previously for driving under the influence of alcohol, he will probably judge that the risk of being booked again is high and may not attempt to drive home.

Pure Risk: A category of risk in which loss is the only possible outcome; there is no beneficial result. Pure risk is related to events that are beyond the risk-taker's control and, therefore, a person cannot consciously take on pure risk. This is an opposite of speculative risk and insurable.
Example, loss of house due to a natural disaster is pure risk. In this case, there would be not any potential benefit to this risk.

Types of pure risk
1. Personal Risk: The risks that directly affect an individual are known as personal risks. Ex. Premature death, insufficient income during retirement, poor health, unemployment.

2. Property Risk: The risk arising out of destruction of non-living things (land, building, vehicles, machines, goods, raw materials, furniture etc) owned by the persons due to fire, lightening tornadoes, windstorms, earthquakes floods etc. is property risk.

3. Liability Risk: Liability risk involves the possibility of loss of present assets or future income as a result of intentional or unintentional damage caused to third party. A person is legally liable to his wrong doings which cause damages to third party's body, reputation or property. He can be legally sued and the most horrible thing is there is no maximum in the compensation amount if you are found guilty.

Features of pure risk: Huge potential losses, Controllable, Insurability, Lower probability,

Speculative risk : It is a situation where the possibility of either financial loss or financial gain exists, such as in purchase of shares, betting on horses etc. Unlike pure risk speculative risk is not insurable. Almost all investment activities involve speculative risks. However, some investments are more speculative than others. For example, investing in government bonds has much less speculative risk than investing in junk bonds.

Fundamental and Particular Risk: The distinction between fundamental and particular risks is based on the difference in the origin and consequences of the losses. Fundamental risks are impersonal in origin and consequence. It affects large segment or whole population of a country. It is also said to be group risk and is caused by economic, social and political phenomena. Particular risks arise out of individual events and are felt by individuals rather than by the entire segment/group. Unemployment, war, inflation, and floods are all fundamental risks. The burning of a house and the robbery of a bank are particular risks.

Liquidity risk: The risk arising from the lack of marketability of an investment that cannot be bought or sold quickly enough to prevent or minimize a loss. Usually reflected in a wide bid-ask spread or large price movements.

Counterparty risk: The risk to each party of a contract that the counterparty will not honour/live up to its contractual obligations. Counterparty risk as a risk to both parties and should be considered when evaluating a contract. In most financial contracts, counterparty risk is also known as "default risk".

Settlement risk: The risk that one party will fail to deliver the terms of a contract with another party at the time of settlement. Settlement risk can be the risk associated with default at settlement and any timing differences in settlement between the two parties. This type of risk can lead to principal risk.

Credit risk: The risk due to uncertainty in a counterparty's (also called an **obligor's** or **credit's**) ability to meet its obligations. Because there are many types of counterparties—from individuals to sovereign governments—and many different types of obligations—from auto loans to derivatives transactions**.**

Market Risk: It is a risk that the fair value or cash flows of a financial instrument will fluctuate due to changes in market prices. Market risk reflects interest rate risk, currency risk and other price risks.

Interest Rate Risk – Interest rate risk is the risk that an investment's value will change as a result of a change in interest rates. This risk affects the value of bonds more directly than stocks.

Exchange rate risk: The risk that a business operations or an investment value will be affected by changes in exchange rate. Whenever investors or companies have assets or business operations across national borders, they face exchange rate risk/currency risk if their positions are not hedged.

Financial Risk: The risk arising out of use of debt component in the capital structure (financial leverage)

Country Risk (Political Risk): Country risk refers to the risk that a country won't be able to honor its financial commitments. When a country defaults on its obligations, this can harm the performance of all other financial instruments in that country as well as other countries it has relations with. Country risk applies to stocks, bonds, mutual funds, options and futures that are issued within a particular country. This type of risk is most often seen in emerging market. It is the risk of investing funds in another country whereby a major change in the political or economic environment could occur.

Spread risk/Basis Risk: The risk that offsetting investments in a hedging strategy will not experience price changes in entirely opposite directions from each other. This imperfect correlation between the two investments creates the potential for excess gains or losses in a hedging strategy, thus adding risk to the position. It often arises with a position or with derivatives. Suppose a bank lends at prime and finances itself at Libor. It faces spread risk due to the possibility that the prime-Libor spread might narrow. A bond trader might hedge a long position in corporate bonds by shorting Treasury bonds. The hedge eliminates exposure to changes in Treasury yields, but the trader remains exposed to changes in the spread between corporate and Treasury yields. He too is taking spread risk.

Risk Management : Risk management is defined as the process of planning, organizing, directing and controlling the resources and activities of an organization in order to minimize the adverse effects of potential losses at the least possible cost. It is a process that identifies loss exposures faced by an organization and selects the most

appropriate techniques/strategies for treating such exposures. The purpose of risk management is not necessarily to avoid risk altogether.

Risk Management objectives.

1. Pre-loss objectives. and 2. Post loss objectives.

Pre-loss Objectives: The important objectives before a loss occurs include economy, reduction of anxiety and meeting legal obligations.

1. The firm should be prepared for potential losses in the most economical way. This preparation involves an analysis of the cost of safety programs, premiums paid and the cost handling losses.
2. Reduction of the anxiety of the risk manager and the key executives.
3. To meet any legal obligations: This may be asking the firm to install safety devices, pollution controlling devices, waste disposal etc. The insurance manager must try to ensure that these are provided

Post-loss Objectives

Risk management also has certain objectives after a loss occurs

1. Survival of the firm. Resume operations in a short time
2. Continue to operate. Competitors would take up the business
3. Stability of earnings. 4. Growth of the firm. 5. Minimise the effects of loss to the others/society.

Risk management process

1. Risk Identification/Identification of the loss exposures: Here we identify all major and minor loss exposures. This involves analysis of pure risk (Property risk and Liability risk) and business risk.

Property Risk: Property risks are highly visible and are easy to identify. Ex. Loss of property by fire, natural disasters, theft, plane crashes, oil spill.

Liability Risk: Legal liability loss are the hardest to identify. Ex. Consumer lowsuits resulting into compensatory damages, punitive awards etc.

Business Risk: Business loss arise due to business cycles, stock market volatility, fluctuations in interest rate, forex, inflation rate, etc.

2. Risk Measurement and Evaluation / Analysing the loss exposures

a) Loss frequency (i.e. probable no. of losses in a time period)
b) Loss severity (size of the loss): These are done for each type of exposure. When done it helps in finding out the techniques for handling the exposures/estimating the max possible losses. Selecting the appropriate technique for treating the loss exposure

3. Risk control: Financial risks which are non-insurable can be hedged using derivative instruments futures, options & swaps. Although loss control programmers may seem to be expensive, they are actually far less costly than the losses that might occur if no preventive measures were taken. This is a technique for controlling the severity of loss.

1. **Loss Prevention/Elimination**: Some risk can be eliminated or prevented. Ex. Deciding not to build a plant in earthquake zone.
2. **Loss Reduction**: The risks that cannot be eliminated but reduced through loss preventive programmes. These are the measures to avoid the severity of loss after it occurs. Using of fire extinguishers/sprinklers for fire prevention, limiting of the cash to avoid theft and misappropriation, implementation of safety programs to avoid accidents.

4. Risk Financing: Risk financing involves developing a suitable financing plan to meet risk management objective. It also includes how much of pure risk the company should retain and how much it should transfer to an insurer. There are 3 ways of risk financing: Risk Retention, Insurance and Other contractual risk transfers.

Risk retention: A firm cannot transfer all risks to the insurer. A part of the losses has to be retained and the rest is transferred. Therefore the firm has to determine its risk retention level. A strong firm can retain a higher amount of risk than a weaker firm. Potential savings from risk retentions are: 1. Savings on premium loading 2. Reduced exposure to insurance market volatility 3. Use of fund savings on premium 4. Avoiding high premium that may accompany asymmetric information.

Factors Determining Retention:

1. **Pvt. Ltd. Vs. Public Ltd. Co**.: The owners of private limited companies are not diversified and hence they have an incentive to retain less risk (Purchase more insurance) than publicly traded companies.
2. **Firm size and correlation among losses**: Generally the larger firms have larger cash flows and hence they can readily finance the losses of any size out of their own cash flows and hence they can retain more risk (i.e. reduced demand for insurance).

3. **Investment opportunities**: The firms that are likely to have good investment opportunities will be more likely to reduce risk because an unexpected drop in cash flow can force the firm to either forgo the investment project or raise costly external capital in order to undertake the investment project.
4. **Product features**: In case of consumer durables the demand depends upon consumers' perceptions about the likelihood that the producer will be able to provide the future after-sale services. Future services are inversely related to the likelihood of bankruptcy. Therefore, the firms of this kind tend to benefit more from risk reduction than the firms producing non-durable products.
5. **Correlated cash flows**: The firms whose profits are negatively correlated with other cash inflows will have a lower standard deviation of total cash flows, and hence, they tend to retain more risk. When profit tends to be low other cash flows tend to be high, thus reducing the likelihood of financial distress and the need for external funds.
6. **Companies with financial leverage**: The firms with higher financial leverage (debt) are exposed to more financial risk and hence they find risk reduction more advantageous.

INSURANCE

Insurance is a contract between two parties (insured & insurer) in which the insurer makes the good for specified losses of insured in exchange for receiving a premium from the insured at the inception of the contract. Insurance contracts reduce risk for the buyer by transferring some of the risk of loss to the insurer. Insurers in turn reduce risk through diversification.

The American risk and insurance association has defined insurance as "It is the pooling of fortuitous losses by transfer of such risks to insurers who agree indemnify insured for such losses to provide other pecuniary benefits on their occurrence or to render services connected with the risk".

Benefits of Insurance:

1. Avoids raising costly external funds (the firm will get huge amount of claims)
2. Avoids financial distress (Amount of claim received improves financial distress)
3. Reduces tax payments (Premiums are tax deductible)

Basic characteristics:

1. Pooling of losses: This is the spreading of losses incurred by a few over the entire group so that in the process average loss is substituted for actual loss. It involves grouping of a large number of exposure units so that the **law of large numbers** can operate to provide a substantially accurate prediction of future losses. Ideally there should be a large number of similar but not necessarily identical exposure units that are subject to the same peril.

2. **Payment of fortuitous loss**: A fortuitous loss is one that is unforeseen and unexpected and occurs as a result of chance. That means the loss must be accidental and occur randomly. Insurance policies cover only accidental losses and not intentional losses.

3. Risk transfer: Risk transfer means that a pure risk is transferred from the insured to the insurer who typically is in a stronger financial position to pay the loss to the insured.

4. Indemnification: Indemnification means that the insured is restored to his/her approximate financial position prior to the occurrence of loss. This is feasible only in case of non-life insurance like fire, marine and so on.

Principles of Insurance:

Principle of Utmost Good Faith: it says that both the parties involved in an insurance contract should make disclosure of all material facts and figures relating to the subject matter of the insurance contract. If utmost good faith is not disclosed by either party the contract may be avoided by the other. The insured's duty is to disclose all material facts known to him but unknown to the insurer. Similarly, the insurer's duty of utmost good faith is disclosing the scope of insurance at the time of contract. There should not be any concealment, misrepresentation, fraud or mistake concerning the material facts.

Principle of Insurable Interest: A person is said to have insurable interest in the subject matter only if he/she has the benefit from its existence and prejudice by its destruction. Insurable interest must be a pecuniary interest. The insured should have insurable interest in the subject matter of insurance at the following times:

1. In life insurance at the time of taking policy

2. In fire and marine insurance both at the time of taking policy as well as at the time of loss and

Principle of Indemnity: This means that the assured in case of loss against which the policy has been insured, shall be paid only the actual amount of loss. The insured cannot make profit out of it.

Principle of Causa Proxima: It means when a loss is caused by more than one causes, the proximate/nearest/closest cause should be taken into consideration to decide the liability of the insurer. The principle states that to find out whether the insurer is liable for the loss or not, the proximate and not the remote must be looked into. The insurer is liable for the loss caused by the immediate cause which is insured.

For example :- A cargo ship's base was punctured due to rats and so sea water entered and cargo was damaged. Here there are two causes for the damage of the cargo ship - (i) The cargo ship getting punctured because of rats, and (ii) The sea water entering ship through puncture. The risk of sea water is insured but the first cause is not. The nearest cause of damage is sea water which is insured and therefore the insurer must pay the compensation.

However, in case of life insurance, the principle of **Causa Proxima** does not apply. Whatever may be the reason of death (whether a natural death or an unnatural death) the insurer is liable to pay the amount of insurance.

Principle of Mitigation of Loss: In the event of some mishap to the insured property, the insured must make necessary effort to safeguard his remaining property and minimize the loss as much as possible. If the insured is proved to be negligent to preserve the property the insurer may compensate only to the extent of loss suffered had the insured taken due care to safeguard the remaining property.

Principle of Subrogation: The term subrogation means the transfer of all the rights and remedies available to the insured in respect of the subject matter to the insurer after indemnity has been effected. It implies substitution of the insurer in place of the insured in respect of the latter's rights and remedies. For ex: when loss is caused by the wrongful act of a third party, the insurer can proceed against the third party after paying the insured his loss.

Kinds of insurance:
Life insurance: The subject matter of insurance is life of human beings. The insurer will pay the fixed amount of insurance at the time of death or at the expiry of certain period whichever is earlier. This insurance provides protection to the family on premature death or gives adequate amount at the old age when the earning capacity is reduced.

General insurance: General insurance includes **property insurance**, **liability insurance** and **other forms of insurance**.

Property insurance: Under the property insurance, property of a person/business is insured against a certain specified risk. The risk may be **Fire** (covers risk of fire) or M**arine** – (Protection against loss of marine perils like theft of property/goods, damage to property at accident etc.)

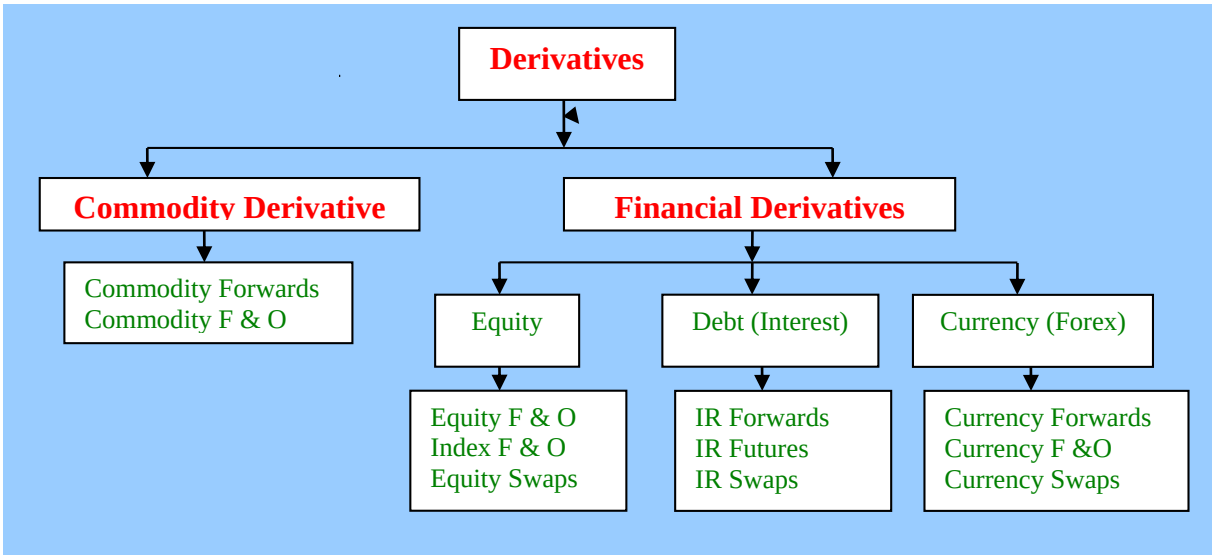
Liability insurance: The liability insurance is fidelity insurance whereby the insurer compensates the loss to the insured when he is under the liability of payment to the third party. It covers awards, settlements, and defense costs for injuries third parties,

Other forms of insurance: Crop insurance, Flood insurance, Cash in transit, insurance, Health insurance, State employees insurance so on.

Social insurance: Social insurance provides protection to the weaker sections of the society who are unable to pay the premium for adequate insurance. Pension plans, disability benefits, widow pension, unemployment benefits, sickness insurance etc.

DERIVATIVES
Derivatives: It is a financial contract whose payoff structure is determined by the value of an underlying **commodity, security, interest rate, share price index, exchange rate** and the like. Thus a derivative instrument derives its value from some underlying variable/asset.

Classification of Derivatives



Objectives of Derivatives

- Reduction of funding costs by borrowers
- Enhancing the yield on assets
- Modifying the payment structure of assets to correspond to the investor's market view
- Protection against losses resulting from unforeseen price changes (hedging).

Institutional & Legal Framework

Exchange: An exchange provides buyers and sellers of futures and options contracts the infrastructure they need to trade. In the outcry system of trading, the exchange has a trading pit, in which the exchange members and their representatives assemble during a fixed trading period and execute transactions. In the online trading system, the exchange provides its members with real-time access to information online and also allows them to execute their orders. Financial Derivative exchanges: BSE (Equity derivatives), NSE (Equity and interest rate derivatives), Commodity derivative exchanges : **MCX** Mumbai (See **www.mcxindia.com** for the commodities traded) **NCDEX** Mumbai (See **www.ncdex.com** for the commodities traded) **NMCEIL** Ahmedabad **(**See www.nmce.com for the commodities traded) **Indian Commodity Exchange Ltd.** New Delhi**, Ace Derivatives and Commodity Exchange Ltd.** Mumbai. Among these MCX is the biggest commodity exchange in India. 21 Regional stock exchanges and 24 Regional Commodity Exchanges in India.

REGIONAL STOCK EXCHANGES IN INDIA

1	AHMEDABAD STOCK EXCHANGE ASSOCIATION (Gujarath)	12	GUWAHATI STOCK EXCHANGE LTD. ( )
2	BHUBHANESHWARA STOCK EXCHANGE ASSOCIATION (Orissa)	13	INTERCONNECTED STOCK EXCHANGE OF INDIA LTD. MUMBAI
3	COCHIN STOCK EXCHANGE LTD. (Kerala)	14	LUDHIANA STOCK EXCHANGE ASSOCIATION (Punjab)
4	DELHI STOCK EXCHANGE ASSOCIATION	15	MADHYAPRADESH STOCK EXCHANGE LTD. INDORE
5	HYDERABAD STOCK EXCHANGE LTD. (AP)	16	PUNE STOCK EXCHANGE LTD. (Maharastra)
6	JAIPUR STOCK EXCHANGE LTD. (Rajasthan)	17	UP STOCK EXCHANGE ASSOCIATION KANPUR
7	MADRAS STOCK EXCHANGE LTD. (TN)	18	MEERUT STOCK EXCHANGE LTD.
8	BANGALORE STOCK EXCHANGE LTD. (Karnatka)	19	SAURASTRA STOCK EXCHANGE LTD. RAJKOT
9	MANGALORE STOCK EXCHANGE LTD. (Karnataka)	20	VADODARA STOCK EXCHANGE LTD. (Maharstra)
10	CALCUTTA STOCK EXCHANGE LTD. (Westbengal)	21	OTCEI MUMBAI
11	COIMBATORE STOCK EXCHANGE LTD. (TN)		

REGIONAL COMMODITY EXCHANGES IN INDA

1	Bhatinda Om & Oil Exchange Ltd., Batinda (Punjab) [Gur]	13	The East India Cotton Association Mumbai [Cotton]
2	The Coffee Futures Exchange India Ltd, Bangalore	14	E-sugar India Ltd., Mumbai [Sugar]
3	e-Commodities Ltd. (New Delhi) [Sugar]	15	Bullion Association Ltd., Jaipur [Mustard seed complex]
4	The Bombay Commodity Exchange Ltd. Mumbai (Maharastra) [Oilseed Complex , Castor oil international contracts]	16	National Board of Trade. Indore (MP) [Soya seed, Soyaoil and Soya meals. Rapeseed/Mustardseed its oil and oilcake and RBD Palmolien]
5	The Rajkot Seeds oil & Bullion Merchants` Association Ltd (Gujarat) [Castor seed, Groundnut, its oil & cake, cottonseed, its oil & cake, cotton (kapas) and RBD palmolein.]	17	The Chamber Of Commerce, Hapur (UP) [Gur , Potatoes and Mustard seed]
6	The Kanpur Commodity Exchange Ltd., Kanpur (UP)	18	Rajdhani Oils and Oilseeds Exchange Ltd., Delhi [Gur, Mustard seed its oil & oilcake]
7	The Spices and Oilseeds Exchange Ltd.Sangli (Maharastra) [Turmeric]	19	The Central India Commercial Exchange Ltd, Gwaliar (MP) [Gur and Mustard seed]

8	The Meerut Agro Commodities Exchange Co. Ltd., Meerut (UP) [Gur]	20	The East India Jute & Hessian Exchange Ltd (West Bengal) [Hessian & Sacking]
9	Ahmedabad Commodity Exchange Ltd.(Gujarat) [Castorseed, cottonseed, its oil and oilcake]	21	First Commodity Exchange of India Ltd, Kochi (Kerala) [Copra/coconut, its oil & oilcake]
10	Vijay Beopar Chamber Ltd., Muzaffarnagar (UP) [Gur, Mustard seed]	22	Bikaner Commodity Exchange Ltd., Bikaner (Rajasthan) [Mustard seed its oil & oilcake, Gram. Guar seed. Guar Gum]
11	India Pepper & Spice Trade Association. Kochi (IPSTA-Kerala) [Pepper (both domestic and international contracts)]	23	National Multi Commodity Exchange of India Limited (NMCE)
12	Haryana Commodities Ltd., Hissar (Haryana) [Mustard seed complex]	24	Surendranagar Cotton oil & Oilseeds Association Ltd (Gujarat) [Cotton, Cottonseed, Kapas]

Clearing House: Every exchange has an affiliated clearing house, which may be a separate legal entity or division of the exchange. BOISL (Bank of India Shareholding Ltd. JV between BOI & BSE) acts as clearing house of BSE. National Securities Clearing Corporation Ltd. (NSCCL) acts as the clearing house for deals done on NSE. It is a subsidiary of NSE; it is simply called as clearing corporation. The clearing house guarantees the performance of contracts, and also it acts as a counterparty to each contract. Transactions are carried out between members and the clearing house. The clearing house ensures solvency of the members of the exchange by imposing various limits on them. The clearing house also devises a suitable margin system to ensure the performance of contracts even in volatile market conditions. This boosts the confidence of people in the futures and options exchange.

Custodian / Warehouse: The issue of delivery may not arise in index futures and options, which are cash settled contracts, but it would arise in stock futures and options, commodity futures and options and interest rate futures and options. In the absence of a proper custodial or warehouse mechanism, the delivery of financial assets and commodities will be a cumbersome task and the futures prices will not reflect the equilibrium price for the convergence of the cash price and the futures price on maturity.

Regulatory Framework: **RBI** is the regulatory authority for the forex and money markets, so it can take the initiative in starting futures and options trading in currency and interest rates. **SEBI** regulates the capital market. **NCDEX** (National Commodities and Derivatives Exchange) set up by Forward Market commission, **MCX** (Multi Commodity Exchange) and **NMCEIL** (National Multi Commodity Exchange of India Ltd.) constitute regulatory authorities for derivative market.

Participants in Derivative Market

HEDGERS: Hedgers are the traders who wish to eliminate the risk of price change to which they are already exposed. Hedging is the prime reason which led to mergence of derivatives. Hedgers are an important constituent of the derivative markets.
Ex. Traders dealing in exports and imports are subject to fluctuations in the foreign exchange rates, (forex risk) which can be hedged in derivatives. A steel manufacturer can hedge price movements of iron ore which is raw material used for manufacturing steel. A jeweler can hedge price movements of gold and silver which is used in making jewellery. A farmer hedge against the price movements of the food grains produced

SPECULATORS: Hedgers wish to avoid the price risk but speculators wish to take such risk. The speculator assumes risk my taking position in the market and makes profit from fluctuations in the prices. The speculators use market information, make forecasts about the prices and put their money in market. By taking positions, they are betting that a price would go up or they are betting that it would go down. Speculators may be **day traders** or **position traders**.

Day Traders : The day traders speculate on the price movements during one trading day, both the open and close positions are executed the same day and the position cannot be carried to the next day.

Position Traders: Position traders also attempt to gain from price fluctuations but they keep their positions for longer durations may be for a few days, weeks or even months.

ARBITRAGEURS: An arbitrageur makes riskless profits out of price differential in two different markets.
Arbitrage Over Space: It involves making profit by simultaneously entering into transactions in two or more markets. Ex. If a certain share is quoted at a lower rate on the Delhi Stock Exchange (DSE) and at a higher rate on Bombay Stock Exchange (BSE), an arbitrageur buys the share at DSE and simultaneously sell it at BSE and makes profit.

Arbitrage Over Time: Introduction of derivatives trading, the scope of arbitrageur activities extended to arbitrage over time. Ex. If an arbitrageur feels that the futures are being quoted at a high level considering the cost of carry he could buy securities underlying an index today and sell the futures, maturing in a month or two hence.

Functions of Derivate Instruments/Market

Price Discovery: The individuals with better information and judgment are inclined to participate in these markets to take advantage of such information. When some new information arrives, for instance, some good news about the economy, the actions of speculators swiftly feed their information into the derivatives markets causing changes in prices of the derivatives. These markets are usually the first ones to react because the transaction cost is much lower in these markets than in the spot markets.

Risk Transfer (Hedging): Derivative instruments redistribute the risk between the market participants. The whole derivative market may be compared to a gigantic insurance company providing means to hedge against adversities of unfavorable market movements in return for a premium, and providing opportunities to those who are prepared to take risks and make money in the process.

Market Completion: The existence of derivative instruments adds to the degree of completeness of the market. A market is said to be complete if instruments may be created which can, provide a cover against all the possible adverse outcomes. A complete market implies that the number of independent securities (or instruments) is equal to the number of all possible alternative future states of the economy.

Financing Function: Derivative instrument provides the finance in the sense, the traders in derivative instrument need to pay only margin money (which ranges from 5 – 10% of the contract value) but not total traded volume of the contract.

Liquidity: Since futures and options are conducted on the basis of margins, the buyer and seller have to deposit only a fraction of the contract value. It means that the traders in the futures market can do the business a much larger volume of contracts than in a spot market, and thus, makes market more liquid.

Price Stabilization Function: Futures market reduces both the heights of the peaks and the depth of the troughs. The major causative factors responsible for such price stabilizing influences are such as, speculation price discovery, tendency to panic, etc.

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Module-2
FUTURES AND FORWARDS

FORWARD CONTRACTS: Forward contract/transaction is a contract to buy or sell an asset on a certain future date at an agreed price. In a spot market, we pay cash and get delivery of the asset underlying immediately.

Features:

- There are two parties: one takes long position and agrees to buy the underlying asset on a specified future date for a certain specified price. The other party takes a short position, agreeing to sell the asset at the same date for the same price.
- Forwards are over-the-counter (OTC) contracts. OTC are customized contracts which are written across the counter or struck on telephone, fax or any other mode of communication by financial institutions to suit the needs of their customers.
- Both the buyers and sellers are committed to the contracts. The buyer has to take delivery and the seller has to deliver the underlying asset.
- The mutually agreed price in a forward contract is known as the delivery price.
- On maturity, the contract is settled so that the holder of the short position delivers the underlying asset to the holder of the long position who in turn pays cash equal to the delivery price.
- There is no performance guarantee in a forward contract and hence there is always counterparty risk.

FUTURES CONTRACTS

A futures contract is a promise to buy or sell a certain quantity of a standardized commodity or asset on a certain future date at an agreed price. Futures contract is very much like a forward contract. Forward contracts are between two parties who directly deal with and have accountability to each other for a particular contract, the futures contracts are between two parties who do not necessarily know each other and guaranteed for performance by an intermediary, known as the clearing house. And hence, the parties to the futures contracts need not worry about the credit worthiness of each other, unlike in case of forward contracts.

Features:

- There are two parties: one takes long position and another takes short position
- The parties to the contract do not know each other
- Futures are traded on organized exchanges (Secondary market) with clearing association that act as intermediary between the contracting parties.
- Since it has a secondary market, it offers a high degree of liquidity.
- Futures are standardized contracts (Futures on ACC at NSE is 750 shares, gold futures at NCDEX is 1 kg etc.)
- Both the parties pay a margin to the clearing association. This is used as a performance bond by contracting parties. The margin paid is generally marked to the market price every day.
- Each futures contract has an association month which represents the month contract delivery or final settlement, Ex. A September T-bill, a March Euro, November Nifty futures

FORWARD VS. FUTURES		
Basis of Diff.	**Forward Contract**	**Futures Contract**

Terms of the contract (size, delivery date etc.)	Tailored to individual needs (Customized)	Standardised
Maturity	Tailored to individual needs	Standardised
Method of Transaction	OTC traded	Exchange traded
Commission	Spread between the bank's bid and ask	Brokerage fees
Security Deposit	No margin money	Margin money with Clearing house
Access	Limited to very large customers who deal in foreign trade	Open to any one who needs hedging or speculation
Regulation	Self-regulating	Regulated by the rules of the stock exchange
Settlement	Mostly settled by actual delivery a few by offsetting contract	Mostly by offsetting contract and a few by actual delivery
Performance / Credit risk	Exists	Eliminated
Liquidity	Low	High
MTM	Not done	Exists
No. of contracts in a year	Any no. of contracts	Fixed 4 - 12

Types of Futures

Commodity Futures: In commodity futures, the underlying asset will be agricultural products (cotton, jute, coffee, oilseeds, food grains, tea, sugar, wheat, yarn etc.) **Energy products** (Oils), **Metal products** (bullion, silver, iron and steel etc.) and **Chemicals & Plastics**.

Financial Futures:

1.Stock Futures 2. Index Futures 3. Interest Rate Futures 4. Bond Index Futures and 5. Cost of Living Index Futures and 6. Currency Futures

1. Stock Futures: Futures contracts can be undertaken on stocks and shares of the companies

2. Stock Index Futures: These are major group of futures contracts all over the world. These contracts are based on stock market indices. The most striking feature of these contracts is that they do not involve actual delivery, only trader's obligation must be fulfilled by a reversing trade or settlement by cash payment at the end of trading. These are mainly used for hedging and speculation purposes. These are commonly traded by mutual funds, pension funds, investment trusts, insurance companies, speculators, arbitrageurs and hedgers. These are used in managing large stock portfolios. There are two types of settlement – **MTM (Marking-To-Market) settlement** which takes place at the end of each day, and the **Final settlement** which takes place on the last trading day of the futures contract. BSE was the first to start trading in index futures; but volumes on BSE are very meager compared to NSE. The major attraction of index futures for investors is the leverage and other reasons are ease of short-selling and low transaction cost.

3. Currency Futures: Futures contract is made in buying and selling of foreign currencies at agreed exchange rate. It is also known as Exchange Rate Futures.

Features

- Traded only in a limited number of currencies US $, UK £, Yen, French Francs, Marks, C$ etc.
- MTM also exist for currency futures.
- Size of the contract is standardised (Chicago Mercantile Exchange 62,500 Pounds, Canadian $ 1,00,000, Australian $ 1,00,000, Euro 1,25,000, Swiss fr. 1,25,000 and Japanese Yen 1,25,00,000)
- The date of delivery is fixed (i.e. third Wednesday of January, March, April, June, July, September, October and December)
- Normally futures currency contracts are used for hedging purpose by the exporters, importers, bankers, financial institutions and large companies.

4. Interest Rate Futures: It is a contract between borrower and lender to borrow a certain money in future at specified rate of interest. It is one of the important financial futures instruments in the world. Important. Interest rate futures traded on various exchanges are: notional gilt-contracts, short-term deposit futures, treasury bill futures, euro-dollar futures, treasury bond futures and treasury notes futures. Ex. 3-month maturity instruments like treasury bills and euro-dollar time deposits, including foreign debt instruments at Chicago Mercantile Exchange (CME), British Govt. Bonds at London International Financial Futures Exchange (LIFFE), Japanese Govt. Bonds at CBOT etc. are traded. Interest rate futures can be classified into two categories: Short-term Interest Rate futures (STIRs) and long-term IRF (Bond futures). In India, IRFs are of fairly recent origin; they commenced trading only in June 2003 and contrary to international experience, these contracts drew a big blank on the Indian markets. In India, the only short-term IRF contract being traded is the 91-day Treasury bill.

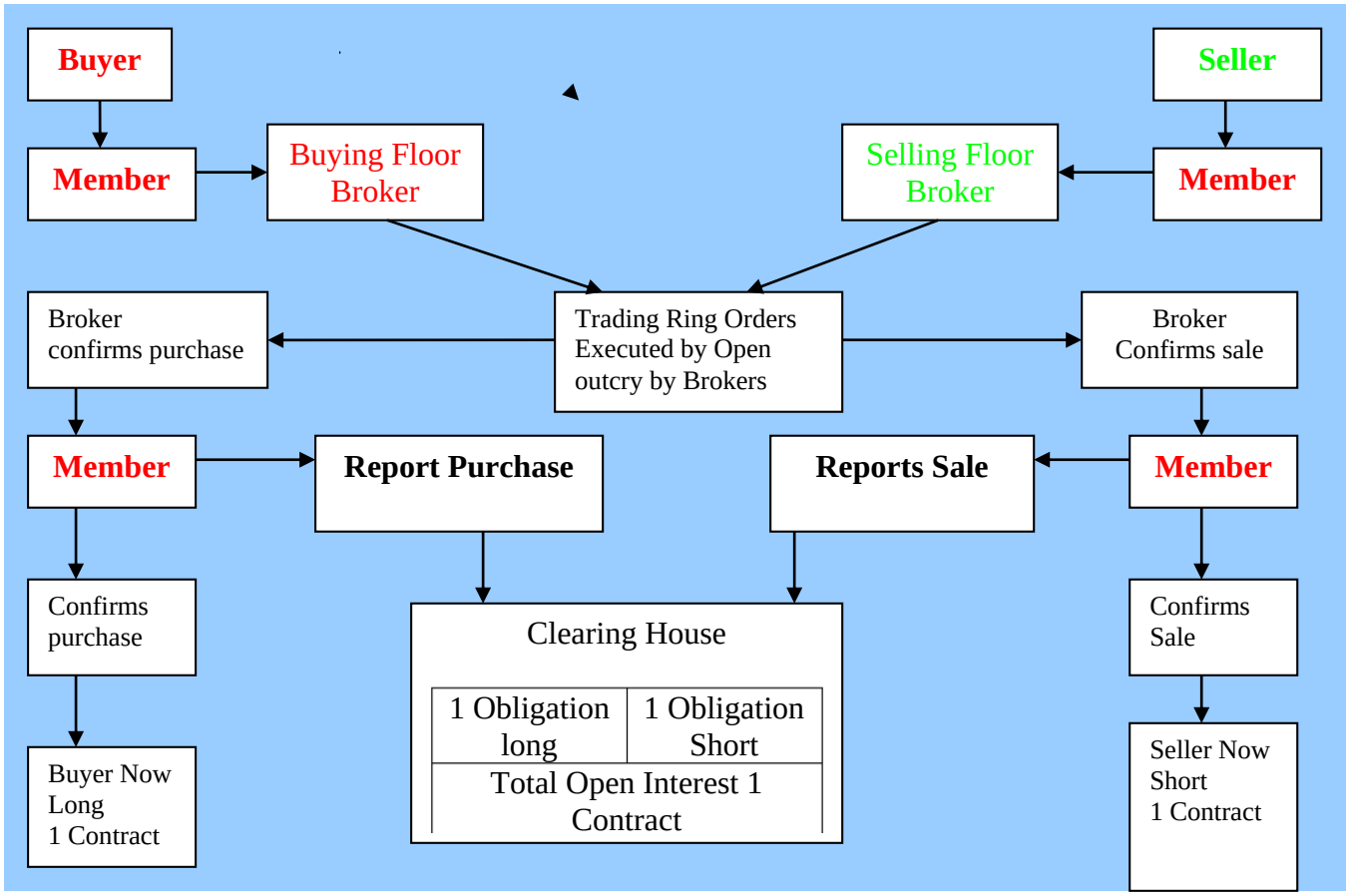
T-Bills: T-bills are short-term securities issued by the central govt. to finance the govt's deficit. These are issued in the denominations – 14, 91, 181 & 364 days. But at present only the 91-days and 364-days bills are being issued. RBI stopped auctioning the bills with tenures other than 91 and 364days bills . The major participants are banks and primary dealers. The minimum face value of T-bill is Rs.25,000 and in multiples of 25,000.

Contract Specifications: Three continuous contract months – Near, Next & Far months and fixed quarterly contracts for the year. New contract will be introduced on the trading day following the expiry of the near month contract. For example, in the month of May 2004, the available contracts will be May, June, July & Sept, Dec. 2004 and March 2005. Contract's minimum value is Rs.2,00,000 and the lot size is 2000. The contract expires on the last Thursday of the month. The minimum price movement permitted by the exchange is Re. 0.01.

5. Bond Index Futures: These futures contracts are based on particular bond indices, i.e. indices of bond prices. Ex. Municipal bond Index futures based on US Municipal Bonds which is traded on Chicago Board of Trade (CBOT)

6. Cost of Living Index Futures: It is also known as **Inflation futures**. It is used to hedge against unanticipated inflation which cannot be avoided. Futures contract are based on a specified cost of living index, for example, consumer price index, wholesale price index etc. At International Monetary Market (IMM) in Chicago, such futures contracts based on American Consumer Price Index are traded. It is useful to the investors like provident funds, pension funds, mutual funds, large companies and govt.

Mechanism of Futures Contract



Financial Futures Vs. Commodity Futures

Cash Settlement: Most of the commodity futures are generally settled through physical delivery whereas some of the financial futures are necessarily settled through cash only. Ex. Stock index futures contracts must be settled for cash. SENSEX represents only a hypothetical portfolio of the constituent stocks, and it can not be settled by a physical delivery.

Contract Life: The financial futures are available for longer duration than the futures on agricultural commodities (not more than one year). The US treasury bond futures are traded with even more than two years. Agricultural commodity futures are mostly for 90 days or less.

Maturity Dates: While maturity months for commodity futures contracts vary depending upon the nature of the underlying commodity, the maturity dates for financial futures are standardized.

Contract Specifications of S & P CNX Nifty Futures	
Underlying index	S&P CNX Nifty
Exchange of trading	National Stock Exchange of India Limited
Security descriptor	FUTIDX
Contract size	Permitted lot size 50 (minimum value Rs.2 lakh)
Price steps	Re. 0.05
Price bands	Operating range of 10% of the base price
Trading cycle	Maximum of 3 month trading cycle – 1, 2 & 3 months New contract will be introduced on the next rading day following the expiry of near month contract.
Expiry day	Last Thursday of the expiry month or the previous trading day if the last Thursday is a trading holiday.
Settlement basis	MTM and final settlement will be cash settled on T+1 basis.
Settlement price	Daily settlement price will be the closing price of the futures contracts for the trading day and the final settlement price shall be the closing value of the underlying index on the last trading day of such futures contract.

Contract Specifications of Stock Futures	
Underlying Asset	Individual securities available for trading in cash market
Exchange of trading	National Stock Exchange of India Limited
Security descriptor	FUTSTK
Contract size	Prescribed by the Exchange (Min. Value Rs.2 lakh)
Price steps	Re. 0.05
Price bands	Operating range of 20% of the base price
Trading cycle	Maximum of 3 month trading cycle – 1, 2 & 3 months New contract will be introduced on the next trading day following the expiry of near month contract.
Expiry day	Last Thursday of the expiry month or the previous trading day if the last Thursday is a trading holiday.
Settlement basis	MTM and final cash settlement on T+1 basis.
Settlement Price	Daily settlement price will be the closing price of the futures contracts for the trading day and the final settlement price shall be the closing price of the underlying security on the last trading day

Contract Specifications for Japanese Govt. (10-Year) Bond Futures

Contract	Standardised 6%, 10-year Japanese Govt. Bond
Contract Months	March, June, Sept. Dec. Cycle (Five contract months traded at all times)
Trading Units	Japanese Govt. Bonds Yen 100 million face value
Minimum Fluctuation	1/100 point per 100 points (Yen 10,000 per contract)
Daily Price Limit	2 points upward or downward (Yen 2 million per contract)
Last day of Trading	The 9th business day prior to each delivery date. The trading day in a new contract month begins on the business day immediately following the last trading day.
Delivery Date	20th of each contract month
Deliverable Grade	Exchange listed Japanese Govt. Bonds having maturity of 7 years or more but less than 11 years
Margin Requirements for Customers	Greater of 3% of nominal transaction value or Yen 6 million
Margin Requirements for Customers	2% of nominal transaction value
Trading Hours	9.00 am to 11 am 12.30 pm to 3.00 pm
Trading system	Pure auction through the Computer-assisted Order Routing and Execution system for FUTURES (CORES-F)

Margins - Initial, Maintenance and Variation margins

Initial Margin: The amount of money that must be deposited at the time of signing of the contract is known as **Initial Margin**. The buyers and sellers (investors) are required to deposit **initial margin** which is typically **5 to 10%** of the value of the contract. The exact amount is determined by the exchange and the clearing house, primarily in keeping with the expected fluctuations which are estimated from the past data. The individual brokers are free to require greater, but not lower, margins than determined by the futures exchange. The purpose of

maintaining the margin is to avoid or minimize contract defaults. The margin is used as a bond performance and not as a down payment for the contract.

MTM (Marking-To-Market): At the end of the each trading day, the margin account is adjusted to reflect the investors' gain or loss. The gains and losses are netted against the initial margin. This is called marking to market. The effect of marking to market is that a futures contract is settled daily instead of being settled at the date of the maturity. Writing of gain/loss to the margin account of the investor has the effect of bringing the value of the contract back to zero. The trader who incurs loss is required to pay the mark-to-market loss amount in cash, which is in turn is passed on to those traders who have made an MTM gain.

Maintenance Margin: The minimum level to which the margin is allowed to fall in the sequel of loss is known as **Maintenance Margin**. In marking to market day after day, it is possible that the margin may become too low, or possibly even wipe out or the balance may be negative. To prevent this kind of situation, an investor is required to ensure a maintenance margin, which is typically 3/4th of the initial margin. In the process of marking to the market, if the balance in the margin account falls below the maintenance margin, the investor receives a **margin call** and it requires to deposit additional funds to bring the balance to the level of initial margin in a very short period of time. The extra funds deposited are called **variation margin**. If the investor does not provide the variation margin, the broker closes out the position. With the liquidation of the contract, any remaining margin is given to the investor. On the other hand, if the balance in the margin account exceeds the initial margin, the investor is entitled to withdraw the excess money.

Collateralisation in OTC Markets: In an attempt to reduce credit risk, the OTC market is now imitating the margining system adopted by exchanges with a procedure known as collateralization. The parties to the contract enter into a collateralization agreement where they value the contract each day. Suppose company A and B enter into the contract and if from one day to the next the value of the contract to company A increases, company B is required to pay company A cash equal to this increase and vice-versa. Interest is paid on outstanding cash balances.

Factors influencing Margin

- Distance from the clearing house,
- Price volatility of the underlying security,
- Daily price moves permitted for the contract,
- Time needed to recover position losses from the customers,
- Objectives of the trader (bonafide hedger is required lower margin than speculator)

Clearing Margins: A clearing house member is required to maintain a margin account with the clearing house. The margin accounts of the members are adjusted daily against the profit/loss during the day in the same way as those of investors. However, there is no maintenance margin in case of clearing house member.

Illustration:
Using the following data, prepare a margin account of an investor. Assume that if a margin call is made at any time, the investor would deposit the amount called for and further the investor is assumed not to withdraw any excess money.

No. of Contracts: one	Contract size: 100 units	Unit Price: Rs.600
Initial margin: 10% of contract value	Date of contract: 2nd Sept.	Position: Short
Maintenance margin: ¾ of initial margin	Closing date of contract: 27th Sept	Position : Long

Operations of margins on a Wheat Futures Contract

Trading Day	Futures Price	Change in Price	Daily Gain/Loss	Margin A/C Balance	Margin Call @ Rs.4,500
Sept. 2	600.00	-	-	6000	
	598.20	-1.80	-180	5820	
3	593.60	-4.60	-460	5360	
4	594.00	0.40	40	5400	
5	589.50	-4.50	-450	4950	
6	584.80	-4.70	-470	4480	1520 (6000 – 4480)
9	582.20	-2.60	-260	5740	
10	583.70	1.50	150	5890	
11	577.30	-6.40	-640	5250	
12	577.10	-0.20	-20	5230	
13	572.40	-4.70	-470	4760	
16	570.10	-2.30	-230	4530	
17	568.50	-1.60	-160	4370	1630

18	569.80	1.30	130	6130	
19	573.80	4.00	400	6530	
20	573.60	-0.20	-20	6510	
23	577.30	3.70	370	6880	
24	576.80	-0.50	-50	6830	
25	578.80	2.00	200	7030	
26	578.00	-0.80	-80	6950	
27	584.20	6.20	620	7570	

Profit/Loss = 6,000 + 1,520 + 1,630 – 7,570 = -1,580

News Paper Quotes (Futures on NSE)

October	Price (Rs.)				Open Interest (000)	Trading Quantity (000)	No. of contracts
	Open	High	Low	Close			
ACC	279.45	282.20	277.55	278.20	6615.00	8188.50	5459
Andhra Bank	51.45	51.90	51.00	51.30	3969.80	1941.20	422
Source: The Economic Times Tuesday Oct. 5, 2004							

Open: The price for the day's first trade that occurs during the time period designated as the opening of the market (or the opening call)
High: the highest price of a trade recorded during the day.
Low: The lowest price of a trade recorded during the day.
Close: The closing price is usually determined by formula using the range of prices recorded within the closing period (such as the last minute of trading). It is determined by the exchange's settlement committee and is intended to indicate the fair value f the futures contract at the close of trading.
Open Interest: It is the number of futures contracts that are open (or being held) at the close of the previous day's trading
Trading Quantity: Quantity is the total value of futures contracts at the end of the day for each stock.
Number of contracts: It is total number of futures contracts that are traded during the day.

Contract Size: It is an unit of trading and represents the value of the security represented in the contract. SEBI stipulated that the minimum contract size of the derivative should not be below Rs. 2 lakh at the time of introducing the contract in the market and this is being followed on both exchanges.

Contract Multiplier: It is predetermined value used to arrive at the contract size. In the contract of index futures. It is the price per index point. Ex. Contract multiplier for Sensex futures is Rs.50. Since contract multiplier is fixed by respective exchanges, it is not constant across the exchanges and across the contract also.

Lot size: It is number of underlying securities in one contract. Lot size is determined by considering the minimum contract size requirement at the time of introduction of derivative contract on a specific underlying. Ex. Lot size of Bharat Tele (when it is quoted at Rs.200) = 2,00,000/200 = 1000 shares.

Tick size: It is the minimum price movement allowed. In the case of Sensex futures, the tick size is 0.05 points or Rs.2.50 (0.05 x Rs.50 per point).

PRICING OF FUTURES AND FORWARDS (Valuation)

Carry Cost or Cost of Carry: Carry cost refer to the holding costs, including the interest charges on borrowings to buy (or the opportunity cost of using one's own funds) the asset. In case of physical commodities, the carrying costs also include costs such as insurance, obsolescence, storage etc.

Carry Return: Carry return refers to the income, such as dividends on shares, which may accrue to the investor.

Assumptions

1. The market is perfect
2. Market participants have no influence over price (price takers).
3. There are no transaction costs and no tax
4. All the assets are infinitely divisible
5. No Bid-Ask spread. Bid-ask spread does not exist so that it is assumed that only one price prevails
6. There are no restrictions on **Short selling or Shorting** (i.e. Selling an asset that is not owned). Also, short sellers get to use full proceeds of the sales.
7. No restrictions for borrowing & lending
8. Borrowing & lending is done at the same rate of interest

Continuous compounding: The calculation of forward prices and option prices is based on the concept of continuous compounding. $r = \ln (1 + R/c)^c$ OR $c \ln (1 + R/c)$

[R = Annual rate of interest r = Rate of interest continuously compounding; c = compounding factor]

Cash and Futures Price
The difference between cash price and futures price is known as **Basis (i.e.** Basis = Cash Price – Futures Price). The basis may be positive (Futures price being lesser than cash price) or negative (Futures price being greater than cash price)
When futures price is compared with cash price, the following points are observed

- Generally Futures price will be always above the cash price.
- The extent to which the futures price exceeds the cash price is largely determined by the time to delivery. The longer the time period before expiration, the more the futures price exceeds the cash price.
- As the delivery date approaches the futures price slowly but inevitably converges to the cash price; because it is determined by Cost of Carry approach.

Contango Vs. Backwardation Market
If futures prices are accurately described by a full carry relationship or Cost of Carry approach, the futures prices will be higher than the cash prices (i.e. Negative Basis). This condition is known as a **Contango Market**. When the futures prices are determined by considerations other than or in addition to cost of carry factors, the futures price will be less than the cash price (Positive Basis), This condition is known as **Backwardation market**. The backwardation is also used to refer to a market in which the futures price is above the cash price but still below the fully-carry futures price (i.e. theoretical futures price). The terms contango and backwardation can be used to describe an entire pattern of futures prices, from the price of the nearest month contract to the price of the most distant month contract (or the contract that expires at a time most distant from the present). A contango market is characterized by progressively rising futures prices as the time to delivery becomes more distant, and a backwardation market by progressively lower futures prices as delivery becomes more distant.

Hedging Strategies
Short Hedge: Hedges that involve taking a short position in a futures contract are known as short hedges. A short hedge is appropriate when the hedger already owns an asset and expects to sell it at some time in the future. A short hedge can also be used when an asset is not owned.

Long Hedge: Hedges that involve taking a long position in a futures contract are known as long hedges. A long hedge is appropriate when a company knows it will have to purchase a certain asset in the future and wants to lock in a price now.

Cross Hedge: In the hedging strategies other than cross hedge, the asset underlying the futures contract has been the same as the asset whose price is being hedged. Cross hedge occurs when the two assets are different.

When a firm wishes to hedge against a particular asset for which no future contract is available, this situation is known as **asset mismatch**. When the same future period on a particular asset is not available, this is known as **maturity mismatch**. In these situations there is still possibility to hedge against price risk in related assets. Such hedges are called cross hedge. **Ex.** An airline is concerned about the future price of jet fuel. But there is no futures contract on jet fuel and therefore it might choose to use heating oil futures contracts to hedge its exposure. A firm wants to hedge portfolio of silver coins but no future contracts are available for silver coin, but it can be hedged considering silver future contract. A soyabean oil producer may not be able to get soyabean oil futures contracts. It may substitute ground nut oil futures for soyabean oil futures if the soyabean oil and groundnut oil prices tend to move in unison. When a firm resorts to cross-hedging it must take into account how the relative prices move. Suppose, it finds that the following regression relationship holds.
1% change in soyabean oil price = 0.9% change in groundnut oil price. According to this relationship, 1% change in the price of soyabean oil leads to an 0.9% change in the price of groundnut. Hence, the soyabean oil producer must sell 0.9 units of groundnut oil futures for every unit of soyabean oil to be sold.

Static Vs. Dynamic Hedging: As the value of delta keeps changing on account of market fluctuations, trader's hedged delta remain neutral only for a relatively short period of time. The hedge has to be adjusted periodically. Dynamic hedging requires the hedge position to be adjusted periodically under static hedging, hedge once set up is never adjusted.

Pricing Forwards/Futures Contracts or Value of Forwards/Futures Contract
Following formulas are used to find out theoretical value of the Forwards/Futures. And this theoretical value is used to know any opportunities for arbitrage. If actual Forward/Futures price is exactly equal to theoretical value, there will be no opportunity for arbitrage, however, arbitrage is possible only when actual Forward/Futures price is either greater or less than the theoretical value.

If actual Forward/Futures price is greater than theoretical price (i.e. $F > S_0 e^{rt}$)
Opportunity for short Forwards/Futures available **(Contango Market)**

Arbitrage Process:
On Contract Date: 1. Borrow money equivalent to the spot price of the stock/commodity
2. Buy stock/commodity at the spot rate in the cash market
3. Take short position in Futures/Forwards market

On Maturity: 1. Sell the shares at Futures/Forward price
2. Less: Repay the loan with interest continuously compounded
Gain on Arbitrage

If actual Forward/Futures price is less than theoretical price (i.e. $F < S_0 e^{rt}$)
Opportunity for Long Forwards/Futures available **(Backwardation market)**
Arbitrage Process:
On Contract Date: 1. Sell the asset in the spot market
2. Invest the sales proceeds till maturity
3. Take long position in Forwards/Futures market

On Maturity: 1. Realise the investment on maturity
2. Less: Purchase the asset at Forwards/Futures price
Gain on Arbitrage

Case - 1. For Non-Dividend Payment Security: $F = S_0 e^{rt}$

S_0 = Spot price r = Riskfree rate of return (continuously compounded) t = time to maturity

Ex.-1 Consider a forward contract on a non-dividend paying share which is available at Rs.70, to mature in 3-months time. If the riskfree rate of interest be 8% p.a. compounded continuously. What is forward price? Ans. Rs.71.41

Case - 2. For Dividend Paying Security (Known amount): $F = (S_0 - I) e^{rt}$
(Preference shares are an example of this)
I = Present value of dividend (Ye^{-rt}) Y = Amount of dividend

Ex.-2: Consider a 6-month forward contract on 100 shares with a price of Rs.38 each. The riskfree rate of interest (continuously compounded) is 10% p.a. The share in question is expected to yield a dividend of Rs.1.50 in 4 months from now. What is the value of the forward contract? Ans. Rs.3,842.31

Case - 3. For Dividend Payment Security ((Known Yield): $F = S_0 e^{(r-y)t}$
y = Dividend Yield

Stock index may be regarded as such securities. The shares included in the portfolio comprising the index are expected to yield dividends in the course of time which may be expressed as a percentage of their prices, and thus be related to the index. Theoretically, it is assumed to be paid continuously.

Ex.-3: A stock underlying an index provides a dividend yield of 4% p.a., the current value of the index is 520 and the continuously compounded riskfree rate of interest is 10% p.a. What is the value of 3-month forward contract? Ans. Rs.527.85

Pricing of Futures Contract (Commodities)
Carry-type Commodities: The commodities which are used for investment purpose. Ex. Gold, Silver

When there is known amount of storage cost: $F = (S_0 + s) e^{rt}$
s = Present value of Storage cost incurred during the life of a futures contract ($s e^{-rt}$)

When storage cost is proportional to the price of the commodity: $F = S_0 e^{(r+s)t}$
s = storage costs p.a. as a proportion of the spot price.

Ex. Consider a 6-month gold futures contract of 100 gm. Assume that the spot price is Rs.480 per gram and that it costs Rs.3 per gram for the 6-monthly period to store gold and that the cost is incurred at the end of the period. If the risk-free rate of interest is 12% p.a. compounded continuously. What is the value of futures contract?
Ans. Rs.51,268.15

Non-carry type Commodities: The commodities which are meant primarily for consumption. The cost of carry model cannot be applied. In respect of such commodities, this model serves to determine the upper bound only. In other words, for non-carry commodities, we may say that the futures price will not exceed the sum of the spot price and the carrying cost less carry return, if any. In other words, for carry-type commodities the arbitrage opportunity exists but for non-carry commodities, arbitrage opportunity does not exist.

Convenience Return or Convenience Yield: It is the return (expressed in monetary terms or in percentage terms) that an investor (the holder) realizes for carrying inventory of the commodity over his/her immediate short-term needs. The financial assets do not have convenience yield. Convenience return for a commodity is likely to be different for different investors, and may vary over time. As such, the convenience return cannot be measured and expressed easily and objectively.

$$F = (S_0 + s)\, e^{(r-c)\,t} \qquad \textbf{OR} \qquad F = S_0\, e^{(r+p-c)\,t}$$

s = Present value of storage cost p = Constant proportion of storage cost p.u.

VALUATION OF INDEX FUTURES

Case - 1. When the securities included in the index are not expected to pay any dividends during the life of the contract : $F = S_0\, e^{rt}$

S_0 = Spot price r = Riskfree rate of interest (continuously compounded) t = time to maturity

Ex. Calculate the value of a futures contract using the following data:
Spot value of index = 3090; Time to expiration = 76 days
Contract multiplier = 100; Risk-free rate of return = 8% p.a.
Ans.3139.92 and Value of the contract = Rs.3,13,992 (3139.92 x 100)

Case - 2. When dividend is expected to be paid by one or more of the securities included in the index during the life of the contract::
$F = (S_0 - I)\, e^{rt}$
(Dividend amount obtained on some of the stocks is discounted back then the rule of pricing securities with known income is applied)
I = Present value of dividend (Ye^{-rt}) Y = Amount of dividend **Ex. (See QB)**

Case - 3. When dividend on the securities included in the index is assumed to be paid continuously during the life of the contract:(Known yield) $F = S_0\, e^{(r-y)t}$
y = Dividend Yield

Ex. Consider a three-month futures contract on NSE-50. Assume that the spot value of the index is 1090, the continuously compounded risk-free rate of return is 12% p.a., and the continuously compounded yield on shares underlying the NSE-50 index is 4% p.a. Find the value of a futures contract, assuming the multiplier to be 200.
Ans: 1112.02; Value of the contract = Rs.2,22,404 (1112.02 x 200)

Securities Lending and Borrowing Mechanism (SLB): Security lending occurs when a holder lends eligible securities to borrowers in return for a fee. Security lending began as a means to cover short sales. This creates income opportunities for the security holders and also gives rise to increased liquidity that facilitates trading strategies of the borrowers. A Securities lending program is used by lenders to maximize yields on their portfolio. In this mechanism, the legal title of a security is temporarily transferred from lender to a borrower; however, the lender retains all the benefits of ownership, other than the voting rights. The borrow is entitled to make use of the securities as required but is liable to the lender for all benefits (e.g. dividends, interest, or rights). To guarantee the transaction and avoid default on return of the securities, the borrower has to deposit collateral securities (e.g. cash, bank guarantees, govt. securities or certificates of deposit or other securities) with an approved intermediary. Approved intermediaries in India are: National Securities Clearing Corporation Ltd. (NSCCL), Stock Holding Corporation of India Ltd. (SHCIL), Deutsche Bank and Reliance Capital.

Terminology of Futures

Pits : A trading roof, under which brokers strike the deals sitting face to face in case of currency futures.
Locals / Floor Traders : When the brokers trade for themselves.
Scalpers : The brokers who hold long or short position for not more than a few minutes.
Day Traders : The brokers who hold their position for a comparatively short period that is less than a full trading session.
Position Traders : The brokers who hold a position for a period ranging from overnight to a week or a month.
Commission Brokers / Floor Brokers : When the brokers trade on behalf of their customers.

Dual Traders : Traders acting for themselves as well as on behalf of their customers.
Front-running : Dual traders act more for their own benefit and not so much for their clients. Such favourable treatment for their own account at the expense of their clients is called front-running.

Important Futures Exchanges

CBOT	Chicago Board of Trade (USA)
CME	Chicago Mercantile Exchange (USA)
NYMEX	New York Mercantile Exchange (USA)
LIFFE	London International Financial Futures and Options Exchange (UK)
LME	London Metal Exchange (UK)
IPE	International Petroleum Exchange (London)
TOCOM	Tokyo Commodity Exchange (Japan)
TIFFE	Tokyo International Financial Futures Exchange
KSE	Korea Stock Exchange
MONEP	Monetary Exchange of Paris (France)

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Module - 3
FINANCIAL SWAPS

Meaning of Swap : An agreement between two parties to exchange one set of cash flows for another. It is a financial arrangement made for obtaining the desired form of financing in an indirect way that could otherwise be inaccessible or costly. It is an extension of the parallel loans or the back-to-back loans emerged during 1970s. Limitation of Swap is finding a party with matched financing requirements.

Features of Swaps
Counter Parties: All swaps involve the exchange of a series of periodic payments between at least two parties. Ex. A firm having a loan of ten million dollar payable at 10% fixed coupon rate for five years, wants to exchange for a floating interest rate with a party who is also interested to exchange its liability to fixed.

Facilitators: Swap agreements are arranged mostly, (known as swap facilitators), through an intermediary which is usually a large international financial institution / bank having network of its operations in major countries. This institution is normally having contracts with major international business firms who have direct link with other firms.

Types of Facilitators: **Brokers** – Brokers function as agents and identify and bring the counter parties on the table for the swap deal. The broker's basic objective is to initiate the counter parties to finalise the swap deal according to their respective requirements.
Swap dealers - Dealers themselves become counter-party and undertake the risk. Since the swap dealers are the party to the swap deals, they face two important problems. First, how to price swap to provide for his service. Second, the swap dealer creates a portfolio, therefore, the second problem is to manage this portfolio.

Cash flows: In the swap deal, two different payment streams in terms of cash flows are estimated to be identical.

Documentations: Swap transactions may be carried out with great speed since their documentations and formalities are generally much less in comparable to loan deals. Swap deals are less complicated, less time consuming and simpler in terms of documentations and other formalities.

Transaction Cost: It has been observed that transaction costs are relatively low in swap transactions in comparison to loan agreements. They are unlikely to exceed half percent of the total sum involved in the swap agreement.

Benefit to Parties: Swap agreements benefit both the counter parties. It enables to obtain desired form of financing.

Termination: Swap deal cannot be terminated at one's instance. Termination requires to be accepted by both the parties.

Default Risk: Since most of the swap deals are bilateral agreements, the problem of potential default by either of the counter party exist,

Types of Swaps: 1. Interest Rate Swaps 2. Currency Swaps 3. Equity Swaps

INTEREST RATE SWAP

It is an arrangement in which two parties agree to exchange interest rate cash flows, based on a specified notional amount from a fixed rate to a floating rate (or vice versa) or from one floating rate to another. When borrower expect a rise in interest rates, they swap floating-rate loan for a fixed-rate loan. When they expect a fall in the interest rate, they swap fixed-rate loan for floating-rate loan. Interest rate swaps are commonly used for both hedging and speculation.

Features of Interest Rate Swaps :

- The counter-parties exchange the interest payments and feel as if they are using the loans according to their own choice.
- Condition : Amount of loan is identical in the two cases and periodic payment of interest takes place in the same currency.
- Synchronisation of interest – one getting cheaper fixed-rate and the other getting cheaper floating-rate funds.
- Principal amount are not exchanged (it is only notional), only interest payment is exchanged on periodic payment dates.
- The interest payment is known as legs of swap & fixed rate is called swap coupon.

Potential Gain in the Swap = (Interest rate differential in one form of borrowing +/- Interest rate differential in another form of borrowing
Net Gain =Potential Gain - Commission to Swap Dealer
Gains to each party = ½ of Net Gain
Cost of Borrowing to each party = Interest rate of Desired form of borrowing – Gain

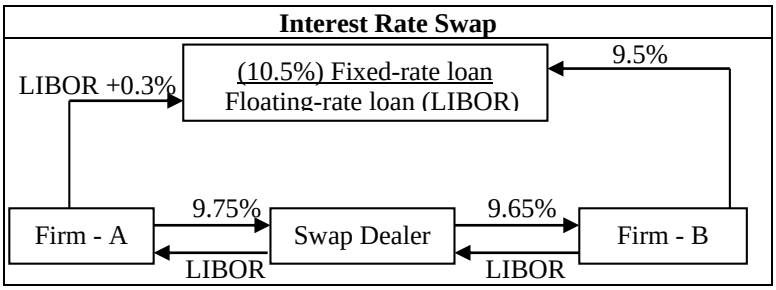
Suppose firm A needs fixed rate funds which is available to it at the rate of 10.50% to be computed half yearly, but it has access to cheaper floating rate funds available to it at LIBOR + 0.3%. Firm B needs floating rate funds available to it at 6 month LIBOR flat, but has access to cheaper fixed rate funds available to it at the rate of 9.5% to be computed half yearly. Both the principles are identical in size and maturity and are in the same currency. The interest rate swap takes place as follows

Stage-1 :
Firm A borrows floating rate loan at LIBIOR + 0.3%; Firm B borrows fixed rate loan @ 9.5%

Stage – 2
Since, both the firms have not borrowed according to their needs, they approach swap dealer .

Swap dealer and firm A
Swap dealer asks firm A to pay fixed rate interest to it as if it has borrowed fixed rate loan say only 9.75%. In exchange, the swap dealer pays firm A the interest at 6-month LIBOR. And firm A pays LIBOR + 0.3% to the lender on its floating rate borrowing.

Swap dealer and firm B
Swap dealer asks firm B to pay 6-month LIBOR as if it has borrowed floating rate loan. In exchange, the swap dealer pays firm B fixed rate interest which is higher than what firm B has to pay to the ultimate lender (i.e. 9.5%). [This is interest rate received from firm A – its commission (i.e. 9.75% - 0.10%)]



Firm A's Cost of Borrowing		Firm B's Cost of Borrowing		Gain to Swap Dealer	
Cost of floating-rate loan	LIBOR + 0.3%	Cost of fixed rate borrowing	9.50%	Interest rate received	9.75%

Less : floating interest rate received	-LIBOR	Less : fixed rate received	-9.65%	Less : interest rate paid -9.65% Net gain (Commission) 0.10%
Net cost differential	+0.3%	Net cost differential	- 0.15%	
Converting the cost differential from money-market yield to bond equivalent yield. (0.3 x 365/360 = 0.304%)		Converting the cost differential from Bond-Equivalent Yield (BEY) to Money-Market Yield (MMY); (-0.15 x 360/365 = -0.148)		
	9.75%			
Add : Swap coupon	0.304%			
Total cost of borrowing	**10.054%**	Total cost of borrowing	**LIBOR - 0.148%**	

Case

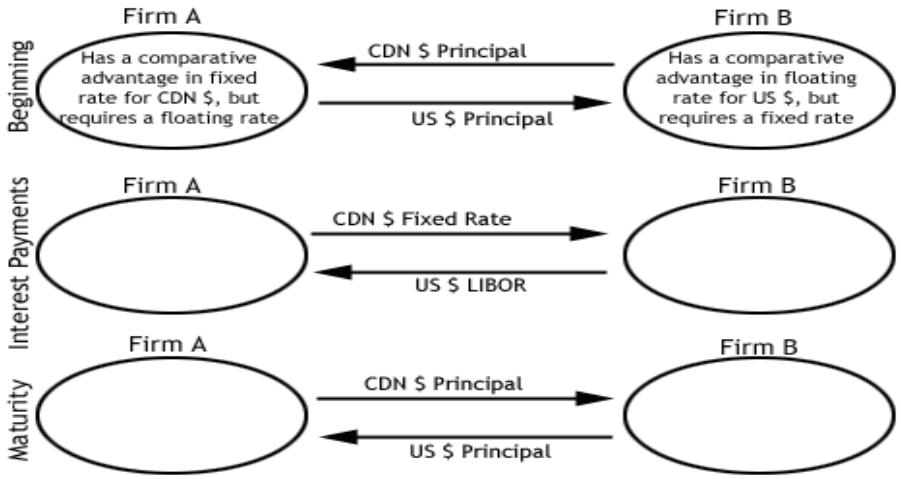
On 16th March, Maruti Udyog Ltd. (MUL) took a syndicated foreign currency loan of US $ 120 million. The terms of the loan agreement specified that MUL would draw $ 30 million by 16th March 1985, $ 40 million by 16th march 1986, and $ 50 million by the 16th March 1987. The loan was repayable from march 1988 through March 1991. The rate of interest on the loan was stipulated to be 3/8% over LIBOR till March 1988 and ½% over LIBOR thereafter. Concerned about the dollar LIBOR fluctuations, MUL decided to go in for an interest rate swap. On 30th July 1985, MUL enters into a transaction with Bank of America for an interest rate swap. Under this deal, Bank of America agreed to pay Bank of Tokyo an interest of 3/8% over LIBOR on $ 120 million while MUL agreed to pay a fixed rate of interest of 10.5% to Bank of America.

CURRENCY SWAP

A swap that involves an exchange of principal and interest in one currency for the same in another currency. Both the principal and interest in one currency are swapped for principal and interest in another currency. It involves exchange of different currencies. Suppose firm A can borrow Euro at a fixed rate of 8% or it can borrow US dollar at a floating rate of one-year LIBOR. Firm B can borrow Euro at a fixed rate of 9.2% and can borrow US dollar at one-year LIBOR. However, the firm B needs fixed-rate Euro, and firm A needs floating rate Dollar debt. Both the parties approach swap dealer. Principal payments flow in the opposite direction to the arrows as the start of the life of the swap and in the same direction as the arrows at the end of the life of the swap. The financial institution would be exposed to some foreign exchange risk which could be hedged using forward contract.
It is considered to be a foreign exchange transaction and is not required by law to be shown on a company's balance sheet.

Types:

1. Fixed-for-fixed currency swap 2. Floating-for-floating currency swap 3. Fixed-for-floating currency swap
Fixed-for-Fixed: Fixed rate in one currency is exchanged for fixed rate in another currency
Floating-for-Floating: Floating rate (LIBOR) in one currency is exchanged for floating in another currency.
Fixed-for-floating: Floating rate in one currency is exchanged for a fixed rate in another currency. It is also known as **Cross Currency interest rate swap**.



Benefits from Currency Swap

Cost to Firm A

Cost of US Dollar debt in absence of swap LIBOR

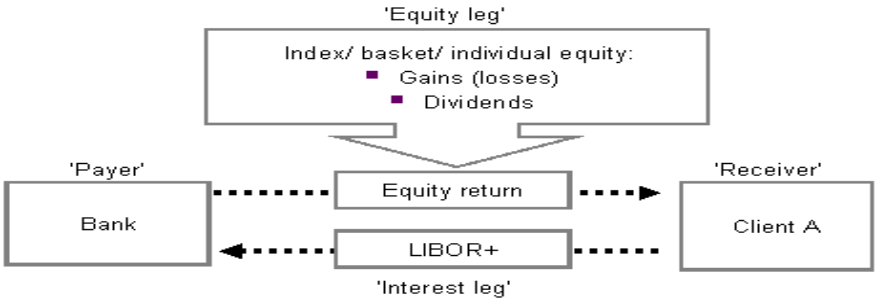
Cost of US Dollar debt after swap :
Interest paid minus interest received 8%+LIBOR-8.50% =LIBOR– 0.50% = LIBOR – 0.5%
(0.04 x 360/365 = 0.39) LIBOR – 0.39%

Cost to Firm B
Cost of Euro debt without swap 9.2%
Cost of Euro debt after swap :
Interest paid minus interest received 8.70% + LIBOR – LIBOR = 8.70%

Gain to Swap Dealer

Interest rate received	Euro 8.70% + $ LIBOR
Less : interest rate paid	- Euro 8.50% + $ LIBOR
Net gain (Commission)	0.20%

EQUITY SWAP
It is an arrangement where one of the legs is pegged to a floating rate such as LIBOR (floating leg) and the other leg of the swap is based on the performance of either a share of stock or a stock index (equity leg). It is an arrangement to exchange the total return (i.e. dividend and capital gains) realized on an equity index for either a fixed or a floating rate of interest. Ex. Total return on S & P 500 in successive 6-month periods might be exchanged for LIBOR with both being applied to the same principal. Most equity swaps involve a floating leg vs. an equity leg, although some exist with two equity legs. An equity swap involves a notional principal, a specified tenor and predetermined payment intervals.
Most equity swaps today are conducted between large financing firms such as auto financiers, investment banks and capital lending institutions. LIBOR rates are a common benchmark for the fixed income portion of equity swaps, which also tend to be held at intervals of one year or less, much like commercial paper. It is used when the equity investment is highly volatile. The recipients of the dividend go for swapping their receipt with the swap dealer.



Various Forms of Swaps
Fixed-for-floating : One party pays fixed rate and another party pays floating rate (normally found).

Fixed-for-fixed : Both the counter parties pay fixed rate of interest to the swap dealer and in turn get floating rate of interest. . It is found when the cash flow of a stream of the firm opting for swap is highly volatile.

Floating-for-floating : Both the counter parties pay floating rate of interest to the swap dealer (i.e. both the legs are floating) and in turn get fixed rate of interest

Basis Swap : Two legs are tied to two different indices. (e.g. one leg is tied to 3-month LIBOR, while the other leg is tied to 6-month LIBOR).

Covered Vs. Naked Swap : Swap dealer's position is covered in case of covered swap however, swap dealer's position is not covered in case of naked swap.

Single swap Vs. Circus Swap: Single swap involves one agreement only. Circus swap is a combination of one fixed-for-fixed currency swap and one floating-for-floating interest rate swap. It is also known as double swap agreement.

Forward Swap: This swap involves an exchange of interest rate payment that does not begin until a specified future point in time. It is also kind of swap involving fixed for floating interest rate.

Option Swap : The purchaser of swap has the right, and not the obligation to enforce the deal. When the results of the deal are in favour of the purchaser it enforces the deal. **Types**: Callable and Putable Swap

Callable Vs. Puttable Swap : When the swap is terminated before maturity by the fixed interest rate payer, it is callable however, when it is terminated by the floating interest rate payer, it is puttable.

Capped Equity Swap : Floating leg of the equity swap is caped. If it has to pay more than the ceiling, the excess amount is paid by the cap dealer with which there is an agreement.

Rate Capped Swap: In this swap, there is an exchange of fixed rate payments for floating rate payments, whereby the floating rate payments are capped. An upfront fee is paid by floating rate party to fixed rate party for the cap.

Amortising Currency Swap: Principals amortise over the life of the swap and so there is no single re-exchange of currencies.

Plain Vanilla (Generic) swap : The original structure of interest rate swap as discussed as above. There are minor variations in the swap.

Yield-curve Swap : Two legs are tied to two long-term rates.

Extendable Swap : Maturity of the loan can be extended.

Zero-coupon swap : A zero coupon swap is similar to a vanilla interest rate swap except the difference that the fixed rate cash flows are not paid periodically; rather they are compounded and paid only once, on the expiry date of the swap. However, floating rate cash flows on the other side (or a fixed rate) will be paid periodically. It is used by corporates, banks and other investors.

Circus Swap: It is a combination of currency swap and interest rate swap. It is also known as Cross currency swap or currency coupon swap. Here loans in one currency with fixed rate is swapped for a floating rate loan in the other currency.

DEFAULT SWAPS

It is a credit derivative that can be used to protect against default risk.

Suppose, Bank P agrees to pay a fixed amount annually to bank Q, as long as A, a borrower of bank P, does not default. In return, bank Q promises to compensate bank P, if A defaults. In essence, bank P is buying long-term insurance from bank Q against default risk by paying an insurance premium every year. In principal, a bank that has a portfolio of loans can enter into a default swap of each loan separately. In practice, it would be simpler for it to do a portfolio debt swap that protects its entire portfolio from default risk.

Risks borne by Swap Dealer

Interest-Rate Risk: Fixed rate loans under the swap carry higher risk. The swap dealer is faced with the interest rate risk, especially when it has a naked position in the swap.

Exchange Rate Risk: If the swap dealer faces both the interest rate and the exchange risk simultaneously, the quantum of risk will be very large. If the two risks are positively correlated, the risk will be still higher.

Credit Risk: Credit risk arises when a counter-party defaults payment to the swap dealer. In such case, contract is terminated. Termination of contract does not protect the swap dealer from the loss.

Mismatch Risk: It arises when it is difficult for the swap dealer to find a perfect match for a counter-party. In this case, swap dealer offers concessions to attract suitable counter-party. Such concession causes loss to it.

Sovereign Risk: It arises when the government of a country to which one of the two counter-party belongs, puts restrictions on the flow of foreign exchange. This entails upon payments received by the swap.

Delivery Risk: It arises when the two counter-parties are located in two different time zones so that the date of maturity differs by one day.

Documentation for Swap : Swap deal is agreed upon normally over telephones in OTC market. So as to avoid confusion, normal practice is to prepare the necessary documentation. Role of International Swap Dealers' Association (ISDA) is very important. The ISDA made the rules regarding documentation which include : identification of the parties, payments, representations, agreements, default, termination, tax matters, jurisdiction etc.

REASONS FOR SWAPS

Spread Compression : When there is a variation in the spreads of interest rates applicable to two parties in different markets, there is an opportunity for a mutually advantageous financial swap.

Why do spreads in different market tends to vary ?
Credit evaluation and risk compensation norms vary across financial markets.
In US credit evaluation is based mainly on the credit rating provided by independent credit rating agencies and a BBB rated firm may have to pay 2% more in interest than a AAA rated firm.

Market Saturation : An issuer may find that a particular capital market, saturated with its debt, is unwilling to absorb any more. In such a situation, a proxy borrower may be used along with swap transaction.

E.g.
In 1981, the Swiss market, saturated with World Bank debt, was unwilling to absorb any more. The World Bank, however, could borrow in the US market on attractive terms. With the help of IBM, which was quite acceptable in the Swiss market, the problem was solved. IBM borrowed in the Swiss market, World Bank borrowed in the US market, and IBM and World Bank swapped their debts.

Difference in Financial Norms : Differing debt equity norms across various capital markets may induce swap transactions.

E.g. Liberal debt equity ratios are permitted in Japan, but not in the US. As a result, a highly levered Japanese firm, interested in dollar financing, may not have direct access to the US capital market. In order to obtain dollar financing, such a firm may obtain a yen loan and swap it with a dollar loan.

VALUATION OF SWAPS

For Interest Rate Swaps

For Fixed Rate Payer (Long position in floating and short position in fixed): $V_S = B_{Fl} - B_{Fix}$
For Floating Rate Payer: $V_S = B_{Fix} - B_{Fl}$

B_{Fl} = Value of floating rate bond underlying the swap
B_{Fix} = Value of fixed rate bond underlying the swap

$$B_{Fl} = (P + K^*)e^{-r1\ t1}$$

$$B_{Fix} = Ke^{-r1t1} + Ke^{-r2t2} + \ldots..(P + K)\ e^{-rn\ tn}$$

P = Principal amount K = Cash flow (interest amount) K* = Amount of interest paid at last

For Currency Swaps
For domestic currency payer: $V_S = E_0\ B_F - B_D$
For foreign currency payer: $V_S = B_D - E_0\ B_F$

$$B_D = Ke^{-r1t1} + Ke^{-r2t2} + \ldots..(P + K)\ e^{-rn\ tn} \qquad B_F = Ke^{-r1t1} + Ke^{-r2t2} + \ldots..(P + K)\ e^{-rn\ tn}$$

V_S = Value of Swap B_F = Value of foreign currency
E_0 = Current exchange rate B_D = Value of domestic currency

Module - 4
OPTIONS

Meaning of Option: It is a legal contract which gives the holder the right to buy or sell a specified amount of underlying asset at a fixed price within a specified period of time.

Features

- Two parties are involved: One party takes a long Position (buys the option) and other one takes a short position (sells the option).
- The one who takes a short position is the option writer and who takes a long position is holder of the option
- Option gives the holder the right to buy or sell a designated asset. It is not an obligation to buy or sell.

Types of Options:
Call Option: It is a contract which gives the owner the right to buy an asset for a certain price on or before a specified date.

Put Option: It is a contract which gives its owner the right to sell something for a certain predetermined price on or before a specified date.

American Option: An American option can be exercised by its owner at any time on or before the expiration date.

European Option: The owner can exercise his right only on the expiration date and not before it. Most of the options traded in the world including those in Europe are American style options.

Other Classification of Options
Forward Reversing Option : The buyer gets liberal terms. Call option premium is paid only when the spot rate is below a specified level. The premium is quoted by the seller who charges the premium only when the options are not exercised.

Preference Option : Buyer gets additional privilege to designate the option either as a call option or as a put option. This privilege is exercised only after the lapse of a specified period.

Average Rate Option : It is the arithmetic average of the spot rate during the life of the option that is taken into account at maturity instead of the spot rate.

Look-back Option : It gives the holder the right to purchase or sell foreign currency at the most favourable exchange rate realised over the life of the option.

Cylinder / Tunnel Option : This option contains two strike rates

i. When spot rate < the lower strike rate : Buyer pays lower strike rate

ii. When spot rate > higher strike rate : Buyer pays higher strike rate
iii. When spot rate is between two strike rates : Buyer pays spot rate

Barrier Option : Down-and-out Option and Down-and-in Option

Down-and-out Option : The option expires automatically if the spot rate reaches a level mentioned in the contract.

Down-and-in Option : The option is activated only when the spot rate reaches a specified barrier within the expiry date.

Basket Option : It caters to buyers who are confronted with foreign exchange risk in respect of many currencies.

Option Type	Owner/Holder/Buyer of Option (Long Position)	Writer/Seller of Option (Short Position)
Call	Right to buy an asset	Obligation to sell an asset
Put	Right to sell an asset	Obligation to buy an asset

Physical Delivery Vs. Cash Settled Options
Option contracts are settled through either physical delivery of the underlying asset or cash settlement. In case of cash settlement, the traders make/receive payments to settle any losses or gains on exercise or maturity of the contract. instead of making physical delivery.

For Stock Options: 3 Contract Cycles. Minimum 9 strike prices are available during the trading month.

Contract Specifications of S & P CNX Nifty Options	
Underlying index	S&P CNX Nifty
Exchange of trading	National Stock Exchange of India Limited
Security descriptor	OPTIDX
Contract size	Permitted lot size 50 (minimum value Rs.2 lakh)
Price steps	Re. 0.05
Price bands	A contract specific price range based n its delta value and is computed and updated on a daily basis.
Trading cycle	Maximum of 3 month trading cycle – 1, 2 & 3 months New contract will be introduced on the next trading day following the expiry of near month contract. Also, LT options have 3 quarterly and 5 half yearly expires
Expiry day	Last Thursday of the expiry month or the previous trading day if the last Thursday is a trading holiday.
Settlement basis	cash settlement on T+1 basis.
Style of Option	European
Strike Price Interval	Depending on the index level
Daily Settlement Price	NA (MTM does not exist)
Final Settlement Price	Closing value of the index on the last trading day

For Stock Options: 3 Contract Cycles. Minimum 11 strike prices for every option types (i.e. call & put) are available during the trading month. Five ITM, Five OTM and One ATM

Contract Specifications of Stock Options	
Underlying Asset	Individual securities available for trading in cash market
Exchange of trading	National Stock Exchange of India Limited
Security descriptor	OPTSTK
Style of option	European
Strike price interval	Specified by the exchange
Contract size	Prescribed by the Exchange (Min. Value Rs.2 lakh)
Price steps	Re. 0.05
Price bands	NA
Trading cycle	Maximum of 3 month trading cycle – 1, 2 & 3 months New contract will be introduced on the next trading day following the expiry of near month contract.
Expiry day	Last Thursday of the expiry month or the previous trading day if the last Thursday is a trading holiday.

Settlement basis	Daily settlement on T+1 basis and final option exercise settlement on T+1 basis
Daily Settlement Price	Premium value (Net)
Final Settlement Price	Closing price of underlying on exercise day or expiry day
Settlement day	Last trading day

Contract Specifications for Options in India

Underlying Unit	Individual scrip specified by SEBI (given in the list)
Ticker symbol	Given in the list
Contract Multiplier (Lot Size)	Given in the list
Strike Price	Shall have a minimum of five strikes (2 in-the-money, one near-the-money and 2 out-of-the-money)
Premium Quotation	Rupees per share
Last Trading day	Last Thursday of the contract month. If it is a holiday, the immediately preceding business day
Expiration day	Last Thursday of the contract month. If it is a holiday, the immediately preceding business day (Business day is a day during which the underlying stock market is open for trading)
Contract Month	1, 2 and 3 months (e.g. in the month of July: July, August and September contracts would be available for trading. New contract is introduced on the next trading day following the expiry of near-month contract)
Exercise Style	American
Settlement Style	Cash (in Cash on T + 1)
Trading hours	9.30 am to 3.30 pm
Tick size	0.01 Closing price of the underlying security in the cash segment of the stock exchange, Mumbai. The following algorithm is used for calculating the closing value of these stocks in the cash segment. Weighted average price of all the trades in the last fifteen minutes of the continuous trading session. If there are no trades during the last fifteen minutes, then the last traded price in the continuous trading session would be taken as the official closing price.
Exercise Notice Time	It would be a specified time (Exercise session every day)
Settlement day	Last trading day
Margins	Upfront initial margin on daily basis.

Important Terminologies

Exercise Price or Strike Price: It is the price at which the parties with the long and short positions buy and sell the underlying asset. It is selected by the exchange. Typically, exercise prices are just above or below the current market price of the underlying asset. If the price of the share becomes higher than the highest strike price, the exchange would introduce a new series of options prices for all expiration months with a strike price just above the old highest strike price. Similarly, if the price of the share becomes lower than lowest strike price, a new series of options prices for various expiration months with a strike price just below the old lowest strike price would be issued by the exchange.

For trading in Indian markets, an exchange provides for a minimum of Five strike prices for every option type viz. Two contracts with strike prices above, two contracts with strike prices below and one contract with strike price equal to the current price of the security.

Expiration Date: The date mentioned in an options contract is called expiration date or maturity date. After the maturity date, an option has worthless. Standardized options have specified dates mentioned for maturity. Generally, the maximum life of an option on stock is nine months.

Option Premium: One may naturally wonder as to why the seller (writer) of an option should be always obliged to sell/buy an asset whenever the other party desires. The writer of an option receives a consideration for the obligation he/she undertakes on himself/herself. This is known as the price or the premium of the option. Option contracts are created when a buyer and a seller agree on a price. The buyer pays the premium to the seller which belongs to the seller whether the option is exercised or not. If the owner of an option decides not to exercise the option, the option expires worthless, the amount of premium becomes the profit of the option writer, while if the option is exercised, the premium gets adjusted against the loss the writer incurs upon such exercise.

Open Interest: The number of positions outstanding at a given time is known as open interest. The open interest in an options contract is an index of its liquidity. The financial press regularly publishes information on the open interest in addition to the usual price data.

Contracts, (Str.Pr.) Premium [Traded Qty, Notion Value in Rs.Lks., No. of Contracts]	Open Int.	Exp. Date
Call Options at NSE		
ACC(140.00) 12.00, 12.00, 12.00 [1500, 2.28, 1]	18000	25/4/2002

Bajaj Auto(480.00) 3.00, 3.00, 3.00 [800, 3.86, 1]	1600	25/4/2002
Put Options at NSE		
Digital Global (510) 680.75 [-, -, -]	800	25/4/2002
Call Options at BSE		
BHEL (180) 161.60 [-, -, -]	1200	25/4/2002
Source: The Economic Times, April 26, 2002		

For Call Option
In-The-Money (ITM) **:** If the spot price of the stock is greater than the exercise price
Out-Of-The-Money (OTM) **:**If the spot price of the stock is lower than the exercise price
At-The-Money (ATM) **:** If the spot price of the stock is equal to the exercise price

For Put Option
In-The-Money (ITM) **:** If the spot price of the stock is lower than the exercise price
Out-Of-The-Money (OTM) **:**If the spot price of the stock is greater than the exercise price
At-The-Money (ATM) **:** If the spot price of the stock is equal to the exercise price

Condition	Call Option	Put Option
$S_0 > E$	ITM	OTM
$S_0 < E$	OTM	ITM
$S_0 = E$	ATM	ATM

Intrinsic Value/ Parity Value: It is the amount by which it is in money if it is ITM. The option which is OTM or ATM has zero intrinsic value. It cannot be negative.

For Call Option = Max (0, S_0 - E)
For Put Option = Max (0, E - S_0)

Time Value / Premium Over parity: It is the difference between the premium of the option and the intrinsic value of the option.
For both Call and Put Option : ATM or OTM: Entire premium amount is the time value
ITM: If premium is greater than intrinsic value: Time value exist.

Time Value of a Call = C - Max (0, S_0 - E)
Time Value of a Put = P - Max (0, E - S_0)

Arbitrage
If intrinsic value is greater than the premium, there will be an opportunity for arbitrage.

Ex. Consider the following data about calls on a hypothetical stock:

Option	Exercise Price	Stock Price	Call Option Price or Premium
1	80.00	83.50	6.75
2	85.00	83.50	2.50
3	83.50	83.50	2.50

Option	Exercise Price	Stock Price	Call Option Price	Type	IV	TV
1	80	83.50	6.75	ITM	3.50	3.75
2	85	83.50	2.50	OTM	0	2.50
3	83.50	83.50	2.50	ATM	0	2.50

Options Clearing Corporations (OCC): The buyers and sellers of options do not deal with each other directly. Instead, the clearing corporations act as an intermediary between them, by issuing standardized options and by ensuring that the options contracts are honoured. OCC does not buy or sell options by itself. The OCC comes into picture only after two parties trade a contract. It takes an opposite position to each of the traders – a short position in respect of the party with the long position and a long position against the party with a short position. Thus, the buyer of an option relies on the OCC for fulfillment of contractual obligations. Similarly, the option writer has an obligation to the OCC.

Margin Requirements: Since, potential future liabilities exist only by option writer, margin account is required to be maintained only by option writer but not by option holder. Margin requirements exist as a form of collateral to ensure that the writer of a naked call can fulfill the terms of the contract. The requirements vary depending upon the brokerage firm, the price of the underlying asset, the price of the option, and whether the option is a call

or a put. As a general rule, initial margins are at least 30% of the stock price when the option is written, plus the intrinsic value of the option.

OPTIONS ON FUTURES

Future Options: The options on futures are similar to options on individual stocks and options on stock indices except that holders acquire the right to buy or sell futures contracts on the underlying assets rather than the assets themselves. A call option gives the holder a right to buy a futures contract while a put option gives a right to sell a futures contract. As of now, such contracts are not available for trading in the Indian market.

An important way in which futures options differ from equity or index options is in respect of their expiration. Usually, for commodities, the option month refers to the delivery month of the futures contract while it (the option) expires on a specific date in the preceding month. The actual expiration date of a futures option varies with each contract in accordance with the stipulation laid in it in this regard.

Covered and Naked Calls: If a call writer owns the asset underlying the call, he/she is said to have written a covered call. On the other hand, if a call is written where the writer does not have the asset underlying the call option, the call is said to be a naked call. In the event of a decision of the call owner to exercise the option in the latter case, the seller of the call has to buy the underlying asset at its prevailing market price and give it to the call owner.

Buyer/Seller Attitudes:

Call buyers are bullish Call seller/Writers are bearish
Put buyers are bearish Put seller are bullish

Option Prices

There will be two prices on an option – Bid price and Ask price. The Bid price is the price at which one is prepared to buy an option while the ask price is the price at which one is prepared to sell it. Ask price will be greater than the bid price. These prices are quoted by market makers, the exchange members who provide liquidity to the market. The difference between the ask and bid prices is the bid-ask spread which is the source of profit for the market makers.

Options at Expiration

Call Option

In case of the call being OTM or ATM – Buyer will lose premium and the same will be gain for the seller
In case of the call being ITM – If IV >TV Arbitrage profit can be made by buying call option
If IV <TV Arbitrage profit can be made by selling call option

Put Option

In case of the Put being OTM or ATM – Buyer will lose premium and the same will be gain for the seller
In case of the Put being ITM – If IV >TV Arbitrage profit can be made by buying Put option
If IV <TV Arbitrage profit can be made by selling Put option

Call Option

E	S_0	Cat	IV	Prem.	Profit	
					Buyer	Writer
60	55	OTM	0	4	-4	+4
60	60	ATM	0	4	-4	+4
60	65	ITM	5	4	+1	-1
60	65	ITM	5	5	0	0
60	65	ITM	5	6	-1	+1

Buyer: Loss is Limited Gain is Infinite
Seller: Gain is limited Loss is infinite

Put Option

E	S_0	Cat	IV	Prem.	Profit	
					Buyer	Writer
55	60	OTM	0	4	-4	+4
60	60	ATM	0	4	-4	+4
65	60	ITM	5	4	+1	-1
65	60	ITM	5	5	0	0
65	60	ITM	5	6	-1	+1

Buyer: Loss is Limited Gain is unlimited
Seller: Gain is limited Loss is unlimited

Profit Function of Call Option

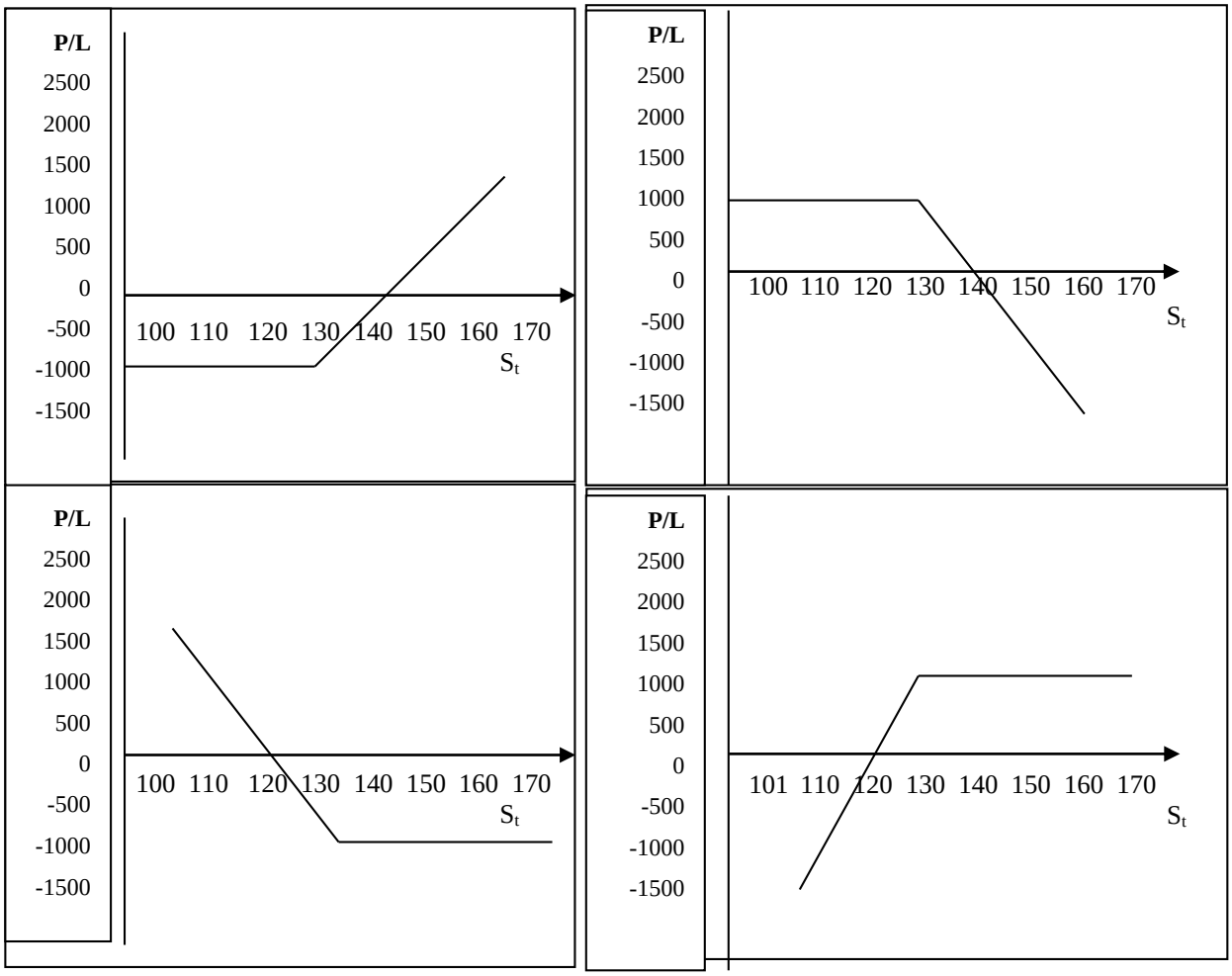
S1	E	Cat	Profit/Loss for	
			Buyer	Seller
100	130	OTM	-1000	1000
110	130	OTM	-1000	1000
120	130	OTM	-1000	1000
130	130	ATM	-1000	1000
140	130	ITM	0	0
150	130	ITM	1000	-1000
160	130	ITM	2000	-2000

Profit Function of Put Option

S1	E	Cat	Profit/Loss for	
			Buyer	Seller
100	130	ITM	2000	-2000
110	130	ITM	1000	-1000
120	130	ITM	0	0
130	130	ATM	-1000	1000
140	130	OTM	-1000	1000
150	130	OTM	-1000	1000
160	130	OTM	-1000	1000

170	130	ITM	3000	-3000		170	130	OTM	-1000	1000

Premium : Rs.10 per share; Size of contract : 100 shares; Exercise Price : Rs.130



PROFIT FUNCTION OF PUT OPTION BUYER **PROFIT FUNCTION OF PUT OPTION WRITER**

TRADING STRATEGIES

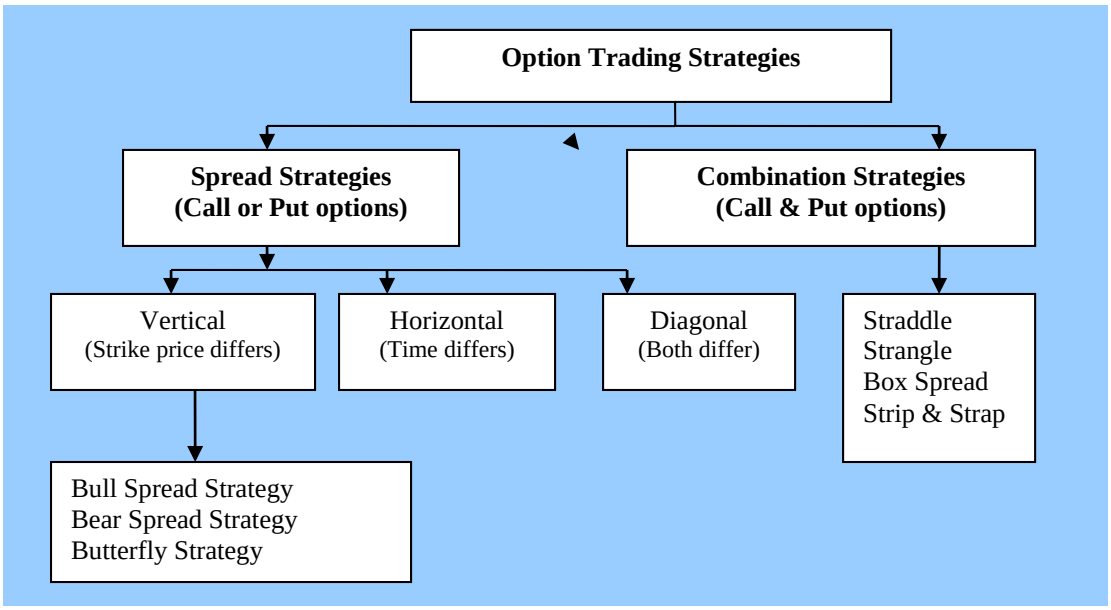
Spreads and Combinations: A **Spread** trading strategy involves taking a position in two or more options of the same type. These are: Bull spread, Bear spread, Butterfly spread, etc. However, **Combinations** strategies involve taking positions in both calls and puts on the same stock. Important combination strategies are: Straddles, Strips, Straps and Strangles.

SPREAD STRATEGIES

Vertical: Simultaneous buying and selling of options on the same underlying instrument for the same expiry month but different strike prices. Bull spread, Bear spread and Butterfly strategies belong to this category.

Horizontal: Simultaneous buying and selling of options on the same underlying instrument for the same strike price but with different maturities. It involves selling an option with a relatively short period to expiration and buying an option with a longer period to expiration. It is also called as **Time Spread or Calendar Spread.** It is called horizontal because, various expiry months are shown horizontally in the financial press publication.

Diagonal: It is a spread where both the expiration date and the strike price of the calls are different.



1. Bull Spread: One of the most popular spread strategies is a bull spread. A bull spread reflects the bullish sentiment of a trader. A bull spread can be created using either call or put.

Using Call: One Call is bought and one Call is sold on the same stock with the same expiry date but with a higher exercise price. If the stock price is greater than the higher exercise price, both options are ITM and the payoff equals the difference between the exercise prices of the two options (**Most Conservative**). If the stock price rules between the strike prices of the two calls, the purchased call is ITM while the call sold expires unexercised and the payoff will be the difference between the stock price and the lower exercise price (**Less Aggressive**). If the stock price is below the lower strike price, both the calls would expire unexercised and the loss will be limited to the initial cost of the spread (**Most Aggressive**).

Payoffs from a Bull Spread (Using Call)

Price of Stock	Payoff from Long Call	Payoff from Short Call	Total Payoff
When $S_1 \geq E_2$	$S_1 - E_1$	$E_2 - S_1$	$E_2 - E_1$
When $E_1 < S_1 < E_2$	$S_1 - E_1$	0	$S_1 - E_1$
When $S_1 \leq E_1$	0	0	0

Price of Stock	Payoff from Long Call ($E_1 = 50$; Prem. = 5)	Payoff from Short Call ($E_2 = 60$; Prem. = 4)	Total Payoff	Net Profit/Loss
When 65	65 – 50 = +15	60 – 65 = -5	+10	10 – 5 + 4 = +9
When 55	55 – 50 = +5	0	+5	5 – 5 + 4 = +4
When 45	0	0	0	0 – 5 + 4 = -1

Using Put: One put is bought and one put is sold on the same stock with the same expiry date but with a higher exercise price.

Payoffs from a Bull Spread (Using Put)

Price of Stock	Payoff from Long Put	Payoff from Short Put	Total Payoff
When $S_1 \geq E_2$	0	0	0
When $E_1 < S_1 < E_2$	0	$S_1 - E_2$	$S_1 - E_2$
When $S_1 \leq E_1$	$E_1 - S_1$	$S_1 - E_2$	$E_1 - E_2$

Price of Stock	Payoff from Long Put ($E_1 = 50$; Prem. = 4)	Payoff from Short Put ($E_2 = 60$; Prem. = 5)	Total Payoff	Net Profit/Loss
When 65	0	0	0	0 – 4 + 5 = 1
When 55	0	55 – 60 = -5	-5	-5 – 4 + 5 = -4
When 45	50 – 45 = +5	45 – 60 = -15	-10	-10 – 4 + 5 = -9

2. Bear Spreads: Bear spreads are used as a strategy when one is bearish on the market, believing that it is more likely to go down than up. It is similar to bull spread except the difference that the exercise price of the call option purchased is higher than that of the call option sold.

Payoffs from a Bear Spread (Using Call)

Price of Stock	Payoff from Long Call	Payoff from Short Call	Total Payoff
When $S_1 \geq E_2$	$S_1 - E_2$	$E_1 - S_1$	$E_1 - E_2$
When $E_1 < S_1 < E_2$	0	$E_1 - S_1$	$E_1 - S_1$
When $S_1 \leq E_1$	0	0	0

Price of Stock	Payoff from Long Call ($E_2 = 60$; Prem. = 4)	Payoff from Short Call ($E_1 = 50$; Prem. = 5)	Total Payoff	Net Profit/Loss
When 65	65 – 60 = +5	50 – 65 = -15	-10	-10 – 4 + 5 = -9
When 55	0	50 – 55 = -5	-5	-5 – 4 + 5 = -4
When 45	0	0	0	0 – 4 + 5 = 1

Payoffs from a Bear Spread (Using Put)

Price of Stock	Payoff from Long Put	Payoff from Short Put	Total Payoff
When $S_1 \geq E_2$	0	0	0
When $E_1 < S_1 < E_2$	$E_2 - S_1$	0	$E_2 - S_1$
When $S_1 \leq E_1$	$E_2 - S_1$	$S_1 - E_1$	$E_2 - E_1$

Price of Stock	Payoff from Long Put ($E_2 = 60$; Prem. = 5)	Payoff from Short Put ($E_1 = 50$; Prem. = 4)	Total Payoff	Net Profit/Loss
When 65	0	0	0	0 – 5 + 4 = -1
When 55	60 – 55 = +5	0	+5	+5 – 5 + 4 = +4
When 45	60 – 45 = +15	45 – 50 = -5	+10	+10 – 5 + 4 = +9

3. Butterfly Spreads: A butterfly spread results from positions in options with three different strike prices. This involves buying a call option with a relatively low exercise price, E1, buying another call option with a relatively large exercise price, E3, and selling two call options with a strike price, E2 which is halfway between E1 and E3. The price E2 is usually close to the current stock price, with the result that a profit results if the stock price stays close to E2 and a small loss would be incurred if there is a significant price movement either way from it. The strategy is meant for an investor who feels that large price changes are unlikely.

Payoffs from a Butterfly Spread

Price of Stock	Payoff from 1st Long Call (E1)	Payoff from 2nd Long Call (E3)	Payoff from 2 Short Calls (E2)	Total Payoff
When S1< E1	0	0	0	0
When $E_1 < S_1 < E_2$	$S_1 - E_1$	0	0	$S_1 - E_1$
When $E_2 < S_1 < E_3$	$S_1 - E_1$	0	$2 (E_2 - S_1)$	$E_3 - S_1$
When $S_1 \geq$ E3	S1 – E1	S1-E3	$2 (E_2 - S_1)$	0

Price of Stock	Payoff from 1st Long Call ($E_1 = 50$; Prem. = 5)	Payoff from 2nd Long Call ($E_3 = 70$; Prem. = 4)	Payoff from 2 Short Calls ($E_2 = 60$; Prem. = 4)	Total Payoff	Net Profit/Loss
When 45	0	0	0	0	0 – 9 + 8 = -1
When 55	55 – 50 = +5	0	0	+5	+5 – 9 + 8 = +4
When 65	65 – 50 = +15	0	2 (60 – 65) = -10	+10	+10 – 9 + 8 = +4
When 75	75 – 50 = +25	75 – 70 = +5	2 (60 – 75) = -30	+15	+15 – 9 + 8 = -1

4. Candors: A condor is an investment strategy which involves four call options or four put options. It may be long condor or a short condor. A long condor involving call options is created by buying calls – one with a very low exercise price E1 and another with a comparatively high exercise price E4 – and selling two calls options – one with a price E2 higher than, and closer to E1 and the other with a price E3 which is lower than and closer to E4. A short condor on the other hand, results by reversing the above strategy, and involving selling two calls having exercise prices of E1 and E4, and buying two calls with exercise prices of E2 and E3.

COMBINATION STRATEGIES

1. **Straddle:** It involves buying a call and a put with the same exercise price and date of expiration. This is also referred to as a bottom straddle or Straddle purchase. This kind of strategy is an obvious one to employ in respect of the stock of a company which is subject to a takeover bid. Straddle strategy is designed when large price changes are expected in the stock. For lower prices of the stock, put option will be exercised and for higher price, call option will be exercised.

Payoffs from a Straddle

Exercise Price	Payoff from Long Call	Payoff from Long Put	Total Payoff
$S_1 \leq E$	0	$E - S_1$	$E - S_1$
$S_1 > E$	$S_1 - E$	0	$S_1 - E$

Exercise Price	Payoff from Long Call Option (E = 50; Prem.5)	Payoff from Long Put Option (E = 50; Prem. 4)	Total Payoff	Net Profit/Loss
45	0	50 – 45 = +5	+5	+5 -5 -4 = -4
55	55 – 50 = +5	0	+5	+5 – 5 – 4 = -4

2. Strangles: It involves buying a put and a call with different exercise prices but at the same expiration date. The exercise price of the put is lower than the exercise price of the call, so that a profit would result if the stock price is lower than the exercise price of the put or if the stock price exceeds the call exercise price. Between the two exercise prices, none of the options is exercised and hence, a net loss, equal to the sum of the premium paid for buying the two options, results. It follows, then, that a strangle is an appropriate strategy for adoption when the price is expected to move sharply. The investor is betting that a large price change would take place but is not sure as to the direction in which the change would occur. This is also called as **bottom vertical combination or strangle bought or long strangle.** Similarly, a strangle may be sold. A short strangle is the choice of an investor who believes that large variations in stock price are unlikely.

Payoffs from a Strangle

Stock Price	Payoff from Long Put E1	Payoff from Long Call E2	Total Payoff
$S_1 \leq E_1$	$E_1 - S_1$	0	$E_1 - S_1$
$E_1 < S_1 < E_2$	0	0	0
$S_1 \geq E_2$	0	$S_1 - E_2$	$S_1 - E_2$

Stock Price	Payoff from Long Put (E = 60; Prem.5)	Payoff from Long Call (E = 70; Prem.4)	Total Payoff	Net Profit/Loss
55	60 – 55 = +5	0	+5	+5 - 5 – 4 = -4
65	0	0	0	0 - 5 – 4 = -9
75	0	75 – 70 = +5	+5	+5 - 5 – 4 = -4

3. Box Spread: A box spread is created in many ways. It is created by buying one call and writing one put with an exercise price equal to E1 and writing one call and buying one put with an exercise price of E2 (E2 > E1). It is also created by buying one call and writing one put at E2 and writing one call and buying one put at E1.

Payoffs from a Box Spread

Stock Price	Payoff from Options				Total Payoff
	Long Call (E1)	Short Put (E1)	Short Call (E2)	Long Put (E2)	
$S_1 \leq E_1$	0	$S_1 - E_1$	0	$E_2 - S_1$	$E_2 - E_1$
$E_1 < S_1 < E_2$	$S_1 - E_1$	0	0	$E_2 - S_1$	$E_2 - E_1$
$S_1 \geq E_2$	$S_1 - E_1$	0	$E_2 - S_1$	0	$E_2 - E_1$

Stock Price	Payoff from Options				Total Payoff	Net Profit/Loss
	Long Call (E1) (E1 = 50; Prem.5)	Short Put (E1) (E1 = 50; Prem.6)	Short Call (E2) (E2 = 60; Prem.4)	Long Put (E2) (E2 = 60; Prem.7)		
45	0	45 – 50 = -5	0	60 – 45 = +15	+10	+10 – 5 + 6 + 4 – 7 = +8
55	55 – 50 = +5	0	0	60 – 55= +5	+10	+10 – 5 + 6 + 4 – 7 = +8
65	65 – 50 = +15	0	60 – 65 = -5	0	+10	+10 – 5 + 6 + 4 – 7 = +8

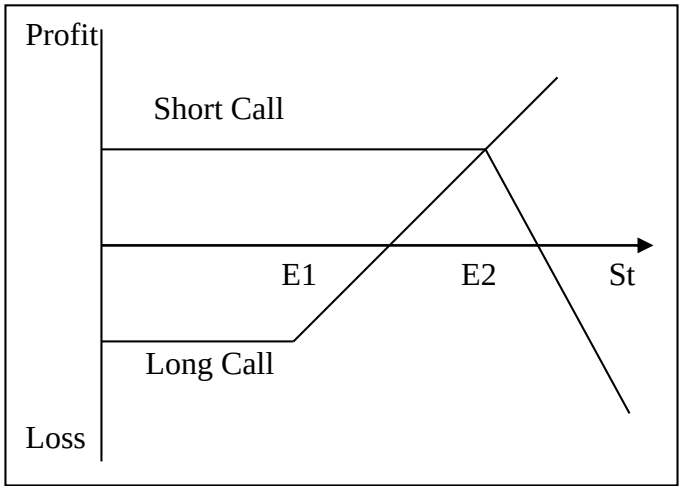
Strip and Strap: A strategy with one long call and two long puts with the same strike price is known as **Strip**. Here the investor is expecting that a big price movement in the stock price will take place but a decrease in the stock price is more likely than the increase. A strategy with two long calls and one long put with the same strike price is known as **Strap.** This strategy is used when the investor feels that there is a greater likelihood of the price increasing rather than decreasing.

Type	Sl.No.	**Type of Strategy**	**Buy**	**Sell**	**BEP**
	1	Bull Spread (Call)	Buy 1 Call E_1	Sell 1 Call E_2	LSP – Net Premium
	2	Bull Spread (Put)	Buy 1 Put E_1	Sell 1 Put E_2	HSP – Net Premium
	3	Bear Spread (Call)	Buy 1 Call E_2	Sell 1 Call E_1	LSP + Net Premium

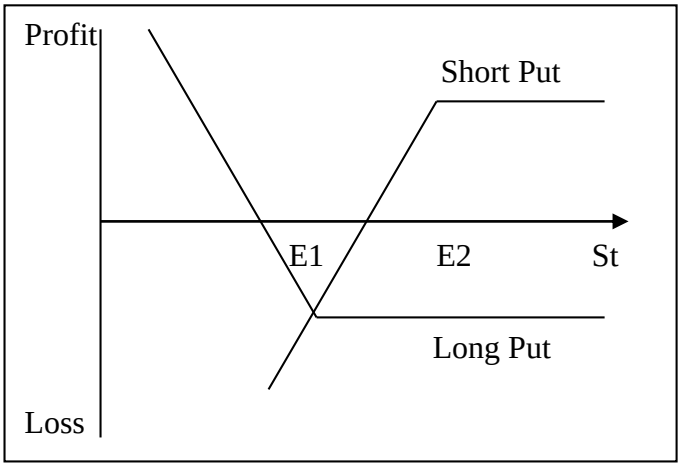
Spread Strategies	4	Bear Spread (Put)	Buy 1 Put E_2	Sell 1 Put E_1	HSP + Net Premium
	5	Butterfly Spread (Call)	Buy 2 Calls (E_1 & E_3)	Sell 2 Calls (E_2)	LSP – Net Premium HSP + Net Premium
	6	Butterfly Spread (Put)	Buy 2 Puts (E_1 & E_3)	Sell 2 Puts (E_2)	
	7	Condor (Call) Long Condor	Buy 1 Call E_1 Buy 1 Call E_4	Sell 1 Call E_2 Sell 1 Call E_3	
		Short Condor	Buy 1 Call E_2 Buy 1 Call E_3	Sell 1 Call E_1 Sell 1 Call E_4	
	8	Condor (Put) Long Condor	Buy 1 Put E_1 Buy 1 Put E_4	Sell 1 Put E_2 Sell 1 Put E_3	LSP – Net Premium HSP + Net Premium
		Short Condor	Buy 1 Put E_2 Buy 1 Put E_3	Sell 1 Put E_1 Sell 1 Put E_4	
Combination Strategies	1	Straddle Bottom	Buy 1 Call (E) Buy 1 Put (E)	-	Strike Price + Net Premium Strike Price – Net Premium
		Top Straddle Straddle Write	-	Sell 1 Call E Sell 1 Put E	
	2	Strangle (Long)	Buy 1 Call E_2 Buy 1 Put E_1	-	LSP + Net Premium HSP – Net Premium
		Strangle (Short)	-	Sell 1 Call E_2 Sell 1 Put E_1	
	3	Box Spread	Buy 1 Call E_1 Buy 1 Put E_2	Sell 1 Put E_1 Sell 1 Call E_2	
	4	Strip (Bearish)	Buy 1 Call E Buy 2 Puts E	-	
	5	Strap (Bullish)	Buy 2 Calls E Buy 1 Put E	-	
Tunnel	Buying call and selling put is tunnel for **importers** and Buying put and selling call is tunnel for **exporters.**				

OPTION TRADING STRATEGIES

BULL SPREAD (USING CALLS)

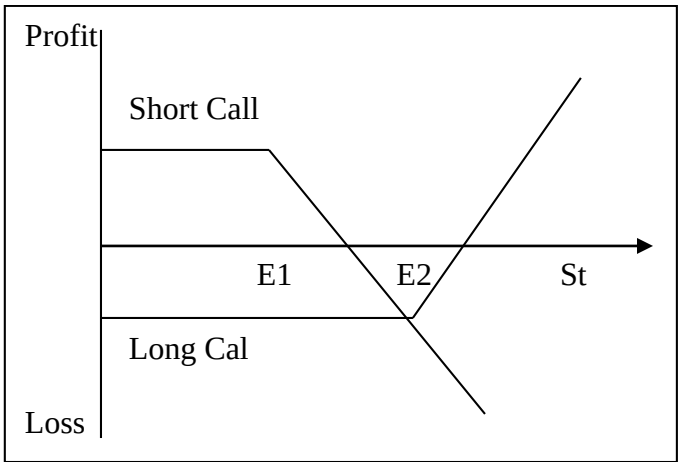


BULL SPREAD (USING PUTS)

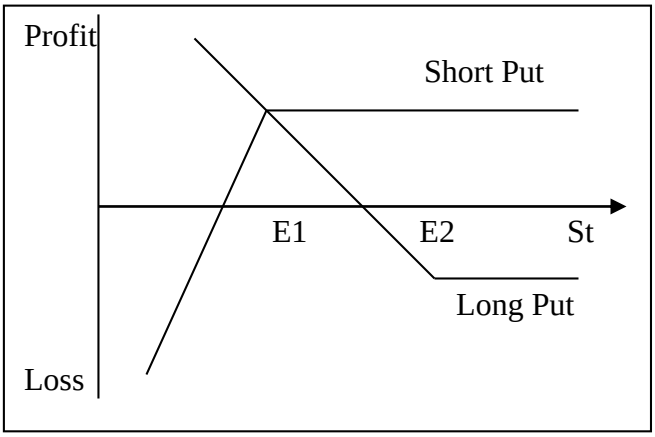


BEAR SPREAD (USING CALLS)

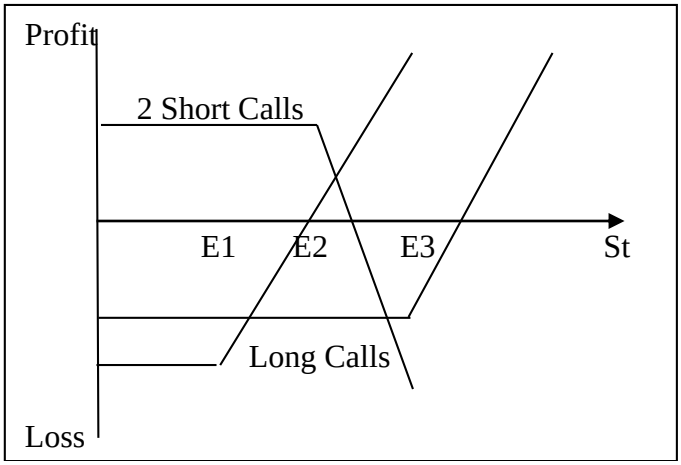
BEAR SPREAD (USING PUTS)

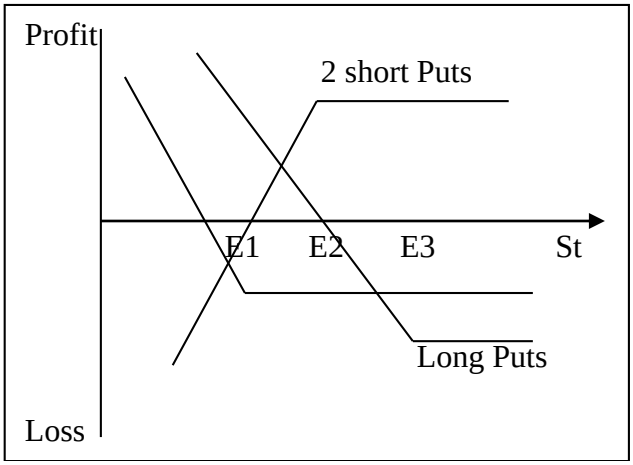


BUTTERFLY SPREAD (USING CALLS)



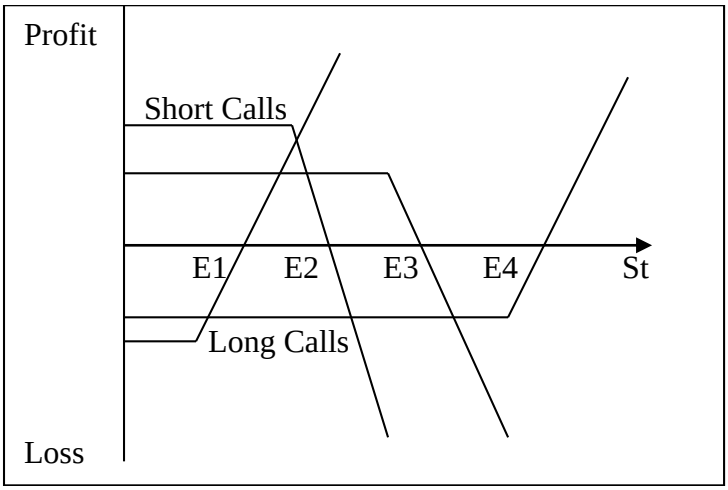
BUTTERFLY SPREAD (USING PUTS)

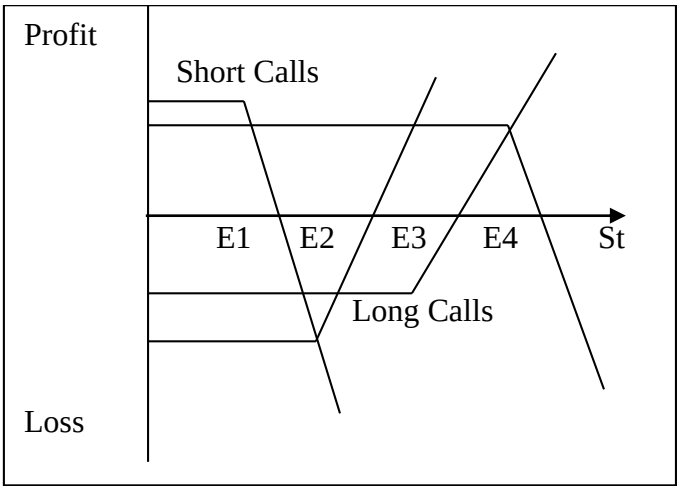




LONG CONDOR

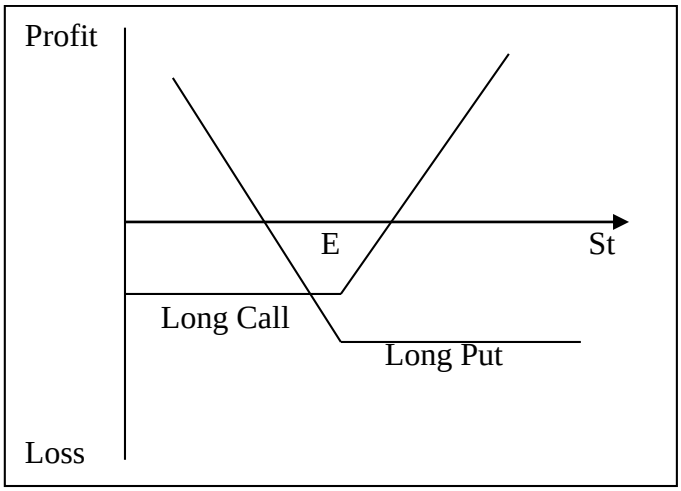
SHORT CONDOR



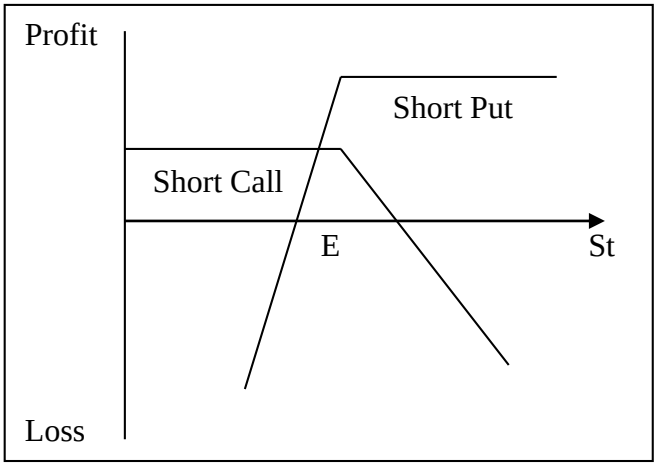


BOTTOM STRADDLE

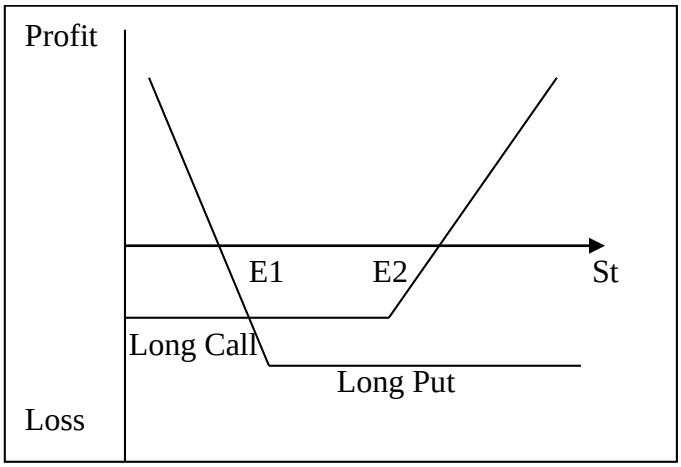
TOP STRADDLE

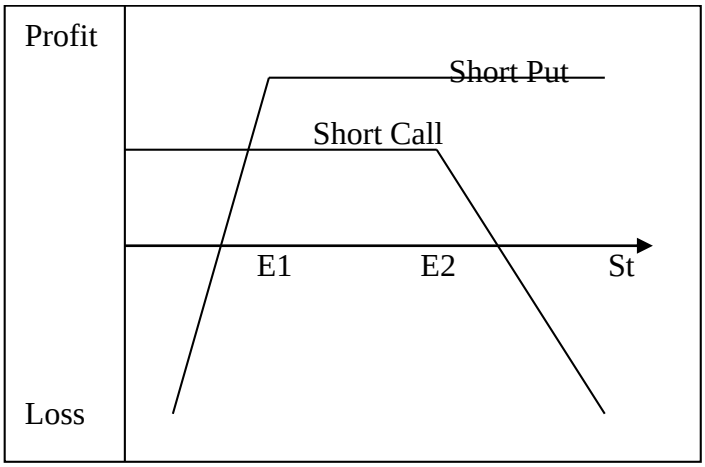


LONG STRANGLE

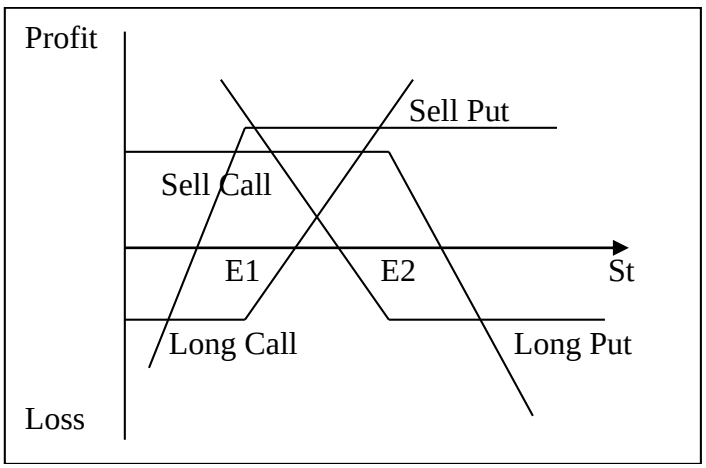


SHORT STRANGLE



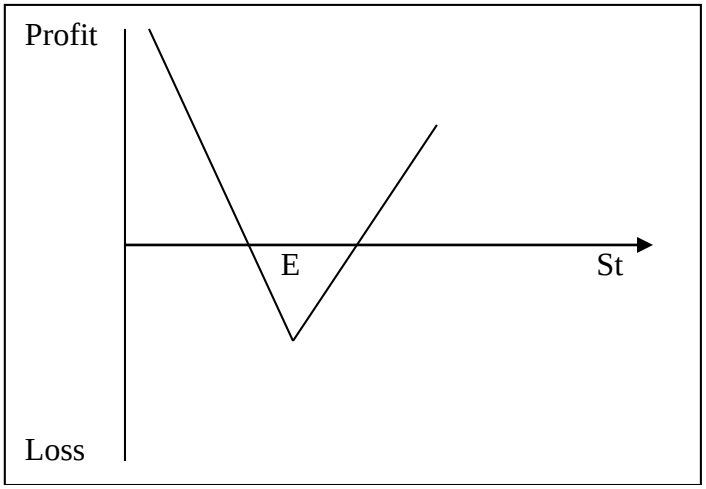


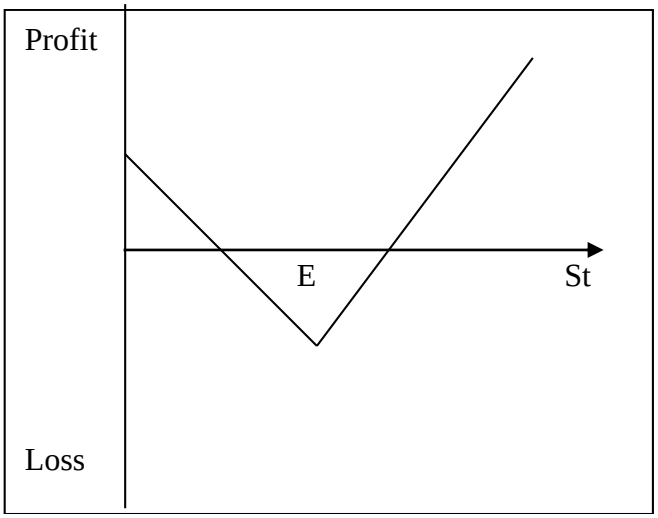
BOX SPREAD



STRIP

STRAP





VALUATION OF OPTIONS

The value of an option, which is known as the premium, is equal to the sum of its intrinsic value and time value. There are a number of models available for valuation of options. Two of the more important ones are: **Black and Scholes Option Pricing Model** and **Binomial Option Pricing Model**. Both the models are in respect of the European call options. These methods differ in terms of the assumptions made about how share prices change over time. While, Binomial model assumes that percentage change in share price follows a binomial distribution, the Black and Scholes model follows a log normal distribution.

Factors Affecting Valuation of Options

1. Current Stock Price
2. Exercise Price
3. Time to maturity
4. Volatility of the stock price
5. Risk-free rate of return
6. Expected Dividends

Summary of the effect on the price of stock option of increasing one variance while keeping all others fixed

Sl. No.	Factors	European		American	
		Call	Put	Call	Put
1	Current stock price	+	-	+	-
2	Strike price	-	+	-	+
3	Volatility	+	+	+	+
4	Risk free rate	+	-	+	-
5	Amount of dividend	-	+	-	+
6	Time to expiration	?	?	+	+

Current Stock Price: Pay-off of call option will be the amount by which the stock price exceeds the strike price. Call option becomes more valuable as the stock price increases; put option behave the opposite way from call option. The higher the current share price, the greater is the probability that the share price will increase above the exercise price, and therefore the higher the call price, other things being equal. Ignoring market imperfections, a call whose underlying share price is already above the exercise price must be worth at least the difference between the two. For put options, higher the current share price, the lower the put price.

Exercise Price: The higher the exercise price, the lower is the probability that the share price will increase above the exercise price, and therefore, the lower the call price. For put options, the higher the exercise price, the higher is the price of the option.

Time to Maturity: Both American put and call options become more valuable as the time to expiration increases. The owner of the long life option has all the exercise opportunities open to the owner of the short life option Euro, call and put option usually become most valuable as the time to expiration increases. This is not always the case. The longer the term to expiry, the greater is the probability that the share price will increase above the exercise price. Therefore, the longer the term to expiry, the greater is the call price. Therefore, the longer term call is more valuable. For American put option, a longer term to expiry increases the value of the put.

Volatility of the Share: As volatility increases, the chance that the stock will do very well or very poorly increases. The owner of a call benefits from price increases but has limited downside risk in the event of price decreases because at the most the owner can lose is the price of the option. Similarly the owner of a put benefits from price decreases but as limited downside risk in the event of price increases. The volatility of a share is the variability of its price over time. The call on the low volatility share is less valuable than the call on the high-volatility share. The same holds good in put options also. Because, higher volatility implies a greater chance of large increases and large decreases in the share price.
The volatility of a stock index can be expected to be less than the volatility of a typical stock. This is because in a stock index, unsystematic risk is largely diversified away and only the systematic risk contributes to volatility.

Risk-free Interest Rate: As the interest rate in the economy increases, the expected return required by investors from the stock tends to increase. In addition, the present value of any future cash flow received by the holder of the option decrease The combined impact of these two effects is to increase the value of call option and decrease the value of put option. The higher the risk free interest rate, the higher is the price of a call.

Expected Dividend: Dividends have the effect of reducing the stock price on the ex-dividend date. The value of a call option is therefore negatively related to the size of a anticipated future dividend and the value of a put option is positively related to the size of a anticipated future dividend. Calls on dividend paying shares are worth less than calls on non-dividend (or less-dividend) paying shares.

Call and put option Prices on Maruthi shares on October 20, 2004

Expiry month	Exercise Price	Type of Option	Option Price
October	350	American Call	17.40
October	360	American Call	9.35
November	360	American Call	18.00
November	370	American Call	15.65
October	330	American Put	0.75
October	340	American Put	1.65
November	350	American Put	8.00
October	350	American Put	2.65
Source: The Hindu, Business Line, Wednesday, October 20, 2004			

Upper and Lower Bound for Option Price
If an option price is above the upper bound or below the lower bound, then there are profitable opportunities for arbitrage.
Lower Bound

A lower bound for the European Call option		A lower bound for the European Put option	
Non-dividend Paying Stock	**Dividend Paying Stock**	**Non-dividend Paying Stock**	**Dividend Paying Stock**
Max. $(So - Ke^{-rt}, 0)$	Max. $(Soe^{-\delta t} - Ke^{-rt}, 0)$	Max. $(Ke^{-rt} - So, 0)$	Max. $(Ke^{-rt} - Soe^{-\delta t}, 0)$

Upper Bound
Call Option: The option can never be worth more than the stock. Hence, the stock price is an upper bond to option price. (i.e. $C \leq So$). If these relationships were not true, an arbitrageur can easily make a riskless profit by buying the stock and selling the call option.
Put Option: Option cannot be worth more than the present value of K today. (i.e. $P \leq Ke^{-rt}$). If these relationships were not true, an arbitrageur can make a riskless profit by selling the option and investing the proceeds of the sale at the risk free interest rate.

Put-Call Parity: Value of a European call with a certain strike price and exercise date can be deduced from the value of a European put with the same strike price and exercise date and vice versa. Put-call parity holds only for European option.

Non-dividend Paying Stock	**Dividend Paying Stock**
$Co + Ke^{-rt} = P + So$	$Co + Ke^{-rt} = P + Soe^{-\delta t}$

If the put-call parity does not hold, there exists an arbitrage opportunity. If a portfolio with European put is overpriced to portfolio with call, an arbitrageur can buy the securities in underpriced portfolio and short the securities in overpriced portfolio. (i.e. Buying the call option and shorting both the put option and the stock). If a portfolio with European put is underpriced to portfolio with call an arbitrageur can short the securities in overpriced portfolio and buy the securities in underpriced portfolio. (i.e. Shorting the call and buying both the put option and stock with the initial investment).

Black and Scholes Option Pricing Model: Fischer Black, Myron Scholes Robert Merton developed the model in 1970. Merton & Schole were awarded a Nobel prize in 1997 for this work in economics. Since Black died in 1995, he could not get Nobel prize. The model is known as Black-Schole model or Black-Schole-Merton model.

1. Option on Stock/Index

$Co = S_0 N(d_1) – Ee^{-rt} N(d_2)$

$P = Ee^{-rt} N(-d_2) – S_0 N(-d_1)$ OR

$P = C_0 – S_0 + Ee^{-rt}$ (Put Call Parity)

$$d_1 = \frac{l_n(S_0/E) + (r + ½\sigma^2)\, t}{\sigma\sqrt{t}}$$

$d_2 = d_1 - \sigma\sqrt{t}$ OR

$$= \frac{l_n(S_0/E) + (r - ½\sigma^2)\, t}{\sigma\sqrt{t}}$$

C_0 = Equilibrium value of a call option
S_0 = Price of the stock now
E = Exercise price
r = annualized continuously compounded risk-free interest rate
t = length of time in years to the expiration date
l_n = Natural logarithm
σ = Standard deviation of the annualized continuously compounded return on the stock
δ = Dividend rate

When underlying stock yields dividend: The present value of dividend is adjusted for S_0 (i.e. $So – D_0 e^{-rt}$)

When continuous Dividend rate is given

$C_0 = S_0 e^{-\delta t} N(d_1) – E e^{-rt} N(d_2)$

$P = Ee^{-rt} N(-d_2) – S_0 e^{-\delta t} N(-d_1)$

$$d_1 = \frac{l_n (S_0/E) + (r – \delta + ½\sigma^2)\, t}{\sigma\sqrt{t}}$$

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

2. Option on Futures

$FC = Fe^{-rt} N(d_1) – Ee^{-rt} N(d_2)$

$FP = Ee^{-rt} N(-d_2) - Fe^{-rt} N(-d_1)$ OR

$FP = FC – Fe^{-rt} + Ee^{-rt}$ (Using Put Call Parity)

$$d_1 = \frac{l_n(F/E) + (½\sigma^2)\, t}{\sigma\sqrt{t}}$$

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

Note: Risk free rate does not enter either in d_1 or d_2 as it is taken care of in the forward / futures price of the underlying. It also does not require that F should follow a geometric Brownian motion but only assumption that F is distributed lognormally with a constant variance.

Assumptions of Black and Scholes Model

1. **The option being valued is a European style option, with no possibility of an early exercise**: American options are more valuable because they provide greater flexibility of exercise.
2. **The market is efficient:** There are no taxes, no transaction cost, options of shares are infinitely divisible and information is available to all investors with no cost.
3. The risk-free interest rate is known and constant over the life of the option
4. The volatility of the underlying instrument is known and is constant over the life of the option and known to the investors or market participants
5. The probability distribution of final return on the share is normal
6. Share prices behave in a manner consistent with random walk in continuous time.

Ex. If the daily volatility of the Nifty is 1.75 and 252 days in a year, compute annualized sigma to be used in BS Model.

$\sigma y = 1.75 \times \sqrt{252} =$ **27.67%**

Derivatives of Black and Scholes Model (OPTION GREEKS)

Delta: Option delta is also called as hedge ratio. This is a very significant by-product of the Black and Scholes model and is used extensively in the context where options form part of the portfolios. Delta refers to the amount by which the price of an option changes for a unit change in the price of the underlying security or index. The call delta value would always be greater than zero and less than one, since N(d1) represents area under the standard normal curve.

Delta varies between +1 and 0 : for Call Option and –1 and 0 : for Put Option

$$\text{Delta } (\partial) = \frac{\text{Change in premium}}{\text{Change in spot rate}}$$

For Call Option; Delta = $N(d_1)$ For Put Option; Delta = $N(d_1) - 1$

Uses of Delta:

It is used to measure volatility: As a measure of volatility of the option premium, delta refers to the amount by which the price of an option changes for a unit change in the price of the underlying security or index.

It measures likelihood that an option will be in-the-money on the expiration day: Delta is also employed as a measure of the probability that a given option will be in-the-money on the expiration day. Ex. A delta of 0.64 implies that nearly 64% chance that the stock price on the expiration day will be above the option exercise price.

It is used as a hedge ratio: It also gives optimal hedge ratio. This indicates how many units of the option are necessary to mimic the returns of the underlying stock . Ex. Delta of 0.64 implies that for every call option purchased, 0.64 of the share of the stock should be sold short.

Delta hedging: The construction of risk less hedge is known as delta hedging. In other words, it is the number of units of a stock the investor should hold for each option written in order to create a riskless hedge. The delta of a call position will be positive and the delta of a put option will be negative.

Delta Neutral: A position with a delta of zero is called delta neutral

Gamma: The gamma represents the amount by which an option delta would move in response to a unit change in the underlying stock price or index. In language of calculus, gamma is the second derivative of the option price with respect to the stock price, S_0. Thus, it measures the proportional change in delta for a given change in the underlying asset value. The gamma of a call option is always equal to the gamma of a put option and it can be either positive or negative.

$$\textbf{Gamma (For both Call and Put)} = \frac{Z(d_1)}{S_0\sigma\sqrt{t}} \qquad Z(d_1) = \frac{e^{(-d1 \times ½)}}{\sqrt{2\pi}}$$

Theta: The theta is obtained by considering value of an option as a function of time when all other parameters of the pricing model remain constant. It is thus known as the time decay of the option value. Theta represents the price decay that affects an option as it ages and loses time value. It is nearly always negative for an option because as the time to maturity approaches, the option tends to become less valuable. It represents an exponential and not a linear relationship between time to maturity and the value of an option.

$$\text{Theta } (\theta) = \frac{\text{Change in premium}}{\text{Change in time}} \quad \text{or} \quad \text{Change in Premium} = \text{Theta} \times \text{Change in time}$$

Theta:

$$\text{For Call Option} = -\frac{S_0\, Z(d_1)\,\sigma}{2\sqrt{t}} - Ee^{-rt} rN(d_2) \qquad \text{Put Option Theta} = -\frac{S_0\, Z(d_1)\,\sigma}{2\sqrt{t}} + Ee^{-rt} rN(-d_2)$$

Rho: The rho measures the sensitivity of an option value to interest rate. This refers to the rate of change of the value of the option with respect to a unit change (say 1%) in the interest rate. Generally, the option values are not very sensitive to the changes in interest rates. For call options, rho is always positive while for put options, it is negative.

Rho: For Call Option $\text{Rho} = Ete^{-rt} N(d_2)$ For Put Option $\text{Rho} = Ete^{-rt} N(-d_2)$

Vega: It is also known as **Kappa or Lambda**. It measures the rate of change of the value of an option with respect to the volatility of the underlying stock. Vega is always positive and identical for call and put options. Larger the volatility, the greater is the chance for the spot rate moving and greater is the value of the option. Linear relationship exists between volatility of ER and value of option. A high Vega suggests that the option value is very sensitive to small changes in volatility, while a low Vega implies that volatility changes over time cause relatively insignificant impact on the option prices. However, it is difficult to know the extent of volatility in advance.

Vega (Kappa/Lambda) : For Both Call & Put Option $\text{Vega} = S_0\sqrt{t}\ Z(d_1)$ $\text{Vega} = \frac{\text{Change in premium}}{\text{Change in volatility}}$

S0 =		Rs.486
E =		Rs.500
t =		65 days
r =		9%
σ =		54%
Derivatives	**Call**	**Put**
Premium	41.40	47.45
Delta	0.524	- 0.476

When S0		**Rs.487**
Derivatives	**Call**	**Put**
Premium	41.93	46.98
Delta	0.527	- 0.473
Gamma	0.004	0.004
Vega	0.818	0.818
Theta	- 0.393	- 0.271

When S0		**485**
Derivatives	**Call**	**Put**
Premium	40.88	47.93
Delta	0.52	-0.48
Gamma	0.004	0.004
Vega	0.815	0.815
Theta	-0.391	-0.27

Gamma	0.004	0.004
Vega	0.817	0.817
Theta	- 0.392	- 0.27
Rho		

Rho		

Rho		

When t =		**64**	**When t =**		**66**	**When r =**		**10%**
Derivatives	**Call**	**Put**	**Derivatives**	**Call**	**Put**	**Derivatives**	**Call**	**Put**
Premium	41..008	47.18	Premium	41.792	47.721	Premium	41.782	46.957
Delta	0.523	-0.477	Delta	0.525	-0.475	Delta	0.527	-0.473
Gamma	0.004	0.004	Gamma	0.004	0.004	Gamma	0.004	0.004
Vega	0.811	0.811	Vega	0.823	0.823	Vega	0.816	0.816
Theta	-0.394	-0.273	Theta	-0.389	-0.268	Theta	-0.398	-0.263
Rho			Rho			Rho		

When r =		**8%**	**When σ =**		**55%**	**When σ =**		**53%**
Derivatives	**Call**	**Put**	**Derivatives**	**Call**	**Put**	**Derivatives**	**Call**	**Put**
Premium	41.023	47.95	Premium	42.218	48.268	Premium	40.585	46.635
Delta	0.521	-0.479	Delta	0.525	-0.475	Delta	0.523	-0.477
Gamma	0.004	0.004	Gamma	0.004	0.004	Gamma	0.004	0.004
Vega	0.817	0.817	Vega	0.817	0.817	Vega	0.817	0.817
Theta	-0.386	-0.278	Theta	-0.398	-0.277	Theta	-0.386	-0.264
Rho			Rho			Rho		

American Options: In the absence of dividends, American option should never be exercised early; when there are dividends, it can only be optimal to exercise at a time immediately before the stock goes ex-dividend.

Binomial Option Pricing Model: The Binomial model uses a numerical approach. The model is based on the assumption that if a share price is observed at the start and end of a period of time, it will take one of the two values at the end of that period. i.e. the model assumes that the share price would move up or down to a predetermined level.

Assumptions

1. There are only two possible states (raise or fall) of the spot rate of the underlying asset
2. There are no arbitrage opportunities
3. All riskless investments are priced to earn the risk free rate
4. Both the domestic and foreign investment rates are constant
5. There are no transaction cost, taxes and margin requirement
6. Short selling is allowed without any restrictions

$C = \frac{C_u \frac{(I-d)}{(u-d)} + C_d \frac{(u-i)}{(u-d)}}{i}$	C = Call Price u = S1/S0 (When S1 > S0) (i.e. 1 + % increase in stock price from t_0 to t_1) d = S1/S0 (When S1 < S0) (i.e. 1 - % decrease in stock price) α = No. of Shares purchased per share of the call Cu = Value of call option if S1 > S0 : Max. (S1 - E, o) Cd = Value of call option if S1< S0 Max (S1 – E, o)
	OR
$C = \Delta S - B$ $\Delta = \frac{C_u - C_d}{S(u-d)}$ $B = \frac{dC_u - uC_d}{(u-d)R}$ $\Delta = \frac{\text{Spread of possible option prices}}{\text{Spread of possible share prices}}$	C_u = Max. (uS – E, 0) C_d = Max. (dS – E, 0) C = Equilibrium value of Call option Δ = Hedge ratio (Delta) C_u = Value of Call option when price goes up C_d = Value of Call option when price goes down

Hedge Ratio: A ratio comparing the value of a position protected via a hedge with the size of the entire position itself. In other words, a ratio comparing the value of futures contracts purchased or sold to the value of the cash commodity being hedged. For options, it is ratio between the change in an option's theoretical value and the change in price of the underlying stock at a given point in time. Say you are holding $10,000 in foreign equity, which exposes you to currency risk. If you hedge $5,000 worth of the equity with a currency position, your hedge ratio is 0.5 (50 / 100). This means that 50% of your equity position is sheltered from exchange rate risk. The

hedge ratio is important for investors in futures contracts, as it will help to identify and minimize basis risk. Hedge ratio is calculated as follows.

$$\alpha = \frac{(C_u - C_d)}{S_0 (u - d)}$$

Risk-Neutral Valuation Model

C = Expected future Value / 1 + Risk free rate

Expected Future Value = (Probability of rise x $C_{u)}$ + (Probability of decline x $C_{d)}$

F & O Trading System

The F & O trading system of NSE is called NEAT-F&O trading system. It provides a fully automated screen-based trading for index F & O and stock F & O on a nationwide basis as well as an online monitoring and surveillance mechanism. The software for the F & O market has been developed to facilitate efficient and transparent trading in F & O instruments.

Criteria for Stocks and Index Eligibility for Trading

Eligibility criteria of stocks

- The stock is chosen from amongst the top 500 stocks in terms of average daily market capitalisation and average daily traded value in the previous six months on a rolling basis.
- The stock's median quarter-sigma order size over the last six months should be not less than Rs. 5 lakhs. For this purpose, a stock's quarter-sigma order size should mean the order size (in value terms) required to cause a change in the stock price equal to one-quarter of a standard deviation.
- The market wide position limit in the stock should not be less than Rs.100 crores. The market wide position limit (number of shares) is valued taking the closing prices of stocks in the underlying cash market on the date of expiry of contract in the month. The market wide position limit of open position (in terms of the number of underlying stock) on futures and option contracts on a particular underlying stock shall be 20% of the number of shares held by non-promoters in the relevant underlying security i.e. free-float holding.

For an existing F&O stock, the continued eligibility criteria is that market wide position limit in the stock shall not be less than Rs. 60 crores and stock's median quarter-sigma order size over the last six months shall be not less than Rs. 2 lakh. If an existing security fails to meet the eligibility criteria for three months consecutively, then no fresh month contract will be issued on that security. However, the existing unexpired contracts can be permitted to trade till expiry and new strikes can also be introduced in the existing contract months.

Further, once the stock is excluded from the F&O list, it shall not be considered for re-inclusion for a period of one year. Futures & Options contracts may be introduced on (new) securities which meet the above mentioned eligibility criteria, subject to approval by SEBI.

Eligibility criteria of indices

The exchange may consider introducing derivative contracts on an index if the stocks contributing to 80% weightage of the index are individually eligible for derivative trading. However, no single ineligible stocks in the index should have a weightage of more than 5% in the index. The above criteria is applied every month, if the index fails to meet the eligibility criteria for three months consecutively, then no fresh month contract would be issued on that index, However, the existing unexpired contacts will be permitted to trade till expiry and new strikes can also be introduced in the existing contracts.

Eligibility criteria of stocks for derivatives trading on account of corporate restructuring

The eligibility criteria for stocks for derivatives trading on account of corporate restructuring is as under:

I. All the following conditions shall be met in the case of shares of a company undergoing restructuring through any means for eligibility to reintroduce derivative contracts on that company from the first day of listing of the post restructured company/(s) (as the case may be) stock (herein referred to as post restructured company) in the underlying market,

a) the Futures and options contracts on the stock of the original (pre restructure) company were traded on any exchange prior to its restructuring;

b) the pre restructured company had a market capitalisation of at least Rs.1000 crores prior to its restructuring;

c) the post restructured company would be treated like a new stock and if it is, in the opinion of the exchange, likely to be at least one-third the size of the pre restructuring company in terms of revenues, or assets, or (where appropriate) analyst valuations; and

d) in the opinion of the exchange, the scheme of restructuring does not suggest that the post restructured company would have any characteristic (for example extremely low free float) that would render the company ineligible for derivatives trading.

II. If the above conditions are satisfied, then the exchange takes the following course of action in dealing with the existing derivative contracts on the pre-restructured company and introduction of fresh contracts on the post restructured company

a) In the contract month in which the post restructured company begins to trade, the Exchange introduce near month, middle month and far month derivative contracts on the stock of the restructured company.

b) In subsequent contract months, the normal rules for entry and exit of stocks in terms of eligibility requirements would apply. If these tests are not met, the exchange shall not permit further derivative contracts on this stock and future month series shall not be introduced.

Charges

The maximum brokerage chargeable by a trading member in relation to trades effected in the contracts admitted to dealing on the F&O Segment of NSE is fixed at 2.5% of the contract value exclusive of statutory levies. However, NSE has been periodically reviewing and reducing the transaction charges being levied by it on its trading members. With effect from October 1st, 2009, the transaction charges for trades executed on the futures segment is as per the
table given below:

Total traded value in a month	Transaction Charges (Rs. Per lakh of traded value)
Up to First Rs. 2500 cores	Rs. 1.90 each side
More than Rs. 2500 crores up to Rs. 7500 crores	Rs. 1.85 each side
More than Rs. 7500 crores up to Rs. 15000 crores	Rs. 1.80 each side
Exceeding Rs.15000 crores	Rs. 1.75 each side

However for the transactions in the options sub-segment the transaction charges are levied on the premium value at the rate of 0.05% (each side) instead of on the strike price as levied earlier. Further to this, trading members have been advised to charge brokerage from their clients on the Premium price (traded price) rather than Strike price. The trading members contribute to Investor Protection Fund of F&O segment at the rate of Re. 1/- per Rs. 100 crores of the traded value (each side).

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Module - 5
COMMODITY DERIVATIVES

COMMODITY EXCHANGES IN INDIA

National Exchanges

1. Multi Commodity Exchange of India Ltd., Mumbai (MCX)
2. National Commodity and Derivatives Exchange of India Ltd. Mumbai (NCDEX)
3. National Multi Commodity Exchange of India Ltd. Ahmedabad (NMCEIL)
4. Indian Commodity Exchange Ltd. New Delhi
5. Ace Derivatives and Commodity Exchange Ltd. Mumbai

Regional Commodity Exchanges

1. The Bombay Commodity Exchange Ltd. Vashi, Mumbai (Maharastra) [Oilseed Complex, Castor oil International contracts]
2. The Rajkot Seeds oil & Bullion Merchants` Association Ltd (Gujarat) [Castor seed, Groundnut, its oil & cake, cottonseed, its oil & cake, cotton (kapas) and RBD palmolein.]

3. The Meerut Agro Commodities Exchange Co. Ltd., Meerut (UP) [Gur]
4. The Spices and Oilseeds Exchange Ltd.Sangli (Maharastra) [Turmeric]
5. Vijay Beopar Chamber Ltd., Muzaffarnagar (UP) [Gur, Mustard seed]
6. India Pepper & Spice Trade Association. Kochi (IPSTA-Kerala) [Pepper (both domestic and international contracts)]
7. Rajdhani Oils and Oilseeds Exchange Ltd., Delhi [Gur, Mustard seed its oil & oilcake]
8. National Board of Trade. Indore (MP) [Soya seed, Soyaoil and Soya meals. Rapeseed/Mustard seed its oil and oilcake and RBD Palmolien]
9. The Chamber Of Commerce, Hapur (UP) [Gur , Potatoes and Mustard seed]
10. The East India Cotton Association Mumbai [Cotton]
11. The Central India Commercial Exchange Ltd, Gwaliar (MP) [Gur and Mustard seed]
12. The East India Jute & Hessian Exchange Ltd (West Bengal) [Hessian & Sacking]
13. First Commodity Exchange of India Ltd, Kochi (Kerala) [Copra/coconut, its oil & oilcake]
14. Bikaner Commodity Exchange Ltd., Bikaner (Rajasthan) [Mustard seed its oil & oilcake, Gram. Guar seed. Guar Gum]
15. Surendranagar Cotton oil & Oilseeds Association Ltd (Gujarat) [Cotton, Cottonseed, Kapas]
16. Haryana Commodities Ltd., Hissar (Haryana) [Mustard seed complex]
17. e-Commodities Ltd. (New Delhi) [Sugar]
18. Bullion Association Ltd., Jaipur [Mustard seed complex]
19. Bhatinda Om & Oil Exchange Ltd., Batinda (Punjab) [Gur]
20. The Kanpur Commodity Exchange Ltd., Kanpur (UP)
21. Ahmedabad Commodity Exchange Ltd.(Gujarat) [Castorseed, cottonseed, its oil and oilcake]
22. The Coffee Futures Exchange India Ltd, Bangalore
23. E-sugar India Ltd., Mumbai [Sugar]

Multi Commodity Exchange of India Limited (MCX): Headquartered in Mumbai MCX, is an independent and de-materialised exchange with a permanent recognition from Government of India. Key shareholders of MCX are Financial Technologies (India) Ltd., SBI, Union Bank of India, Corporation Bank, Bank of India and Canara Bank. MCX facilitates online trading, clearing and settlement operations for commodity futures markets across the country. MCX started offering trade in November 2003 and has built strategic alliances with Bombay Bullion Association, Bombay Metal Exchange, Solvent Extractors' Association of India, Pulses Importers Association and Shetkari Sanghatana.

National Commodity & Derivatives Exchange Limited (NCDEX): NCDEX located in Mumbai is a public limited company incorporated on April 23, 2003 under the Companies Act, 1956 and had commenced its operations on December 15, 2003.This is the only commodity exchange in the country promoted by national level institutions. It is promoted by ICICI Bank Ltd., LIC, NABARD and NSE. It is a professionally managed online multi commodity exchange. NCDEX is regulated by Forward Market Commission and is subjected to various laws of the land like the Companies Act, Stamp Act, Contracts Act, Forward Commission (Regulation) Act and various other legislations.

National Multi-Commodity Exchange of India Limited (NMCEIL): NMCEIL is the first de-materialised, Electronic Multi-Commodity Exchange in India. On 25th July, 2001, it was granted approval by the Government to organise trading in the edible oil complex. It has operationalised from November 26, 2002. It is being supported by Central Warehousing Corporation Ltd., Gujarat State Agricultural Marketing Board and Neptune Overseas Limited. It got its recognition in October 2002.

Indian Commodity Exchange Limited: It is a screen based on-line derivatives exchange for commodities and has established a reliable, time tested, and a transparent trading platform. It is also in the process of putting in place robust warehousing facilities in order to facilitate deliveries. It has Reliance Exchangenext Ltd. as anchor investor and has MMTC Ltd., Indiabulls Financial Services Ltd., Indian Potash Ltd., KRIBHCO and IDFC among others, as its partners.

Forward Markets Commission (FMC): FMC headquartered at Mumbai, is a regulatory authority set up in 1953 under the Forward Contracts (Regulation) Act, 1952. It is overseen by the **Ministry of Company Affairs, Food and Public Distribution, Govt. of India**. The Commission shall consist of not less than two but not exceeding four members appointed by the Central Government and one among them will be the Chairman. Currently Commission comprises two members among whom Mr. Ramesh Abhishek, IAS is the Chairman, and Dr. M. Mathisekaran, IES is the Member of the Commission.

Function of the FMC:

1. To advise the Central Government in respect of the recognition or the withdrawal of recognition from any association or in respect of any other matter arising out of the administration of the Forward Contracts (Regulation) Act 1952.
2. To keep forward markets under observation and to take such action in relation to them, as it may consider necessary, in exercise of the powers assigned to it by or under the Act.
3. To collect and whenever the Commission thinks it necessary, to publish information regarding the trading conditions in respect of goods to which any of the provisions of the act is made applicable, including information regarding supply, demand and prices, and to submit to the Central Government, periodical reports on the working of forward markets relating to such goods;
4. To make recommendations generally with a view to improving the organization and working of forward markets;
5. To undertake the inspection of the accounts and other documents of any recognized association or registered association or any member of such association whenever it considerers it necessary.

Margin System: MCX follows a comprehensive and stringent margining system for all future contracts traded on the Exchange platform. Actual margining and position monitoring is done on an on-line basis. For the purpose of computing and levying the margins, MCX uses SPAN (Standard Portfolio Analysis of Risk) system which follows a risk-based and portfolio-based approach. The Initial Margin requirement is based on a worst-case loss scenario of portfolio at client level to cover VaR (value at Risk) over a one day horizon, subject to a minimum Base Margin defined by FMC for the respective commodity. The SPAN Risk Parameter File (RPF) is generated by the Exchange periodically at pre-defined timings and RPF files so generated are provided to the members using the FTP service and on the Exchange website. In addition to SPAN margins, MCX levies additional margins and/or Special margins whenever deemed necessary considering the volatility and price movement in the commodities. Such margins are also levied as per the directions of FMC. Tender Period margins and Delivery Period Margins are levied on contracts nearing expiry to ensure non default in commodity delivery.

Margin Requirements: As in stocks, in commodities also the margin is payable to exchanges through brokers and calculated by (value at risk) VaR system ranging between 5 – 10% of the contract value.

Trading Timings:
Normal Session:
Monday-Friday: 10:00 a.m. to 11:30 p.m.
(up to 11:55 p.m. on account of day light savings typically between every November and March of the following year)

Saturdays: 10:00 a.m. to 2:00 p.m
Agri-commodities are available for futures trading up to 5:00 p.m. whereas non agri-commodities (bullions, metals, energy products) are available up to 11:30 pm / 11.55pm.

Special Session:
Monday to Saturday: 9:45 a.m. to 9:59 a.m.
Special Session (order cancellation session) is held to cancel the pending orders prior to opening of market

Clearing & Settlement System
The Exchange has an in house clearing house which monitors and performs all activities relating to delivery, fund settlement, margining and managing the settlement guarantee funds. It operates a well-defined settlement cycle to ensure no deviations or deferments from this cycle. MCX has empanelled 16 Clearing Banks to provide banking services to trading members. The clearing house collects margin from the members, effect of pay-in and pay-out and monitor delivery and settlement process. The members are requested to forward all their clearing & settlement related correspondence on the following address:

Trading & Delivery System

All the commodity exchanges have electronic trading and settlement systems and a national presence. There are multiple broker members associated with each or all of these commodities. You can choose any of these. You may find some traditional brokers, and also the new age brokers, which offer online trading in commodities just like equity markets.

All the exchanges have both - cash and physical delivery mechanisms. Choice is given by the tradeer. If you want your contract to be cash settled, you have to indicate at the time of placing the order that you don't intend to deliver the item. If you want to take or make delivery, you need to have the required warehouse receipts. The option to settle in cash or through delivery can be changed as many times as one wants till the last day of the expiry of the contract.

Circuit Filters: Commodity exchanges have circuit filters. The filters vary from commodity to commodity but the maximum individual commodity circuit filter is 6%. The price of any commodity that fluctuates either way beyond its limit will immediately call for circuit breaker.

Brokerage & Transaction Charges: The brokerage charges range from 0.10-0.25 per cent of the contract value. Transaction charges range between Rs 6 and Rs 10 per lakh/ per contract. The brokerage will be different for different commodities. It will also differ based on trading transactions and delivery transactions. In case of a contract resulting in delivery, the brokerage can be 0.25 - 1 per cent of the contract value. The brokerage cannot exceed the maximum limit specified by the exchanges.

Sales Tax: The sales tax is applicable only in case of trade resulting into delivery. Normally it is the seller's responsibility to collect and pay sales tax. If the trade is squared off no sales tax is applicable.

Stamp Duty: As of now, there is no stamp duty applicable for commodity futures that have contract notes generated in electronic form. However, in case of delivery, the stamp duty will be applicable according to the prescribed laws of the state the investor trades in. This is applicable in similar fashion as in stock market.

Prices and Trading lots in the bullion market

Gold -10 grams Silver-1 KG.

Agricultural commodities -vary from exchange to exchange (KG. Quintals or Tonnes).

Commodities Traded at MCX:
Bullions-Gold, Gold Guinea, Gold M, Gold Petal, Gold Petal (New Delhi) Platinum, silver, Silver M, Silver Micro.
Plantations: Rubber
Metals: Aluminium, Aluminium Mini, Copper, Copper Mini, Iron ore, Lead, Lead Mini, Mild Steel Ingot, Billets, Nickel, Nickel Mini, Tin, Zinc, Zinc Mini.
Energy: ATF, Brent Crude Oil, Crude oil, Electricity Monthly & Weekly, Gasoline, Heating oil, Imported Thermal Coal, Natural gas.
Weather: Carbon (CER), Carbon (CFI)
Oil & Oil Seeds: Crude Oil, Kapasia Khalli, Refined soya Oil, Soya bean.
Cereals: Barley, Wheat, Maize-Feed/Industrial Grade
Fiber: Kapas, Cotton (29mm)
Spices: Cardamon, Coriander, Turmeric
Pulses: Chana
Others: Almond, Gaur Seed, Melted Menthol Flakes, Metha Oil, Potato (Agra), Potato (Tarkeshwar), Sugar M

What makes commodity trading attractive?

A good low-risk portfolio diversifier
A highly liquid asset class, acting as a counterweight to stocks, bonds and real estate.
Less volatile, compared with, equities and bonds.
Investors can leverage their investments and multiply potential earnings.
Better risk-adjusted returns.
A good hedge against any downturn in equities or bonds as there is little correlation with equity and bond markets.
High co-relation with changes in inflation.
No securities transaction tax levied.

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Module - 6
INTEREST RATE MARKETS

TYPES OF INTEREST RATES

Treasury Rates: Treasury rates are the rates an investor earns on Treasury bills or Treasury bonds. These are the instruments used by a government to borrow in its own currency. Japanese Treasury rates are used by Japan to borrow Yen; Us Treasury rates are used by the US govt. to borrow US dollars. Treasury rates are totally risk-free in the sense that an investor who buys a treasury bill or treasury bond is certain that interest and principal payments will be made as promised.

LIBOR (London Interbank Offer Rate). A LIBOR quote by a particular bank is the rate of interest at which the bank is prepared to make a large wholesale deposit with other banks. Large banks and other financial institutions quote LIBOR in all major currencies for maturities up to 12 months: 1-month LIBOR is the rate at which 1-month deposits are offered, 3-month LIBOR is the rate at which 3-month deposits are offered.

LIBID Rate (London Interbank Bid Rate): It is the rate at which the bankers will accept deposits from other banks. LIBOR is always greater than LIBID. The spread between LIBOR and LIBID is the profit to the banker. LIBOR and LIBID trade in what is known as the Eurocurrency market. This market is outside the control of any one government. The rates themselves are determined by active trading between banks and are continuously changing so that the supply of funds in the interbank market equals the demand for funds in that market.

Repo Rates: This is a contract where an investment dealer who owns securities agrees to sell them to another company now and buy them back later at a slightly higher price. The other company is providing a loan to the investment dealer. The difference between the price at which the securities are sold and the price at which they are repurchased is the interest it earns. The most common type of repo is an overnight repo, in which the agreement is renegotiated each day. However, longer-term arrangements, known as term repos, are sometimes used.

MIBOR (Mumbai Interbank Offer Rate) It is the equivalent of LIBOR and is based on rates applicable in the interbank dealings in Mumbai. A large number of floating rate values are linked to the MIBOR values. In fact, MIBOR is increasingly becoming very popular for floating rate linkages, and a lot of the floating rate instruments are being priced based on MIBOR or functions of MIBOR.

MIFOR (Mumbai Interbank Forward Offer Rate): Indian banks and derivative market participants in India also use the MIFOR as a benchmark for setting prices on the various interest rate derivatives. MIFOR is calculated by looking at a combination of the LIBOR and the corresponding forward premia derived from the foreign exchange market in India. In effect, this is a synthetic rate that is implied by the US dollar LIBOR rate and the currency forwards. In fact, when the currency forwards **are in discount, the implied MIFOR would be lower than LIBOR, a curious market distortion.**

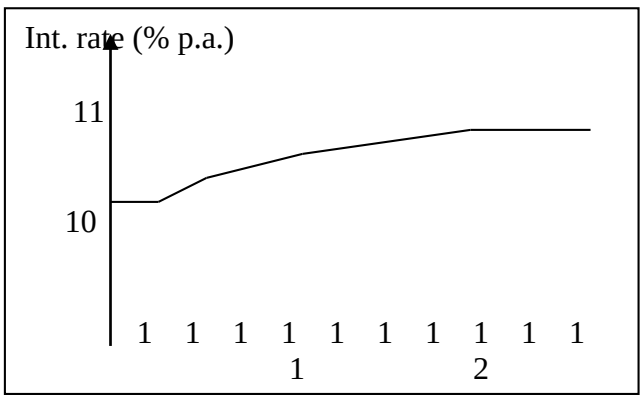
Call Rates: Another important source of funding (short term and unsecured) in the Indian markets is the money available in the call market at rates known as call rates. This is exactly similar to overnight rates in some of the other more mature markets. In the Indian scenario, both banks and corporates entities can borrow in the call money market, but only banks can be the lender in the call money markets.

Collaterised Borrowing and Lending Obligation (CBLO): CBLO is a unique product designed for the Indian market by the Clearing Corporation of India Ltd. (CCIL) and has been approved by the RBI for usage as a money market instrument in India. It is a type of derivative debt instrument, which is secured by approved bonds lodged with the CCIL through the subsidiary general account. The instrument is a discounted instrument available in an electronic book entry form, and generally has short maturity periods, usually up to 90 days (the maturity period can be up to 1 year, as per the RBI' guidelines). The CBLO has certain new features that overcome the drawbacks of the repo market.

ZERO RATES: The n-year zero –coupon interest rate is the rate of interest earned on an investment that starts today and lasts for n years. All the interest and principal is realised at the end of n years. There are no intermediate payments. Suppose a 5-year zero rate with continuous compounded is quoted as 5% p.a. this means that Rs.100 if invested for 5 years grows to $100 \times e^{(0.05 \times 5)} = \text{Rs.}128.40$

The n-year zero coupon interest rate is sometimes also referred to as the n-year spot rate, the n-year zero rate, or just the n-year zero. Most of the interest rates we observe directly in the market are not pure zero rates. Zero-coupon interest rates are calculated from the prices of coupon-bearing instruments using an approach known as Bootstrap method. (See Question Bank for illustration).

There are two ways of calculating zero rates: The first one is to observe yield on 'Strips'. These are zero coupon bonds that are synthetically created by traders when they sell coupons on a Treasury bond separately from the principal. The second one is to determine from Treasury bills and coupon bearing bonds. The most popular approach is known as 'Bootstrap' method.



Zero Curve: A chart showing the zero rate as a function of maturity is known as **zero curve**.

Assumptions:

1. Zero curve is linear between the periods determined using the bootstrap method.
2. Zero curve is horizontal prior to the first point and horizontal beyond the last point.

By using longer maturity bonds, the zero curve would be more accurately determined beyond 2 years. In practice, we do not, usually have bonds with maturity equal to exactly 1.5 years, 2 years, 2.5 years and so on.

Zero Curve

FORWARD RATES: Forward interest rates are the rates of interest implied by current zero rates for periods of time in the future. (See Question Bank for illustration) The forward rate for year 2 is 5% p.a. this is a rate of interest that is implied by a zero rates for the period of time between the end of the first year and end of the second year. It can be calculated from 1- year zero interest rate of 3% p.a. and 2-year zero rate of 4% p.a. It is the rate of interest for year – 2. To show that correct answer is 5% p.a. suppose that Rs.100 is invested. A rate of 3% for the 1st year and 5% for the 2nd year gives 100 $e^{(0.03)} \times e^{(0.05 \times 1)} = 108.33$ at the end of 2nd year A rate of 4% p.a. for 2 year gives 100 x $e^{(0.04 \times 2)} = 108.33$

FORWARD RATE AGREEMENTS (FRA)

It is a contract through which a borrower or a lender locks the interest rate on its future borrowings or lending and protects itself from the unfavourable changes in the interest rate. In other words it is an agreement between two parties which determines the interest rate that will apply to a notional future loan / deposit of an agreed amount for a specified period. It is essentially inter-bank money market instrument. FRA is a simple derivative which is used when an institution is exposed to a single period interest rate risk. It allows the forward fixing of interest rates on money market transaction. FRA is widely used by banks and by corporates for hedging and arbitrage activities. The principal amount under the FRA deal will be a notional amount, and the bank will pay to the firm only present value of the difference of the interest payment between the pre-change rate mentioned in the deal (locked interest) and the post-change rate prevailing at the time of maturity. The discount factor is the actual (post-change) interest rate. Borrower buys FRA when interest rate is expected to rise; Lender buys when interest rate is expected to fall.

Features

1. FRA is an OTC traded
2. It is used as an inter-bank instrument for hedging short-term interest rate risk
3. There is no upfront premium payable
4. Most liquid and frequently traded FRAs are for 3 – 6 month but also available for periods extendable to 2 years
5. The underlying principal amount is notional and no exchange taken place

FRA Quote:

3 x 6 or 3 – 6 or 3vs 6 or 3 ÷ 6

It is read as 3's 6's or 3's against 6's. The quote signifies it is for a period starting 3 months from now and ending 6 month from now. The first figure is known as settlement / starting date. The second figure is known as maturity / expiry date. The intervening period is known as FRA / contract period.

Terminology

Buyer / Borrower: The buyer of FRA seeks protection against rise in interest rate
Seller / Lender: The seller of FRA seeks protection against decrease in interest rate
Settlement date: The start date of loan / deposit
Maturity date: The date on which FRA contract ends
Contract period: The intervening period between settlement date and maturity date
Contract rate: It is FRA rate of interest
Contract amount: It is notional sum on which FRA is based
Fixing date: It is the day, which is two business days prior to the settlement date (But for pound sterling fixing date and settlement date are the same)

Compensation = (Contract Rate – Interest rate on settlement date) x Contract amount x contract period
PV of Compensation = Compensation ÷ [1 + (Settlement rate x Maturity period)]

Illustration :

Suppose, interest rate at present is 6% p.a. (Locked rate of interest), amount of future borrowing $ 1,00,000; maturity period is 3 months and risen interest rate is 7%. Find the amount of receivables.

Solution :

Amount of interest at risen rate (7%) = 7% x 1,00,000 x90/360 = **$ 1750.0**
Amount of interest at locked interest rate (6%) = 6% x 1,00,000 x 90/360 = **$1500.0**
If it purchases FRA for an equivalent principal, it will get from its banker

$\underline{\$ 1,00,000 \times (0.07 - 0.06) \times 90/360}$ 245/1.0175 = **$ 245.70**

[1 + (0.07 x 90/360)]

FRAs and the Lender

Lender buys FRA when interest rate is expected to drop. Suppose, the present rate of interest is 8%. The amount of future borrowing is $ 1,00,000. The maturity is 3 months. The fallen interest rate is 7%. It means that the lender will get lesser interest equivalent to $ 252.77. But if the lender buys and FRA, the loss will be compensated by the seller of the FRA. The seller will pay.

[1,00,000 x (0.08 – 0.07) x (90/360)]/(1 + (0.07 x 90/360) = 250/1.0175 = **$ 245.70**

Interest-rate Swap

When borrower expect a rise in interest rates, they swap floating-rate loan for a fixed-rate loan
When they expect a fall in the interest rate, they swap fixed-rate loan for floating-rate loan.

Interest Rate Futures (IRFs)

- Used to hedge interest rate risk
- Emerged in mid 1970s in the US financial market.
- It is like a currency futures market where contracts are made in the pit of the organised exchange through an authorised broker.
- Nominal amount of the contract is standardised.
- Maturity falls in March, June, September and December.
- There is a clearing house to record the transactions and to function as a counter-party.
- Margin money and margin call mechanisms are found.
- On the maturity, the contract is reversed.
- Used in the case of both rising interest rate and falling interest rate.
- Hedging of interest rate exposure through IRF is based primarily not on the changes in interest rate but on the value of the bond, which changes as a sequel to changes in the interest rate.
- Value of the bond diminishes with a rise in the interest rate and vice versa. And bondholders incur loss.

Illustration :

Suppose, a company is having 10-year French Govt. bond for Euro 10,00,000.
Present interest rate (in July) : 10% Expected to rise in December : 11%
Standard size of Euro futures is Euro 5,00,000 Assume value of bond declines to Euro 9,41,000

Solution :

Two futures are bought (10,00,000/5,00,000)

Computation of Value of Portfolio

1. In the absence of IRF
   9,41,000 + 50,000 (Half-year interest) = **Euro 9,91,000**

2. when IRF is taken
   Euro 9,41,000 + 50,000 + 59,000* = **Euro 10,50,000**
   *Price sold – price bought (10,00,000 – 9,41,000 = 59,000)

3. No change in interest rate and no IRF
   Euro 10,00,000 + 50,000 = **Euro 10,50,000**

Contrarily if rate of interest falls there will be loss on the future contracts, but the loss would be compensated by an increase in the value of the bonds.

Treasury Bond (Note) Futures: One of the most popular long-term interest rate futures contracts is the Treasury bond futures contract traded on the Chicago Board of Trade (CBOT). In this contract, any government bond that has more than 15 years to maturity on the first day of the delivery month and is not callable within 15 years from that day can be delivered. The Treasury note and 5-year Treasury note futures contract in the US are also very popular. With Treasury note futures, any govt. bond (or note) with a maturity between 6-1/2 and 10 years can be delivered.

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Types of Interest Rate Risk

1. Credit Risk
2. Liquidity Risk (Non-financial companies)
3. Basis Risk (Financial companies)

Credit Risk or Default Risk: It arises when borrower fails to make payment of interest and principal. This type of risk can be minimised by Providing loans only to the borrowers who re financially sound and who have no record of default and Diversification of lending among large number of borrowers.

Liquidity Risk (Gap Risk): More typical of non-financial firms. Related to the timing of mismatches between cash inflows and cash outflows on account of interest payment.

Basis Risk: It arises when interest rate exposure on one instrument is offset by the interest rate exposure on another instrument. Related primarily to financial companies. Magnitude of risk depends upon how the interest is calculated. Because, practices differ from one country to another. In Switzerland, 360 days make a year, British practice involves 365 days a year for calculation of interest.

Credit Risk Mitigation Techniques: Netting, Collateralisation and Downgrade Triggers

Netting: It is elimination of counter payments and net amount only is paid. It has become standard in OTC derivatives contracts. Netting has been successfully tested in the courts in most jurisdictions. It can substantially reduce credit risk for a financial institution. It eliminates transaction cost and inter-currency conversion cost.

Collateralisation: A typical collateralisation agreement specifies that the contracts be valued periodically. If the total value of the contracts to the financial institution is above a specified threshold level, the agreement requires the cumulative collateral posted by the company to equal the difference between the value of the contracts to the financial institution and the threshold level. In the event of a default by the company, the financial institution can seize the collateral. If the company does not post collateral as required, the financial institution can close out the contracts.

Downgrade Triggers: This clause states that if the credit rating of the counterparty falls below a certain level, say Baa, the financial institution has the option to close out a derivatives contract at its market value. Downgrade triggers do not provide protection from a big jump in a company's credit rating

Total Return Swaps: It is a type of credit derivative. It is an agreement to exchange the total return on a bond (or any portfolio of assets) for LIBOR plus a spread. The total return includes coupons interest and the gain or loss on the asset over the life of the swap.

Asset-Backed Securities (ABS): ABS is a security created from a portfolio of loans, bonds, credit card receivables, mortgages, auto loans, aircraft leases or other financial assets. The loans would typically be classified, according to the credit quality of the borrower as prime, nonprime and subprime. Suppose there are 10,000 nonprime loans, Rather than keeping these as assets on its balance sheet the bank might decide to sell them to a special purpose vehicle (SPV), also known as a trust or a conduit. The SPV issues securities that are backed by the cash flows of the loans. The arrangement has the effect of insulating investors from the credit risk of the bank that issued the loans. The investors' return depends solely on the cash flows from the loans. The bank earns a fee for originating and servicing the loans. However, the credit risk associated with the loans is passed on to the investors.

Collateralised Debt Obligations (CDO): A type of asset backed security. In this the assets being securitised are bonds issued by corporations or countries. The creator of the CDO acquires a portfolio of bonds. These are passed on to an SPV which passes the income generated by the bonds to a series of tranches. The income from the bonds is first used to provide the promised return to the most senior tranche, then to the next most senior tranche, and so on. As is usual with asset-backed securities, the structure is designed so that the most senior tranche is rated AAA.

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Module - 8
VALUE at RISK (VaR)

Introduction: VaR is an attempt to provide a single number summarizing the total risk in a portfolio of financial assets. It measures potential loss in market value of a security in a portfolio using estimated volatility and correlation within a given probability over a predetermined time horizon. It is the amount of money that a particular security or portfolio would lose over say in the next 24 hours with a 99% confidence level. i.e. the loss experienced on any one day will not exceed the VaR number.
It has become widely used by corporate treasurers and fund managers as well as by financial institutions. It is the most widely accepted measure of market risk all over the world including India. It is the most important risk-management tool used by banks and financial institutions. RBI prescribes VaR as the methodology to be adopted for the measurement of market risk of the portfolios of individual banks and financial institutions.

Methods for calculating VaR:

Historical Simulation , Model-building approach, Linear Model, Quadratic Model and Monte Carl Simulation
However, **Historical Simulation** and **Model-Building approach** are the main approaches

VaR Measure: VaR is the function of two parameters: Time horizon (N-days) and the confidence level (X%). It is the loss level over N days that has a probability of only (100 – X%) of being exceeded. Bank regulators require banks to calculate VaR for market risk with N = 10 days and X = 99%

Historical Simulation: It is a popular way of estimating VaR. It involves using past data in a very direct way as a guide to what might happen in the future. Suppose that VaR is to be calculated for a portfolio using a 1-day time horizon, at 99% confidence level, and 501 days of data.
Step – 1: To identify market variables affecting the portfolio (these are exchange rates, equity prices, interest rates etc.)
Step-2: Data is collected on the movements in these market variables over the most recent 501 days. This provides 500 alternative scenarios for what can happen between today and tomorrow.

Model-Building Approach:

Single Asset case:
N-day X% VaR = Daily Volatility x Size of Position x N(x) x $\sqrt{N}$

Volatility: Research shows that volatility is much higher when exchange is open for trading than when it is closed. And hence, volatility is estimated during trading days (252 days) rather than calendar days (365 days).

$$\text{Daily Volatility } (\sigma_{day}) = \frac{\sigma_{year}}{\sqrt{\textbf{252 days}}}$$

Two-asset Case:
Step-1: VaR on Individual asset = Daily Volatility x Size of Position x N(x) x $\sqrt{N}$

Step-2: VaR on portfolio (N-day X% VaR) $= \sqrt{(V_A)^2 + (V_B)^2 + (2 \times \gamma \times V_A \times V_B)}$

OR $= \sqrt{(\Delta_1 \times \sigma_1)^2 + (\Delta_2 \times \sigma_2)^2} \times (N(X) \times \sqrt{N})$

Benefit of Diversification = **(** $VaR_A + VaR_B$) - VaR_P

Monte Carlo Simulation: A Model-building approach can be implemented using Monte Carlo simulation to generate the probability distribution for ΔP. The drawback of Monte Carlo simulation is that it tends to be slow because a company's complete portfolio (which might consists of hundreds of thousands of different instruments) has to be revalued many times.

Procedure:
1. Value the portfolio today in the usual way using the current values of market variables
2. Sample once from the multivariate normal probability distribution of the Δxi
3. Use the values of the Δxi that are sampled to determine the value of each market variable at the end of one day
4. Revalue the portfolio at the end of the day in the usual way
5. Subtract the value calculated in step 1 from the value in step 4 to determine a sample ΔP
6. Repeat steps 2 – 5 many times to build up a probability distribution for ΔP

Stress Testing and Back Testing: In addition to calculating VaR, many companies carry out Stress Testing. Stress testing involves estimating how a company's portfolio would have performed under some of the most extreme market moves seen in the last 10 – 20 years.

Back Testing: An important reality check is Back Testing. It involves testing how well the VaR estimates would have performed in the past. Suppose 1-day 99% VaR is calculated. Back testing involves looking at how often the loss in a day exceeded the 1-day 99% VaR that would have been calculated for that day. If this happened on about 1% of the days, we can feel reasonably comfortable with the methodology for calculating VaR. If it happened on, say, 7% of days, the methodology is suspect.

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Module
ACCOUNTING & TAXATION ISSUES OF DERIVATIVE TRADING

Accounting for Derivatives-Futures

Accounting at the inception of a contract
Every client is required to pay to the trading member/clearing member, the initial margin determined by the clearing corporation as per the bye-laws/regulations of the exchange for entering into equity index futures contracts. Initial margin paid/payable should be debited to "Initial margin - Equity index futures account". Additional margins, if any, should also be accounted for in the same manner. It may be mentioned that at the time when the contract is entered into for purchase/sale of equity index futures, no entry is passed for recording the contract because no payment is made at that time except for the initial margin. On the balance sheet date, the balance in the 'Initial margin - Equity index futures account' should be shown separately under the head 'current assets'. In those cases where any amount has been paid in excess of the initial/additional margin, the excess should be disclosed separately as a deposit under the head 'current assets'. In cases where instead of paying initial margin in cash, the client provides bank guarantees or lodges securities with the member, a disclosure should be made in the notes to the financial statements of the client.

Accounting at the time of daily settlement
Payments made or received on account of daily settlement by the client would be credited/debited to the bank account and the corresponding debit or credit for the same should be made to an account titled as "Mark-to-market margin - Equity index futures account". The client may also deposit a lump sum amount with the broker/trading member in respect of mark-to-market margin money instead of receiving/paying mark-to-market margin money on daily basis. The amount so paid is in the nature of a deposit and should be debited to an appropriate account, say, "Deposit for mark-to-market margin account". The amount of "markto-market margin" received/paid from

such account should be credited/debited to “Mark-tomarket margin - Equity index futures account” with a corresponding debit/credit to “Deposit for mark-to-market margin account”. At the year-end, any balance in the “Deposit for markto- market margin account” should be shown as a deposit under the head “current assets”.

Accounting for open positions

Position left open on the balance sheet date must be accounted for. Debit/credit balance in the “mark-to-market margin - Equity index futures account”, represents the net amount paid/received on the basis of movement in the prices of index futures up to the balance sheet date. Keeping in view ‘prudence’ as a consideration for preparation of financial statements, provision for anticipated loss, which may be equivalent to the net payment made to the broker (represented by the debit balance in the “mark-to-market margin - Equity index futures account”) should be created by debiting the profit and loss account. Net amount received (represented by credit balance in the “mark-to-market margin - Equity index futures account”) being anticipated profit should be ignored and no credit for the same should be taken in the profit and loss account. The debit balance in the said “mark-to-market margin - Equity index futures account”, i.e., net payment made to the broker, may be shown under the head “current assets, loans and
advances” in the balance sheet and the provision created there-against should be shown as a deduction therefrom. On the other hand, the credit balance in the said account, i.e., the net amount received from the broker, should be shown as a current liability under the head “current liabilities and provisions in the balance sheet”.

Accounting at the time of final settlement

At the expiry of a series of equity index futures, the profit/loss, on final settlement of the contracts in the series, should be calculated as the difference between final settlement price and contract prices of all the contracts in the series. The profit/loss, so computed, should be recognized in the profit and loss account by corresponding debit/credit to “mark-to-market margin - Equity index futures account”. However, where a balance exists in the provision account created for anticipated loss, any loss arising on such settlement should be first charged to such provision account, to the extent of the balance available in the provision account, and the balance of loss, if any, should be charged to the profit and loss account. Same accounting treatment should be made when a contract is squared-up by entering into a reverse contract. It appears that, at present, it is not feasible to identify the equity index futures contracts. Accordingly, if more than one contract in respect of the series of equity index futures contracts to which the squared-up contract pertains is outstanding at the time of the squaring of the contract, the contract price of the contract so squared-up should be determined using First-In, First-Out (FIFO) method for calculating profit/loss on squaring-up. On the settlement of equity index futures contract, the initial margin paid in respect of the contract is released which should be credited to “Initial margin - Equity index futures account”, and a corresponding debit should be given to the bank account or the deposit account (where
the amount is not received).

Accounting in case of a default

When a client defaults in making payment in respect of a daily settlement, the contract is closed out. The amount not paid by the Client is adjusted against the initial margin. In the books of the Client, the amount so adjusted should be debited to “mark-to-market – Equity index futures account” with a corresponding credit to “Initial margin - Equity index futures account”. The amount of initial margin on the contract, in excess of the amount adjusted against the mark-to-market margin not paid, will be released. The accounting treatment in this regard will be the same as explained above. In case, the amount to be paid on daily settlement exceeds the initial margin the excess is a liability and should be shown as such under the head ‘current liabilities and provisions’, if it continues to exist on the balance sheet date. The amount of profit or loss on the contract so closed out should be calculated and recognized in the profit and loss account in the manner dealt with above.

Disclosure requirements

The amount of bank guarantee and book value as also the market value of securities lodged should be disclosed in respect of contracts having open positions at the year end, where initial margin money has been paid by way of bank guarantee and/or lodging of securities. Total number of contracts entered and gross number of units of equity index futures traded (separately for buy/sell) should be disclosed in respect of each series of equity index futures. The number of equity index futures contracts having open position, number of units of equity index futures pertaining to those contracts and the daily settlement price as of the balance sheet date should be disclosed separately for long and short positions, in respect of each series of equity index futures.

Accounting for options

The Institute of Chartered Accountants of India issued guidance note on accounting for index options and stock options from the view point of the parties who enter into such contracts as buyers/holder or sellers/writers. Following are the guidelines for accounting treatment in case of cash settled index options and stock options:

Accounting at the inception of a contract

The seller/writer of the option is required to pay initial margin for entering into the option contract. Such initial margin paid would be debited to ‘Equity Index Option Margin Account’ or to ‘Equity Stock Option Margin

Account', as the case may be. In the balance sheet, such account should be shown separately under the head 'Current Assets'. The buyer/holder of the option is not required to pay any margin. He is required to pay the premium. In his books, such premium would be debited to 'Equity Index Option Premium Account' or 'Equity Stock Option Premium Account', as the case may be. In the books of the seller/writer, such premium received should be credited to 'Equity Index Option Premium Account' or 'Equity Stock Option Premium Account' as the case may be. Accounting at the time of payment/receipt of margin Payments made or received by the seller/writer for the margin should be credited/debited to the bank account and the corresponding debit/credit for the same should also be made to 'Equity Index Option Margin Account' or to 'Equity Stock Option Margin Account', as the case may be. Sometimes, the client deposit a lump sum amount with the trading/clearing member in respect of the margin instead of paying/receiving margin on daily basis. In such case, the amount of margin paid/received from/into such accounts should be debited/credited to the 'Deposit for Margin Account'. At the end of the year the balance in this account would be shown as deposit under 'Current Assets'. Accounting for open positions as on balance sheet dates The 'Equity Index Option Premium Account' and the 'Equity Stock Option Premium Account' should be shown under the head 'Current Assets' or 'Current Liabilities', as the case may be. In the books of the buyer/holder, a provision should be made for the amount by which the premium paid for the option exceeds the premium prevailing on the balance sheet date. The provision so created should be credited to 'Provision for Loss on Equity Index Option Account' to the 'Provision for Loss on Equity Stock Options Account', as the case may be. The provision made as above should be shown as deduction from 'Equity Index Option Premium' or 'Equity Stock Option Premium' which is shown under 'Current Assets'. In the books of the seller/writer, the provision should be made for the amount by which premium prevailing on the balance sheet date exceeds the premium received for that option. This provision should be credited to 'Provision for Loss on Equity Index Option Account' or to the 'Provision for Loss on Equity Stock Option Account', as the case may be, with a corresponding debit to profit and loss account. 'Equity Index Options Premium Account' or 'Equity Stock Options Premium Account' and 'Provision for Loss on Equity Index Options Account' or 'Provision for Loss on Equity Stock Options Account' should be shown under 'Current Liabilities and Provisions'. In case of any opening balance in the 'Provision for Loss on Equity Stock Options Account' or the 'Provision for Loss on Equity Index Options Account', the same should be adjusted against the provision required in the current year and the profit and loss account be debited/credited with the balance provision required to be made/excess provision written back.

Accounting at the time of final settlement

On exercise of the option, the buyer/holder will recognize premium as an expense and debit the profit and loss account by crediting 'Equity Index Option Premium Account' or 'Equity Stock Option Premium Account'. Apart from the above, the buyer/holder will receive favorable difference, if any, between the final settlement price as on the exercise/expiry date and the strike price, which will be recognized as income. On exercise of the option, the seller/writer will recognize premium as an income and credit the profit and loss account by debiting 'Equity Index Option Premium Account' or 'Equity Stock Option Premium Account'. Apart from the above, the seller/writer will pay the adverse difference, if any, between the final settlement price as on the exercise/expiry date and the strike price. Such payment will be recognized as a loss. As soon as an option gets exercised, margin paid towards such option would be released by the exchange, which should be credited to 'Equity Index Option Margin Account' or to 'Equity
Stock Option Margin Account', as the case may be, and the bank account will be debited. Accounting at the time of squaring off an option contract The difference between the premium paid and received on the squared off transactions should be transferred to the profit and loss account. Following are the guidelines for accounting treatment in case of delivery settled index options and stock options: The accounting entries at the time of inception, payment/receipt of margin and open options at the balance sheet date will be the same as those in case of cash settled options. At the time of final settlement, if an option expires un-exercised then the accounting entries will be the same as those in case of cash settled options. If the option is exercised then shares will be transferred in consideration for cash at the strike price. For a call option the buyer/holder will receive equity shares for which the call option was entered into. The buyer/holder should debit the relevant equity shares account and credit cash/bank. For a put option, the buyer/holder will deliver equity shares for which the put option was entered into. The buyer/holder should credit the relevant equity shares account and debit cash/bank. Similarly, for a call option the seller/writer will deliver equity shares for which the call option was entered into. The seller/writer should credit the relevant equity shares account and debit cash/bank. For a put option the seller/writer will receive equity shares for which the put option was entered into. The seller/writer should debit the relevant equity shares account and credit cash/bank. In addition to this entry, the premium paid/received will be transferred to the profit and loss account, the accounting entries for which should be the same as those in case of cash settled options.

Taxation of Derivative Transaction in Securities

Prior to Financial Year 2005–06, transaction in derivatives were considered as speculative transactions for the purpose of determination of tax liability under the section 43(5) of Income-tax Act. Section 43(5) defined speculative transaction as a transaction in which a contract for purchase or sale of any commodity, including stocks and shares, is periodically or ultimately settled otherwise than by the actual delivery or transfer of the commodity or scrips. However, such transactions entered into by hedgers and stock exchange members in course of jobbing or arbitrage activity were specifically excluded from the purview of definition of speculative

transaction. In view of the above provisions, most of the transactions entered into in derivatives by investors and speculators were considered as speculative transactions. The tax provisions provided for differential treatment with respect to set off and carry forward of loss on such transactions. Loss on derivative transactions could be set off only against other speculative income and the same could not be set off against any other income. This resulted in payment of higher taxes by an assessee.

As per Finance Act, 2005 amended section 43(5) income or loss on derivative transactions which are carried out in a "recognized stock exchange" is treated as non speculative income or loss. Thus, loss on derivative transactions can be set off against any other income during the year and if it cannot be set off, the same can be carried forward to subsequent assessment year/s(upto 8 A.Y.) and set off against any other income of the subsequent year. STT paid on such transactions is eligible as deduction under Income-tax Act, 1961.

Securities transaction tax on derivatives transactions

As per Chapter VII of the Finance (No. 2) Act, 2004, Securities Transaction Tax (STT) is levied on all transactions of sale and/or purchase of equity shares and units of equity oriented fund and sale of derivatives entered into in a recognized stock exchange.

Rates of STT as per Finance Act 2008, (w.e.f. 1st June 2008)

Sl.No.	Taxable securities transaction	Rates	Payable by
1	Sale of an option in securities where option is not exercised	0.017%	Seller
2	Sale of an option in securities, where option is exercised	0.125%	Buyer
3	Sale of a futures in securities	0.017%	Seller

E.g. Mr. A. sells a futures contract of XYZ Ltd. (Lot Size: 1000) expiring on 29-Sep-2005 for Rs. 300 each share. The spot price of the share is Rs. 290.

STT = 0.017% of (1000 x 300) = Rs.51 [payable by seller & not tax paid by buyer]

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ANNEXURES

COMODITIES NOTIFIED UNDER SECTION 15 OF FC (R)ACT AND COMMENCEMENT OF TRDING

Sr. No.	Commodity	Date of Notification	Sr. No.	Commodity	Date of Notification
I FOOD GRAINS AND PULSES			**III SPICES**		
1	Arhar Chuni	01.04.2003	60	Aniseed	01.04.2003
2	Bajra	01.04.2003	61	Betelnuts	01.04.2003
3	Barley	01.04.2003	62	Cardamom	01.04.2003
4	Gram	01.04.2003	63	Chillies	01.04.2003
5	Gram Dal	01.04.2003	64	Cinnamon	01.04.2003
6	Guar	01.04.2003	65	Cloves	01.04.2003
7	Jowar	01.04.2003	66	Coriander Seed	01.04.2003
8	Kulthi	01.04.2003	67	Ginger	01.04.2003
9	Lakh (Khesari)	01.04.2003	68	Methi	01.04.2003
10	Maize	01.04.2003	69	Nutmegs	01.04.2003
11	Masur	01.04.2003	70	Pepper	11.01.1957
12	Moth	01.04.2003	71	Turmeric	11.04.1956
13	Mung	01.04.2003	**IV METALS**		
14	Mung Chuni	01.04.2003	72	Copper / Inc, Lead or I"m	01.04.2003
15	Mung Dal	01.04.2003	73	Gold	01.04.2003
16	Peas	01.04.2003	74	Silver Coins	01.04.2003
17	Ragi	01.04.2003	75	Silver Coins	01.04.2003
18	Rice or Paddy	01.04.2003	**V FIBERS AND MANUFACTURES**		
19	Small Millets (Rodan Kulti, Kodra, Vargu, Sawan, Rala, Kakon, Samar & Banti)	01.04.2003	76	Art Silk Yarn	01.04.2003
20	Tur Dal (Arhar Dal)	01.04.2003	77	Cotton Cloth	01.04.2003
21	Tur (Arhar)	01.04.2003	78	Cotton Pods	01.04.2003

22	Urad (Mash)	01.04.2003	79	Cotton Yarn	01.04.2003
23	Urad Dal	01.04.2003	80	Indian Cotton (Full pressed. Half pressed or loose)	03.07.1954
24	Wheat	01.04.2003	81	Jute ggods (I lessian and sackings and cloth and / or bagstwines and / yarns mld by any of the mills and / or any other manufacturers of whatever nature made from jute).	06.02.2001
II OIL SEEDS AND OILS			**VI OTHERS**		
25	Celeryseed	01.04.2003	85	Camphor	01.04.2003
26	Copra Oil/Coconut Oil	12.04.1999	86	Castoor Seed	16.04.1985
27	Copra oOil cake / Coconut OilCake	12.04.1999	87	Chara or Berseem (including chara seed or berseem seed)	01.04.2003
28	Copra / Coconut	12.04.1999	88	Crude Oil	29.12.2004
29	Cottonseed	12.04.1999	89	Gram liusk (Gram Chilka)	01.04.2003
30	Cottonseed Oil	12.04.1999	90	Gur	10.08.1970
31	Cottonseed Oilcake	12.04.1999	91	Khandsari Sugar	14.05.2001
32	CPO Refined	07.03.2005	92	Polymer	24.03.2005
33	Crude Palm Oil	07.03.2005	93	Potato	15.05.1985
34	Crude Palm Olive	07.03.2005	94	Rubber	24.03.2005
35	Groundnut	12.04.1999	95	Seedlac	01.04.2003
36	Groundnut Oil	12.04.1999	96	Shellac	01.04.2003
37	Groundnut Oilcake	12.04.1999	97	Sugar	14.05.2001
38	Linseed	01.04.2003	98	Furnance Oil	30.06.2005
39	Linseed Oil	01.04.2003	99	Ethanol	19.07.2005
40	Linseed Oilcake	01.04.2003	100	Cooking Coal	19.07.2005
41	Rapeseed Oil/ Mustard Oil	12.04.1999	101	Electricity	09.01.2006
42	Rapeseed Oilcake/ Mustardseed Oilcake	12.04.1999	102	Natural Gas	09.01.2006
43	Rapeseed / Mustardseed	12.04.1999	103	Onion	13.04.2006
44	RBD Palmolein	07.08.2000	104	Corban Credit	04.01.2008
45	Rice Bran	12.04.1999	105	Thermo Coal	06.12.2007
46	Rice Bran Oil	12.04.1999	106	Methanol	14.09.2009
47	Rice Bran Oilcake	12.04.1999	107	Melted Menthol Flakes	25.11.2009
48	Sunflower	12.04.1999	108	Mentha Oil	25.11.2009
49	Sunflower Oil	12.04.1999	109	Menthol Crystals	25.11.2009
50	Sunflower Oilcake	12.04.1999	110	Irone ORE	29.09.2010
51	Sesamum (Til or Jiljilli)	12.04.1999			
52	Sesamum Oil	12.04.1999			
53	Sesamum Oilcake	12.04.1999			
54	Soy Meal	01.03.2001			
55	Soy Oil	01.03.2001			
56	Soybean	01.03.2001			
57	Sunflower Oil	12.04.1999			
58	Sunflower Oilcake	12.04.1999			
59	Sunfloer Seed	12.04.1999			

COMMODITIES FOR WHICH FUTURES TRADING PERMITTED DURING 2011

S. No.	Commodities/Varieties	National Exchanges	Regional Exchanges (commodity specific)
Where futures trading is being conducted			
FIBERS :			
1	Kalyan /V-797 Kapas	MCX,NMCE, NCDEX	Surendranagar Cotton Oil & Oilseeds Association Ltd
2	Shankar Kapas	NCDEX	----------

3	Sacking	NMCE	----------
4	Raw Jute	NMCE, ICEX	----------

SPICES:

1	Coriander	MCX, NCDEX	----------
2	Cardamom	MCX, NMCE	----------
3	Turmeric	MCX, NCDEX, NMCE	----------
4	Pepper	NCDEX, NMCE	The India Pepper &Spice Trade Association Kochi
5	Red Chilli	MCX, NCDEX	----------
6	Jeera / Cumin Seed	NCDEX,	----------

EDIBLE OIL, OILSEEDS, OIL CAKES:

1	Crude Palm Oil (CPO)	MCX, NCDEX	----------
2	Copra / Coconut Oil	NMCE	The First Commodity Exchange of India Ltd Kochi
3	Rape / Mustard Seed	NCDEX, NMCE, ICEX, ACE	The Central India Commercial Exchange, Gwalior, Chamber of Commerce, Hapur, Rajdhani oils & Oilseeds Exchange Ltd, Haryana Commodities Ltd Sirsa & National Board of Trade Ltd Indore
4	Soya Bean	MCX, NCDEX, ICEX, ACE	National Board of Trade Ltd Indore
5	Refined Soya Oil	MCX, NCDEX, NMCE,ICEX, ACE	National Board of Trade Ltd Indore
6	Castor Seed	NCDEX, NMCE, ACE	Bombay Commodity Exchange Ltd & Rajkot Commodity Exchange Ltd
7	Kapas Khali / Cottonseed Oilcake	MCX, NCDEX	Haryana Commodities Ltd., Sirsa
8	Cotton Seed Wash Oil	MCX	----------
9	Expeller Mustard Oil (Kachhi Ghani)	NCDEX	----------

PULSES

1.	Chana	MCX, NCDEX, NMCE, ICEX, ACE	----------

ENERGY PRODUCTS

1	Light Sweet Crude Oil	MCX, NCDEX, ICEX, ACE	----------
2	Brent Crude Oil	MCX, NCDEX	----------
3	Heating Oil	MCX, NCDEX	----------
4	Aviation Turbine Fuel (ATF)	MCX	----------
5	Gasoline	MCX, NCDEX	----------
6	Natural Gas	MCX, NCDEX, ICEX	----------
7	Imported Thermal Coal	MCX,NCDEX	----------

METALS & BULLION

1	Copper	MCX,NCDEX,NMCE,ICEX	----------
2	Aluminium	MCX,NMCE	----------
3	Aluminium Mini	MCX	----------
4	Lead	MCX,NCDEX,NMCE,ICEX	----------
5	Lead Mini	MCX	----------
6	Mild Steel Ingot/Billets	MCX	----------
7	Steel Long	NCDEX	----------

8	Nickel	MCX,NCDEX, NMCE	----------
9	Platinum	MCX,NCDEX	----------
10	Zinc	MCX,NCDEX, NMCE	----------
11	Zinc Mini	MCX	----------
12	Tin	MCX	----------
13	Gold (1kg)	MCX,MCDEX, NMCE,ICEX, ACE	----------
14	Gold Mini (100 Gms)	MCX,NCDEX, NMCE,ICEX, ACE	----------
15	Gold Guinea (8 gms)	MCX,NMCE	----------
16	Gold Petal	MCX	----------
17	Silver (30 kg)	MCX,NCDEX,NMCE,ICEX	----------
18	Silver Mini (5kg)	MCX,NCDEX, ICEX	----------
19	Silver Micro(1 kg)	MCX,ACE	----------
20	Iron Ore	MCX,ICEX	----------

VEGETABLES & GRAINS

1	Potato(Agra)	MCX,NCDEX	----------
2	Potato(Tarkeshwar)	MCX	----------
3	Barley	MCX,NCDEX	----------
4	Maize-Feed-Ind.Grade	MCX,NCDEX	----------
5	Wheat	MCX,NCDEX,NMCE	----------
6	Almond	MCX,NCDEX	----------
7	Coffee	NMCE	----------
8	Rubber	MCX,NCDEX,NMCE	----------
9	Gur	NCDEX	The Chamber of Commerce Hapur, The Meerut Agro Commodities Exchange Co. Ltd, The Vijai Beopar Chamber Ltd Muzzffarnagar , Rajdhani oils & Oilseeds Exchange Ltd
10	Isadgulseed	NMCE	----------
11	Carbon Credit(CER)	MCX	----------
12	Mentha Oil	MCX,NCDEX,ICEX	----------
13	Menthol Flakes	MCX	----------
14	Menthol Crystal	NMCE	----------
15	Guarseed	MCX,NCDEX,NMCE,ICEX	Bikaner Commodity Exchange Ltd
16	Guargum	NCDEX,NMCE	----------
17	Sugar (M)	MCX,NCDEX,ACE	----------
18	Sugar (S)	NCDEX	----------
19	Polyvinyl Chloride	NCDEX	----------

Commodities suspended : Tur and Urad (23/1/2007) and Rice (27/2/2007)

Major Commodity Exchanges Trading F & O

AMEX	American Stock exchange	MEXDER	Mexican Derivatives Exchange
ASX	Australian Stock exchang	MGE	Minneapolis Grain Exchange
BM&F	Bolsa de Mercadorias Y Futuros, Brzil	ME	Montreal Exchange
BM	Bursa Malaysia	NSE	National Stock Exchange of India
CBOT	Chicago Board of Trade	NYBOT	New York Board of Trade
COOE	Chicago Board Options Exchange	NYMEX	New York Mercantile Exchange
CME	Chicago Mercantile Exchange	NYSE	New York Stock Exchange
EUREX	Durex	OMX	Nordic Exchange
EURONEXT	Euronext	OSE	Osaka Securities Exchange
HKFE	Hong Kong Futures Exchange	PHLX	Philadelphia Stock Exchange

ICE	Intercontinental Exchange	SGX	Singapore Exchange
IPE	International Petroleum Exchange, London	SFE	Sydney Futures Exchange
ISE	International Securities Exchange	TGE	Tokyo Grain Exchange
KCBT	Kansas City Board of Trade	TFX	Tokyo Financial Exchange
LME	London Metal Exchange	WCE	Winnipeg Commodity Exchange
MEFF	MEFF Renta Fija and Variable, Spain		

ABBREVIATIONS

Abbreviations	Expansion
MIBOR	Mumbai Inter-bank Offer Rate
LIBOR	London Inter-bank Offer Rate
MIFOR	Mumbai Inter-bank Forward Offer Rate
NCDEX	National Commodity and Derivative Exchange, Mumbai
MCX	Multi Commodity Exchange, Mumbai
NMCEIL	National Multi Commodity Exchange of India Ltd., Ahmedabad
NSCCL	National Securities Clearing Corporation Ltd.
F & O	Futures and Options
ALBM	Automated Lending & Borrowing Mechanism
OCC	Option Clearing Corporation USA
SPAN	Standard Portfolio Analysis of Risk
TIMS	Theoretical Inter market Margin system
SIMEX	Singapore International Monetary Exchange Ltd.

FORMULAS

FORWARDS / FUTURES

Continuous compounding rate of interest: $r = \ln (1 + R/c)^c$ OR $c \ln (1 + R/c)$

Value of Forward/Futures Contract

For Non-Dividend Payment Security: $F = S_0 e^{rt}$

For Dividend Payment Security (Known amount): $F = (S_0 - I) e^{rt}$ $[I = D_0 e^{-rt}]$

For Dividend Payment Security ((Known Yield): $F = S_0 e^{(r-y)t}$

When there is known amount of storage cost: $F = (S_0 + s) e^{rt}$

When storage cost is proportional price of the commodity: $F = S_0 e^{(r+s)t}$

For Non-Carry Commodity: $F = (S_0 + s) e^{(r-c)t}$ OR $F = S_0 e^{(r+p-c)t}$

FINANCIAL SWAPS

Potential Gain in the Swap = (Interest rate differential in one form of borrowing +/- Interest rate differential in another form of borrowing

Net Gain =Potential Gain - Commission to Swap Dealer

Gain to each party = ½ of Net Gain

Cost of Borrowing to each party = Interest rate of Desired form of borrowing – Gain

OPTIONS

a. Binomial Model for Valuation of Option

$$C = \frac{C_u \frac{(I-d)}{(u-d)} + C_d \frac{(u-i)}{(u-d)}}{i}$$

Hedge Ratio $\alpha = \frac{(C_u - C_d)}{S_0 (u-d)}$

C = Call Price

u = S1/S0 (When S1 > S0) (i.e. 1 + % increase in stock price from t_0 to t_1)

d = S1/S0 (When S1 < S0) (i.e. 1 - % decrease in stock price)

α = No. of Shares purchased per share of the call

Cu = Value of call option if S1 > S0 : Max. (S1 - E, o)

Cd = Value of call option if S1< S0 Max (S1 – E, o)

OR

$C = \Delta S - B$

$\Delta = \frac{C_u - C_d}{S(u-d)}$ $\quad B = \frac{dC_u - uC_d}{(u-d)R}$

$\Delta = \frac{\text{Spread of possible option prices}}{\text{Spread of possible share prices}}$

C_u = Max. (uS – E, 0)

C_d = Max. (dS – E, 0)

C = Equilibrium value of Call option

Δ = Hedge ratio (Delta)

C_u = Value of Call option when price goes up

C_d = Value of Call option when price goes down

b. Risk-Neutral Valuation Model

C = Expected future Value / 1 + Risk free rate

Expected Future Value = (Probability of rise x $C_{u)}$ + (Probability of decline x $C_{d)}$

c. Black-Scholes formula

1. Option on Stock/Index

$Co = S_0 N(d_1) - Ee^{-rt} N(d_2)$

$P = Ee^{-rt} N(-d_2) - S_0 N(-d_1)$ OR

$P = C_0 - S_0 + Ee^{-rt}$ (Put Call Parity)

$d_1 = \frac{l_n(S_0/E) + (r + \frac{1}{2}\sigma^2)t}{\sigma\sqrt{t}}$

$d_2 = d_1 - \sigma\sqrt{t}$ OR

$= \frac{l_n(S_0/E) + (r - \frac{1}{2}\sigma^2)t}{\sigma\sqrt{t}}$

When continuous Dividend rate is given

$C_0 = S_0 e^{-\delta t} N(d_1) - E e^{-rt} N(d_2)$

$P = Ee^{-rt} N(-d_2) - S_0 e^{-\delta t} N(-d_1)$

$d_1 = \frac{l_n(S_0/E) + (r - \delta + \frac{1}{2}\sigma^2)t}{\sigma\sqrt{t}}$

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

C_0 = Equilibrium value of a call option

S_0 = Price of the stock now

E = Exercise price

r = annualized continuously compounded risk-free interest rate

t = length of time in years to the expiration date

l_n = Natural logarithm

σ = Standard deviation of the annualized continuously compounded return on the stock

δ = Dividend rate

2. Option on Futures

$FC = Fe^{-rt} N(d_1) - Ee^{-rt} N(d_2)$

$FP = Ee^{-rt} N(-d_2) - Fe^{-rt} N(-d_1)$ OR

$FP = FC - Fe^{-rt} + Ee^{-rt}$ (Using Put Call Parity)

$d_1 = \frac{l_n(F/E) + (\frac{1}{2}\sigma^2)t}{\sigma\sqrt{t}}$

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

Option Greeks

1. Delta: For Call Option Delta = $N(d_1)$ For Put Option Delta = $N(d_1) - 1$

2. Gamma (For both Call and Put) = $\frac{Z(d_1)}{S_0\sigma\sqrt{t}}$ $\quad Z(d_1) = \frac{e^{(-d1 \times \frac{1}{2})}}{\sqrt{2\pi}}$

3. Theta:

For Call Option $= -\frac{S_0 Z(d_1)\sigma}{2\sqrt{t}} - Ee^{-rt} rN(d_2)$ Put Option Theta $= -\frac{S_0 Z(d_1)\sigma}{2\sqrt{t}} + Ee^{-rt} rN(-d_2)$

4. Rho: For Call Option Rho = $Ete^{-rt} N(d_2)$ For Put Option Rho = $Ete^{-rt} N(-d_2)$

5. Vega (Kappa/Lambda) : For Both Call & Put Option Vega = $S_0\sqrt{t}\ Z(d_1)$

Implied Volatility $\sigma = \frac{0.5(C + P)\sqrt{2\pi/t}}{E/(1+r)^t}$

ii. Pricing of Futures

a. Stock Futures

Futures price = Spot price + Cost of Carry – Carry returns or

$$\mathbf{F_0 = S_0 (1 + r_f - d)^T}$$

F_0 = Price of Futures contract

S_0 = Spot Price

r_f = Risk free rate of interest (or Cost of Carry)

d = Carry Returns (or dividend yield)

T = Life of futures contract

b. Treasury Bond Futures

$F_0 = (S_0 - PVC)(1 + r_f)^T$

c. Commodity Futures (Storable Commodities)

$$\frac{\text{Future Price}}{(1 + r_f)^T} = \text{Spot Price} + \text{P.V. of Storage Cost} - \text{P.V. of Convenience Yield}$$

d. Commodity Futures (Perishable Commodities)

1. When buyer provides service to seller (i.e. **Normal Backwardation** relationship)
   F_0 = Expected Spot Price – Expected Risk Premium

2. When Seller provides service to the buyer (**Contango** relationship)
   F_0 = Expected Spot Price + Expected Risk Premium

3. When buyer or sellers are investors or speculators. No group is providing or receiving service
   F_0 = Expected Spot Price

VALUE AT RISK (VAR)

Single Asset case:
N-day X% VaR = Daily Volatility x Size of Position x N(x) x $\sqrt{N}$

$$\text{Daily Volatility } (\sigma_{day}) = \frac{\sigma_{year}}{\sqrt{\textbf{252 days}}}$$

Two-asset Case:
Step-1: VaR on Individual asset = Daily Volatility x Size of Position x N(x) x $\sqrt{N}$

$$\text{Step-2: VaR on portfolio (N-day x\% VaR)} = \sqrt{\sigma_A^2 + \sigma_B^2 + (2\ \gamma\ \sigma_A\sigma_B)}$$

Benefit of Diversification = **(** $VaR_A + VaR_B$) - VaR_P