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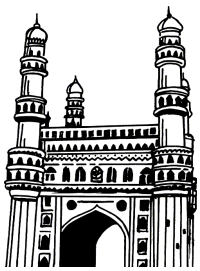

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UNIT I

INTRODUCTION TO FINANCIAL DERIVATIVES

Financial Derivatives: Definition - Features - Types - Uses - Critiques - History of Derivatives Markets - Financial Derivatives Indian Scenario - Evolution of Derivatives in India - Benefits of Derivatives - Equity Derivatives - Derivatives Trading at NSE and BSE - Emerging Structure of Derivatives Markets in India

1.1 Introducton to Financial Derivatives

1.1.1 Definition

Q1. Explain the term Financial Derivative.

(OR)

What is a Financial Derivative?

Ans : **(May-18, May-16)**

Introduction

The past decade has witnessed the multiple growth in the volume of international trade and business due to the wave of globalization and liberalization all over the world. As a result, the demand for the international money and financial instruments increased significantly at the global level. In this respect, changes in the interest rates, exchange rates and stock market prices at the different financial markets have increased the financial risks to the corporate world. Adverse changes have even threatened the very survival of the business world. It is, therefore, to manage such risks, the new financial instruments have been developed in the financial markets, which are also popularly known as financial derivatives.

The basic purpose of these instruments is to provide commitments to prices for future dates for giving protection against adverse movements in future prices, in order to reduce the extent of financial risks. Not only this, they also provide opportunities to earn profit for those persons who are ready to go for higher risks. In other words, these instruments, indeed, facilitate to transfer the risk from those who wish to avoid it to those who are willing to accept the same.

Today, the financial derivatives have become increasingly popular and most commonly used in the world of finance. This has grown with so phenomenal speed all over the world that now it is called as the derivatives revolution. In an estimate, the present annual trading volume of derivative markets has crossed US $ 30,000 billion, representing more than 100 times gross domestic product of India.

A derivative is a financial contract or an instrument whose returns and values are derived from the value and the performance of some underlying asset. Derivatives are basically classified into options, futures, swaps and forwards.

A forward contract is one of the primary derivative contracts used by many individuals and companies to manage and reduce various risks faced by individuals or firms. Whereas in futures contract, two parties with mutual understanding enters into an agreement, one party agrees to buy while the other party agrees to sell, at a future date for a certain price.

Meaning

The term "Derivative" indicates that it has no independent value, i.e., its value is entirely derived from the value of the underlying asset. The underlying asset can be securities, commodities, bullion, currency, livestock or anything else. In other words, derivative means forward, futures, option or any other hybrid contract of predetermined fixed duration, linked for the purpose of contract fulfillment to the value of a specified real or financial asset or to an index of securities.

The Securities Contracts (Regulation) Act 1956 defines "derivative" as under :

"Derivative" includes

(i) Security derived from a debt instrument, share, loan whether secured or unsecured, risk instrument or contract for differences or any other form of security.

(ii) A contract which derives its value from the prices, or index of prices of underlying securities.

The above definition conveys that

- The derivatives are financial products.
- Derivative is derived from another financial instrument/contract called the underlying. In the case of Nifty futures, Nifty index is the underlying. A derivative derives its value from the underlying assets. Accounting Standard SFAS133 defines a derivative as, 'a derivative instrument is a financial derivative or other contract with all three of the following characteristics.
- one or more underlyings, and (2) one or more notional amount or payments provisions or both. Those terms determine the amount of the settlement or settlements.
- It requires no initial net investment or an initial net investment that is smaller than would be required for other types of contract that would be expected to have a similar response to changes in market factors.

1.1.2 Features

Q2. What are the important features of financial derivaties?

Ans :

A financial derivative is a financial instruments whose value is derived from the value of an underlysing asset, hence, the name 'derivative' came into existence.

1. A derivative instrument relates to the future contract between two parties. It means there must be a contract-binding on the underlying parties and the same to be fulfilled in future. The future period may be short or long depending upon the nature of contract. **For example,** short term interest rate futures and long term interest rate futures contract.
2. Normally, the derivative instruments have the value which derived from the values of other underlying assets, such as agricultural commodities, metals, financial assets, intangible assets, etc. Value of derivatives depends upon the value of underlying instrument and which changes as per the changes in the underlying assets, and sometimes, it may be nil or zero. Hence, they are closely related.
3. In general, the counter parties have specified obligation under the derivative contract. Obviously, the nature of the obligation would be different as per the type of the instrument of a derivative. For example, the obligation of the counter parties, under the different derivatives, such as forward contract, future contract, option contract and swap contract would be different.
4. The derivatives contracts can be undertaken directly between the two parties or through the particular exchange like financial futures contracts. The exchange-traded derivatives are quite liquid and have low transaction costs in comparison to tailor-made contracts. Example of ex-change traded derivatives are Dow Jons, S&P 500, Nikki 225, NIFTY option, S&P Junior that are traded on New York Stock Exchange, Tokyo Stock Exchange, National Stock Exchange, Bombay Stock Exchange and so on.
5. In general, the financial derivatives are carried off-balance sheet. The size of the derivative contract depends upon its national amount. The notional amount is the amount used to calculate the pay off. For instance, in the option contract, the potential loss and potential pay off, both may be different from the value of underlying shares, because the payoff of derivative products differ from the payoff that their notional amount might suggest.
6. Usually, in derivatives trading, the taking or making of delivery of underlying assets is not involved, rather underlying transactions are

mostly settled by taking offsetting positions in the derivatives themselves. There is, therefore, no effective limit on the quantity of claims, which can be traded in respect of underlying assets.

7. Derivatives are also known as deferred delivery or deferred payment instrument. It means that it is easier to take short or long position in derivatives in comparison to other assets or securities. Further, it is possible to combine them to match specific, i.e., they are more easily amenable to financial engineering.

8. Derivatives are mostly secondary market instruments and have little usefulness in mobilizing fresh capital by the corporate world, however, warrants and convertibles are exception in this respect.

9. Although in the market, the standardized, general and exchange-traded derivatives are being increasingly evolved, however, still there are so many privately negotiated customized, over-the-counter (OTC) traded derivatives are in existence. They expose the trading parties to operational risk, counter-party risk and legal risk. Further, there may also be uncertainty about the regulatory status of such derivatives.

10. Finally, the derivative instruments, sometimes, because of their off-balance sheet nature, can be used to clear up the balance sheet.

For example, a fund manager who is restricted from taking particular currency can buy a structured note whose coupon is tied to the performance of a particular currency pair.

1.1.3 Types

Q3. Explain the different types of financial derivatives along with their features in brief.

(OR)

Explain the types of financial derivatives.

Ans : **(May-18, Imp.)**

Presently, there are bewilderingly complex varieties of derivatives already in existence, and the markets are innovating newer and newer ones continuously. For example, various types of financial derivatives based on their different properties like, plain, simple or straightforward, composite, joint or hybrid, synthetic, leveraged, mildly leveraged, customized or OTC traded, standardized or organized exchange traded, etc. are available in the market.

In simple form, the derivatives can be classified into different categories which are shown in the Fig,

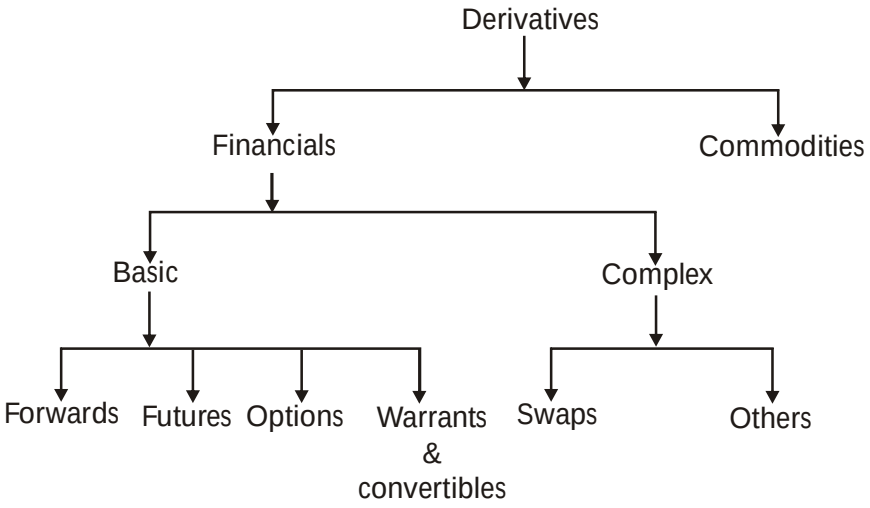


Fig.: Classification of Derivatives

One form of classification of derivative instruments is between commodity derivatives and financial derivatives. The basic difference between these is the nature of the underlying instrument or asset. In a commodity derivatives, the underlying instrument is a commodity which may be wheat, cotton, pepper, sugar, jute, turmeric, corn, soyabeans, crude oil, natural gas, gold, silver, copper and so on. In a financial derivative, the underlying instrument may be treasury bills, stocks, bonds, foreign exchange, stock index, gilt-edged securities, cost of living index, etc. It is to be noted that financial derivative is fairly standard

(I) Basic Financial Derivatives

1. Forward contracts

A forward contract is a simple customized contract between two parties to buy or sell an asset at a certain time in the future for a certain price. Unlike future contracts, they are not traded on an exchange, rather traded in the over-the-counter market, usually between two financial institutions or between a financial institution and one of its client.

The basic features of a forward contract are given in brief here as under:

(i) Forward contracts are bilateral contracts, and hence, they are exposed to counter-party risk. There is risk of non-performance of obligation either of the parties, so these are riskier than to futures contracts.

(ii) Each contract is custom designed, and hence, is unique in terms of contract size, expiration date, the asset type, quality, etc.

(iii) In forward contract, one of the parties takes a long position by agreeing to buy the asset at a certain specified future date. The other party assumes a short position by agreeing to sell the same asset at the same date for the same specified price. A party with no obligation offsetting the forward contract is said to have an open position. A party with a closed position is, sometimes, called a hedger.

(iv) The specified price in a forward contract is referred to as the delivery price. The forward price for a particular forward contract at a particular time is the delivery price that would apply if the contract were entered into at that tirne. It is important to differentiate between the forward price and the delivery price. Both are equal at the time the contract is entered into. However, as time passes, the forward price is likely to change whereas the delivery price remains the same.

(v) In the forward contract, derivative assets can often be contracted from the combination of under-lying assets, such assets are oftenly known as synthetic assets in the forward market.

(vi) In the forward market, the contract has to be settled by delivery of the asset on expiration date. In case the party wishes to reverse the contract, it has to compulsory go to the same counter party, which may dominate and command the price it wants as being in a monopoly situation.

(vii) In the forward contract, covered parity or cost-of-carry relations are relation between the prices of forward and underlying assets. Such relations further assist in determining the arbitrage-based forward asset prices.

2. Futures

Like a forward contract, a futures contract is an agreement between two parties to buy or sell a specified quantity of an asset at a specified price and at a specified time and place. Futures contracts are normally traded on an exchange which sets the certain standardized norms for trading in the futures contracts.

The futures contracts have following features in brief :

(i) Standardization

One of the most important features of futures contract is that the contract has certain standardized specification, i.e., quantity of the asset, quality of the asset, the date and month of delivery, the units of price quotation, location of settlement, etc.

For example, the largest exchange on which futures contracts are traded are the Chicago Board of Trade (CBOT) and the Chicago Mercantile Exchange (CME). They specify about each term of the futures contract.

(ii) Clearing house

In the futures contract, the exchange clearing house is an adjunct of the exchange and acts as an intermediary or middleman in futures. It gives the guarantee for the performance of the parties to each transaction. The clearing house has a number of members all of which have offices near to the clearing house. Thus, the clearing house is the counter party to every contract.

(iii) Settlement price

Since the futures contracts are performed through a particular exchange, so at the close of the day of trading, each contract is marked-to-market. For this the exchange establishes a settlement price. This settlement price is used to compute the profit or loss on each contract for that day. Accordingly, the members accounts are credited or debited.

(iv) Daily settlement and margin

Another feature of a futures contract is that when a person enters into a contract, he is required to deposit funds with the broker, which is called as margin. The exchange usually sets the minimum margin required for different assets, but the broker can set higher margin limits for his clients which depend upon the credit-worthiness of the clients. The basic objective of the margin account is to act as collateral security in order to minimize the risk of failure by either party in the futures contract.

(v) Tick size

The futures prices are expressed in currency units, with a minimum price movement called a tick size. This means that the futures prices must be rounded to the nearest tick. The difference between a futures price and the cash price of that asset is known as the basis. The details of this mechanism will be discussed in the forthcoming chapters.

(v) Cash settlement

Most of the futures contracts are settled in cash by having the short or long to make a cash payment on the difference between the futures price at which the contract was entered and the cash price at expiration date. This is done because it is inconvenient or impossible to deliver some-times, the underlying asset. This type of settlement is very much popular in stock indices futures contracts.

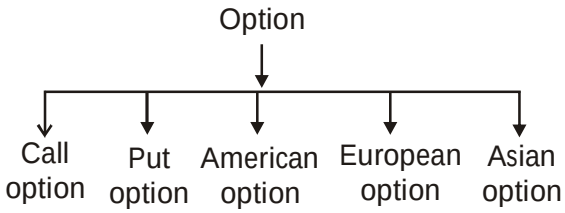
(vii) Delivery

The futures contracts are executed on the expiry date. The counter parties with a short position are obligated to make delivery to the exchange, whereas the exchange is obligated to make delivery to the longs. The period during which the delivery will be made is set by the exchange which varies from contract to contract.

3. Options contracts

An option is a contract between two parties, i.e., between the buyer and the seller. The option contract gives the option holder (Buyer) the right to buy or sell or enter into transaction with the other party (option seller or writer), but are not in an obligation to do so. The purchase and sale of things are to be done at a future date for a price agreed on a present day, at the time of entering the contract.

The option buyer or buyer gives the seller an amount of money called as price or premium, for which the seller is ready to sell as per the terms of the contract or on the will of the buyer. Basically there are about five types of options



(i) Call Option

A call option is a contract that gives an option or right to the buyer (owner) to purchase an underlying asset at a predetermined and agreed fixed price, on or prior to a specific day. The buyer has a right but not an obligation to buy the asset.

On the other hand, the seller is under an obligation to complete the contract by

providing or delivering the underlying asset on the date and time, as agreed between the buyer and the seller. Thus, in a call option the buyer is given the right to buy and seller comes under the obligation to sell the asset. The price fixed for an option is called as strike price or exercise price and denominated in terms of alphabet.

(ii) Put Option

A put option is a contract that provides the right to sell an underlying asset to the buyer, for a particular price and on a specified date. Here the buyer is under an obligation to purchase the asset and the owner has the right to sell the asset.

(iii) American Option

In American option the holder of the instrument can exercise the option at any time (on or before the date of maturity).

(iv) European Option

In European option the owner can exercise the option only at the time of expiration of the contract.

(v) Asian Option

This option is also referred to as an average option. In this option, the return is linked to the average value of the underlying asset, on a particular set of dates, along the life of the contract.

Parties

There are three parties involved in the options contract, the option holder, the option seller and the broker.

(i) Option Buyer/Holder

The option buyer pays a price to the option seller to make him write the option.

(ii) Option Seller

The option seller or writer is an individual who gives an option to the buyer to purchase sell the asset at a price or premium.

(iii) Broker

A broker is a person who deals mostly in securities and acts like an agent to search the buyer and seller and he also receives charges, fees in the form of brokerage commission.

4. Warrants and convertibles

Warrants and convertibles are another important categories of financial derivatives, which are frequently traded in the market.

- Warrant is just like an option contract where the holder has the right to buy shares shares of a specified company at a certain price during the given time period. In other words, the holder of a warrant instrument has the right to purchase a specific number of shares at a fixed price in a fixed period from a issuing company.
- If the holder exercised the right, it increases the number of shares of the issuing company, and thus, dilutes the equities of its shareholders. Warrants are usually issued as sweeteners attached to senior securities like bonds and debentures so that they are successful in their equity issues in terms of volume and price.
- Warrants can be detached and traded separately. Warrants are highly speculative and leverage instruments, so trading in them must be done cautiously.
- Convertibles are hybrid securities which combine the basic attributes of fixed interest and variable return securities.
- Most popular among these are convertible bonds, convertible debentures and convert-ible preference shares. These are also called equity derivative securities.

II) Complex Derivatives

1. Swap contracts

A swap is a contract wherein currencies are exchanged between two parties, it is an exchange of payments or cash flows at a future date. It is defined in the following ways.

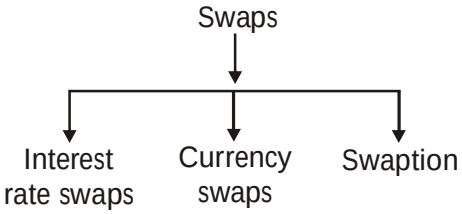
(i) If refers to trading between two parties for the exchange of payments or cash flows.

(ii) It is an agreement between two persons to exchange interest amounts for a specified maturity date and for an agreed price.

(iii) Exchange of one interest payment for another.

For example, fixed or floating interest payments

Types of Swaps



(i) Interest Rate Swaps

If the terms of contract say that only interest payments are to be exchanged and not the principal or base amount, then it is called as interest rate swaps.

(ii) Currency Swaps

Currency swaps refer to an agreement between two parties by exchanging principal and interest amount of one currency with the other currency, for a predetermined period of time. As the exchange takes place between different countries, it is referred to as foreign exchange agreement and is also called as cross currency swap.

(iii) Swaption

A swaption is a contract in which a party acquires an option to enter into a swap agreement. The buyer of the swaption has the right to enter into a swap agreement on the predetermined terms by some specified date in future.

2. Other derivatives

Forwards, futures, options, swaps, etc. are described usually as standard or 'plain vanilla' derivatives. In the early 1980s, some banks and other financial institutions have been very imaginative and designed some new derivatives to meet the specific needs of their clients. These deriva-tives have been described as 'non-standard' derivatives. The basis of the structure of these derivatives was not unique, for example, some non-standard derivatives were formed by combining two or more 'plain vanilla' call and put options whereas some others were far more complex. In fact, there is no boundary for designing the non-standard financial derivatives, and hence, they are sometimes termed as 'exotic options' or just 'exotics'. There are various examples of such non-standard derivatives such as packages, forward start option, compound options, choose options, barrier options, binary options, look back options, shout options, Asian options, basket options, Standard Oil's Bond Issue, Index Currency Option Notes (ICON), range forward contracts or flexible forwards and so on.

1.1.4 Uses

Q4. What are the uses of financial derivatives?

(OR)

Explain the uses of financial derivatives.

Ans : **(May-18, Imp.)**

Derivatives are supposed to provide the following services :

1. One of the most important services provided by the derivatives is to control, avoid, shift and manage efficiently different types of risks through various strategies like hedging, arbitraging, spreading, etc. Derivatives assist the holders to shift or modify suitably the risk characteristics of their portfolios. The'se are specifically useful in highly volatile financial market conditions like erratic trading, highly flexible interest rates, volatile exchange rates and monetary chaos.
2. Derivatives serve as barometers of the future trends in prices which result in the discovery of new prices both on the spot and futures markets. Further, they help in disseminating different information regarding the futures markets trading of various commodities and securities to the society which enable to discover or form suitable or correct or true equilibrium prices in the markets. As a result, they assist in appropriate and superior allocation of resources in the society.
3. As we see that in derivatives trading no immediate full amount of the transaction is required since most of them are based on margin trading. As a result, large number of traders, speculators arbitrageurs operate in such markets. So, derivatives trading enhance liquidity and reduce trans-action costs in the markets for underlying assets.

4. The derivatives assist the investors, traders and managers of large pools of funds to devise such strategies so that they may make proper asset allocation increase their yields and achieve other investment goals.

5. It has been observed from the derivatives trading in the market that the derivatives have smoothen out price fluctuations, squeeze the price spread, integrate price structure at different points of time and remove gluts and shortages in the markets.

6. The derivatives trading encourage the competitive trading in the markets, different risk taking preference of the market operators like speculators, hedgers, traders, arbitrageurs, etc. resulting in increase in trading volume in the country. They also attract young investors, professionals and other experts who will act as catalysts to the growth of financial markets.

7. Lastly, it is observed that derivatives trading develop the market towards 'complete markets'. Complete market concept refers to that situation where no particular investors be better of than others, or patterns of returns of all additional securities are spanned by the already existing securities in it, or there is no further scope of additional security.

Q5. What are the reasons for the growth of financial derivatives market

Ans : **(May-17, Imp.)**

(i) Price Volatility

A price is what one pays to acquire or use something of value. The objects having value maybe commodities, local currency or foreign currencies. The concept of price is clear to almost everybody when we discuss commodities. There is a price to be paid for the purchase of food grain, oil, petrol, metal, etc. the price one pays for use of a unit of another persons money is called interest rate. And the price one pays in one's own currency for a unit of another currency is called as an exchange rate.

(ii) Globalization of the Markets

Earlier, managers had to deal with domestic economic concerns; what happened in other part of the world was mostly irrelevant. Now globalization has increased the size of markets and as greatly enhanced competition .it has benefited consumers who cannot obtain better quality goods at a lower cost. It has also exposed the modern business to significant risks and, in many cases, led to cut profit margins

(iii) Technological Advances

A significant growth of derivative instruments has been driven by technological break through. Advances in this area include the development of high speed processors, network systems and enhanced method of data entry. Closely related to advances in computer technology are advances in telecommunications. Improvement in communications allow for instantaneous world wide conferencing, Data transmission by satellite. At the same time there were significant advances in software programmed without which computer and telecommunication advances would be meaningless. These facilitated the more rapid movement of information and consequently its instantaneous impact on market price.

(iv) Advances in Financial Theories

Advances in financial theories gave birth to derivatives. Initially forward contracts in its traditional form, was the only hedging tool available. Option pricing models developed by Black and Scholes in 1973 were used to determine prices of call and put options. In late 1970's, work of Lewis Edeington extended the early work of Johnson and started the hedging of financial price risks with financial futures. The work of economic theorists gave rise to new products for risk management which led to the growth of derivatives in financial markets.

1.1.5 Critiques

Q5. What are the Critiques of financial derivatives?

Ans : **(Imp.)**

Besides from the important services provided by the derivatives, some experts have raised doubts and have become critique on the growth of derivatives. They have warned against them and believe that the derivatives will cause to destabilization, volatility, financial excesses and oscillations in financial markets. It is alleged that they assist the speculators in the market to earn lots of money, and hence, these are exotic instruments.

(i) Speculative and gambling motives

One of most important arguments against the derivatives is that they promote speculative activities in the market. It is witnessed from the financial markets throughout the world that the trading volume in derivatives have increased in multiples of the value of the underlying assets and hardly one to two percent derivatives are settled by the actual delivery of the underlying assets. As such speculation has become the primary purpose of the birth, existence and growth of derivatives. Sometimes, these speculative buying and selling by professionals and amateurs adversely affect the genuine producers and distributors.

(ii) Increase in risk

The derivatives are supposed to be efficient tool of risk management in the market. In fact this is also one-sided argument. It has been observed that the derivatives market especially OTC markets, as particularly customized, privately managed and negotiated, and thus, they are highly risky. Empirical studies in this respect have shown that derivatives used by the banks have not resulted in the reduction in risk, and rather these have raised of new types of risk.

(iii) Instability of the financial system

It is argued that derivatives have increased risk not only for their users but also for the whole financial system. The fears of micro and macro financial crisis have caused to the unchecked growth of derivatives which have turned many market players into big losers.

(iv) Price instability

Some experts argue in favour of the derivatives that their major contribution is toward price stability and price discovery in the market whereas some others have doubt about this. Rather they argue that derivatives have caused wild fluctuations in asset prices, and moreover, they have widened the range of such fluctuations in the prices.

(v) Displacement Effect

There is another doubt about the growth of the derivatives that they will reduce the volume of the business in the primary or new issue market specifically for the new and small corporate units. It is apprehension that most of investors will divert to the derivatives markets, raising fresh capital by such units will be difficult, and hence, this will create displacement effect in the financial market. However, it is not so strong argument because there is no such rigid segmentation of investors, and investors behave rationally in the market.

(vi) Increased Regulatory Burden

As pointed earlier that the derivatives create instability in the financial system as a result, there will be more burden on the government or regulatory authorities to control the activities of the traders in financial derivatives. As we see various financial crises and scams in the market from time to time, most of time and energy of the regulatory authorities just spent on to find out new regulatory, supervisory and monitoring tools so that the derivatives do not lead to the fall of the financial system.

In our fast-changing financial services industry, coercive regulations intended to restrict banks' activities will be unable to keep up with financial innovation. As the lines of demarcation between various types of financial service providers continues to blur,

the bureaucratic leviathan responsible for reforming banking regulation must face the fact that fears about derivatives have proved unfounded. New regulations are unnecessary.

Indeed, access to risk-management instruments should not be feared, but with caution, embraced to help the firms to manage the vicissitudes of the market.

Financial derivatives have changed the face of finance by creating new ways to understand, mea-sure and manage risks. Ultimately, financial derivatives should be considered part of any firm's risk-management strategy to ensure that value-enhancing investment opportunities are pursued. The freedom to manage risk effectively must not be taken away.

1.2 History of Derivatives Markets

Q6. Bring out the Historical development of financial derivatives.

Ans :

It is difficult to trace the main origin of futures trading since it is not clearly established as to where and when the first forward market came into existence. Historically, it is evident that the development of futures markets followed the development of forward markets. It is believed that the forward trading has been in existence since 12th century in England and France. Forward trading in rice was started in 17th century in Japan, known as Cho-at-Mai a kind (rice trade-on-book) concentrated around Dojima in Osaka, later on the trade in rice grew with a high degree of standardization. In 1730, this market got official recognition from the Tokugawa Shogurate. As such, the Dojima rice market became the first futures market in the sense that it was registered on organized exchange with the standardized trading norms.

The butter and eggs dealers of Chicago Produce Exchange joined hands in 1898 to form the Chicago Mercantile Exchange for futures trading. The exchange provided a futures market for many commodities including pork bellies (1961), live cattle (1964), live hogs (1966), and feeder cattle (1971). The International Monetary Market was formed as a division of the Chicago Mercantile Exchange in 1972 for futures trading in foreign currencies. In 1982, it introduced a futures contract on the S&P 500 Stock Index. Many other exchanges throughout the world now trade futures contracts. Among them are the Chicago Rice and Cotton Exchange, the New York Futures Exchange, the London International Financial Futures Exchange, the Toronto Futures Exchange and the Singapore International Monetary Exchange. They grew so rapidly that the number of shares underlying the option contracts sold each day exceeded the daily volume of shares traded on the New York Stock Exchange.

The futures industry got a shot in the arm with the establishment of the Chicago Board of Trade in 1848; the Butter and Cheese Exchange of New York was founded in 1872; today's New York Mercantile Exchange (NYMEX) in 1877; London Metal Exchange, Chicago Mercantile Exchange's (CME) predecessor-the Chicago Butter and Egg Board-was founded in 1898 and later it became CME in 1919. But the real action in financial derivatives started with the commencement of trading futures on foreign currency in 1972 at Chicago Mercantile Exchange. With the publication of the Black-Schools option-pricing model in 1973, trading of options became a reality and in 1975, American Stock Exchange and Philadelphia Stock Exchange began trading in options. Quickly interest rate futures in 1976 and stock index futures in 1982 began trading in USA and other western markets.

Derivatives have a fairly long history in India too. The first organized futures market came up in 1875 with the establishment of "Bombay Cotton Trade Association Ltd". Subsequently, many futures exchanges, predominantly commodity-based futures sprang up, viz. "Bombay Cotton Exchange Ltd" in 1893, "Gujarati Vyapari Mandali" in 1900, "Calcutta Hessian Exchange Ltd" in 1919 and most of them did not last till the second world war in 1939. After the country attained independence, derivative markets came through a full circle - from prohibition of all sorts of derivative trades to their recent reintroduction. The chronology of the events is presented below:

- 1952 Enactment of the Forward Contracts (Regulation) Act.
- 1953 Setting up of the Forward Markets Commission.
- 1956 Enactment of SCRA.
- 1969 Prohibition of all forms of forward trading under Section 16 of SCRA.
- 1972 Informal carry forward trades between two settlement cycles began on BSE.
- 1980 Khuso Committee recommends reintroduction of futures in most commodities.
- 1983 Government amends bye-laws of exchanges of Bombay, Calcutta and Ahmedabad and introduced carry forward trading in specified shares.
- 1992 Enactment of the SEBI Act.
- 1993 SEBI prohibits carry forward transactions.
- 1994 Kabra Committee recommends futures trading in nine commodities.
- 1995 G.S. Patel Committee recommends Revised Carry Forward System.
- 1996 Revised system restarted on BSE.
- 1996 SEBI appoints L.C. Gupta Committee to develop regulatory framework for derivatives trading.
- 1997 Varma Committee recommends Modified Carry Forward System.

  Cross-currency derivatives with Indian rupee as one leg were introduced with some restrictions in April 1997 credit policy.
- 1998 Varma Committee to recommend Risk Containment Measures for derivatives trading.
- 1999 Securities Laws (Amendment) Act, 1999 permits legal framework for derivative trading in India.

  Forward Rate agreement and swaps permitted by RBI.
- 2000 Trading in index futures began on BSE and NSE.
- 2001 Trading in options on index and stocks commenced trading on BSE and NSE
- 2002 Trading on single stock futures began on BSE and NSE.
- 2003 Introduction of interest rate futures on NSE.

  Introduction of Rupee of options.

  Futures trading-in permitted on almost all commodities but options on commodities still prohibited.

Commencement of NCDEX and MCX Commodity Exchanges

The Indian financial market woke up to this new generation of financial instruments and the Indian derivatives markets' odyssey in modern times commenced with the forex drivers in 1997 has also seen the introduction of many derivatives on different underlying's. Currently the following contracts are allowed for trading in Indian markets:

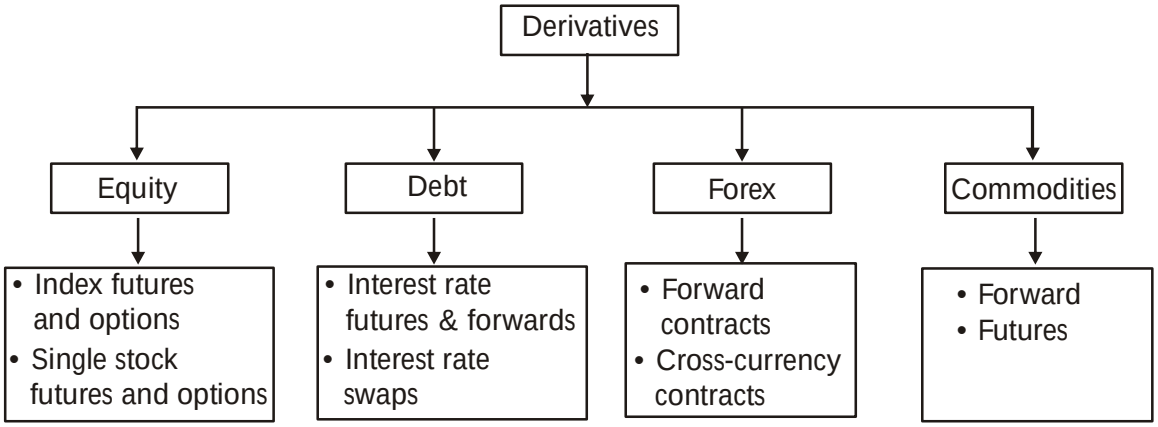


Fig.: Derivatives contracts permitted for trading in India

Also, the following popular contracts are awaiting their turn in Indian markets:

- Foreign currency futures
- Long-term equity options
- Options on interest rates and commodities
- Credit derivatives
- Structured products and some exotic derivatives

1.3 Financial Derivatives Indian Scenario

Q7. Explain the Indian scenario of financial derivatives.

Ans :

The Indian credit and money markets lack the variety and depth of financial instruments that are now in vogue in the actively traded global markets. This situation is gradually changing with current efforts to deregulate the Indian financial markets. An important step in this direction is the recent Government effort to let the market forces determine the cost of funds, based on tenor, liquidity and credit quality of the debt issuer. In the regulated financial market, with minimal difference between short and long term rates, it has been hard to decipher a normally shaped upward sloping yield curve for the rupee, which one usually finds in well developed capital and money markets. At best, it has remained flat. With a flat yield curve, and its stability guaranteed through regulation, it is hard to envisage the development of derivative products for the Indian financial markets. Deregulation and competition will undoubtedly make the capital and financial markets more efficient, resulting in improved cost of funds for firms and the ultimate consumer. This could potentially generate conditions that are ripe for the introduction of derivative products.

While awaiting these developments, India's private and public borrowings abroad, trade oriented payments and receipts, the country's crude oil and other essential imports, and exports of a wide range of agricultural commodities provide the backdrop for an active use of derivative products. The risks arising from the volatility of all these economic variables are hedgeable through derivative structures. The country can profit from the use of derivative products that are now traded in the global markets.

Absence of liquidity: At present, the rupee/rupee swap market extends only up to one year, highlighting the ill-liquidity of this market. Fixed rates are quoted against MIBOR (Mumbai Inter- Bank

Offered Rate) which is set daily. Current MIBOR is around 8 per cent bid-8.20 per cent offered, whereas the one year fixed swap rate is at 8.95 per cent bid/9.25 per cent offered. The current wide spread between bid and offer rates is a sign of ill-liquidity and the primitive nature of Indian rupee swap market. The flip side of this relative backwardness is the great potentials that await this market, once the deregulation process moves forward with full steam.

However, the currency swap markets, in particular the rupee/dollar market, seems to be developing pretty rapidly. At present, there are bid/offer swap quotations available up to five years, with fixed rupee rates quoted against floating dollar LIBOR. There are also recent instances of execution of ten year rupee/dollar swaps.

At present, financial institutions seem to execute a derivative structure only when this almost perfectly matches with an underlying debt or asset. Thus, an Indian corporation with a dollar debt denominated in dollar LIBOR for, say five years, can insure against this floating LIBOR risk by agreeing to pay a fixed rupee rate for five years, via a rupee/dollar currency swap. In the process, the firm will have eliminated the floating LIBOR risk as well as the foreign exchange risk. Likewise commodity exporters can insure against falling prices by buying floors against primary commodities such as cotton, rubber, wheat, rice and spices. It is prudent that the fledgling Indian derivative industry continues to operate with the key constraint that a derivative truly serves as a hedge against a perceived or well-defined risk.

- The Indian credit and money markets lack the variety and depth of financial instruments that are now in vogue in the actively traded global markets.
- Deregulation and competition will undoubtedly make the capital and financial markets more efficient, resulting in improved cost of funds for firms and the ultimate consumer.
- The current wide spread between bid and offer rates is a sign of ill-liquidity and the primitive nature of Indian rupee swap market.
- An Indian corporation with a dollar debt denominated in dollar LIBOR for, say five years, can insure against this floating LIBOR risk by agreeing to pay a fixed rupee rate for five years, via a rupee/dollar currency swap.

1.4 Evolution of Derivatives in India

Q8. Explain briefly the evolution of derivatives in India.

Ans : **(May-16, Imp.)**

Commodities futures trading in India was initiated long back in 1950s, however, the 1960s marked a period of great decline in futures trading. Market after market was closed usually because different commodities' prices increases were attributed to speculation on these markets. Accordingly, the Central Government imposed the ban on trading in derivatives in 1969 under a notification issue. The late 1990s shows this signs of opposite trends–a large scale revival of futures markets in India, and hence, the Central Government revoked the ban on futures trading in October, 1995. The Civil Supplies Ministry agreed in principle for starting of futures trading in Basmati rice, further, in 1996 the Government granted permission to the Indian Pepper and Spice Trade Association to convert its Pepper Futures Exchange into an International Pepper Exchange. As such, on November 17, 1997, India's first international futures exchange at Kochi, known as the India Pepper and Spice Trade Association-International Commodity Exchange (IPSTA-ICE) was established.

Similarly, the Cochin Oil Millers Association, in June 1996, demanded the introduction of futures trading in coconut oils. The Central Minister for Agriculture announced in June 1996 that he was in favour of introduction of futures trading both domestic and international. Further, a new coffee futures exchange (The Coffee Futures Exchange of India) is being started at Bangalore. In August, 1997, the Central Government proposed that Indian companies with commodity price exposures should be allowed to use foreign futures and option markets. The trend is not confined to the commodity markets alone, it has initiated in financial futures too.

The Reserve Bank of India set up the Sodhani Expert Group which recommended major liberalization of the forward exchange market and had urged the setting up of rupee-based derivatives in financial instruments. The RBI accepted several of its recommendations in August, 1996. A landmark step taken in this regard when the Securities and Exchange Board of India (SEBI) appointed a Committee named the Dr. L.C. Gupta Committee (LCGC) by its resolution, dated November 18,1996 in order to develop appropriate regulatory framework for derivatives trading in India. While the Committee's focus was on equity derivatives but it had maintained a broad perspective of derivatives in general.

The Board of SEBI, on May 11,1998, accepted the recommendations of the Dr. L.C. Gupta Committee and approved introduction of derivatives trading in India in the phased manner. The recommendation sequence is stock index futures, index options and options on stocks. The Board also approved the 'Suggestive Bye-Laws' recommended by the Committee for regulation and control of trading and settlement of derivatives contracts in India. Subsequently, the SEBI appointed J.R. Verma Committee to look into the operational aspects of derivatives markets. To remove the road-block of non-recognition of derivatives as securities under Securities Contract Regulation Act, the Securities Law (Amendment) Bill, 1999 was introduced to bring about the much needed changes. Accordingly, in December, 1999, the new framework has been approved and 'Derivatives' have been accorded the status of 'Securities'. However, due to certain completion of formalities, the launch of the Index Futures was delayed by more than two years. In June, 2000, the National Stock Exchange and the Bombay Stock Exchange started stock index based futures trading in India. Further, the growth of this market did not take off as anticipated. This is mainly attributed to the low awareness about the product and mechanism among the market players and investors. The volumes, however, are gradually picking up due to active interest of the institutional investors.

1.5 Benefits of Derivatives

Q9. What are the benefits of derivatives?

(OR)

What are the advantages of financial derivatives?

Ans : **(May-17, May-16)**

(i) Hedging Risk

Derivative contracts are used for hedging risk arising out of fluctuations in price movements. Value of these contracts is dependent upon the value of underlying assets. Investor will purchase those derivative contracts whose value moves opposite to the value of security the investor owns. Therefore, losses in underlying commodities may be offset by profit in contracts of derivatives.

(ii) Determine Underlying Asset Price

Derivatives contracts helps in ascertaining the price of underlying assets. An approximation of commodity prices is known through the spot prices of future contracts.

(iii) Provide Access To Unavailable Market Or Asset

Another important advantage of derivative is that it provides access to unavailable market and assets to peoples. Individuals can acquire funds at lower or favorable rate of interest as compared to direct borrowings with the help of interest rate swaps.

(iv) Enhance Market Efficiency

Derivatives plays an efficient role in improving the financial market's efficiency. These contracts are used for replicating the assets payoff. It enables in getting fair and correct economic value of underlying commodity as these contracts brings price corrections via arbitrage. This way market becomes price efficient and an equilibrium is attained.

(v) Low Transaction Cost

Trading of these instruments involves low transaction cost which is beneficial for

investors. This acts as a risk management tool and a protection against price fluctuations. Cost of trading in derivatives is lower as compared to other securities like shares or debentures.

Q10. What are the disadvantages of financial derivatives?

Ans : **(May-17)**

(i) High Risk

Derivatives contracts are exposed to high degree of risk due to high volatile price of underlying securities. Prices of these underlying securities like shares or metals keeps on changing rapidly as derivatives are mostly traded in open market. This involves a high degree of risk.

(ii) Counter Party Risk

There is a possibility of default on the part of counter-party in case of derivatives traded over the counter due to lack of due diligence process. OTC derivatives as compared to exchange derivatives lacks a benchmark for due diligence.

(iii) Speculative Features

Derivatives are instrument which are used for speculation purpose for earning profits. Sometimes huge losses may occur due to unreasonable speculation as derivatives are of unpredictable and high risky nature.

(vi) Requires Expertise

This is one of the major drawbacks in trading of derivative instruments. Investor's requires high knowledge and expertise for trading in these instruments as compared to other securities likes stocks and metals.

Q11. What are the myths and truths of financial derivatives? Explain.

Ans : **(May-17)**

(i) Myth number 1

"Derivatives are new, complex, high-tech financial products created by Wall Street's rocket scientists"

Financial derivatives are not new; they have been around for years. A description of the first know option contract can be found in Aristotle's writing tells philosopher from Mitetus who developed a financial device, which involves a principal of universal application. People reproved Thales, syning that his lack of wealth was proof that philosophy was a useless occupation and of no practical value. But Thales knew what he was doing and made plans to prove to others his wisdom and intellect.

(ii) Myth number 2

"Derivatives are purely speculative, highly leveraged instrument"

Put another way. This myth is that "derivatives" is a fancy name for gambling. Has speculative trading of derivative products fuelled the rapid growth in their use? Are derivatives used only to specu-late on the direction of interest rates or currency exchange rates? Of course not. Indeed, the explosive use of financial derivative products in recent years was brought about by three primary forces: more volatile markets, deregulation and new technologies.

(iii) Myth number 3

"The enormous size of the financial derivatives market dwarfs bank capital, thereby making derivatives trading an unsafe and unsound banking practice.

(iv) Myth number 4

"Only large multinational corporations and large banks have a purpose for using derivatives''.

(v) Myth number 5

"Financial derivatives are simply the latest risk-management fad".

(vi) Myth number 6

"Derivatives take money out of productive processes and never put anything back"

Financial derivatives, by reducing uncertainties, make it possible for corporations to initiate produc-tive activities that might not otherwise be pursued.

(vii) Myth number 7

"Only risk-seeking organizations should use derivatives"

Financial derivatives can be used in two ways: to hedge against unwanted risks or to speculate by taking a position in anticipation of a market movement. The olive-press owners, by locking in a guaran-teed return no matter how good or bad the harvest, hedged against the risk that the next season's olive harvest might not be plentiful.

(viii) Myth number 8

"The risks associated with financial derivatives are new and unknown"

The kinds of risks associated with derivatives are no different from those associated with traditiona[1] financial instruments.

(ix) Myth number 9

Derivatives Link Market Participants More Tightly Together, thereby Increasing Systemic Risks

Financial derivative participants can be divided into two groups: end-users and dealers. As end-users, banks use derivatives to take positions as part of their proprietary trading or for hedging as part of their asset/ liability management. As dealers, banks use derivatives by quoting bids and offers and committing capital to satisfy customers' needs for managing risk.

(x) Myth number 10

"Because of the risks associated with derivatives, banking regulators should ban their use by any institution covered by federal deposit insurance"

The problem is not derivatives but the perverse incentive banks have under the current system of federal deposit guarantees. Deposit insurance and other deposit reforms were first introduced to address some of the instabilities associated with systemic risk.

1.6 Equity Derivatives

Q12. Explain the concept of Equity Derivatives.

Ans :

Dr. L.C. Gupta Committee considered in its study both types of equity like stock index derivatives and individual stocks derivatives. At the international level, stock index derivative is more popular than the individual stock. The Committee found in its survey that index futures are more preferable than individual stock from the respondents. The order of over-all preference in India as per the survey of the Committee, was as follows:

(i) Stock index futures,

(ii) Stock index options,

(iii) Individual stock options and (iv) Individual stock futures.

Basic reasons for the preference of stock index futures:

Not only in India, in other countries too, stock index futures is most popular financial derivatives due to the following reasons:

1. Institutional investors and other large equity holders prefer the most this instrument in terms of portfolio hedging purpose.
2. Stock index futures are the most cost-efficient hedging device whereas hedging through individual stock futures is costlier as observed in other countries.
3. Stock index futures cannot be easily manipulated whereas individual stock price can be exploited more easily. In India it is rather more easy to play this game as witnessed in the past scams.
4. This is in fact that due to a limited supply of an individual stock, supply can easily be cornered even in large companies in India like Reliance Industries, State Bank of India, etc. The Management of these companies

have complained many times about their share prices being manipulated by some interested parties. On the other hand, the supply of stock index futures is unlimited, and hence, the possibility of cornering is ruled out. Infact, the manipulation of stock index futures can be possible only of the cash prices of each component securities in the index be influenced, which is rare and not so high.

5. It is observed from the experiences of other countries that stock index futures are more liquid, more popular and favourable than individual stock futures. The same is also witnessed by the L.C. Gupta Committee in its survey from the responses of the respondents.

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

7. In case of stock index futures trading, there is always clearing house guarantee, so the chances of the clearing house going to be bankrupt is very rare, and hence, it is less risky.

8. Another important reason is that in case of individual stocks, the outstanding positions are settled normally against physical delivery of the shares. Hence, it is necessary that futures and cash prices remained firmly tied to each other. However, in case of stock index futures, the physical delivery is almost impractical, and they are settled in cash all over the world on the premise that index value, as independently derived from the cash market, is safely accepted as the settlement price.

9. Lastly, it is also seen that regulatory complexity is much less in the case of stock index futures in comparison to other kinds of equity derivatives.

In brief, it is observed that the stock index futures are more safer, popular and attractive derivative instrument than the individuals stock. Even in the US market, the regulatory framework does not allow use of futures on the individual stocks. Further only very few countries of world, say one or two, have futures trading on individual stock.

1.7 Derivatives Trading at NSE and BSE

Q13. Explain the trading mechanism of derivatives at National Stock Exchange (NSE) and Bombay Stock Exchange(BSE).

Ans : **(Imp.)**

The most notable of development in the history of secondary segment of the Indian stock market is the commencement of derivatives trading in June, 2000. The SEBI approved derivatives trading based on futures contracts at National Stock Exchange (NSE) and Bombay Stock Exchange (BSE) in accordance with the rules bye-laws and regulations of the stock exchanges. To begin with, the SEBI permitted equity derivatives named stock index futures. The BSE introduced on 9 June, 2000 stock index futures based on the sensitive Index (also called SENSEX comprising 30 scripts) named BSX, and NSE started on June 12, 2000 stock index future based on its index S&P CNX NIFTY (comprised 50 scripts) in the name of N FUTIDX NIFTY. Further details of these are given in Table.

Table : Salient Features of Index Futures Contracts at BSE and NSE

S.No.	Items	BSE	NSE
1.	Date of introduction	June 9,2000	June 12,2000
2.	Name of security	BSX	N FUTIDX NIFTY
3.	Underlying asset	BSE Sensitive Index (SENSEX)	S&P CNX NIFTY
4.	Contract size	Sensex value x 50	200 or multiples of 200
5.	Tick size/Price step	0.1 point of Sensex (equivalent to Rs 5)	Rs 0.05
6.	Minimum price fluctuations	Rs 5	Not applicable
7.	Price bands	NA	NA
8.	Expiration months	3-near months	3-near months
9.	Trading cycle	A maximum of 3 months; the near month (1), the next month (2) and the a month (3)	As in previous column
10.	Last trading/Expiry day	Last Thursday of the month or the preceding day	As in previous column
11.	Settlement	In cash on T+1 has	As in previous column
12.	Final settlement price	Index closing price on the last trading day (a)	Index closing price on the 1 st trading day (s)
13.	Daily settlement price	Closing of futures contract (a)(a)	Closing of future contract
14.	Trading hours	9.30 am to 3.30 pm	
15.	Margin	Upfront margin on daily basis	As in previous column

(a) Computed on the basis of the weighted average of last 15 minutes trading.

(b) Computed on the basis of weighted average of the last 5 minutes, or if the no, of weighted average of last 5 trades.

(c) Weighted average price for the last half an hour's trade.

In India, stock index futures are available for one-month, two-month and three-month maturities. All the open positions in these contracts are settled daily. Further, the buyers and sellers are required to deposit margin with the respective stock exchanges determined as per the SEBI guidelines. To facilitate the effective risk management in the derivatives segment, all the important measures like minimum the worth requirement for the broker, determination of margin based on value at risk model, position limit for various participants, mechanism for collection and enforcement of margin, etc. have been put in place. Subsequently, the derivative products range had been increased by including options and futures on the indices and on several highly traded stocks. In an estimate, the product wise turnover of derivatives or. The Indian stock markets as on July 6, 2002 is stock futures (50%), index futures (21%), stock option; (25%) and index option (4%). It means stock futures are most popular derivative traded at the stock market of India.

During the last decade, to make stock market functioning effective for futures trading, the SEBI has adopted several internationally tested and accepted mechanism for implementation at the Indian stock exchanges. For this, proper surveillance and risk containment like the circuit breaker, price bands, value at risk (VaR) based margin collections, etc. have been introduced.

The SEBI set up a 'Technical Group' headed by Prof. J.R. Verma to prescribe risk containment measures for new derivative products. The group recommended the introduction of exchange traded options on Indices which is also conformity with the sequence of introduction of derivatives products recommended by Dr. L.C. Gupta Committee.

The Technical Group has recommended the risk containment measure for exchange traded options on indices. The following are the important features of the risk containment framework for the trading and settlement of both index futures and index option contracts:

1. European style index options will be permitted initially. These will be settled in cash.
2. Index option contracts will have a minimum contract size of Rs 2 lakh, at the time of its introduction.
3. The risk containment measures described here under are only for premium style European option.
4. Index option contract will have a maximum maturity of 12 months and a minimum of three strikes, i.e., in the money, at the money and out of the money.
5. A portfolio based margining approach, which would take an integrated view of the risk involved in the portfolio of individual client will be adopted. It is for the first time that such an approach is introduced in the Indian stock market. It is inconsistent with the practices followed in the countries. This approach will not only cover the risk but also help in reducing the transaction costs in derivatives.
6. The initial margin requirements will be based on worst case loss of a portfolio of an individual client to cover a 99% value at risk (Va) over a one day horizon. The initial margin requirement will be netted at level of individual client and it will be on gross basis at the level of Trading/Clearing member. Further, the initial margin requirement for the proprietary position of Trading/Clearing member will also be on net basis.
7. The short option minimum margin equal to 30% of the Notional value of all short index option will be charged if sum of the worst scenario loss and the calendar spread margin is lower than the short option minimums margin.
8. Net option value will be calculated on the current market value of the option times the number of options (positive for long options and negative for short options) in the portfolio. The net option value will be added to the Liquid Net Worth of the clearing member.
9. For option positions, the premium will be paid in by the buyer in cash and paid out to the seller in cash on $T + 1$ day until the buyer pays in the premium due shall be deducted from the available Liquid Net Worth on a real time basis. In case of index futures contracts, the mark-to-market gains losses for index futures position will continue to be settled.

SEBI's technical group on new derivative products has recently examined this issue and recommended the following measures for the development of derivatives market:

1. The system of sub-brokers be used for increasing the volume of trading in this market.
2. Financial institutions and mutual funds be permitted to sell short in the cash market for facilitating the free arbitrage between cash and derivatives market. However, such short sale may be restricted to the extent of corresponding exposure in the derivative market.
3. Arbitrage between cash and derivatives markets will assist in better price discovery in both the markets.

1.8 Emerging Structure of Derivatives Markets in India

Q14. Bring out the Emerging Structure of Derivatives Markets in India

Ans :

Derivatives markets in India can be broadly categorized into two markets namely; financial derivatives markets and commodities futures markets. Financial derivatives markets deal with the financial future-instruments like stock futures, index futures, stock options, index options, interest rate futures, currency forwards and futures, financial swaps, etc. whereas commodity futures markets deal with commodity instruments like agricultural products; food grains, cotton and oil; metals like gold, silver, copper and steel and other assets like live stocks, vegetables and so on.

Financial derivatives markets in India are regulated and controlled by the Securities and Exchange Board of India (SEBI). The SEBI is authorized under the SEBI Act to frame rules and regulations for financial futures trading on the stock exchanges with the objective to protect the interest of the investors in the market. Further carry forward trading (Badla trading) is also regulated by the SEBI which is traded on the stock exchanges.

Some of the other financial derivatives like currency options and futures and interest rate futures are controlled by the Reserve Bank of India (RBI). These are dealt on Over-the-Counter (OTC) markets. Financial futures on interest rate include both short-term interest rate and long-term interest rate for wards. Currencies include options and forwards. Since the RBI is the apex body to regulate currencies and interest rates in India, hence, financial derivatives relating to foreign currencies and interest rates are generally come under the RBI regulation.

Major stock exchanges in India, under the regulation of the SEBI, trade in two kinds of futures products, namely equity and carry forwards. Equity futures include stock futures, index futures, stock options and index options. Currently these are traded on National Stock Exchange and Bombay Stock Exchange. Examples of such companies on which options and futures are available, e.g. ACC, SBI. CIPLA, HPCL, TELCO, GRASIM, Dr. Reddy Lab, HLL, HDFC, Hero Honda, etc.

Commodity futures markets are regulated in India by Forward Market Commission (FMC). The Commission is entrusted with to regulate commodities futures trading in India. Products like Hessian. potatoes, pepper, cotton, etc. are traded on Coimbotore Commodity Exchange and Calcutta Commodity Exchange. Recently the Central Government has allowed futures trading on 54 new commodities of different categories to be eligible for trading on exchanges.

The future of derivatives trading in India is bright and growing day by day. More new products and instruments are coming up to be traded on stock and commodity exchanges. Very soon we will have trading on interest rate futures on NSE and BSE.

Q15. What are the challenges faced by derivatives in India?

Ans : **(Imp.)**

The following are the challenges faced by Indian Commodity Markets currently. These are explained and also the conclusion is provided at the end of it:

(i) Legal challenges

(ii) Regulatory challenges

(iii) Infrastructural challenges

(i) Legal Challenges

Right from the beginning of commodity markets there has been several bottlenecks regarding the products being in the essential commodities list because of which they often get banned. Also there were times when because of hoarding and black marketing there were famines for a very long time, so the market needed an efficient regulator which lead to the formation of FMC. Moreover, many efficient institutions like

banks and mutual funds are not allowed to participate in commodity markets. Also weather and rainfall indexes are also banned from trading on the commodity exchanges because of the clauses of the Banking regulations act, which defines that anything that could be obtained in physical form only can be traded at the exchanges. These inefficiencies must be eradicated by amending these cats. Several amendments have been introduced in these acts and also accepted by the government but only some of them have been passed. Rests are in the queue. Let's have a look at those amendments:

Forwards contracts (Regulation) Amendment Act, 2010

Under the existing FCRA, hedging products like options, indices and weather derivatives, which can be tailored to the risk appetite of hedgers, are currently not permissible. This leaves less scope for innovation. On the regulatory front, the current law leaves the market regulator,

FMC dependent on the government financially and for day-to-day operations. This lack of autonomy does not render enough teeth to the regulator of the commodity derivatives markets a phenomenon quite unlike than that of the regulators of the equity markets (SEBI) or insurance (IRDA).

As is evident in the rapid growth and overall size of the commodity derivatives market in India, participants use sophisticated trading systems and world-class technology. In this context, the regulatory system too needs a major upgrade to keep up with its regulated entities. Thus, a stronger and autonomous regulatory body is required to properly to develop strong monitoring systems to oversee the regulated entities on a real-time basis. FMC is short on human and technological resources, and needs to ramp up its capacity. It needs powers and autonomy equivalent to its capital market counterpart, the SEBI, to fulfill this role.

The FMC needs to operate under a regulatory framework that enables it to:

- Protect market integrity.
- To preserve the economic functions of the commodity markets to shift commercial price risk and aid in price discovery.
- Ensure market fairness.
- Ensure financial safety and soundness by guarding against systemic risk.
- Key component required for the development of commodities market in India is the infrastructure. Though there are number of exchanges in India, they lack in infrastructure exception to a few large exchanges like National Commodity Derivatives Exchange (NCDEX) and Multi Commodity Exchange (MCX). Infrastructure requirements like warehousing facilities, clearing house and modem trading ring are absent in majority of the exchanges.

The Standing Committee on Food, Consumer Affairs and Public Distribution, chaired by Vilas Muttemwar, submitted its report on FCRA Bill, which was introduced in the Lok Sabha in December 2010.

Objectives of the FCR) Amendment Bill 2010

The main objectives of the FCR Amendment Bill 2010 are as follows:

(i) Strengthening of the regulatory framework including enforcement and penal provisions for the commodity derivatives markets.

(ii) Functional and Financial Autonomy for the market regulator, the Forward Markets Commission (FMC) to better regulate the commodity derivatives market.

(iii) Permitting new products, viz., options in the commodity derivative market which are more suitable for participants like farmers to cover their price-risks.

(ii) Regulatory Challenges

The Regulator As the market activity pick-up and the volumes rise, the market will definitely need a strong and independent regular; similar to the Securities and Exchange Board of India (SEBI) that regulates the securities markets. Unlike SEBI which is an independent body, the Forwards Markets Commission (FMC) is under the Department of Consumer Affairs (Ministry of Consumer Affairs, Food and Public Distribution) and depends on it for funds. It is imperative that the Government should grant more powers to the FMC to ensure

an orderly development of the commodity markets. The SEBI and FMC also need to work closely with each other due to the inter- relationship between the two markets.

(iii) Infrastructural Challenges

(a) The Warehousing and Standardization : For commodity derivatives market to work efficiently, it is necessary to have a sophisticated, cost-effective, reliable and convenient warehousing system in the country., "A sophisticated warehousing industry has yet to come about".

Further, independent labs or quality testing centers should be set up in each region to certify the quality, grade and quantity of commodities so that they are appropriately standardized and there are no shocks waiting for the ultimate buyer who takes the physical delivery. Warehouses also need to be conveniently located.

Central Warehousing Corporation of India is operating 500 Warehouses across the country with a storage capacity of 10.4 million tonnes. This is obviously not adequate for a vast country. To resolve the problem, a Gramin Bhandaran Yojana (Rural Warehousing Plan) has been introduced to construct new and expand the existing rural godowns. Large scale privatization of state warehouses is also being examined.

(b) Cash versus Physical Settlement : It is probably due to the inefficiencies in the present warehousing system that only about 1% to 5% of the total commodity derivatives trade in the country is settled in physical delivery. Therefore the warehousing problem obviously has to be handled on a war footing, as a good delivery system is the backbone of any commodity trade. A particularly difficult problem in cash settlement of commodity derivative contracts is that at present, under the Forward Contracts (Regulation) Act 1952, cash settlement of outstanding contracts at maturity is not allowed.

(c) Lack of Economy of Scale : There are too many (3 national level and 21 regional) commodity exchanges. Though over 80 commodities are allowed for derivatives trading, in practice derivatives are popular for only a few commodities. Again, most of the trade takes place only on a few exchanges. All this splits volumes and makes some exchanges unviable. This problem can possibly be addressed by consolidating some exchanges. Also, the question of convergence of securities and commodities derivatives markets has been debated for a long time now.

The Government of India has announced its intention to integrate the two markets. It is felt that convergence of these derivative markets would bring in economies of scale and scope without having to duplicate the efforts, thereby giving a boost to the growth of commodity derivatives market. It would also help in resolving some of the issues concerning regulation of the derivative markets.

Short Question and Answers

1. What is a Financial Derivative?

Ans :

Introduction

The past decade has witnessed the multiple growth in the volume of international trade and business due to the wave of globalization and liberalization all over the world. As a result, the demand for the international money and financial instruments increased significantly at the global level. In this respect, changes in the interest rates, exchange rates and stock market prices at the different financial markets have increased the financial risks to the corporate world. Adverse changes have even threatened the very survival of the business world. It is, therefore, to manage such risks, the new financial instruments have been developed in the financial markets, which are also popularly known as financial derivatives.

The basic purpose of these instruments is to provide commitments to prices for future dates for giving protection against adverse movements in future prices, in order to reduce the extent of financial risks. Not only this, they also provide opportunities to earn profit for those persons who are ready to go for higher risks. In other words, these instruments, indeed, facilitate to transfer the risk from those who wish to avoid it to those who are willing to accept the same.

Today, the financial derivatives have become increasingly popular and most commonly used in the world of finance. This has grown with so phenomenal speed all over the world that now it is called as the derivatives revolution. In an estimate, the present annual trading volume of derivative markets has crossed US $ 30,000 billion, representing more than 100 times gross domestic product of India.

A derivative is a financial contract or an instrument whose returns and values are derived from the value and the performance of some underlying asset. Derivatives are basically classified into options, futures, swaps and forwards.

A forward contract is one of the primary derivative contracts used by many individuals and companies to manage and reduce various risks faced by individuals or firms. Whereas in futures contract, two parties with mutual understanding enters into an agreement, one party agrees to buy while the other party agrees to sell, at a future date for a certain price.

Meaning

The term "Derivative" indicates that it has no independent value, i.e., its value is entirely derived from the value of the underlying asset. The underlying asset can be securities, commodities, bullion, currency, livestock or anything else. In other words, derivative means forward, futures, option or any other hybrid contract of predetermined fixed duration, linked for the purpose of contract fulfillment to the value of a specified real or financial asset or to an index of securities.

2. What are the reasons for the growth of financial derivatives market

Ans :

(i) Price Volatility

A price is what one pays to acquire or use something of value. The objects having value maybe commodities, local currency or foreign currencies. The concept of price is clear to almost everybody when we discuss commodities. There is a price to be paid for the purchase of food grain, oil, petrol, metal, etc. the price one pays for use of a unit of another persons money is called interest rate. And the price one pays in one's own currency for a unit of another currency is called as an exchange rate.

(ii) Globalization of the Markets

Earlier, managers had to deal with domestic economic concerns; what happened in other part of the world was mostly irrelevant. Now globalization has increased the size of markets and as greatly enhanced competition .it has benefited consumers who cannot obtain

better quality goods at a lower cost. It has also exposed the modern business to significant risks and, in many cases, led to cut profit margins

(iii) Technological Advances

A significant growth of derivative instruments has been driven by technological break through. Advances in this area include the development of high speed processors, network systems and enhanced method of data entry. Closely related to advances in computer technology are advances in telecommunications. Improvement in communications allow for instantaneous world wide conferencing, Data transmission by satellite. At the same time there were significant advances in software programmed without which computer and telecommunication advances would be meaningless. These facilitated the more rapid movement of information and consequently its instantaneous impact on market price.

(iv) Advances in Financial Theories

Advances in financial theories gave birth to derivatives. Initially forward contracts in its traditional form, was the only hedging tool available. Option pricing models developed by Black and Scholes in 1973 were used to determine prices of call and put options. In late 1970's, work of Lewis Edeington extended the early work of Johnson and started the hedging of financial price risks with financial futures. The work of economic theorists gave rise to new products for risk management which led to the growth of derivatives in financial markets.

3. What are the important features of financial derivaties?

Ans :

A financial derivative is a financial instruments whose value is derived from the value of an underlysing asset, hence, the name 'derivative' came into existence.

1. A derivative instrument relates to the future contract between two parties. It means there must be a contract-binding on the underlying parties and the same to be fulfilled in future. The future period may be short or long depending upon the nature of contract. **For example,** short term interest rate futures and long term interest rate futures contract.

2. Normally, the derivative instruments have the value which derived from the values of other underlying assets, such as agricultural commodities, metals, financial assets, intangible assets, etc. Value of derivatives depends upon the value of underlying instrument and which changes as per the changes in the underlying assets, and sometimes, it may be nil or zero. Hence, they are closely related.

3. In general, the counter parties have specified obligation under the derivative contract. Obviously, the nature of the obligation would be different as per the type of the instrument of a derivative. For example, the obligation of the counter parties, under the different derivatives, such as forward contract, future contract, option contract and swap contract would be different.

4. The derivatives contracts can be undertaken directly between the two parties or through the particular exchange like financial futures contracts. The exchange-traded derivatives are quite liquid and have low transaction costs in comparison to tailor-made contracts. Example of ex-change traded derivatives are Dow Jons, S&P 500, Nikki 225, NIFTY option, S&P Junior that are traded on New York Stock Exchange, Tokyo Stock Exchange, National Stock Exchange, Bombay Stock Exchange and so on.

5. In general, the financial derivatives are carried off-balance sheet. The size of the derivative contract depends upon its notional amount. The notional amount is the amount used to calculate the pay off. For instance, in the option contract, the potential loss and potential pay off, both may be different from the value of underlying shares, because the payoff of derivative products differ from the payoff that their notional amount might suggest.

4. Forward contracts

Ans :

A forward contract is a simple customized contract between two parties to buy or sell an asset at a certain time in the future for a certain price. Unlike future contracts, they are not traded on an exchange, rather traded in the over-the-counter market, usually between two financial institutions or between a financial institution and one of its client.

The basic features of a forward contract are given in brief here as under:

(i) Forward contracts are bilateral contracts, and hence, they are exposed to counter-party risk. There is risk of non-performance of obligation either of the parties, so these are riskier than to futures contracts.

(ii) Each contract is custom designed, and hence, is unique in terms of contract size, expiration date, the asset type, quality, etc.

(iii) In forward contract, one of the parties takes a long position by agreeing to buy the asset at a certain specified future date. The other party assumes a short position by agreeing to sell the same asset at the same date for the same specified price. A party with no obligation offsetting the forward contract is said to have an open position. A party with a closed position is, sometimes, called a hedger.

(iv) The specified price in a forward contract is referred to as the delivery price. The forward price for a particular forward contract at a particular time is the delivery price that would apply if the contract were entered into at that tirne. It is important to differentiate between the forward price and the delivery price. Both are equal at the time the contract is entered into. However, as time passes, the forward price is likely to change whereas the delivery price remains the same.

(v) In the forward contract, derivative assets can often be contracted from the combination of under-lying assets, such assets are oftenly known as synthetic assets in the forward market.

5. Futures

Ans :

Like a forward contract, a futures contract is an agreement between two parties to buy or sell a specified quantity of an asset at a specified price and at a specified time and place. Futures contracts are normally traded on an exchange which sets the certain standardized norms for trading in the futures contracts.

The futures contracts have following features in brief :

(i) Standardization

One of the most important features of futures contract is that the contract has certain standardized specification, i.e., quantity of the asset, quality of the asset, the date and month of delivery, the units of price quotation, location of settlement, etc.

For example, the largest exchange on which futures contracts are traded are the Chicago Board of Trade (CBOT) and the Chicago Mercantile Exchange (CME). They specify about each term of the futures contract.

(ii) Clearing house

In the futures contract, the exchange clearing house is an adjunct of the exchange and acts as an intermediary or middleman in futures. It gives the guarantee for the performance of the parties to each transaction. The clearing house has a number of members all of which have offices near to the clearing house. Thus, the clearing house is the counter party to every contract.

(iii) Settlement price

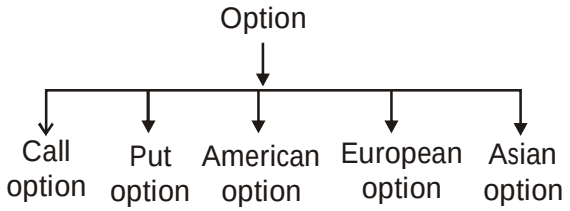
Since the futures contracts are performed through a particular exchange, so at the close of the day of trading, each contract is marked-to-market. For this the exchange establishes a settlement price. This settlement price is used to compute the profit or loss on each contract for that day. Accordingly, the members accounts are credited or debited.

6. Options Contracts

Ans :

An option is a contract between two parties, i.e., between the buyer and the seller. The option contract gives the option holder (Buyer) the right to buy or sell or enter into transaction with the other party (option seller or writer), but are not in an obligation to do so. The purchase and sale of things are to be done at a future date for a price agreed on a present day, at the time of entering the contract.

The option buyer or buyer gives the seller an amount of money called as price or premium, for which the seller is ready to sell as per the terms of the contract or on the will of the buyer. Basically there are about five types of options



(i) Call Option

A call option is a contract that gives an option or right to the buyer (owner) to purchase an underlying asset at a predetermined and agreed fixed price, on or prior to a specific day. The buyer has a right but not an obligation to buy the asset.

On the other hand, the seller is under an obligation to complete the contract by providing or delivering the underlying asset on the date and time, as agreed between the buyer and the seller. Thus, in a call option the buyer is given the right to buy and seller comes under the obligation to sell the asset. The price fixed for an option is called as strike price or exercise price and denominated in terms of alphabet.

(ii) Put Option

A put option is a contract that provides the right to sell an underlying asset to the buyer, for a particular price and on a specified date. Here the buyer is under an obligation to purchase the asset and the owner has the right to sell the asset.

(iii) American Option

In American option the holder of the instrument can exercise the option at any time (on or before the date of maturity).

(iv) European Option

In European option the owner can exercise the option only at the time of expiration of the contract.

7. Swap contracts

Ans :

A swap is a contract wherein currencies are exchanged between two parties, it is an exchange of payments or cash flows at a future date. It is defined in the following ways.

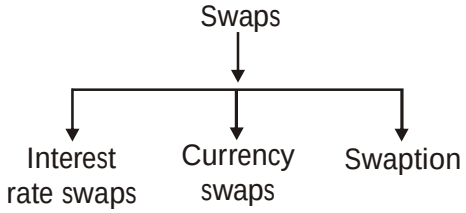
(i) If refers to trading between two parties for the exchange of payments or cash flows.

(ii) It is an agreement between two persons to exchange interest amounts for a specified maturity date and for an agreed price.

(iii) Exchange of one interest payment for another.

For example, fixed or floating interest payments

Types of Swaps



(i) Interest Rate Swaps

If the terms of contract say that only interest payments are to be exchanged and not the principal or base amount, then it is called as interest rate swaps.

(ii) Currency Swaps

Currency swaps refer to an agreement between two parties by exchanging principal and interest amount of one currency with the

other currency, for a predetermined period of time. As the exchange takes place between different countries, it is referred to as foreign exchange agreement and is also called as cross currency swap.

(iii) Swaption

A swaption is a contract in which a party acquires an option to enter into a swap agreement. The buyer of the swaption has the right to enter into a swap agreement on the predetermined terms by some specified date in future.

8. What are the Critiques of financial derivatives?

Ans :

Besides from the important services provided by the derivatives, some experts have raised doubts and have become critique on the growth of derivatives. They have warned against them and believe that the derivatives will cause to destabilization, volatility, financial excesses and oscillations in financial markets. It is alleged that they assist the speculators in the market to earn lots of money, and hence, these are exotic instruments.

(i) Speculative and gambling motives

One of most important arguments against the derivatives is that they promote speculative activities in the market. It is witnessed from the financial markets throughout the world that the trading volume in derivatives have increased in multiples of the value of the underlying assets and hardly one to two percent derivatives are settled by the actual delivery of the underlying assets. As such speculation has become the primary purpose of the birth, existence and growth of derivatives. Sometimes, these speculative buying and selling by professionals and amateurs adversely affect the genuine producers and distributors.

(ii) Increase in risk

The derivatives are supposed to be efficient tool of risk management in the market. In fact this is also one-sided argument. It has been observed that the derivatives market especially OTC markets, as particularly customized, privately managed and negotiated, and thus, they are highly risky. Empirical studies in this respect have shown that derivatives used by the banks have not resulted in the reduction in risk, and rather these have raised of new types of risk.

(iii) Instability of the financial system

It is argued that derivatives have increased risk not only for their users but also for the whole financial system. The fears of micro and macro financial crisis have caused to the unchecked growth of derivatives which have turned many market players into big losers.

(iv) Price instability

Some experts argue in favour of the derivatives that their major contribution is toward price stability and price discovery in the market whereas some others have doubt about this. Rather they argue that derivatives have caused wild fluctuations in asset prices, and moreover, they have widened the range of such fluctuations in the prices.

9. What are the benefits of derivatives?

Ans :

(i) Hedging Risk

Derivative contracts are used for hedging risk arising out of fluctuations in price movements. Value of these contracts is dependent upon the value of underlying assets. Investor will purchase those derivative contracts whose value moves opposite to the value of security the investor owns. Therefore, losses in underlying commodities may be offset by profit in contracts of derivatives.

(ii) Determine Underlying Asset Price

Derivatives contracts helps in ascertaining the price of underlying assets. An approximation of commodity prices is known through the spot prices of future contracts.

(iii) Provide Access To Unavailable Market Or Asset

Another important advantage of derivative is that it provides access to unavailable market

and assets to peoples. Individuals can acquire funds at lower or favorable rate of interest as compared to direct borrowings with the help of interest rate swaps.

(iv) Enhance Market Efficiency

Derivatives plays an efficient role in improving the financial market's efficiency. These contracts are used for replicating the assets payoff. It enables in getting fair and correct economic value of underlying commodity as these contracts brings price corrections via arbitrage. This way market becomes price efficient and an equilibrium is attained.

10. What are the disadvantages of financial derivatives?

Ans :

(i) High Risk

Derivatives contracts are exposed to high degree of risk due to high volatile price of underlying securities. Prices of these underlying securities like shares or metals keeps on changing rapidly as derivatives are mostly traded in open market. This involves a high degree of risk.

(ii) Counter Party Risk

There is a possibility of default on the part of counter-party in case of derivatives traded over the counter due to lack of due diligence process. OTC derivatives as compared to exchange derivatives lacks a benchmark for due diligence.

(iii) Speculative Features

Derivatives are instrument which are used for speculation purpose for earning profits. Sometimes huge losses may occur due to unreasonable speculation as derivatives are of unpredictable and high risky nature.

(vi) Requires Expertise

This is one of the major drawbacks in trading of derivative instruments. Investor's requires high knowledge and expertise for trading in these instruments as compared to other securities likes stocks and metals.

Choose the Correct Answer

1. The payoffs for financial derivatives are linked to [c]
   (a) Securities that will be issued in the future
   (b) The volatility of interest rates.
   (c) Previously issued securities.
   (d) Government regulations specifying allowable rates of return.
2. Financial derivatives include [c]
   (a) Stocks (b) Bonds
   (c) Futures (d) None of the above
3. Financial derivatives include [c]
   (a) Stocks (b) Bonds
   (c) Forward contracts (d) Both (a) and (b) are true
4. Which of the following is not a financial derivative? [a]
   (a) Stock (b) Futures
   (c) Options (d) Forward contracts
5. A contract that requires the investor to buy securities on a future date is called a _____ . [b]
   (a) Short contract (b) long contract
   (c) Hedge (d) Cross
6. A long contract requires that the investor [b]
   (a) Sell securities in the future (b) Buy securities in the future
   (c) Hedge in the future (d) Close out his position in the future
7. A person who agrees to buy an asset at a future date has gone [a]
   (a) Long (b) Short
   (c) back (d) Ahead
8. This option is also referred to as an [a]
   (a) Average option (b) Relative value
   (c) Average value (d) None
9. What are the type of Swap's [d]
   (a) Interest rate swaps (b) Currency swaps
   (c) Swaption (d) All the three
10. Derivative contracts permitted for trading in India [c]
   (a) Equity (b) Debts
   (c) Forwards (d) None

11. The following popular contracts are waiting their turn in Indian markets [b]
    (a) Foreign currency futures (b) Long-term equity option
    (c) None (d) Credit derivatives
12. Commodities futures trading in India was intiated long back in [a]
    (a) 1950's (b) 1952
    (c) 1980's (d) 1956
13. Salient features of Index futures contracts at BSE & NSE [b]
    (a) Data of introduction (b) Name of seventy
    (c) June 9,2000 (d) As previous column
14. Challenges forced by Derivative in India [a]
    (a) Legal challenges (b) Amendment Act 2010
    (c) FMC (d) SEBI
15. NSE asked SEBI for permission trade futures [a]
    (a) 14 Dec. 1995 (b) 18 Nov. 1996
    (c) 11 May 1998 (d) 9 June 2000
16. Swap is a contract where in currencies are exchanged between [b]
    (a) One parties (b) Two parties
    (c) Three parties (d) Many parties
17. ETD means [a]
    (a) Exchange traded derivative (b) Exchange trade direction
    (c) Exchange trade department (d) Exchange trade decisions

Fill in the blanks

1. The term _____ indicates that it has no independent value, i.e., its value is entirely derived from the value of the underlying asset.
2. A _____ which derives its value from the prices, or index of prices of underlying securities.
3. A derivative instrument relates to the future contract between _____ parties.
4. The size of the derivative contract depends upon its _____ amount.
5. A _____ contract is a simple customized contract between two parties to buy or sell an asset at a certain time in the future for a certain price.
6. _____ contracts are normally traded on an exchange which sets the certain standardized norms for trading in the futures contracts.
7. CBOT stands for _____ .
8. The option buyer or buyer gives the seller an amount of money called as _____ or _____ ,
9. A _____ option is a contract that provides the right to sell an underlying asset to the buyer.
10. In _____ option the holder of the instruments exercise the option at any time
11. In _____ option the owner can exercise the option only at the time of expiration of the contract.
12. A _____ is a contract where in currencies are exchanged between two parties, it is an exchange of payments or cash flows at a future date.
13. _____ swaps refer to an agreement between two parties by exchanging principal and interest amount of one currency with the other currency.
14. A _____ is a contract in which a party acquires an option to enter into a swap agreement.
15. A _____ is what one pays acquire or use something of value.
16. Derivatives are purely _____ , highly leveraged instruments.
17. _____ derivatives are simply the latest risk management fad.
18. _____ Committee considered in its study both types of equity like stock index derivatives and individual stocks derivatives.
19. NSE stands for _____ .
20. BSE stands for _____ .
21. OTC stands for _____ .
22. Commodity futures markets are regulated in India by _____ .
23. FCRA stands for _____ .
24. _____ Corporation of India is operating 500 Warehouses across the country with a storage capacity of 10.4 million tones.
25. Financial derivatives markets in India are regulated and controlled by the _____ .

ANSWERS

1. Derivative
2. Contract
3. Two
4. National
5. Forward
6. Futures
7. Chicago Board of Trade
8. Price, Premium
9. Put
10. American
11. European
12. Swap
13. Currency
14. Swaption
15. Price
16. Speculative
17. Financial
18. Dr. L.C. Gupta
19. National Stock Exchange
20. Bombay Stock Exchange
21. Over-the-Counter market
22. Forward Market Commission
23. Forward Contracts Regulation Amendment Act
24. Central Warehousing
25. Securities and Exchange Board of India

UNIT II

FORWARDS AND FUTURES

Forwards and Futures: Meaning - Distinction between Forwards and Futures Contracts - Future Terminology and Types of Financial Future Contracts - Future Payoffs - Operation of Traders in Futures Market - Growth of Futures Market in India - Futures Market Trading Mechanism - Forward Market Trading Mechanism - Forward Prices Vs. Future Prices - Determination of Future Prices of Specific Assets - Futures on Commodities - Theory of Futures Prices - Recommendations of L.C Gupta Committee (Theory)

2.1 FORWARDS

2.1.1 Meaning

Q1. What is a Forward contract ?

(OR)

Define the forward contract.

Ans : **(May-16)**

Introduction

Forwards are the oldest of all derivatives. It is an agreement between two parties to buy or sell an asset at a certain date in future at a predetermined price. The promised asset may be currency, commodity, instrument like shares / debentures etc.

Forward contracts are normally traded outside stock exchanges. They are popular on the over the counter market. In a forward contract, the party who promises to buy the specified asset at an agreed price at a future date is said to be in the 'long position' and party who promises to sell is said to be in 'short position'. Thus, long position and short position takes the form of buy and sell in a forward contract.

Meaning

Forward contract is a simple form of financial derivative instruments. It is an agreement to buy or sell a specified quantity of an asset at a certain future date for a certain price agreed upon now. In a forward contract, two parties agree to do a trade at some future date at a stated price and quantity. No money changes at the time the deal is signed. However unlike futures contracts, they are not traded on an exchange. They are private contracts between two parties which may be between financial institutions, between a financial institution and one of its corporate client, etc. Further, these contracts differ from 'cash' or 'spot' contracts where delivery is made immediate within a short settlement period. Most of the forward contracts are traded on the over-the-counter (OTC) market or by telephones. Honouring the contract is made generally by taking and giving delivery and counter parties risk depends on the counter party only.

At the time the forward contract is written, a specified price is fixed at which the asset is purchased or sold. This specified price is referred to as the delivery price. This delivery price is set such that the value of the forward contract is zero at the time of its formation. This means that it costs nothing to take either a long (buyer) or a short (seller) position. This is done by convention so that no cash is exchanged between the parties entering into the contracts. In this way, the delivery price yields a 'fair' price for the future delivery of the underlying asset. One of the parties to a forward contract agrees to buy the underlying asset is said to have a 'long' position. On the other hand, the party that agrees to sell the same underlying asset is said to have a 'short' position.

Q2. Discuss the features of forward contract.

(OR)

What are the features of forward contract ?

Ans :

Features

(i) It is an agreement between the two counter parties in which one is buyer and other is seller. All the terms are mutually agreed upon

by the counterparties at the time of the formation of the forward contract.

(ii) It specifies a quantity and type of the asset (commodity or security) to be sold and purchased.

(iii) It specifies the future date at which the delivery and payment are to be made.

(iv) It specifies a price at which the payment is to be made by the seller to the buyer. The price is determined presently to be paid in future.

(v) It obligates the seller to deliver the asset and also obligates the buyer to buy the asset.

(vi) No money changes hands until the delivery date reaches, except for a small service fee, if there is.

2.1.2 Forward Market Trading Mechanism

Q3. Discuss the trading mechanism of forward market.

Ans :

Forward contracts are very much popular in foreign exchange markets to hedge the foreign currency risks. Most of the large and international banks have a separate 'Forward Desk' within their foreign exchange trading room which are devoted to the trading of forward contracts.

Let us take an example to explain the forward contract.

(i) Long position

The party who agrees to buy in the future is said to hold long position. For example, in the earlier case, the bank has taken a long position agreeing to buy 3-month dollar in futures.

(ii) Short position

The party who agrees to sell in the future holds a short position in the contract. In the previous example, UK MNC has taken a short position by selling the dollar to the bank for a 3-month future.

(iii) The underlying asset

It means any asset in the form of commodity, security or currency that will be bought and sold when the contract expires, e.g., in the earlier example US dollar is the underlying asset which is sold and purchased in future.

(iv) Spot-price

This refers to the purchase of the underlying asset for immediate delivery. In other words, it is the quoted price for buying and selling of an asset at the spot or immediate delivery.

(v) Future spot price

The spot price of the underlying asset when the contract expires is called the future spot price, since it is market price that will prevail at some futures date.

(vi) Delivery price

The specified price in a forward contract will be referred to as the delivery price. This is decided or chosen at the time of entering into forward contract so that the value of the contract to both parties is zero. It means that it costs nothing to take a long or a short position. In other words, at the day on writing of a forward contract, the price which is determined to be paid or received at the maturity or delivery period of the forward contract is called delivery price. On the first day of the forward contract, the forward price may be same as to delivery price. This is determined by considering each aspect of forward trading including demand and supply position of the underlying asset. However, a further detail regarding this will be presented in forthcoming chapter.

(vii) The forward price

It refers to the agreed upon price at which both the counter parties will transact when the contract expires. In other words, the forward price for a particular forward contract at a particular time is the delivery price that would apply if the contract were entered into at that time. In the example discussed earlier, on April 10, 2002, 0.6250 is the forward price for a forward contract that involves the delivery of US dollar on July 10,2002.

2.2 FUTURES

2.2.1 Meaning

Q4. What is a financial future contract?

(OR)

What is a future contract?

Ans : **(May-18)**

Meaning

A futures contract is an agreement between a buyer and a seller where the seller agrees to deliver a specified quantity and grade of a particular asset at a predetermined time in futures at an agreed upon price through a designated market (exchange) under stringent financial safeguards. A futures contract, in other words, is an agreement to buy or sell a particular asset between the two parties in a specified future period at an agreed price through specified exchange. For example, the S&P CNX NIFTY futures are traded on National Stock Exchange (NSE). This provides them transparency, liquidity, anonymity of trades, and also eliminates the counter party risks due to the guarantee provided by National Securities Clearing Corporation Limited (NSCCL).

Definition

Bombay Stock Exchange (BSE) website defines futures contract: "Futures are exchange traded contracts to sell or buy financial instruments or physical commodities for future delivery at an agreed price. There is an agreement to buy or sell a specified quantity of financial instrument/commodity in a designated future month at a price agreed upon by the buyer and the seller. The contracts have certain standardized specifications.

The standardized items in any futures contract are:

- Quantity of the underlying asset
- Quality of the underlying asset (not required in financial futures)
- The date and month of delivery
- The units of price quotation (not the price itself) and minimum change in price (tick-size).

Q5. Discuss the characteristics of future contracts.

(OR)

What are the features of future contract?

Ans : **(May-18, May-17, Imp.)**

The following are the features of future contract are :

1. Exchange Traded

Future Contracts are generally traded on an exchange. The exchanges provide a mechanism of guarantee to honour the contract. So there i s secondary market for futures.

2. Standardized

Future contracts are highly standardised and legally enforceable. There is lack of flexibility.

3. Types of Future

Future contracts can be classified into two :

(a) Commodity future in which underlying asset is a commodity

(b) Financial future in which the underlying asset is a security or bond.

4. Transparency

The contracts enjoy a fair degree of transparency. The terms and conditions are published by exchanges.

5. Down Payment

In future contracts, the contracting parties have to deposit a certain percentage of contract price called as Margin Money with the exchange. It acts as a collateral to support the contract.

6. Delivery of Asset

In future contract the parties only exchange the difference between the future price and the spot price prevailing on the date of maturity.

7. Settlement

A future contract is always settled daily, irrespective of maturity date. It is marked to market on a daily basis. The difference between future price and spot price on a day constitutes either profit or loss.

2.2.2 Future Terminology

Q6. Explain the terminology used in future contract.

Ans :

This guide provides basic definitions of commodity futures terminology. Although the terminology of trading agricultural commodities goes far beyond the scope of this guide, this information can be used to build a knowledge base from which a broader understanding of the futures market can be developed.

- **Arbitrage :** The simultaneous purchase and sale of similar commodities in different markets to take advantage of a perceived price discrepancy.
- **Basis :** The difference between the current cash price and the futures price of the same commodity for a given contract month.
- **Bear market :** A period of declining market prices.
- **Bull market :** A period of rising market prices.
- **Broker :** A company or individual that executes futures and options orders on behalf of financial and commercial institutions or the general public.
- **Call option :** An option that gives the buyer the right, but not the obligation, to purchase (go "long") the underlying futures contract at the strike price on or before the expiration date of the option.
- **Cash (spot) market :** A place where people buy and sell the actual (cash) commodities, that is, a grain elevator, livestock market, or the like.
- **Commission (brokerage) fee :** A fee charged by a broker for executing a transaction.
- **Convergence :** A term referring to cash and futures prices tending to come together as the futures contract nears expiration.
- **Cross-hedging** : Hedging a commodity using a different but related futures contract when there is no futures contract for the cash commodity being hedged and the cash and futures markets follow similar price trends. For example, hedging cull cows on the live cattle futures market.
- **Daily trading limit :** The maximum price change set by the exchange each day for a contract.
- **Day traders :** Speculators who take positions in futures or options contracts and liquidate them before the close of the same trading day.
- **Delivery :** The transfer of the cash commodity from the seller of a futures contract to the buyer of a futures contract.
- **Forward (cash) contract :** A cash contract in which a seller agrees to deliver a specific commodity to a buyer at a specific time in the future.
- **Fundamental analysis :** A method of anticipating future price movement using supply and demand information.
- **Futures contract :** A legally binding agreement, made on the trading floor of a futures exchange, to buy or sell a commodity or financial instrument sometime in the future. Futures contracts are standardized according to the quality, quantity and delivery time and location for each commodity. The only variable is price, which is determined on an exchange trading floor.
- **Hedger :** An individual or company owning or planning to own a cash commodity - corn, soybeans, wheat, U.S. Treasury bonds, notes, bills, etc. - and concerned that the costs of the commodity may change before it can be either bought or sold in the cash market. A hedger achieves protection against changing cash prices by purchasing (selling) futures contracts of the same or similar commodity

and later offsetting that position by selling (purchasing) futures contracts of the same quantity and type as the initial transaction and at the same time as the cash transaction occurs.

- **Hedging** : The practice of offsetting the price risk inherent in any cash market position by taking an equal but opposite position in the futures market. Hedgers use the futures markets to protect their business from adverse price changes.
- **Initial margin :** The amount a futures market participant must deposit into a margin account at the time an order is placed to buy or sell a futures contract.
- **In-the-money option :** An option having intrinsic value. A call option is in-the-money if its strike price is below the current price of the underlying futures contract. A put option is in-the-money if its strike price is above the current price of the underlying futures contract.
- **Intrinsic value :** The difference between the strike price and the underlying futures price for an option that is in-the-money.
- **Liquidate :** Selling (or purchasing) futures contracts of the same delivery month purchased (or sold) during an earlier transaction or making (or taking) delivery of the cash commodity represented by the futures contract.
- **Long position :** One who has bought futures contracts or plans to own a cash commodity.
- **Maintenance margin :** A set minimum margin (per outstanding futures contract) that a customer must maintain in a margin account.
- **Nearby (delivery) month :** The futures contract month closest to expiration. Also referred to as spot month.
- **Open interest :** For a given commodity, the total number of futures or options contracts that have been neither offset by an opposite futures or option transaction nor fulfilled by delivery of the commodity or option exercise. Each option transaction has a buyer and a seller, but for calculation of open interest, only one side of the contract is counted.
- **Option :** A contract that conveys the right, but not the obligation, to buy or sell a futures contract at a certain price for a specified time period. Only the seller (writer) of the option is obligated to perform.
- **Option premium :** The price of an option; the sum of money that the option buyer pays and the option seller receives for the rights granted by the option.
- **Out-of-the-money option :** An option with no intrinsic value; that is, a call whose strike price is above the current futures price or a put whose strike price is below the current futures price.
- **Purchasing hedge (long hedge) :** Buying futures contracts to protect against a possible increase in the price of cash commodities that will be purchased in the future. At the time the cash commodities are bought, the open futures position is closed by selling an equal number and type of futures contracts as those that were initially purchased.
- **Put option :** An option that gives the option buyer the right but not the obligation to sell (go short) the underlying futures contract at the strike price on or before the expiration date of the option.
- **Selling hedge (short hedge) :** Selling futures contracts to protect against possible declining prices of commodities that will be sold in the future. At the time the cash commodities are sold, the open futures position is closed by purchasing an equal number and type of futures contracts as those that were initially sold.
- **Short position :** One who has sold futures contracts or plans to sell a cash commodity. Selling futures contracts or initiating a cash forward contract sale without offsetting a particular market position.

- **Speculator :** A market participant who tries to profit from buying and selling futures and option contracts by anticipating future price movements. Speculators assume market price risk and add liquidity and capital to the futures markets. They do not hold equal and opposite cash market risks.
- **Spread :** The price difference between two related markets or commodities. For example, the April to August live cattle spread.
- **Strike price :** The price at which the futures contract underlying a call or put option can be purchased (call) or sold (put). Also called exercise price.
- **Technical analysis :** Anticipating future price movements using historical prices, trading volume, open interest, and other trading data to study price patterns.
- **Time value :** The amount of money option buyers are willing to pay for an option in the anticipation that, over time, a change in the underlying futures price will cause the option to increase in value. In general, an option premium is the sum of time value and intrinsic value. Any amount by which an option premium exceeds the option's intrinsic value can be considered time value.
- **Underlying futures contract :** The specific futures contract that can be bought or sold by exercising an option.
- **Volatility :** A measurement of the change in price over a given time period. It is often expressed as a percentage and computed as the annualized standard deviation of percentage change in daily price.
- **Volume :** The number of purchases or sales of a commodity futures contract made during a specified period of time, often the total transactions for one trading day.

2.3 Types of Financial Future Contracts

Q7. Discuss the types of Types of Financial Future Contracts.

(OR)

Explain the types of Financial Future Contracts.

Ans : **(Imp.)**

There are different types of contracts in financial futures which are traded in the various futures financial markets of the world. These contracts can be classified into various categories which are as under :

(i) Interest rate futures

It is one of the important financial futures instruments in the world. Futures trading on interest bearing securities started only in 1975, but the growth in this market has been tremendous. Important interest- bearing securities are like treasury bills, notes, bonds, debentures, euro-dollar deposits and municipal bonds. In this market, almost entire range of maturities bearing securities are traded. For example, three- month maturity instruments like treasury bills and euro-dollar time deposits, including foreign debt instruments at Chicago Mercantile Exchange (CME), British Government Bonds at London International Financial Futures Exchange (LIFFE), Japanese Government Bonds at CBOT, etc. are traded. This market is also further categorized into short-term and long-term interest bearing instruments. A few 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.

(ii) Foreign currencies futures

These financial futures, as the name indicates, trade in the foreign currencies, thus, also known as exchange rate futures. Active futures trading in certain foreign currencies started in the early 1970s. Important currencies in which these futures contracts are made such as US-dollar, Pound Sterling, Yen, French Francs, Marks, Canadian dollar, etc. These contracts have a directly corresponding to spot market, known as inter bank foreign exchange market, and also have a parallel inter bank forward market. Normally futures currency contracts are used for hedging purposes by the exporters, importers, bankers, financial institutions and large companies.

(iii) Stock index futures

These are another major group of futures contracts all over the world. These contracts are based on stock market indices. For example, in the US markets, there exist various such futures contracts based on different indices like Dow Jones Industrial Average, Standard and Poor's 500, New York Stock Exchange Index, Value Line Index, etc. Other important futures contracts in different countries are like in London market, based on the Financial Times—Stock Exchange 100 share Index, Japanese Nikkei Index on the Tokyo Futures Exchange and on the Singapore International Monetary Exchange (SIMEX) as well. Similarly, in September, 1990, Chicago Mercantile Exchange began trading based on Nikkei 225 Stock Index and Chicago Board of Trade launched futures contracts based on the TOPIX index of major firms traded on the Tokyo Stock Exchange.

One of the most striking features of these contracts is that they do not insist upon the actual delivery, only trader's obligation must be fulfilled by a reversing trade or settlement by cash payment at the end of trading. Stock Index futures contracts 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.

(iv) Bond index futures

Like stock index futures, these futures contracts are also based on particular bond indices, i.e., indices of bond prices As we know that prices of debt instruments are inversely related to interest rates, so the bond index is also related inversely to them. The important example of such futures contracts based on bond index is the Municipal Bond Index futures based on US Municipal Bonds which is traded on Chicago Board of Trade (CBOT).

(v) Cost of living index futures

This is also known as inflation futures. These futures contracts are based on a specified cost of living index, for example, consumer price index, wholesale price index, etc. At International Monetary Market (1MM) in Chicago, such futures contracts based on American Consumer Price Index are traded. Since in USA, the inflation rates in 1980s and 1990s were very low, hence, such contracts could not be popular in the futures market. Cost of living index futures can be used to hedge against unanticipated inflation which cannot be avoided. Hence, such futures contracts can be very useful to certain investors like provident funds, pension funds, mutual funds, large companies and governments.

2.4 Distinction between Forwards and Futures Contracts

Q8. What are the differences between futures and forwards? Explain.

(OR)

Compare and contrast futures and forwards?

Ans : **(May-18, Imp.)**

S.No.	Futures Market	S.No.	Forward Markets
1.	Trading is conducted in a competitive arena by "open outory" of bids, offers, and amounts.	1.	Trading is done by telex or telephone, with participants generally dealing directly with broker-dealers.
2.	Contract terms are standardized with all buyers and sellers negotiating only with respect to price.	2.	All contract terms are negotiated privately by the parties.
3.	Non-member participants deal through brokers (exchange members who represent them on the exchange floor.	3.	Participants deal typically on a principal-to-principal basis.
4.	Participants include banks, corporations financial institutions, individual investors, and speculators.	4.	Participants are primarily institutions dealing with one other and other interested parties dealing through one or more dealers.
5.	The clearing house of the exchange becomes the opposite side to each cleared transactions; therefore, the credit risk for a futures market participant is always the same and there is no need to analyze the credit of other market participants.	5.	A participant must examine the credit risk and establish credit limits for each opposite party.
6.	Margins deposits are to be required of all participants.	6.	Typically, no money changes hands until-delivery, although a small margin deposit might be required of nondealer customers uncertain occasions.
7.	Settlements are made daily through the exchange clearing House.Gains on open positions may be withdrawn and losses are collected daily.	7.	Settlement occurs on date agreed upon between the parties to each transaction.
8.	Long and short positions are usually liquidated easily.	8.	Forward positions are not as easily offset or transferred to other participants.
9.	Settlements are normally made in cash, with only a small percent age of all contracts resulting actual delivery.	9.	Most transactions result in delivery.
10.	A single, round trip (in and out of the market) commission is charged. It is negotiated between broker and customer and is relatively small in relation to the value of the contract.	10.	No commission is typically charged if the transaction is made directly with another dealer. A commission is charged to both buyer and seller, however, if transacted through a broker.
11.	Trading is regulated.	11.	Trading is mostly unregulated.
12.	The delivery price is the spot price.	12.	The delivery price is the forward price.

2.5 Future Payoffs

Q9. Explain the concept of Future Payoffs.

Ans :

Futures contracts have linear payoffs. In simple words, it means that the losses as well as profits for the buyer and the seller of a futures contract are unlimited. These linear payoffs are fascinating as they can be combined with options and the underlying to generate various complex payoffs.

(i) Payoff for buyer of futures: Long futures

The payoff for a person who buys a futures contract is similar to the payoff for a person who holds an asset. He has a potentially unlimited upside as well as a potentially unlimited downside.

Take the case of a speculator who buys a two-month Nifty index futures contract when the Nifty stands at 1220. The underlying asset in this case is the Nifty portfolio.

When the index moves up, the long futures position starts making profits, and when the index moves down it starts making losses.

(ii) Payoff for seller of futures: Short futures

The payoff for a person who sells a futures contract is similar to the payoff for a person who shorts an asset. He has a potentially unlimited upside as well as a potentially unlimited downside.

Take the case of a speculator who sells a two-month Nifty index futures contract when the Nifty stands at 1220. The underlying asset in this case is the Nifty portfolio.

When the index moves down, the short futures position starts making profits, and when the index moves up, it starts making losses.

The mechanics of futures trading are straightforward: both buyers and sellers deposit funds - traditionally called margin but more correctly characterized as a performance bond or good faith deposit - with a brokerage firm. This amount is typically a small percentage - less than 10 percent - of the total value of the item underlying the contract.

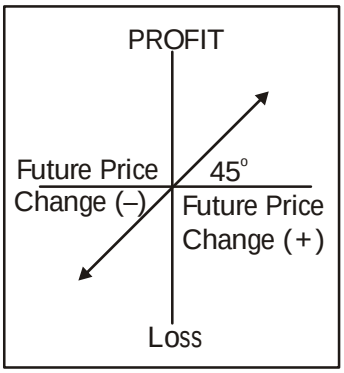


Fig 1. : Payoff Diagram of a Long Futures Position

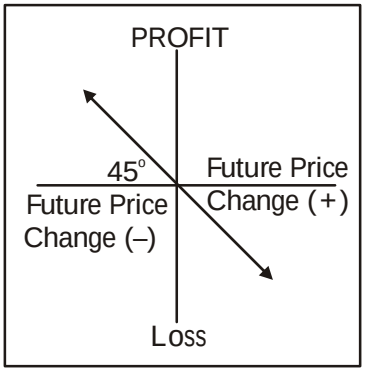


Fig 2 . : Payoff Diagram of a Short Futures Position

As indicated in Figure 1, if you buy (go long) a futures contract and the price goes up, you profit by the amount of the price increase times the contract size; if you buy and the price goes down, you lose an amount equal to the price decrease times the contract size.

Figure 2 reflects the profit and loss potential of a short futures position. If you sell (go short) a futures contract and the price goes down, you profit by the amount of the price decrease times the contract size; if you sell and the price goes up, you lose an amount equal to the price increase times the contract size.

2.6 Operation of Traders in Futures Market

Q10. Discuss the various traders involved in future market.

(OR)

Discuss the types of traders in futures market.

Ans : **(Imp.)**

Usually financial derivatives attract three types of traders which are discussed here as under:

1. Hedgers

Generally there is a tendency to transfer the risk from one party to another in investment decisions. Put differently, a hedge is a position taken in futures or other markets for the purpose of reducing exposure to one or more types of risk. A person who undertakes such position is called as 'hedger'. In other words,

a hedger uses futures markets to reduce risk caused by the movements in prices of securities, commodities, exchange rates, interest rates, indices, etc. As such, a hedger will take a position in futures market that is opposite a risk to which he or she is exposed. By taking an opposite position to a perceived risk is called 'hedging strategy in futures markets'. The essence of hedging strategy is the adoption of a futures position that, on average, generates profits when the market value of the commitment is higher than the expected value.

2. Speculators

A speculator is a person who is willing to take a risk by taking futures position with the expectation to earn profits. Speculator aims to profit from price fluctuations. The speculator forecasts the future economic conditions and decides which position (long or short) to be taken that will yield a profit if the forecast is realized.

Speculators are two types

(i) Day traders and position traders.

(ii) Position speculator uses fundamental analysis of economic conditions of the market and is known as fundamental analyst, whereas the one who predicts futures prices on the basis of past movements in the prices of the asset is known as technical analyst.

3. Arbitrageurs

Arbitrageurs are another important group of participants in futures markets. They take advantage of price differential of two markets. An arbitrageur is a trader who attempts to make profits by locking in a riskless trading by simultaneously entering into transactions in two or more markets. In other words, an arbitrageur tries to earn riskless profits from discrepancies between futures and spot prices and among different futures prices.

2.7 Growth of Futures Market in India

Q11. Briefly explain the growth of Futures Market in India.

(OR)

Explain the growth of futures of market in India.

Ans : **(May-18, May-16)**

In 2003, prohibition on futures trading was removed and three national exchanges, Multi Commodity Exchange Ltd. (MCX), National Commodity & Derivatives Exchange Ltd. (NCDEX) and National Multi Commodity Exchange of India Ltd. (NMCE) were set up for wide network coverage, and transparent trading. Currently, six national level exchanges and 11 regional exchanges are facilitating trading in various futures contracts, covering food grains, oil seeds, sugar, spices, energy, metals and gas sectors. However, trading in some commodities has been suspended from time to time based on the perception that trading in futures contracts has increased the volatility and price in the spot market, which lead to higher inflation

Given the fact that commodities have emerged as an alternative investment class, commodity markets across the world are heading towards financialization. Technological innovations and up gradations has made information flow from one market to another very fast. Therefore, market linkages across the world is increasing and hence finding support of such argument is not easy. Suspension of trading in any commodities always creates uncertainty about the regulations in the market which may affect liquidity and other characteristics of the market. Therefore such steps by the regulators should be taken with utmost care. However, since the inception of commodity futures in 2003, a phenomenal growth has been witnessed in terms of volume and value of trades. Trades in commodity futures have gone up from INR 5.7 lakh crore to in 2003 to 181.3 lakh crore in 2011-12. Following Table Provide the trade volume in last decade in Indian commodity market.

Table : Total Traded Volume (Value of the Contracts in Lakh Crore)

Year	Amount (lakh corore INR)
2004-2005	5.7
2005-2006	21.6
2006-2007	36.8
2007-2008	40.7
2008-2009	52.5
2009-2010	77.7
2010-2011	119.5
2011-2012	181.3
2012-2013	170.5
2013-2014	101.4

2.8 Futures Market Trading Mechanism

Q12. Write a note on Futures Market Trading Mechanism.

Ans :

Futures contract, as stated in part, is an agreement between the two parties to buy or sell an asset at a 'certain futures time for a certain price. Futures contracts are traded on recognized stock exchanges. Since the value of a futures contract is derived from the value of the underlying asset, hence, they are called derivative instruments. If the underlying assets are financial instruments then these will be called as financial derivatives or financial futures contracts.

Futures trading refers to entering into contracts to buy or sell financial asset or commodities for futures delivery as settlement on standardized terms. In this section, we will discuss the general mecha-nism in which the exchanges organize the trading of futures contracts. The important issues relating to such trading mechanism like specification of contracts, the operation of margin accounts, delivery/ settlement of the contract, the organization of exchanges, the regulation of the markets, the way in which quotes are made, etc. will be discussed. We will be following here the mechanism of futures trading in general and popular all over the world rather of a particular exchange, because there can be some variations in the terms of the futures contract on different exchanges. A list of the important exchanges in USA which trade futures contracts both in financial assets and commodities is given in Table.

Prior to the discussion on the mechanism of futures trading, it is to be noted that the vast majority of the futures contracts which are initiated do not lead to delivery because most of the investors or traders choose to close out their positions prior to the delivery period specified in the contract. The execution of the futures contracts through delivery is often inconvenient and, in some instances even quite expensive. This has been observed even in case of hedgers. However, a detail of this will be discussed in the section of delivery arrangements of the futures contracts.

2.9 Forward Prices Vs. Future Prices

Q13. Distinguish between Forward Prices and Future Prices.

(OR)

Is the forward price different from futures price comment.

Ans : **(Imp.)**

Forward price and futures price are same (or) differs is a debatable issue. It is very essential to know whether they are identical (or) not.

Investors argue that in the market situations wherein there is uniform risk-free interest rates having same maturity period, the forward price will be same as the futures price of the contract. Practically, if interest rates do not remain same and differ unexpectedly then under such circumstances the forward price differs from futures price.

As daily settlement occurs in futures contract an investor holds long futures position if the current prices increase and make instant profits that can be reinvested at more than the average interest rate. In the same way, if the current price decline/decrease then, an investor is at loss that will be financed at less than average interest rate. In case of forward contracts, such type of situation does not occur as

there is no daily settlement and fluctuations in the interest rates donot have any affect till maturity.

It is also argued that,

(i) Futures prices will be more than the forward prices when, spot prices are highly positively correlated with the interest rates and

(ii) Forward prices will be more than the futures prices when, spot prices are highly negatively correlated with the interest rates.

It is also noticed that, there is theoretical difference between forward and futures prices because of different aspects such as, taxes transaction costs, treatment of margin and default risk. However, the above mentioned differences between forward price and futures price is small and hence it can be overlooked. Therefore, forward and futures prices are presumed to be similar and 'F' symbol is used for indicating the same futures price and forward price at time zero.

2.10 Determination of Future Prices of Specific Assets

Q14. Explain Determination of Future Prices of various assets.

Ans : **(Imp.)**

To be a successful market operator (as a speculator, arbitrageur, trader investor or hedger) one must have adequate information and proper understanding of the functioning of the futures markets. These are essential to make evaluation of derivatives product in terms of their prices and values so that market participants can select as per their objectives.

Futures are useful to the market participants only if futures prices reflect information about the prices of the underlying assets. That is why it is essential to understand how futures market works and how the prices of futures contracts relate to the spot prices.

1. Pricing by Arbitrage

A futures contract, for no arbitrage to be possible, the price paid on delivery must be the same as the cost (including interest) of buying and storing the asset. In other words, the rational forward price represents the expected future value of the underlying discounted at the risk-free rate.

Thus, for a simple, non-dividend paying asset, the value of the future/forward, F(t), will be found by accumulating the present value S(t) at time t to maturity T by the rate of risk-free return t.

$$F(t) = S(t) \times (1 + \tau)^{(T-t)}$$

Any deviation from this equality allows for arbitrage. It involves:

1. Simultaneous buying and selling.
2. No initial investment.
3. Making riskless profits net of transaction costs.

For example, if an investor notices that futures on a security that he has been observing seem overpriced, how can he cash on this opportunity to earn riskless profits? For example, ABC Ltd. trades at `1,000. One-month ABC futures trade at `1,025 and seem overpriced. As an arbitrageur, he can make riskless profit by entering into the following set of transactions:

1. On day one, borrow funds; buy the security on the cash/spot market at 1,000.
2. Simultaneously, sell the futures on the security at 1,025.
3. Take delivery of the security purchased and hold the security for a month.
4. On the futures expiration date, the spot and the futures price coverage.
5. Say the security closes at `1,015. Sell the security.
6. Futures position expires with profit of `10.
7. The result is a riskless profit of ? 15 on the spot position and ? 10 on the futures position.
8. Return the borrowed funds.

If the cost of borrowing funds to buy the security is less than the arbitrage profit possible, it makes sense for the investor to arbitrage.

2. Cost of Carry Model

Cost-of-carry model is an arbitrage-free pricing model. Its central theme is that futures contract is so priced as to preclude arbitrage profit. In other words, investors will be indifferent to spot and futures market to execute their buying and selling of underlying asset because the prices they obtain are effectively the same. Expectations do influence the price, but they influence the spot price and, the futures price. They do not directly influence the futures price. If the investor does not book a futures contract, the alternative form to him is to buy at the spot market and hold the underlying asset. In such a contingency he would incur a cost equal to the spot price plus the cost of carry. The theoretical price of a futures contract is spot price of the underlying plus the cost of carry. Pie futures are not about predicting future prices of the underlying assets.

This model stipulates that future prices equal to sum of spot prices and carrying costs involved in buying and holding the underlying asset, and less the carry return (if any). We use fair value calculation of futures to decide the no- arbitrage limits on the price of a futures contract. According to the cost-of-carry model, the futures price is determined by:

Futures Price = Spot Price + Carry Cost - Carry Return

This can also be expressed as: $F = S (1 + r)^t$

Where,

r = cost of financing,

T = time till expiration.

Carry Cost (CC) is the interest cost of holding the underlying asset (purchased in spot market) until the maturity of futures contract. Carry Return (CR) is the income (e.g., dividend) derived from underlying asset during the holding period.

The cost of carry for a physical asset equals interest cost plus storage costs less convenience yield, i.e.:

Carry costs = Cost of funds + Storage cost – Convenience yield

For a financial asset such as a stock or a bond, storage costs are negligible. Moreover, income (yield) accrues in the form of quarterly cash dividends or semiannual coupon payments. The cost of carry for a financial asset is:

Carry costs = Cost of funds – Income

Carry costs and benefits are modeled either as continuous rates or as discrete flows. Some costs/ benefits such as the cost of funds (i.e., the risk-free interest rate) are best modeled continuously.

The futures pricing equation in computable terms are as follows:

F = Futures price

S = Spot price.

r = Risk-free interest rate (p.a.)

D = Cash dividend from underlying stock,

t = Period (in years) after which cash dividend will be paid.

T = Maturity of futures contract (in years).

The futures price will thus be:

$F = S + (S\ r\ T) – (D – D\ r\ t)$

It is customary to apply the compounding principle in financial calculations. With compounding, the above equation will change to:

$F = S(1 + r)T – D(l + r)t$

Alternately, using the continuous compounding or discounting,

$F = Se^{rT} – De^{-rT}$

There are two good reasons why continuous compounding is preferable to discrete compounding. First, it is computational easier in a spreadsheet. Second, it is internally consistent. For example, interest rate is always quoted on an annual basis but the compounding frequency may be different in different markets. Bond markets use half-yearly compounding; banks use quarterly compounding for deposits and loans; and money markets may use overnight or weekly or monthly intervals for compounding. With continuous compounding, we do not have to specify the frequency of compounding. This is the reason why the academicians prefer continuous compounding to discrete compounding.

Before we use 'r' in the above equation, we will have to convert the simple interest rate into its continuously compounded equivalent, as follows:

Continuously compounded rate = LN (1 + simple rate) Where,

LN = spreadsheet function for natural logarithm.

Similarly, we can convert the continuously compounded interest rate into is simple rate equivalent as follows:

Simple rate = EXP (continuously compounded rate) – 1

2.11 Futures on Commodities

Q15. Explain briefly about Futures on Commodities with an examples.

Ans :

The commodity can be purchased for solely investment purposes like gold and silver whereas some other commodities may be purchased for consumption purposes.

Commodities as Investment Assets (Like gold and silver)

Some investors purchase gold and silver for investment purposes. If the storage costs assume to be zero then these can be considered asset paying no income, then in that case the futures price of gold/silver will be

$F = Se^{n}$

If the storage costs are to be incurred, assuming u as present value of all the storage costs that will be incurred during the life of a futures contract, then the futures value F will be

$F = (S + u)e^{n}$

where u is the present value of storage costs.

Further, if we assume that storage costs incurred at any time are proportional to the price of the commodity then it will be treated as negative dividend yield, and in this case the futures price of a commodity:

$F = Se^{(r + u)T}$

where u is storage cost per annum as a proportion of the spot price.

Example

Suppose a one-year futures contract on gold with a storage costs of Rs 20 per 10 gram per year to store gold to be paid at the end of the year. Assume that the spot price of Rs 4500 and risk-free interest rate is 7 percent per annum for all maturities. In this case, S - Rs 4500, r = 0.07 and T = 1, then

$$u = 20e^{-0.07} = 18.65$$

Now, $F = (S + u)e^{rT}$

$= (4500 + 18.65)^{0.07 \times 1} =$ Rs 48.46

If F > 48.46, an arbitrageur can buy gold and short one-year gold futures contract and in this way he can lock in a profit. Similarly, if F < 48.46 then he is having own gold can sell the gold and purchases gold futures contracts.

Consumption Commodities

The commodities which are not held for investment purposes, the arbitrage arguments used to determine futures prices must be considered and examined carefully. The investors or firms which keep such a commodity in inventory do so because of its consumption value. It means that they are reluctant to sell the commodity and buy futures contracts because futures contracts cannot be consumed. In brief, the futures price for a consumption commodity is:

1. $F \leq (S + u)e^{rT}$ where storage are expressed in present value u.
2. $F \leq Se^{(r + U)T}$ where u is storage cost per annum as a proportion of the spot price.
3. Sometime there are benefits in holding the commodities which is termed as convenience yield. If the convenience yield is denoted by y then above equation will be expressed as:

   $F = Se^{(r + u - y)T}$

   where y is convenience yield per annum as a proportion of the spot price.

   $Fe^{yT} = (S + u)e^{rT}$ where y convenience yield is expressed in present value.

2.12 THEORIES OF FUTURES PRICES

Q16. Explain the various theory of Futures Prices.

Ans :

There are several theories which have made efforts to explain the relationship between spot and futures prices. A few important there are as follows:

1. The Cost-of-Carry Approach

Some top economists like Keynes and Hicks, have argued that futures prices essentially reflect the carrying cost of the underlying assets. In other words, the inter-relationship between spot and futures prices reflect the carrying costs, i.e., the amount to be paid to store the asset from the present time to the futures maturity time (date). For example, food grains on hand in June can be carried forward to, or stored until, December.

Carrying costs are of several types, important among these are:

(i) Storage costs

(ii) Insurance costs

(iii) Transportation costs

(iv) Financing costs

(i) Storage costs

Storage costs refer to those expenses which are done on storing and maintaining the asset in safe custody. It includes rent of the warehouse and others expenses associated with like deterioration, pilfer-age, normal wastage, etc. In case of financial instruments, the costs incurred on keeping the securities in a bank vault or with custodians.

(ii) Insurance costs

Insurance costs refer to amount incurred on safety of the assets against fire, accidents and others. For example, stored wheat be protected against fire, water damage, weather, natural disaster, etc. So insurance is necessary for protection against such hazards. Thus, premium and other costs incurred on insurance is called insurance costs.

(iii) Transportation costs

In some cases, carrying costs also include the transportation costs When the futures contract matures the delivery of the assets is given at a particular place which may be far away from the warehouse of stored goods. Obviously, transportation costs will be different from location to location and also to the nature of the commodities.

(iv) Financing costs

Another important carrying cost is cost of financing the underlying asset. For example, if gold costs Rs 5000 per 10 grams and the financing rate is one percent per month then the financing charge for carrying the gold forward is Rs 50 per month (1% of 5000).

Apart from the carrying cost on an underlying asset, there can be possibility of earning a yield on storing the asset. Such yield is known as 'convenience yield' from holding stocks. For example, in case of wheat, there could arise extra yield due to low production of wheat due to bad weather in futures. Thus, upto a certain level, stock holding has a yield in the event of stock out and unanticipated demand. This may be termed as a negative carrying cost. Hence, the net marginal carrying cost for any given asset may be expressed as:

$$C_t = C_{gt} - Y_t$$

where, C_T is net carrying cost of that quantity, C_{gt} is gross carrying cost of that quantity, Y_t is convenience yield of that quantity and t is time period of storage.

(A) Perfect Market

The following formula describes a general cost-of-carry price relationship between the cash (spot) price and futures price of any asset:

Futures price = Cash (spot) price + Carrying cost

In addition, the formula assumes the conditions of perfect competition which are as under:

1. There are no information or transaction costs associated with the buying and selling the asset.
2. There is unlimited capacity to borrow and lend.
3. Borrowing and lending rates are the same.

4. There is no credit risk. No margin is required on buying and selling the asset.

5. Goods can be stored indefinitely without loss to the quality of the goods.

6. There are no taxes.

Before discussing the various rules of carrying cost, let us see cash-and-carry arbitrage. In this, the trader buys the goods at the cash price and carries it to the expiration of the futures contract. Let us take an example as given in Table.

Table : Cash-and-Carry Gold Arbitrage Transactions

Prices for the analysis	(Rs)
Spot price of gold (per 10 grams)	5,000
Futures price of gold (for delivery 6 months)	5,300
Interest rate 8% per annum	
Other carrying cost assumes	-NIL-
Transaction	Cash flows (Rs)
t = 0 Borrow Rs 5,000 for six months @ 8% p.a.	+5,000
Buy 10 grams of gold at the spot rate	-5,000
Sell a futures contract for Rs 5,300 for delivery	0
after six months	
Total cash flows	0
T = 1 Remove the gold from storage	0
Deliver the gold against the futures contract	+5,300
Repay loan including interest for 6 months (5,000 + 200)	– 5,200
Total cash flow.	100

(B) Imperfect Market

We have seen the relationship between V the spot price and futures price in the conditions of perfect market which is rare in actual practice. There are various imperfections in real markets which disturb the relationship of Rule III and Rule VI. Among the various imperfections, five are important which have been discussed here in after:

(i) Direct Transaction Cost

In actual practice, when a trader makes the spot or futures transactions he has to pay a fee; known as brokerage fee or commission. In other words, transaction costs refer to all such costs which have to be borne by the trader to buy or sell a particular asset for spot or futures. These costs are transaction fees, exchanges charges and fee, fee for arranging funds, etc. It is also called as the round- trip fee.

(ii) Unequal or differential Borrowing and Lending Rates

It refers to that market situation where the rates of interest on borrowing and lending are different and they are not equal. Normally, in real market, borrowing rates are higher than the lending rate. These differential of borrowing and lending rates serve to widen the no-arbitrage boundaries.

(iii) Restriction on Short-selling

This is another market imperfection. Earlier, we have assumed that traders can sell assets short and use the proceeds from the short sale without any restrictions. Due to inherent risks in short sales, there are restrictions on short selling virtually in all markets.

(iv) Bid-ask Spread

It is another market imperfection because we see in actual practice that the trader tries to sell the asset at higher price than to purchase the same. The difference between bid price and ask price is called bid-ask spread.

(v) Storage Problem

It is another market imperfection because except gold, most of the commodities cannot be stored very well at all. The storability of a commodity is very important in futures market trading. If a commodity cannot be stored then full arbitrage opportunity will not be available in the market. Let us see the futures prices after adjusting the above market imperfections. After transaction cost, equation will be

(a) $F_{0,t} \leq S_0(1 + r)\ (I + C)$

(where T is transaction cost in cash and carry arbitrage)

(b) $F_{0,t} \geq S_0(1 - 7)(1 + C)$

(Reverse cash and carry arbitrage)

Combining the above equations, we get

$$S_0\ (1 - T)\ (1 + C) < F_{0,t} \leq S_0\ (1 + T)\ (1 + C)$$

There will be no-arbitrage bounds. Which means within which the futures price must remain to prevent arbitrage. If the futures price goes beyond these boundaries, arbitrage is possible. Hence, the futures price can wonder within the bounds without offering arbitrage opportunities. For example, in our earlier example; if transaction cost is 3 percent and carrying cost is 8 percent then (a) $F_{0\,t}$ = 5000 (1 – 0.03) (1 + 0.u8) = Rs. 5562 and (b) $F_{0,\,t}$ = 5000 (1 – 0.03) (1 + 0.08) = Rs. 5238. This is shown in Tables

Price for analysis

Spot Price of Gold (10 grams) = 5000

Interest rate @ 8% (p.a.) = 8%

Transaction cost (T) = 3%

No-arbitrage futures price in perfect markets (one year basis):

$$F_{0,\,t} = S_0\ (1 + C) = 5000 + 400 = 5400$$

Upper no-arbitrage bound with transaction cost (one year):

$F_{0,t} \leq S_0(I + D)(I + C)$

$= 5000 (103) (1.08) = Rs\ 5562$

Lower no-arbitrage bound with transaction cost (one year):

$F_{0,t} \geq S_0 (1 – t) (1 + C)$

$= 5000 (1 – 0.03) (10.08) = Rs\ 5238$

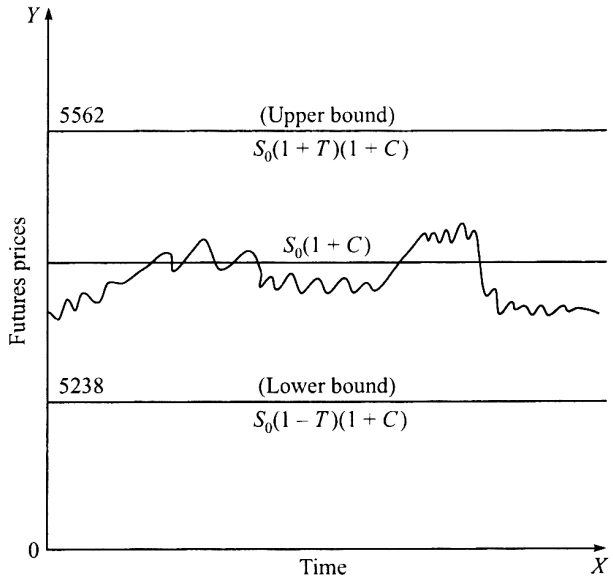


Fig.: No-arbitrage bounds (with transaction cos)

Adjusting the Equal Borrowing and Lending Rates

As we have seen in the perfect capital market conditions that all the traders can borrow and lend at the risk free rate, but in real market, this is not possible, and even the borrowing rate and lending rates of interest are also different.

Thus, if these borrowing and lending rates are not same and are different, then they require adjustment to reflect the fact. Normally, we assume that for a trader, the borrowing rate will be higher than lending rate, hence, we assume, lending rate to be C_L and borrowing rate is C_B.

Now, the equation will be with different rates of interest:

$S_0(1 – 7)(1 + C_L) < F_{0,t} \leq S_0(1 + r)(1 + C_B)$

These differential rates will serve to widen the no-arbitrage boundaries, for example, assuming C_B = 10% and C_L = 6% in our earlier example then the boundaries will be

$5000 (1 – 0.03) (1 + 0.06) \leq F_0, \leq 5000 (1 + 0.03) (1 + 0.10)$

$Rs.\ 5147 \leq F_{0,t} \leq Rs.\ 5665$

It is evident that due to differential borrowing and lending rates of interest, no-arbitrage boundaries: have been widened.

Adjusting the Restrictions on Short Selling

In perfect market, we have assumed the traders can sell assets short and use all the proceeds from the short sales without any restriction However, in actual practice, we see that when a trader goes for short selling then his broker has to arrange the assets from the market from other to sell it on behalf of the short seller. In that case, the risk of broker increases. If later on there are changes in asset prices. In that case, the broker usually does not give full amount of short selling to the trader, rather keeps some amount with himself for risk point of view. This known as 'fractional' amount of the short sales proceeds. However, different traders face different restrictions on using proceeds from a short seller. Further, the differential use of those funds leads to quasi-arbitrage. To reflect this fact that short seller does not have full use of the proceeds, but only subfraction f, we can readjust the equation as follows:

$$F_{0,t} \geq fS_0(I + C)$$

where f is the fraction of usable funds derived from the short sales ranging between I to O.

With restrict short sales, our no-arbitrage bounds will be

$$fS_0(1 + C) \leq F_{0,t} \leq S_0 (1 + C)$$

With other market imperfections, our no-arbitrage bounds will be

$$fS_0(1 - T)(1 + C_L) \leq F_{0',t} \leq S_0(1 + T) (1 + C_B)$$

The above equation seems to be complicated and far from our simple perfect capital market no arbitrage relationship. However, these two are closely related. For example, if we assume the following

$T = 0 \rightarrow$ There are no transaction cost.

$C_B = C_L = C \rightarrow$ Borrowing and lending rates are equal.

$f = 1.0 \rightarrow$ Traders have full use of short sales proceeds.

Then, it reduces the earlier equation to

$$fS_0(1 - T) (1 + C_L) \leq F_{0,t} \leq S_0 (1 + T) (1 + C_B)$$

$$= (1.0) S_0(1 - 0)(I + C) \leq F_{0,t} \leq S_0(I + 0)(I + C)$$

$$= S_0(I + C) \leq F_{0,t} \leq S_0(I + 0)(I + C)$$

$$= S_0(I + C) \leq F_{0',t} \leq S_0(I + C)$$

$$= F_{0',t} = S_0(I + C)$$

2. The Concept of a full-carry-market

The concept of a full-carry-market refers to the degree of restriction relating to the underlying asset. For example, nature of restriction on short selling, supply of goods, non-seasonal production and consumption, etc. will determine the degree of full-carry-market. So it varies asset to asset and market to near-market. There are five main factors that affect market prices and move them towards or away from full-carry-market. These are short selling conditions, supply condition, seasonality of production, seasonality of consumption and ease of storage. In other words, to promote the full-carry-market concept, these restrictions/conditions should be eased.

For example, short selling to be fully eased; there must be large supply of goods, in case of seasonal production, there must be ample stock of goods and subject to large shifting, in case of non-seasonal consumption goods like petroleum products, the supply should be on the pattern of demand,

and lastly there must be high storability capacity in case of seasonal goods to make regular supply without any interruption

3. The expectation approach

This approach is advocated by distinguished luminaries like J. M. Keynes, J. R. Hicks and N. Kalidor who argued the futures price as the market expectation of the price at the futures date. Many traders/ investors, especially those using futures market to hedge, would like to study how today's futures prices are related to market expectations about futures prices.

For example, there is general expectation that the price of the gold next April 1 will Rs 5200 per 10 grams. The futures price today for July I must be somewhat reflects this expectation. If today's futures price is Rs 5180 of gold, going long futures will yield an expected profit of Expected futures profit = Expected futures price - Initial futures price Rs. 20 = Rs. 5200 – Rs. 5180

Any major deviation of the futures prices from the expected price will be corrected by speculative activity. Profit seeking speculators will trade as long as the futures price is sufficiently far away from the expected futures spot price. This approach may be expressed as follows:

$$F_{0,t} = E_0(S_t)$$

where F_0, is Futures price at time t = 0 and $E_0(S_t)$ is the expectation at t = 0 of the spot price to prevail at time t.

The above equation states that the futures price approximately equals the spot price currently expected to prevail at the delivery date, and if, this relationship did not hold, there would be attractive speculative opportunities. In simple terms, the futures price are influenced to some extent on expectations prevailing at the current time. Under this hypothesis, if markets are operating properly then

Current futures price = Expected futures spot price

This is also known as hypothesis of unbiased futures pricing because it advocates that the futures price is an unbiased predictor of the futures spot price, and on an average, the futures price will forecast the futures spot price correctly.

2.13 RECOMMENDATIONS OF L.C. GUPTA COMMITTEE

Q17. Explain the Recommendations of L.C. Gupta Committee on introduction of financial derivatives in India.

Ans : **(May-17, Imp.)**

SEBI appointed the L.C.Gupta Committee on 18th November 1996 to develop appropriate regulatory framework for derivatives trading and to recommend suggestive bye-laws for Regulation and Control of Trading and Settlement of Derivatives Contracts. The Committee was also to focus on financial derivatives and in particular, equity derivatives. The Committee submitted its report in March 1998.

The Board of SEBI in its meeting held on May 11, 1998 accepted the recommendations of the Dr. L.C. Gupta Committee and approved the phased introduction of derivatives trading in India beginning with Stock Index Futures. The Board also approved the "Suggestive Bye-laws" recommended by the committee for Regulation and Control of Trading and Settlement of Derivatives Contracts. SEBI circulated the contents of the Report in June 1998.

SEBI had setup an Advisory Committee on Derivatives headed by Prof. J. R Varma to review the recommendation of Dr. L.C Gupta Committee in the present context. The Advisory Committee gave its recommendation in its report on "Development and Regulation of Derivative Markets in India". The report of the Advisory Committee was placed on the SEBI website for public comments. The SEBI Board in its meeting on November 29, 2002 considered the recommendations made in the report and also considered the comments received from the public. Based on the recommendations of the Advisory Committee on Derivatives, the Board decided that the following norms for market structure and governance shall be adopted by Derivative Segment and its Clearing House/Corporation (hereinafter referred to as derivative segment)

The major recommendations were as follows:

- The committee strongly recommends the introduction of financial derivatives to facilitate the hedging in a most cost-effective way against market risks.
- There is a need for equity derivatives, interest derivatives and currency derivatives.
- There should be phased introduction of the derivative products. To start with, index futures will be introduced, followed by options on index and options on stocks.
- Regulatory framework for derivatives trading envisaged two-level regulation i.e. exchange-level and SEBI-level, with considerable emphasis on self-regulatory competence of derivative exchanges under the overall supervision and guidance of SEBI.
- The derivatives trading should take place on a separate segment of the existing stock exchanges with an independent governing council where the number of trading members will be limited to 49 percent of the total number. The chairman of the governing council will not be permitted to trade on any of the stock exchanges.
- The settlement of the derivatives will be through an independent clearing corporation called the clearinghouse, which will act as a counter party for all trades or alternatively guarantee the settlement of all the trades. The clearing corporation will have adequate risk containment measures and will collect margins through Electronic Fund Transfer.
- The derivatives exchange will have online trading and surveillance systems. It will disseminate trade and price information on real time basis through two information vending networks.
- There will be complete segregation of client money at the level of trading/clearing member and even at the level of the clearing corporation.
- The trading and the clearing member will have stringent eligibility conditions. At least two persons should have passed the certification programme approved by SEBI.
- The clearing member should deposit a minimum of Rs. 50 Lakh with the clearing corporations and have a minimum net worth of 3 Crore.
- Removal of regulatory prohibition on the use of derivatives by mutual funds while making the trustees responsible to restrict the use of derivatives only to hedge and portfolio balancing and not for speculation.
- Creation of a Derivatives Cell, a Derivative Advisory Committee, and Economic Research Wing by SEBI.
- Declaration of derivatives as securities under the section 2(h)(ii) of the SCRA (Source NSE)

The SEBI Board approved the suggested Bye-Laws recommended by the L.C. Gupta Committee for regulation and control of trading and settlement of derivatives contracts.

Short Question and Answers

1. What is a future contract?

Ans :

Meaning

A futures contract is an agreement between a buyer and a seller where the seller agrees to deliver a specified quantity and grade of a particular asset at a predetermined time in futures at an agreed upon price through a designated market (exchange) under stringent financial safeguards. A futures contract, in other words, is an agreement to buy or sell a particular asset between the two parties in a specified future period at an agreed price through specified exchange. For example, the S&P CNX NIFTY futures are traded on National Stock Exchange (NSE). This provides them transparency, liquidity, anonymity of trades, and also eliminates the counter party risks due to the guarantee provided by National Securities Clearing Corporation Limited (NSCCL).

Bombay Stock Exchange (BSE) website defines futures contract: "Futures are exchange traded contracts to sell or buy financial instruments or physical commodities for future delivery at an agreed price. There is an agreement to buy or sell a specified quantity of financial instrument/commodity in a designated future month at a price agreed upon by the buyer and the seller. The contracts have certain standardized specifications."

The standardized items in any futures contract are:

- Quantity of the underlying asset
- Quality of the underlying asset (not required in financial futures)
- The date and month of delivery
- The units of price quotation (not the price itself) and minimum change in price (tick-size).

2. What is a Forward contract ?

Ans :

Introduction

Forwards are the oldest of all derivatives. It is an agreement between two parties to buy or sell an asset at a certain date in future at a predetermined price. The promised asset may be currency, commodity, instrument like shares / debentures etc.

Forward contracts are normally traded outside stock exchanges. They are popular on the over the counter market. In a forward contract, the party who promises to buy the specified asset at an agreed price at a future date is said to be in the 'long position' and party who promises to sell is said to be in 'short position'. Thus, long position and short position takes the form of buy and sell in a forward contract.

Meaning

Forward contract is a simple form of financial derivative instruments. It is an agreement to buy or sell a specified quantity of an asset at a certain future date for a certain price agreed upon now. In a forward contract, two parties agree to do a trade at some future date at a stated price and quantity. No money changes at the time the deal is signed. However unlike futures contracts, they are not traded on an exchange. They are private contracts between two parties which may be between financial institutions, between a financial institution and one of its corporate client, etc. Further, these contracts differ from 'cash' or 'spot' contracts where delivery is made immediate within a short settlement period. Most of the forward contracts are traded on the over-the-counter (OTC) market or by telephones. Honouring the contract is made generally by taking and giving delivery and counter parties risk depends on the counter party only.

At the time the forward contract is written, a specified price is fixed at which the asset is purchased or sold. This specified price is referred to as the delivery price. This delivery price is set such that the value of the forward contract is zero at the time of its formation. This means that it costs nothing to

take either a long (buyer) or a short (seller) position. This is done by convention so that no cash is exchanged between the parties entering into the contracts. In this way, the delivery price yields a 'fair' price for the future delivery of the underlying asset. One of the parties to a forward contract agrees to buy the underlying asset is said to have a 'long' position. On the other hand, the party that agrees to sell the same underlying asset is said to have a 'short' position.

3. What are the features of future contract?

Ans :

The following are the features of future contract are :

1. Exchange Traded

Future Contracts are generally traded on an exchange. The exchanges provide a mechanism of guarantee to honour the contract. So there is secondary market for futures.

2. Standardized

Future contracts are highly standardised and legally enforceable. There is lack of flexibility.

3. Types of Future

Future contracts can be classified into two :

(a) Commodity future in which underlying asset is a commodity

(b) Financial future in which the underlying asset is a security or bond.

4. Transparency

The contracts enjoy a fair degree of transparency. The terms and conditions are published by exchanges.

5. Down Payment

In future contracts, the contracting parties have to deposit a certain percentage of contract price called as Margin Money with the exchange. It acts as a collateral to support the contract.

6. Delivery of Asset

In future contract the parties only exchange the difference between the future price and the spot price prevailing on the date of maturity.

4. Features of forward contract.

Ans :

(i) It is an agreement between the two counter parties in which one is buyer and other is seller. All the terms are mutually agreed upon by the counterparties at the time of the formation of the forward contract.

(ii) It specifies a quantity and type of the asset (commodity or security) to be sold and purchased.

(iii) It specifies the future date at which the delivery and payment are to be made.

(iv) It specifies a price at which the payment is to be made by the seller to the buyer. The price is determined presently to be paid in future.

(v) It obligates the seller to deliver the asset and also obligates the buyer to buy the asset.

(vi) No money changes hands until the delivery date reaches, except for a small service fee, if there is.

5. Interest Rate Future

Ans :

It is one of the important financial futures instruments in the world. Futures trading on interest bearing securities started only in 1975, but the growth in this market has been tremendous. Important interest- bearing securities are like treasury bills, notes, bonds, debentures, euro-dollar deposits and municipal bonds. In this market, almost entire range of maturities bearing securities are traded. For example, three- month maturity instruments like treasury bills and euro-dollar time deposits, including foreign debt instruments at Chicago Mercantile Exchange (CME), British Government Bonds at London International

Financial Futures Exchange (LIFFE), Japanese Government Bonds at CBOT, etc. are traded. This market is also further categorized into short-term and long-term interest bearing instruments. A few 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.

6. Stock index futures

Ans :

These are another major group of futures contracts all over the world. These contracts are based on stock market indices. For example, in the US markets, there exist various such futures contracts based on different indices like Dow Jones Industrial Average, Standard and Poor's 500, New York Stock Exchange Index, Value Line Index, etc. Other important futures contracts in different countries are like in London market, based on the Financial Times Stock Exchange 100 share Index, Japanese Nikkei Index on the Tokyo Futures Exchange and on the Singapore International Monetary Exchange (SIMEX) as well. Similarly, in September, 1990, Chicago Mercantile Exchange began trading based on Nikkei 225 Stock Index and Chicago Board of Trade launched futures contracts based on the TOPIX index of major firms traded on the Tokyo Stock Exchange.

One of the most striking features of these contracts is that they do not insist upon the actual delivery, only trader's obligation must be fulfilled by a reversing trade or settlement by cash payment at the end of trading. Stock Index futures contracts 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.

7. Foreign Currencies Futures

Ans :

These financial futures, as the name indicates, trade in the foreign currencies, thus, also known as exchange rate futures. Active futures trading in certain foreign currencies started in the early 1970s. Important currencies in which these futures contracts are made such as US-dollar, Pound Sterling, Yen, French Francs, Marks, Canadian dollar, etc. These contracts have a directly corresponding to spot market, known as inter bank foreign exchange market, and also have a parallel inter bank forward market. Normally futures currency contracts are used for hedging purposes by the exporters, importers, bankers, financial institutions and large companies.

8. Hedgers

Ans :

Generally there is a tendency to transfer the risk from one party to another in investment decisions. Put differently, a hedge is a position taken in futures or other markets for the purpose of reducing exposure to one or more types of risk. A person who undertakes such position is called as 'hedger'. In other words, a hedger uses futures markets to reduce risk caused by the movements in prices of securities, commodities, exchange rates, interest rates, indices, etc. As such, a hedger will take a position in futures market that is opposite a risk to which he or she is exposed. By taking an opposite position to a perceived risk is called 'hedging strategy in futures markets'. The essence of hedging strategy is the adoption of a futures position that, on average, generates profits when the market value of the commitment is higher than the expected value.

9. Speculators

Ans :

A speculator is a person who is willing to take a risk by taking futures position with the expectation to earn profits. Speculator aims to profit from price fluctuations. The speculator forecasts the future economic conditions and decides which position (long or short) to be taken that will yield a profit if the forecast is realized.

Speculators are two types

(i) Day traders and position traders.

(ii) Position speculator uses fundamental analysis of economic conditions of the market and is known as fundamental analyst, whereas the one who predicts futures prices on the basis of past movements in the prices of the asset is known as technical analyst.

10. Arbitrageurs

Ans :

Arbitrageurs are another important group of participants in futures markets. They take advantage of price differential of two markets. An arbitrageur is a trader who attempts to make profits by locking in a riskless trading by simultaneously entering into transactions in two or more markets. In other words, an arbitrageur tries to earn riskless profits from discrepancies between futures and spot prices and among different futures prices.

Choose the Correct Answer

1. A contract that requires the investor to buy securities on a future date is called a [b]
   (a) Short contract (b) Long contract
   (c) Hedge (d) Cross
2. A long contract requires that the investor. [b]
   (a) Sell securities in the future (b) Buy securities in the future
   (c) Hedge in the future (d) Close out his position in the future
3. A person who agrees to buy an asset at a future date has gone. [a]
   (a) Long (b) Short
   (c) Back (d) Ahead
4. A short contract requires that the investor [a]
   (a) Sell securities in the future (b) Buy securities in the future
   (c) Hedge in the future (d) Close out his position in the future
5. A contract that requires the investor to sell securities on a future date is called a [a]
   (a) Short contract (b) Long contract
   (c) Hedge (d) Micro hedge
6. If a bank manager chooses to hedge his portfolio of treasury securities by selling futures contracts, he [d]
   (a) Gives up the opportunity for gains (b) Removes the chance of loss.
   (c) Increases the probability of a gain (d) Both (a) and (b) are true
7. A disadvantage of a forward contract is that [d]
   (a) It may be difficult to locate a counterparty
   (b) The forward market suffers from lack of liquidity
   (c) These contracts have default risk.
   (d) All of the above.
8. Forward contracts are risky because they [d]
   (a) Are subject to lack of liquidity (b) Are subject to default risk
   (c) Hedge a portfolio (d) Both (a) and (b) are true
9. The advantage of forward contracts over future contracts is that they [d]
   (a) Are standardized (b) Have lower default risk.
   (c) Are more liquid (d) None of the above
10. The advantage of forward contracts over futures contracts is that they [c]
   (a) Are standardized (b) Have lower default risk
   (c) Are more flexible (d) Both (a) and (b) are true

11. Forward contracts are of limited usefulness to financial institutions because [d]
    (a) Of default risk (b) It is impossible to hedge risk
    (c) Of lack of liquidity (d) Both (a) and (c) of the above
12. Futures contracts are regularly traded on the [a]
    (a) Chicago Board of Trade (b) New York Stock Exchange
    (c) American Stock Exchange (d) Chicago Board of Options Exchange
13. When interest rates fall, a bank that perfectly hedges its portfolio of Treasury securities in the futures market [c]
    (a) Suffers a loss (b) Experiences a gain
    (c) Has no change in its income (d) None of the above
14. Futures markets have grown rapidly because futures [d]
    (a) Are standardized (b) Have lower default risk
    (c) Are liquid (d) All of the above
15. Parties who have bought a futures contract and thereby agreed to _____ (take delivery of) the bonds are said to have taken a _____ position. [d]
    (a) Sell; short (b) Buy; short
    (c) Sell; long (d) Buy; long
16. Parties who have sold a futures contract and thereby agreed to _____ (deliver) the bonds are said to have taken a _____ position. [a]
    (a) Sell; short (b) Buy; short
    (c) Sell; long (d) Buy; long
17. On the expiration date of a futures contract, the price of the contract [c]
    (a) Always equals the purchase price of the contract
    (b) Always equals the average price over the life of the contract
    (c) Always equals the price of the underlying asset
    (d) Always equals the average of the purchase price and the price of underlying asset
18. The price of a futures contract at the expiration date of the contract [a]
    (a) Equals the price of the underlying asset (b) Equals the price of the counterparty
    (c) Equals the hedge position (d) Equals the value of the hedged asset
19. Elimination of riskless profit opportunities in the futures market is [b]
    (a) Hedging (b) Arbitrage
    (c) Speculation (d) Underwriting
20. If you sold a short contract on financial futures you hope interest rates [a]
    (a) Rise (b) Fall
    (c) Are stable (d) Fluctuate
21. If you sold a short futures contract you will hope that interest rates [a]
    (a) Rise (b) Fall
    (c) Are stable (d) Fluctuate

Fill in the blanks

1. _____ contracts are normally trade outside stock exchanges.
2. At the time the forward contract is _____ a specified price is fixed at which the asset is purchased or sold.
3. The specified price in a forward contract will be referred to as the _____ price.
4. The spot price of the underlying asset when the contract expires is called future _____ price.
5. _____ contracts are generally traded on an exchange.
6. _____ future in which the underlying asset is a security or bond.
7. A method of anticipating future price movement using _____ and _____ information.
8. LIFFE stands for _____ .
9. Cost of living index futures is also known as _____ .
10. A _____ is a person who is willing to take a risk by taking futures position with the expectation to earn profits.
11. _____ are another important group of participants in futures markets.
12. Future Price = Spot Price + carry Cost – _____ .
13. SEBI appointed the L.C. Gupta Committe on _____ .
14. The _____ exchange will have online trading and surveillance systems.
15. _____ like future forwards option & swaps are important tools to manage assets, portfolios and financial risks.
16. Party who promises to sell is said be in _____ .
17. _____ is a fundamental derivative instrument & is simply a kind of promise to deliver a good at the terms agreed upon today.
18. Forward contracts are private contracts hence trade over the counter and not in _____ .
19. Physical delivery of assets at the time of entering the contracts. Physical delivery takes place only on _____ .
20. A future contract is always _____ irrespective of maturity date.
21. _____ the amount a futures market participant must deposit into a margin amount.
22. _____ the number of purchases or sales of a commodity futures contract made during a specified period of time.
23. _____ has taken a short position by in the contract selling the dollar to the bank force 3-month future.
24. The sport price of the underlying asset when the contract expires is called the _____ .

ANSWERS

1. Forward
2. Written
3. Delivery
4. Spot
5. Future
6. Financial
7. Supply, Demand
8. London International Financial Futures Exchange
9. Inflation futures
10. Speculator
11. Arbitrageurs
12. Carry Return
13. 18th November 1996
14. Derivatives
15. Financial derivatives
16. Short position
17. Forward contract
18. Exchanges
19. Expiry date
20. Settled daily
21. Initial margin
22. Volume
23. UK MNC
24. Future spot price

UNIT III

OPTIONS

Options: Concept of Option - Futures Vs. Options - Determinants of Option Prices - Black Scholes Option Pricing Model - Binomial Pricing Model (Including Problems)

3.1 Concept of Option

Q1. What are options? State the terminology used in option market.

(OR)

What are important terms used in options contract?

Ans : **(May-16, Imp.)**

Introduction

Options are the important financial derivatives where the instruments have additional features of exercising an option which is a right and not the obligation. Hence, options provide better scope for risk coverage and making profit at any time within the expiration date. The price of the underlying is also derived from the underlying asset.

An option is a particular type of a contract between two parties where one person gives the other person the right to buy or sell a specific asset at a specified price within a specific time period. In other words, the option is a specific derivative instrument under which one party gets the right, but no obligation, to buy or sell a specific quantity of an asset at an agreed price, on or before a particular date. For example, one person buys an option contract to purchase 100 shares of State Bank of India at Rs 300 per share for a period of 3 months. It means that the said person has the right to purchase the share of State Bank of India at Rs 300 per share within 3 months from the date of the contract. If the price of State Bank of India increases, he will exercise the option, and if the price falls below Rs 300 then he will not exercise his option.

It is evident from the above that an option is the right, but not the obligation to buy or sell something at a specified date at a stated price. It means the option buyer will exercise the optionally when he is in profit. In case of loss, he will not exercise the option. Today, options are traded on a variety of instruments like commodities, financial assets as diverse as foreign exchange, bank time deposits, treason securities, stocks, stock indexes, petroleum products, food grains, metals, etc.

Meaning

An option is a deferred delivery contract which gives the buyer (holder) the right, but not the obligation, to buy or sell specified quantity of the underlying assets at a specific price (strike price) on or before a specified time (expiration date). The underlying may be physical commodities or financial instruments; today options are traded on underlyings as diverse as stocks, stock indices, foreign exchange, interest rates and metals commodities. Options are relatively newer securities that came into being in 1973 when the first options were traded on CBOE. Initially only call options were traded but after around four years, put options were also allowed for trading. In India, options on individual stocks and stock indices were permitted for trading on NSE and BSE from June 2001.

Terminology

(i) Underlying

Underlying refers to the specific security/asset on which an options contract is based. In the above example, the underlying is the stock of Reliance Industries.

(ii) Option Buyer/Holder

An option buyer/holder is the person who buys an option, which can be a call option or a put option. He enjoys the right to buy or sell the underlying asset at a specified price on or before specified time, without an obligation to do so. The option buyer pays a premium in order to enjoy this right. His upside potential is unlimited while losses are limited to the premium paid by him to the option writer. Anyone can be an option buyer, provided he pays the premium.

(iii) Option Seller/Writer

The person who writes the option, which can be a call option or a put option is called the option seller/writer. He has the obligation to buy (in case of put option) or to sell (in case of call option) the underlying asset, in case the buyer of the option decides to exercise his option. The option writer collects the premium from the option buyer. His profits are limited to the premium received from the buyer while his downside is unlimited.

(iv) Call Option

A call option gives the buyer/holder the right to buy a specified quantity of the underlying asset at the strike price on or before expiration date. The seller of the call option, on the other hand, has the obligation to sell the underlying asset if the buyer of the call option decides to exercise his option to buy. For example, in the above case, the first option, which is a call option, gives the buyer the right to buy shares of Reliance at the exercise price of Rs. 480 on or before the expiration date of July by paying a premium of Rs. 50.

(v) Put Option

A put option gives the buyer/holder the right to sell a specified quantity of the underlying asset at the strike price on or before the expiration date. The -seller of the put option, on the other hand, has the obligation to buy the underlying asset at the strike price if the buyer decides to exercise his option to sell. For example, in the above case, RIL P JUL 520, which is a put option, gives the buyer the right to sell shares of Reliance at the exercise price of Rs. 520 on or before the expiration date of July by paying a premium of Rs. 50.

(vi) Option Premium

Option premium is the price paid by the buyer to the option seller to acquire the right to buy or sell the underlying. In the above case, supposing a person buys the first option, i.e., the July - 480 Call Option, he has to pay a premium of Rs. 50, while the writer receives the same for writing the option. The premium has to be paid upfront and the writer receives the premium irrespective of whether the option is exercised or not. The option premium paid depends on a number of factors, which will be covered later.

(vii) Strike Price or Exercise Price

The strike or exercise price of an option is the specified/pre-determined price of the underlying asset at which the same can be bought or sold if the option buyer exercises his right to buy/sell on or before the expiration day. For example, RIL C JUL 480 will have an exercise price of Rs. 480, i.e., the call buyer can buy the stock of Reliance at Rs. 480, while RIL P JUL 520 will have an exercise price of Rs. 520, i.e., the put buyer can sell the stock of Reliance at Rs. 520.

(viii) Expiration Date

The date on which the option expires is known as expiration date. On expiration date, either the option is exercised or it expires worthless. For example, if it is an August option (RIL C AUG 400, RIL P AUG 400), then the expiration date would be the last Thursday of the month of August, beyond which the option cannot be exercised.

(ix) Exercise Date

The date on which the option is actually exercised by the buyer is known as exercise date. In case of European Options, the exercise date is same as the expiration date while in case of American Options, the exercise date may be the same or it may be earlier than the expiration date but exercise date cannot be beyond the expiration date.

(x) European and American Style of options

An American style of option is the one which can be exercised by the buyer any time on or before the expiration date, i.e., anytime between the day of purchase of the option and the day of its expiry. For example, if a person has purchased RIL C SEP 400, i.e., the September Call Option, he can exercise the option any time before the last Thursday of September.

The European style of option is the one which can be exercised by the buyer on the expiration day only and not anytime before that. For example, if a person has purchased RIL C SEP 400, i.e., the September Call Option, he can exercise the option only on the last Thursday of September month.

(xi) Option Class

It refers to all listed options of a particular type (i.e., call or put) on a particular underlying instrument. For example, in the above example, all call options of Reliance or all put options of Reliance are referred to as an option class.

(xii) Option Series

An option series consists of all the options of a given class with the same expiration date and strike price. For example, RIL C JUL 400 is an options series which includes all Reliance call options that are traded with strike price of 400 and expiry in July.

(xiii) Open Interest

The total number of options contracts outstanding in the market at any given point of time is called open interest.

Q2. What are the features of options ?

Ans :

The following features are common in all types of options.

- **Contract :** Option is an agreement to buy or sell an asset obligatory on the parties.
- **Premium :** In case of option a premium in cash is to be paid by one party (buyer) to the other party (seller).
- **Pay off :** From an option in case of buyer is the loss in option price and the maximum profit a seller can have in the options price.
- **Holder and writer :** Holder of an option is the buyer while the writer is known as seller of the option. The writer grants the holder a right to buy or sell a particular underlying asset in exchange for a certain money for the obligation taken by him in the option contract.
- **Exercise price :** There is call strike price or exercise price at which the option holder buys (call) or sells (put) an underlying asset.
- **Variety of underlying asset :** The underlying asset traded as option may be variety of instruments such as commodities, metals, stocks, stock indices, currencies etc.
- **Tool for risk management :** Options is a versatile and flexible risk management tools which can mitigate the risk arising from interest rate, hedging of commodity price risk. Hence options provide custom-tailored strategies to fight against risks.

Q3. Explain the different classification of options.

(OR)

Classify the different types of option contract.

Ans : **(Imp.)**

Options can be classified into different categories:

1. Call and Put options
2. American and European options
3. Exchange-traded and OTC-traded options

1. Call and put options

When an option grants the buyer (holder) the right to purchase the underlying asset/stock from the writer (seller) a particular quantity at a specified price within a specified expiration date, it is called 'call option or simply a 'call'. It is an option to purchase; its holder has the privilege of purchasing

or calling from a second party (i.e. writer) to buy an asset. The call option holder pays the premium to the writer for the right taken in the option.

A put option, on the other hand, is an option contract where the option buyer has the right to sell the underlying asset to the writer, at a specified price at or prior to the option's maturity date. It is also called, simply a 'put'. Thus, if you buy a put option on State Bank of India stock, you have gained the right to sell the shares of SBI to the writer at a specified price on or before the expiration date.

2. American and European options

On the basis of the timing of the possible exercise, the option contracts can also be classified into two categories: American options and European options. A European option can be exercised only at the expiration date whereas the American option can be exercised at any time up to and including the expiration date, Thus, the definitions given above relating to 'call' and 'put' options apply to the American style options. Most of the options traded in the world today are the American style options. There is nothing particularly geographical about the names, it is just a convention.

3. Exchange-traded and OTC-traded options

Exchange traded options can be traded on recognized exchanges like the futures contracts. Over the counter options are custom tailored agreement traded directly by the dealer without the involvement of any organized exchange. Generally large commercial bankers and investment banks trade in OTC options.

Exchange traded options have specific expiration date, quantity of underlying asset but in OTC traded option trading there is no such specification and terms are subjective and mutually agreed upon by the parties. Hence OTC traded options are not bound by strict expiration date, specific limited strike price and uniform underlying asset.

Since exchange traded options are guaranteed by the exchanges, hence they have less risk of default because the deals are cleared by clearing houses. On the other side OTC options have higher risk element of default due to noninvolvement of any third party like clearing houses. Offsetting the position by buyer or seller

Q4. What are the differences between exchange trade and OTC traded?

Ans :

Both the options have different mechanism of functioning which is discussed here as under:

1. Exchange-traded options, like futures contracts, are standardized and are traded on organized (or government designated) exchanges. On the other hand, the OTC options are written on the counters of the large commercial and investment bankers.
2. Exchange-traded options have certain specified norms relating to quantity, maturity dates, under-lying assets, etc. which are determined by the exchanges. However, in case of OTC options, all such terms are subject to negotiation and mutually determined by the buyer and the seller of the option contract.
3. Being standardized in nature, an option contract traded through the recognized exchange has uniform underlying asset, limited number of strike prices, limited expiration dates and so on. But in case of options through OTC have not such limitations. They are tailor-made contracts designed normally as per desire of the buyers. So there are no foundation on strike prices, expiration dates, etc.
4. Exchange-traded options are performed and cleared through a clearing house corporation which interposes itself as a third party to the all options contracts. Since, these options are guaranteed by the exchanges, hence, default risk is almost eliminated. But in case of OTC-traded options, the degree of the default risk is higher because there are only two parties, and if the options writer commits default, there is no guarantee to the buyer.
5. On buying an option contract from a recognized exchange, the obligation can be fulfilled in one of the three ways which are mentioned as follows:
   (a) The option buyer may not exercise the contract, allowing the option to expire. All the premium is retained by the seller and the seller's obligation is discharged.

(b) In case of American option, the buyer can exercise his right on or before the expiration date, and then, the seller adhere to fulfill all the terms of contract. The writer keeps all of the premium underlying the contract.

(c) Either of the parties to the option contract can execute an offsetting transaction in the option market to eliminate he future obligations. For example, the buyer sells or the seller buys another option with the identical terms. In such situation, the rights or obligations under the original option contract are transferred to a new option holder. It means the option contracts can be offset even before the expiration.

In contrast, the OTC-traded options have no such facilities, as mentioned above, like exchange-traded options. Being tailor-made and unstandardized in nature, the OTC-traded option writers may face difficulties in offsetting the options before the maturity.

6. In case of exchange-traded options, the writers are required to deposit the margin funds since they are exposed to considerable risk. However, in case of the OTC options, the writers deposit no such margins.

7. It has been observed that the transaction costs are lower in exchange-traded options in comparison to the OTC-traded options, which depends usually on the creditworthiness of the buyers of the options!'

Q5. Distinguish between European option and American option.

Ans :

S.No.	Basis of Comparison	European option	American option
1.	**Low/ High premiums**	In the case of European style options, the premium offered is quite low as the holder of the same gets to redeem the option only at its maturity date.	In the case of an American style the holder of the same gets to redeem the option anytime between the date option, the premium offered is high as of option trading and its maturity date.
2.	**Popularity**	European style options are not that popular and this is why these options are less traded.	American style options are very popular and this is why these options are high in demand.
3.	**Trading**	European style options are traded mostly OTC or over the counter.	American style options are traded mostly OTE or over the exchanges.
4.	**Hedging**	It is easier to formulate a hedging strategy in a European style option as the holder of the same can redeem the option at the maturity date which is already known.	It is difficult to formulate a hedging as the holder of the same gets to decide as and whenever the option can be strategy in an American style option redeemed by him or her.
5.	**Risk factor**	As the maturity date is already fixed, the profits or losses can be easily estimated. This is why European style options carry a lower rate of risk.	As the maturity date is decided by the option holder, he or she may choose he or she thinks it quite profitable. This is why American style options carry a to redeem the same as and whenever higher rate of risk.

Q6. What are the differences between call option and put option?

Ans :

S.No.	Nature	Call Option	Put Option
1.	**Definition**	Buyer of a call has the right, but is not required, to buy an agreed quantity by a certain date for a certain price (the strike price)	Buyer of a put option has the right, but is not required, to sell an agreed quantity by by a certain an agreed quantity by a certain date for the strike price.
2.	**Costs**	Premium paid by buyer	Premium paid by buyer
3.	**Obligations**	Seller (writer of the call option) obligated to sell the underlying asset to the option holder if the option is exercised.	Seller (writer of a put option obligated to buy the underlying asset from the option holder if the option is exercised.
4.	**Value**	Increases as value of the underlying asset increases.	Decreases as of the underlying asset increases.
5.	**Analogies**	Security deposit - allowed to take something at a certain price if the	Insurance - protected against a loss in value.

Q7. Define the following terms.

(i) In the money

(ii) At the money

(iii) Out of the money

Ans :

(i) In the money : When the strike price of a call option is lower than the underlying price, the option is said to be in the money. It is considered to be in the money since the owner of the option has the right to buy the stock at a price which is lower than the price he has to pay if he had to buy the same from the open market, i.e., if you exercise an in the money option, there will be an immediate cash inflow.

(ii) At the money : When the strike price of a call option is equal to that of underlying price, the option is said to be at the money.

(iii) Out of the money : When the strike price of a call option is more than that of underlying price, the option is termed to be out of the money. If the option has to become either in the money or at the money, the underlying price has to rise.

Table (a) : When RIL stock is trading at Rs. 450

Condition	Strike price	A call option is termed as
Strike price < Stock price	420	In the money
	430	
	440	
Strike price = Stock price	450	At the money
Strike price > Stock price	460	Out of the money
	470	
	480	

Similarly, in the case of a put option:

- When the strike price is greater than the stock price, the option is said to be in the money because the holder of the option has the right to sell the underlying at a price that is more than the going market price and this results in an immediate cash inflow to the holder of the option.
- If the strike price of the option is equal to the stock price, the put option is said to be at the money.
- When the strike price is less than stock price, the option is said to be out of the money.

Table : (b) When RIL is trading at Rs. 450

Condition	Strike price	A put option is termed as
Strike price < Stock price	420	In the money
	430	
	440	
Strike price = Stock price	450	At the money
Strike price > Stock price	460	Out of the money
	470	
	480	

3.2 FUTURES VS. OPTIONS

Q8. Compare and contract Futures and Options.

(OR)

Distinguish between options and futures contracts.

(OR)

Explain the distinction between options and future contracts.

Ans : **(Imp.)**

S.No.	Futures	S.No.	Options
1.	Both the parties are obliged to perform the contract.	1.	Only the seller (writer) is obligated to perform the contract.
2.	Margins deposits are to be required by all the participants.	2.	The buyer pays the seller (writer) a premium.
3.	The holder of the contract is exposed to the entire spectrum of downside risk and has potential for all the upside return.	3.	The buyer's loss is restricted to downside risk to the premium paid, but retains upward indefinite potentials.
4.	The parties of the contract must perform at the settlement date. They are not obligated to perform the date.	4.	The buyer can exercise option any time prior to the expiry date.

Q9. Explain the mechanism of options trading.

Ans :

The mechanism of options trading involves the following,

Placing an Opening Order

Anyone who is willing to trade options needs to basically open an account with the brokerage firm. After this, instructions must be given to the broker for buying selling a certain specific option. This broker forwards this order to the firm's floor broke on the exchange where the option gets traded. All the orders should be carried out within the normal trading hours which differs from one product to another usually starting from 8:30 am to either 3:02 pm or 3:15 pm central time. A trading pit is being designated for the particular option to get traded. This trading pit is a multilevel octagonal in shape in which the market makers and floor brokers are present.

The following different types of orders can be placed by an investor,

1. Market Order

It provides instructions to the floor broker to get the best price.

2. Limit Order

It mentions the maximum price to pay if buying or minimum price to accept if selling. Limit orders are further divided into two firms,

(i) Good-till-cancelled Order : This order will be in effect until it is being cancelled.

(ii) Day Order : This order would remain in effect for the remainder of the day.

3. Stop Order

An investor may use stop order for a price which is less than the current price.

4. All or None Order

This order helps the broker to fill a part of the order at one price and the other part at some other price.

5. Same Price Order [All or None Order]

The broker needs to either fill the complete order at the same price or do not fill the order at all.

The Role of the Clearing House

The process of clearing house starts as soon as the trading is being completed. Clearing house is formally called as the options clearing corporated [OCC]. OCC is an independent corporation which provides guarantees with respect to the writer's performance and it acts as an intermediary in every single transaction. A buyer using an option is attentive towards the clearing house and not towards the writer. The writer of an exercised option does the payment for or stock delivery to the clearing house.

Every single member of OCC is called as "clearing firm" which holds an account with the OCC. The options exchanges outside the U.S. even makes use of clearing houses which functions in the same manner as that of OCC. However, in case of over-the-counter market there is no clearing house and the buyer is subjected to credit risk on the writer's side.

The OCC accomplishes the vital responsibility of assuring option writer's performances. Thus, a call buyer does not necessarily scrutinize the writer's credit.

The members of clearing firms may assume certain levels of risk for which the OCC charges minimum capital requirements on them. The OCC holds a claim on their securities and margin deposits in case of default. Even the OCC manages a special fund which is supported by its members.

Placing an Offsetting Order

For instance, consider an investor holding a call option. The stock price is being increased recently and the calls price is presently more than the original purchase price. The liquidity of the options market helps the investor to earn profits through selling the option in the market. This process is termed as an offsetting order or an offset. The order is being completed and carried out in the same way as an opening order.

3.3 DETERMINANTS OF OPTION PRICES

Q10. What are the factors that determines the value of options? Explain.

(OR)

What are the factors that determines the price of options? Explain.

(OR)

"Price of an option depends upon a number of factors". Comment on the statement in the light of various factors which affects the option value.

Ans : **(May-17, May-16, Imp.)**

(i) Current price of the underlying asset

The first important factor which influences the option price is the current price of the asset/stock. The option price will change as the stock price changes. For example, for a call option, the option price increases as the stock price increases and v'ce versa. The opposite holds in case of put option.

(ii) Strike price of the option

Strike or exercise price of the option is fixed for the life of the option. Other factors remain constant, in case of call option, the lower the strike price, the higher will be the option price and vice versa. The same is reverse in case of put option.

(iii) Time to expiration of the option

The option is a wasting asset. Since the option has a fixed maturity, so after the expiration of the maturity, there is no value of option. In other words, all other factors remains constant, the longer the time to expiration of the option, the higher will be the option price. This is because as the time to maturity decreases, lesser time remains for stock's price to rise or fall, and therefore, the probability of a favourable price movement decreases.

(iv) Expected Stock price volatility

Fluctuations in stock prices in future is a major factor to influence the option price, because greater the expected volatility of the price of the stock, the more an investor would be willing to pay for the option, and more premium an option writer would demand for it due to increased risk in the option contract.

To understand the role of volatility, consider the following example.

Assume that a stock is currently traded at Rs. 100 and a call option on this stock with a strike price of Rs. 100. The payoff of this option is dependent on the price of the stock at expiry. Consider that the stock can assume the prices as given in Table but the probability of the stock assuming that value is dependent on its volatility.

Current Price	Likely Prices	Call Payoff	Probability of low volatility	Probability of high volatility
	80	0	0.10	0.30
	90	0	0.20	0.10
100	100	0	0.40	0.20
	110	10	0.20	0.10
	120	20	0.10	0.30

Price of the call if volatility is low will be equal to :

$0 \times 0.10 + 0 \times 0.20 + 0 \times 0.40 + 10 \times 0.20 + 20 \times 0.10 =$ Rs. 4

Price of the call if volatility is high will be equal to :

$0 \times 0.30 + 0 \times 0.10 + 0 \times 0.20 + 10 \times 0.10 + 20 \times 0.30 =$ Rs. 7

So it is clear from the above example that higher the volatility, higher will be the option's price.

(v) Risk free interest rate

Interest rate is an important factor which creates impact on the option price. Since buying an option contract involves investment which bears cost for the investor. Consequently, all other factors remain constant, the higher the interest rate (short term-risk free), the greater the cost of buying the underlying and carrying it to the expiration date of the call option. Hence, the higher the short term risk free interest rate, the greater the price of a call option.

(vi) Anticipated cash payments on the stock

Anticipated cash payments on the stock tend to decrease the price of a call option because the cash payments make it attractive to hold stock than to hold the option. On the other hand, for put option, cash payments on the stock tend to increase the price.

The influence of these factors on option price is shown in Table.

Table : Determinants of Option Price

Effect on an increase of factor on

Factor	Symbols	Call price	Put price
Current price of stock	(S)	Increase	Decrease
Strike price	(K)	Decrease	Increase
Time to expiration of option	(f)	Increase	Increase
Price volatility of stock	(σ)	Increase	Increase
Interest rate (short-term)	(r)	Increase	Decrease
Anticipated cash payments	(c)	Decrease	Increase

Before discussing the Black-Scholes option pricing model, let us explain certain parameters to understand the model because the same have been used in the construction of the model.

Q11. Write notes on log normal assumption on the parameters of log normal distribution.

Ans :

The log normal assumption

A stock option pricing model must make certain assumptions about how stock prices behave over time. For example, if the price of State Bank of India share is Rs 300 today in the market, what is the probability distribution for the price in one week or in one month or in one year? The basic assumption in the Black- Scholes option pricing model is that stock prices follow what is termed a random walks. This means that proportional changes in the stock price in the short period are normally distributed. This inturn implies that the stock price at any future time has a log normal distribution.

The general shape of a normal and log normal distribution has been shown in Figure respectively. A variable can take any position; positive or negative in a normal distribution, whereas in a log normally distribution, is restricted to being positive. So, a normal distribution is symmetrical, a log normal distribution is skewed with the mean, median and mode all different. Further, a random variable is log-normally distributed if the natural logarithm of the variable is normally distributed. One reason for using a log normal distribution is that the price relative can never be negative, and hence, the price relatives can not be normally distributed. The natural logarithm of the price relative can be negative and will be normally distributed.

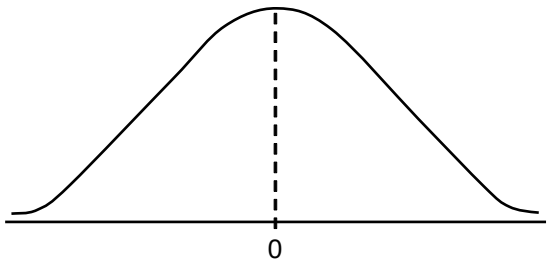


Fig.: A normal distribution

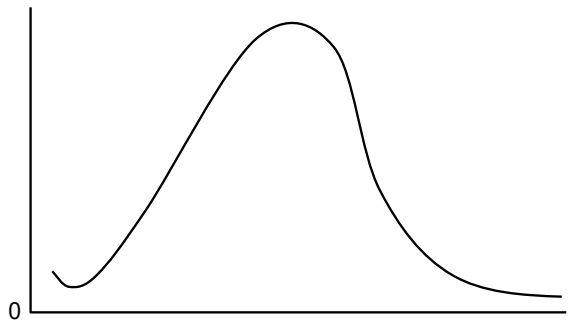


Fig.: A log normal distribution

The parameters of log normal distribution

There are two basic parameters which have described for the behaviour of a stock price under log normal distribution which are as under:

(a) The expected return from the stock

(b) The volatility of the stock price

Expected return

The expected return is the annualized average return earned by investors in a short period of time. Let us denote it by *u.* The expected return desired by investors from a stock depends on the riskiness of the stock. The higher the risk, the higher will be the expected return. It will also depend on the market rate of interest in the economy. For example, if the risk free interest is higher then the expected return on a given stock will also be higher. Expected return can be considered with the period of time, and in time limit, we obtain usually two estimates:

(i) The expected return in a very short period

(ii) The expected return (continuously compounded) over a longer period. The expected return in a very short period of time is *u* and over a longer period is $u - \sigma^2/2$.

Calculation of expected return

In general, the expected return is used in the sense of possible profit outcomes weighted by their probability occurrence.

Volatility

The volatility of stock, σ is a measure of uncertainty about the returns provided by the "Stock. Oftenly volatilities are expressed in percentages per annum. The volatility may be

defined precisely as "the volatility of a stock price is the standard deviation of the return provided by the stock in one-year when the return is expressed using continuous compounding." As a rough approximation, $\sigma\sqrt{T}$ is the standard deviation of the proportional change in the stock price in time.

3.3.1 Black Scholes Option Pricing Model

Q12. "Black Scholes Option Pricing Model is one of the important model for pricing the option". Discuss the statement in the light of various models for option pricing.

(OR)

What are various assumptions of Black Scholes Option Pricing Model?

(OR)

Explain the assumptions of Black Scholes Option Pricing Model.

Ans : **(May-18)**

The Black-Scholes (B-S) option pricing model is probably the most commonly used option pricing model in finance. It was initially developed in 1973 by two academicians, Fisher Black and Myron Scholes and was designed to price European options on non-dividend paying stocks. Later on, since other academicians further modified the model to make it applicable to American option, option on dividend-paying stock, option on other instruments like futures contracts. In this section, we are not explaining the derivation of the model, rather we simply state the B-S model of pricing formula of option and how to use it to price option.

The reason for popularity of the model is that it allows for an analytical solution. It means that there is a formula into which certain values are input and from which an option price is forthcoming. However, this formula when programmed into a computer, it can produce results (option price) within seconds.

Assumptions

The model is based on certain assumptions which are as under :

1. Stock price behaviour corresponds to the log normal distribution which have been explained earlier. It assumes that *u* and dare constant.
2. There are no transaction costs or taxes.
3. All securities/stocks are perfectly divisible.
4. No dividends payments on stock during the life of the option.
5. There are no riskless arbitrage opportunities.
6. Stock trading is continuous.
7. Investors can borrow or lend at the same risk free rate of interest.
8. The short-term risk free interest rate r is constant.

The foundation of the model is the construction of a hypothetical risk free portfolio, consisting of long call options and short positions in the underlying stock, on which an investor earns the riskless return. Thus, it is analogous to the no-arbitrage analysis. The reason why a riskless portfolio can be set up is because the stock price and the option price are both affected by the same underlying source of uncertainties and factors. In short period, the stock price is perfectly correlated with the option price, and the price of a put option is perfectly negatively correlated with the price of the underlying stock. In this way, in both cases, when an appropriate portfolio of the stock and option is created, profit and loss from the stock position will offset the profit and gain from option position so that the overall value of the portfolio at the end of the short period of time is known with certainty.

The (B-S) pricing formula

Black and Scholes drive the following equation for pricing European call options on non-dividend paying stocks:

$$C = SN(d_1) - Ke^{-rt} N(d_2)$$

$$P = Ke^{-rT} N(-d_2) - SN(-d_1)$$

where

$$d_1 = \frac{\ln(S/K) + rT}{\sigma\sqrt{T}} + 0.5\ \sigma\sqrt{T}$$

$$d_2 = \frac{\ln(S/K) + rT}{\sigma\sqrt{T}} - 0.5\ \sigma\sqrt{T}$$

or

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

Where C is call option price,

- P is put option price, 5 is stock price,
- K is strike price, e is exponential (which has the constant value of 2.7182818),
- r is risk free interest rate (annualize), T is time to expiry (in years), a is the annualized standard deviation of stock returns (volatility) as a decimal,
- e^{-rt} is a discount term similar to $1/(1 + r)^t$ and as such it determines the present value of a future sum of money and its discount on continuous compounding,
- $l_n(.)$ is the natural logarithm,
- N(.) is the cumulative probability distribution function for a standardized normal variable,
- $N(d_1)$ is the area under the distribution to the left of d_1 and
- $N(d_2)$ is the area under the distribution to the left of d_2.

Standardized normal distributions have total are a as of so the $N(d_1)$ is the probability oft/ being d_1 or less (likewise for d_2). $N(d_1)$ can be interpreted as the probability of the call option being in the money at the expiry.

Q13. What are the limitations of black scholes model?

There are limitations to the Black-Scholes model, which is one of the most popular models for options pricing. Some of the standard limitations of the Black-Scholes model are:

- Assumes constant values for risk-free rate of return and volatility over the option duration. None of those may remain constant in the real world.
- Assumes continuous and costless trading—ignoring liquidity risk and brokerage charges.
- Assumes stock prices to follow a lognormal pattern, e.g., a random walk (or geometric Brownian motion pattern), thus ignoring large price swings that are observed more frequently in the real world.
- Assumes no dividend payout—ignoring its impact on the change in valuations.
- Assumes no early exercise (e.g., fits only European options). That makes the model unsuitable for American options.
- Other assumptions, which are operational issues, include assuming no penalty or margin requirements for short sales, no arbitrage opportunities, and no taxes. In reality, all these do not hold true. Either additional capital is needed or realistic profit potential is decreased.

PROBLEMS

1. From the following details calculate the price of call option Black-Shoes models market price of share is Rs. 92 and strike price of share Rs. 95 and time period 50 days option expires on Dec. 21st 2002 option contract is made on 11th Nov. 2002 and risk free rate of interest is 7.12% p.a. S.D is 35%.

Sol :

$$C = S.N(d_1) - k.e^{-r.T}.N(d_2)$$

$$d_1 = \frac{\ln\left(S/K\right) + r.T}{\sigma\sqrt{T}} + 0.5\ \sigma\sqrt{T}$$

Strike price of share = 95

Spot and market price of share = 92

Time price = 50

$$d_1 = \frac{\ln\left(92/95\right) + 0.0712 \times \frac{50}{365}}{0.35 \times \sqrt{\frac{50}{365}}} + 0.5 \times .35 \times \sqrt{\frac{50}{365}}$$

$$d_1 = \frac{-0.03208 + 0.0712 \times 0.13699}{0.35 \times 0.01937} + 0.5 \times 0.35 \times 0.01937$$

$$d_1 = \frac{-0.03208 + 0.00975}{0.1295} + 0.06475$$

$$d_1 = \frac{-0.02233}{0.1295} + 0.06475$$

$d_1 = -.17263 + 0.06475 = -0.10788$

Normal $d_1 = 0.4562$

$$\boxed{d_2 = d_1 - \sigma\sqrt{T}}$$

$$d_2 = 0.4562 - 0.35\sqrt{\frac{50}{365}}$$

$= -0.10788 - 0.35 \times 0.3701$

$= -0.10788 - 0.1295$

$= -0.2375$

$Nd_2 = 0.4052$

$$\boxed{C = S.N(d_1) - k.e^{-r.T}.N(d_2)}$$

$$C = (92 \times 0.4562) - 95\ e^{-0.712 \times \frac{50}{365}} \times 0.4052$$

$C = 41.9704 - 95\ e^{-0.00975} \times 0.4052$

$C = 41.9704 - 95 \times 0.9902 \times 0.4052$

$C = 41.9704 - 94.078 \times 0.4052$

$C = 41.9704 - 38.1203 = 3.85.$

2. Mr. Shaker wants to earn by writing call option on RIL's stock the current price of stock is Rs. 28 and shaker wants to write a four month call option with the strike price of Rs. 30/- Mr. shaker wants to determine the appropriate premium to charge for call option. The stock S.D is 30% the risk less rate of interest is 10% p.a. determine the premium value of call option.

Sol :

Market price = 28

S.Price = 30

S.D = 0.30

r = 10%

T = 4 months

$C = S.N(d_1) - ke^{-r.T} . N d_2$

$$d_1 = \frac{\ln\left(S/K\right) + r.T}{\sigma\sqrt{T}} + 0.5\,\sigma\sqrt{T}$$

$$d_1 = \frac{\ln\left(\frac{28}{30}\right) + 0.10 \times \frac{4}{2}}{0.30\sqrt{0.334}} \times 0.5 \times 0.3 \times \sqrt{0.33}$$

$$d_1 = \frac{-0.06899 + 0.10 \times 0.33}{0.172} \times 0.0866$$

$$d_1 = \frac{-0.0359}{0.1732} \times 0.0866$$

$d_1 = -0.20779 \times 0.0866$

$d_1 = -0.1206$

$\rightarrow$ Normal table $\Rightarrow$ 1 under 2

$Nd_1 = 0.4522$

$d_2 = d_1 - \sigma\sqrt{T} = -0.1206 - 0.30\sqrt{0.334}$

$= -0.1206 - 0.1732$

$= -0.2927$

$Nd_2 = 0.3859$

$C = (28 \times 0.4522) - 30e^{-0.1 \times 0.334} \times 0.3859$

$C = 12.6612 - 30e^{-0.0334} \times 0.3859$

$C = 12.6616 - 29.0145 \times 0.3859$

$C = 12.6616 - 11.1967$

C = 1.4649/-

3. Consider the following data stock price Rs. 50. Months to expiration is three month risk free rate of int 10 p.a S.D of stock 40% excise price Rs. 55. Calculate the value of call option.

Sol :

$$\boxed{C = S.N(d_1) - k.e^{-r.T} - N(d_2)}$$

$$d_1 = \frac{\ln\left(S/K\right) + r.T}{\sigma\sqrt{T}} + 0.5\,\sigma\sqrt{T}$$

$$d_1 = \frac{\ln\left(\frac{50}{55}\right) + 0.10.\left(\frac{3}{12}\right)}{0.40\sqrt{\frac{3}{12}}} + 0.5 + 0.4 \times \sqrt{\frac{3}{12}}$$

$$d_1 = \frac{-0.0953 + (0.01 \times 0.25)}{(0.40)\,(0.5)} + (0.5)\,(0.4 \times 0.5)$$

$$d_1 = \frac{-0.0953 + 0.025}{0.2} + 0.1$$

$$d_1 = \frac{-0.0703}{0.2} + 0.1$$

$$d_1 = -0.3515 + 0.1$$

$$d_1 = -0.2515 = 0.4013$$

$$Nd_2 = d_1 - \sigma\sqrt{T}$$

$$Nd_2 = -0.2515 - 0.40\sqrt{\frac{3}{12}}$$

$$Nd_2 = -0.2515 - (0.40 \times 0.5)$$

$$Nd_2 = -0.2515 - 0.2$$

$$Nd_2 = -0.4515$$

$$Nd_2 = 0.3264$$

$$\boxed{C = S.N(d_1) - k.e^{-r.T}.\,N(d_2)}$$

$$C = 50\,.\,(0.4013) - 55\,.\,e^{-0.10 \times \frac{3}{12}}\,.\,(0.3264)$$

$$C = 20.065 - 55\,e^{-0.10 \times 0.25}\,.\,(0.3264)$$

$C = 20.065 - 55\ e^{-0.025}\ (0.3264)$

$C = 20.065 - 55\ (0.975)\ (0.3264)$

$C = 20.065 - 55\ (0.3184)$

$C = 20.065 - 17.50876$

$C = 2.56$

Nd_1 = 2 under 5

is 0.4013

Nd_2 = 4 under 5

is 0.3264.

4. The companies equity stock current price is Rs. 45 and S.D = 0.35, T = 0.5 strike price Rs. 41 risk free interest rate = 10%.

i) What is value of call option and

ii) Determine the call option of the above stock if the annual dividend deal is 6%.

Sol :

$$C = S.N(d_1) - k.e^{-r.T} . N(d_2)$$

$$Nd_1 = \frac{\ln\left(S/K\right) + r . T}{\sigma\sqrt{T}} + 0.5\ \sigma\ \sqrt{T}$$

$$Nd_1 = \frac{\ln\left(45/41\right) + (0.10 \times 0.5)}{0.35\ \sqrt{0.5}} + 0.5 \times 0.35 \times \sqrt{0.5}$$

$$Nd_1 = \frac{0.0931 + 0.05}{0.35 \times 0.707} + 0.5 \times 0.35 \times 0.707$$

$$Nd_1 = \frac{0.1431}{0.24745} + 0.123725$$

$Nd_1 = 0.5711 + 0.123725$

$Nd_1 = 0.694789861$

Table Value : 0.7549

$Nd_2 = d_1 - \sigma\ \sqrt{T}$

$= 0.694789861 - 0.35 \times 0.707$

$= 0.694789861 - 0.24745$

$= 0.4474$

Table value $Nd_2 = 0.6736$

ii) If 6% dividend yield is given the revised market price share is calculated by using dividend yield and time period.

S = Market price

So, $S.e^{-D.T}$

$= 45\ e^{-0.06 \times 0.5}$

S = 43.6711

$C = S.N(d_1) - k.e^{-r.T}\ N(d_2)$

$$Nd_1 = \frac{In\left(S/K\right) + r\ .\ T}{\sigma\sqrt{T}} + 0.5\ \sigma\ \sqrt{T}$$

$$Nd_1 = \frac{In\left(\frac{43.67}{41}\right) + (0.10 \times 0.5)}{0.35 \times 0.707} + 0.5 \times 0.35 \times 0.707$$

$$Nd_1 = \frac{0.0630893 + 0.05}{0.24745} + 0.123725$$

$Nd_1 = 0.457 + 0.123725$

$Nd_1 = 0.580725$

Table value = $Nd_1 = 0.7190$

$Nd_2 = d_1 - \sigma\ \sqrt{T}$

$Nd_2 = 0.580725 - 0.35 \times 0.707$

$Nd_2 = 0.580725 - 0.24745$

$Nd_2 = 0.33275$

Table Value $Nd_2 = 0.6293$

$C = S.N(d_1) - k.e^{-r.T}\ N(d_2)$

$C = 43.67\ (0.7190) - 41\ e^{-0.10 \times 0.5}\ .\ (0.6293)$

$C = 31.39873 - 24.543$

C = 6.86

5. Calculate the value of put option from infra market price of stock Rs. 80 excise price Rs. 70 month to expiration of option contract 3M and S.D is 60%, Risk free rate of R = 12%.

Sol :

$$P = k.e^{-r.T} . N(d_1) - S.N(d_2)$$

$$d_1 = \frac{\ln\left(S/K\right) + r . T}{\sigma\sqrt{T}} + 0.5\,\sigma\,\sqrt{T}$$

$$d_1 = \frac{\ln \frac{80}{70} + 0.12 \times 0.25}{0.60 + \sqrt{0.25}} + 0.5 \times 0.60 \times \sqrt{0.25}$$

$$d_1 = \frac{0.13353 + 0.03}{0.3} + 0.15$$

$d_1 = 0.6951$ seeing $N(-d_1)$ i.e., -0.6951

$$\boxed{Nd_1 = 0.2451}$$

$$\boxed{Nd_2 = d_1 - \sigma\sqrt{T}}$$

$Nd_2 = 0.6951 - 0.60 \times 0.5$

$= 0.6951 - 0.3$

$= 0.3951 + (-d_2)$

$= -0.3951$

$= \boxed{Nd_2 = 0.3483}$

$P = 70.e^{-0.12 \times 0.25}(0.2451) - 80\ (0.3483)$

$P = 16.6499 - 27.864$

$P = -11.214$

6. Consider the following data

Particulars	X	Y
Option	16.12	10.62
Stock	Rs 80	Rs 80
Exercise price	Rs70	Rs80
Time to expiration	3 months	3 months
Risk-free return	12% p.a.	12% p.a.
Expected dividend	0	0
Standard deviation of Stock returns	60%	60%

Calculate the option value for X and Y.

Sol :

For call option X

$C = S.N(d_1) - Ke^{-rt} N(d_2)$

Then,

$$d_1 = \frac{\ln(S/K) + rT}{\sigma\sqrt{T}} + 0.5\sigma\sqrt{T}$$

$$= \frac{0.13353 + 0.075}{0.3} = 0.70$$

$\therefore \quad N(d_1) = 0.7580$

Now $\quad d_2 = \frac{0.13353 - 0.075}{0.3} = 0.40$

$\therefore \quad N(d_2) = 0.6554$

Value of call option

$= \text{Rs. } 80(0.7580) - \text{Rs. } 70\, e^{0.12 \times 0.25}\,(0.6554)$

$= \text{Rs. } 16.62$

For call option Y

$C = S.N(d_1) - Ke^{-rt} N(d_2)$

Then, $\quad d_1 = \frac{\ln(S/K) + rT}{\sigma\sqrt{T}} + 0.5\sigma\sqrt{T}$

$$= \frac{0.0 + 0.075}{0.03} = 0.25$$

$\therefore \quad N(d_1) = 0.5987$

Now, $\quad d_2 = \frac{0.0 - 0.015}{0.3} = -0.05$

$\therefore \quad N(d_2) = 0.48$

Value of call option $= \text{Rs. } 80(0.5987) - \text{Rs. } 80e^{0.12 \times 0.24}(0.48)$

$= \text{Rs. } 10.62$

7. Option on ABC 500

Stock price	**= Rs. 120**
Call exercise price	**= Rs. 100**
Exercise date	**= 6 months**
Estimated standard deviation	**= 30%**
Current market price	**= Rs. 28**
Risk-free retrun	**= 8% p.a.**

Calculate call option price of the stock as per Black-Scholes model.

Sol :

Call option price as per B–S model is

$$C = S.N(d_1) - Ke^{-rt} N(d_2)$$

Then

$$d_1 = \frac{\ln(120/100) + 180/365(0.08)}{0.3\sqrt{180/36.5}}$$

$$= 0.5(0.30)\sqrt{180/365}$$

Thus,

$N(d_1) = 0.8770$

and $N(d_2) = 0.8280$

Value of call option $= 120 - (0.8770) - 100e^{0.08(180/365)} (0.8289)$

$= Rs. 25.56.$

8. Consider the following data:

Stock price = Rs. 50

Months to expriation = 3 months

Risk-free rate of interest = 10% p.a

Standard deviation of stock = 40%

Exercise price = Rs. 55

Option type = European call

Calculate the value of call option as per Black-Scholes model.

Sol:

Given that,

Stock price, (S) = ` 50

Time-to-expiration (T) = 3 month

= 0.25 (3/12)

Risk free rate (R) = 10%

Standard deviation (s) = 40%

Exercise price (K) = ` 55

$$V = SN(d_1) = -Ke^{-rt} N(d_2)$$

$$D_1 = \frac{\ln\left(\frac{S}{K}\right) + [r + 0.5\sigma^2]T}{\sigma\sqrt{T}}$$

$$= \frac{\ln\left(\frac{50}{55}\right) + [0.1 + 0.5(0.4)^2]0.25}{0.4(\sqrt{0.25})}$$

$$= \frac{(-0.0953)+[0.045]}{0.2}$$

$d_1 = -0.2515$

$d_2 = d_1 - s\sqrt{T}$

$= -0.2515 - 0.4\ (\sqrt{0.25}) = -0.4515$

As per cumulative probabilities from the normal distribution table,

$N(d_1) = N(-0.2515)$

$= N(-0.25) - 0.15\ [N(-0.25)-N(-0.256)]$

$= 0.4013 - 0.15\ (0.4013 - 0.3974)$

$= 0.401$

$N(d_2) = N(-0.4515)$

$= N(-0.45) - 0.15[N(-0.45)-N(-0.46)]$

$= 0.3264 - 0.15\ (0.3264 - 0.3228)$

$= 0.326$

Premium value of call option

$V = S\ N(d_1) - Ke^{-rt}\ N(d_2)$

$= 50(0.401) - 55.e^{-0.1\times0.25}\ (0.326)$

$= 20.05 - 55 \times 0.975 \times 0.326$

$= 20.05 - 17.48 = 2.56$

$\therefore$ The premium value of given option is ` 2.56.

9. Option ABS 500

Stock price = ` 120

Call exercise price = ` 100

Exercise date = 6 months

Estimated standard deviation = 30%

Current market price = ` 28

Risk free return = 8% p.a

Calculate call option price of the stock as per Black-Scholes model.

Sol :

Given that,

Stock price, S = ` 120

Call exercise price, k = ` 100

Exercise data, T = 6 months = $\frac{180}{365}$

Estimated standard deviation, s = 30%

Risk free return, r = 8% p.a

Current market price = ` 28

$V = SN(d_1) - ke^{-rt} N(d_2)$

$$d_1 = \frac{In\left(\frac{S}{K}\right) + [r + 0.5\sigma^2]T}{\sigma\sqrt{T}}$$

$$= \frac{In\left(\frac{120}{100}\right) + [0.08 + 0.5(0.3)^2]0.5}{0.3\sqrt{0.5}}$$

$$= \frac{0.1823 + 0.0625}{0.2121}$$

$\therefore d_1 = 1.1542$

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

$= 1.1541 - 0.3\sqrt{0.5}$

$= 0.9420$

The values of $N(d_1)$ and $N(d_2)$ according to cumulative probabilities for standard normal distribution,

$N(d_1) = 0.8770$

$N(d_2) = 0.8289$

Value of call option,

$V = SN(d_1) - Ke^{-rt} N(d_2)$

$= 120(0.870) - 100e^{-0.08-0.5} (0.8289)$

$= 105.24 - 96.73$

$= ` 8.51$

10. Determine the value of a call option using the Black and Scholes model :

The share is currently selling at Rs. 80 and the standard deviation of the stock's rate of return is 0.7. The call has an exercise price of Rs. 90 and has 6 months to for expiration. The continuously compounding rate of return is 8% of per annum.

Sol : **(May-16)**

Spot rate = 80

Strike price/Exercise price = 90

$$t = \frac{6}{12} = 0.5$$

Standard deviation (s) = 0.7

$r = 0.08$

$C = S.N(d_1) - K.e^{-rT} \cdot N(d_2)$

$$d_1 = \frac{\ln(S/K) + r.T}{\sigma\sqrt{T}} + 0.5\ \sigma\sqrt{T}$$

$$= \frac{\ln\left(\frac{80}{90}\right) + 0.08(0.5)}{0.7\sqrt{0.5}} + 0.5(0.7)\sqrt{0.5}$$

$$= \frac{-0.118 + 0.04}{0.7(0.707)} + 0.247$$

$$= \frac{-0.078}{0.495} + 0.247$$

$= -0.158 + 0.247$

$d_1 = 0.089$

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

$= 0.089 - 0.7\sqrt{0.5}$

$= 0.089 - 0.495$

$= -0.406$

$N(d_1) = N(0.089)$

$= 0.5359$

$N(d_2) = N(-0.406) = 0.3409$

$C = 80.(0.5359) - 90 \times e^{-(0.08)(0.5).}\ (0.3409)$

$= 42.87 - 90 \times (0.961)\ (0.3409) = 42.87 - 29.48 = 13.39$

11. From the following information, calculate call option value.

Current market price = Rs. 100 per share

Exercise price = Rs. 80 per share

Volatility of share price = 30%

Risk free interest rate 10% p.a

Time to expiration = 3 months

Use black-scholes options pricing model.

Sol : **(May-17)**

Spot rate = 100

Strike price/Exercise price = 80

$$T = \frac{3}{12} = 0.25$$

Standard deviation r = 10%

r = 2.5

$C = S.N(d_1) - Ke - rT.N(d_2)$

$$d_1 = \frac{I_n(S/K) + r.T}{\sigma\sqrt{T}} + \frac{0.25\sigma\sqrt{T} = I_n\left(\frac{100}{80}\right) + 2.5(0.25)}{0.10\sqrt{0.25}} + 0.25\ (10\%)\ \sqrt{0.25}$$

$$= \frac{0.78 + 0.04}{0.05(0.05)} + \frac{0.82}{0.025} = 32.8$$

12. The current stock price for ACG Ltd is Rs. 85. A European call option with an exercise price of Rs. 85 will expire in 160 days. The yield on a 160-day Treasury bill is 5.18%. The standard deviation of annual returns on ACG's stock is 44%. Compute the premium for a call option on this stock.

Sol :

T = 160/365 = 0.4384 years

$$d_1 = \frac{\{\ln\ (S/X) + (r + 0.5\sigma^2) \times T\}}{\{\sigma^2\sqrt{T}\}}$$

$$= \frac{\{\ln\ (1) + (0.0518 + 0.5 \times [0.44^2]) \times 0.4384\}}{\{0.44\sqrt{0.4384}\}}$$

$$= \frac{(0 + 0.1486 \times 0.4384)}{(0.44 \times 0.6621)} = 0.2236$$

$N(d_1) = 0.58706$

$d_2 = d_1 - \sqrt{T}$

$= 0.2236 - 0.44\sqrt{0.4384}$

$= 0.2236 - 0.2913 = 0.0677$

$N(d_2) = 0.47210$

$C = S_0\ N(d_1) - Xe^{-rT}\ N(d_2)$

$= 85 \times 0.58706 - 85 \times e^{-0.05128 \times 0.4384} \times 0.47210$

$= 49.901 - 85 \times 0.97777 \times 0.47210$

$= 49.00 - 39.236$

3.3.2 Binomial Pricing Model

Q14. What is Binomial Pricing Model? State the various assumptions of Binomial Pricing Model.

Ans : **(Imp.)**

Another important technique of pricing a stock option is through constructing a binomial tree. This is a tree which represents different possible paths that might be followed by the stock price over the life of the option. This model was advocated by Cox, Ross and Rubinstein in 1979 and takes the form of binomial model. This model, like B and S model does not permit an analytical solution rather solves the problem numerically. It means there is no formula that can be programmed into a computer or calculator; instead a computer must be programmed to ascertain solution.

In this section, we will discuss only the introductory aspect of binomial model. Although the explanation of this model will treat the time to expiry of an option as being one period, or divided into 2 periods, and much large number of periods.

Assumptions

The assumptions of Binomial Option Pricing Model are as follows,

1. Options trading is seen in prefect and competitive market which makes the transaction costs margin requirements and takes to be zero.
2. In perfect and competitive markets investors can grab the opportunity of make full use of proceeds from short sales.
3. There exist perfect competition in the market.
4. Does not include transaction cost.
5. Firm will not pay any tax.
6. There is no need for initial payments.
7. The revenue received by the investors from short term sales is completely utilized.
8. Investors are allowed do trade in fractions or proportions of securities which are infinitely divisible.
9. Investors can trade at the prevailing market prices on a daily basis.
10. There is only a single interest rate (r) at which investors lend or borrow money.

Q15. Discuss in detail about two period binomial option pricing model.

Ans : **(Imp.)**

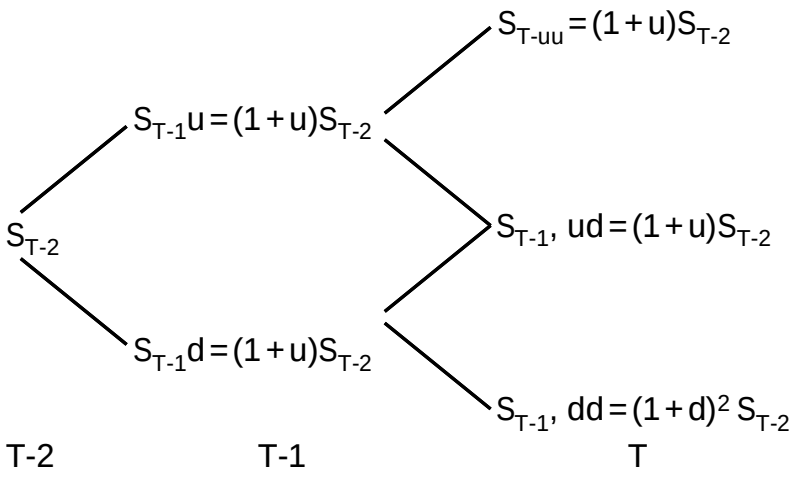
The Two Period Binomial Option Pricing Model

In two-period binominal option pricing model the basic assumption is that the process directing the price of an underlying asset is static in nature over a period of time. This, it is assumed that 'u' and 'd' are

fixed in every period. It is not necessary that this assumption would be helpful in deriving a multi period option model 'u' and 'd' remains constant in order to attain an accurate call option pricing formula for a multiple time period.

Multiperiod Call Option Pricing Formula

The basic assumption is that there are no ex-divided days. The stock price process is,



'T' is the expiration data of a call option.

'S_{r-2}' is the stock price.

The stock price can either take any one out of the two values at the end of the next time period T–1, on the basis of its increased or decreased value. Similarly, at the end of the second time period T, the stock price can be either of the three values. One important point to be remembered noted is that the time T stock price is remains unchanged and is found to be independent with the price movements whether an uptick follows a downtick or a downtick follows an uptick. The same would be applicable in all the cases if 'u' and 'd' remains stationary over time. Therefore, there exists two methods of calculating the stock price $S_{T,ud}$, which is equal to $S_{T,du}$.

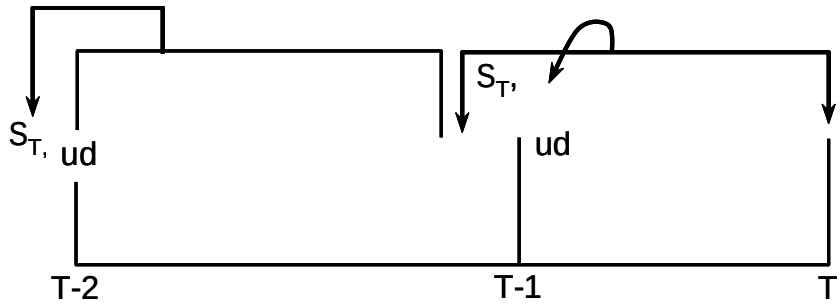
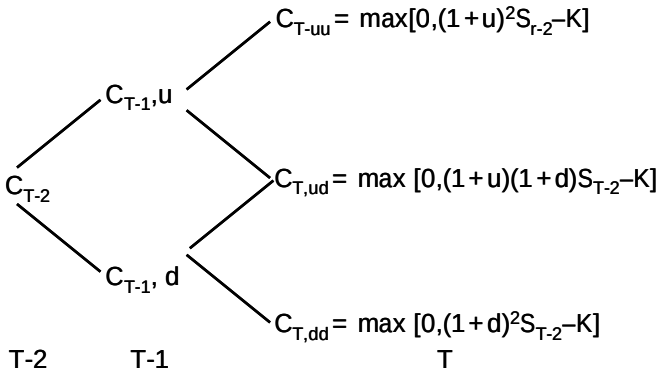
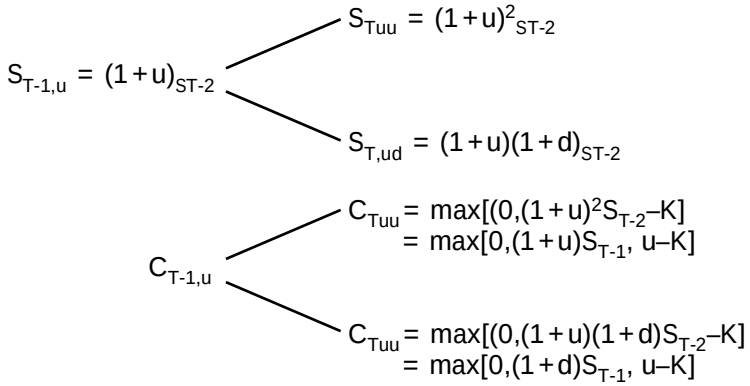


Figure: Multiple Time Period

The pricing process of the call is represented as,



A recursive process is being used to solve C_{T-2} This process begins with the option expiration date and plays an important role is determining the present value on the basis of option price at the expiration date. The C_{r-1}, u value can be calculated with the help of one-period analysis which has already been described in the previous topic. It means that there is an uptick in the stock price at a time, T–1, At this point of time, it can be represented as,



We know that general binomial option pricing model equation for a non-paying dividend stock is given as,

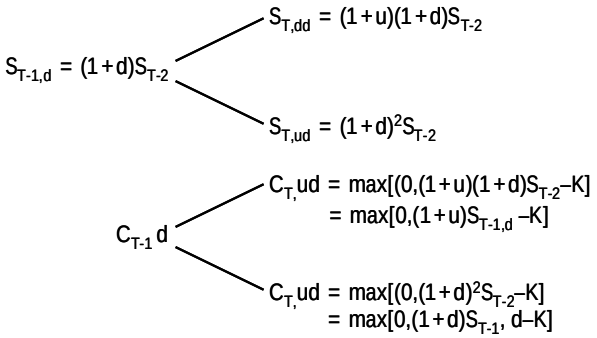
$$C = \frac{PC_u + (1-P)C_d}{1+r} \qquad \ldots (1)$$

It is the clear picture of a single period analysis with the help of a equation (1) value of the call can be determined at time T–1, by assuming that there was an uptick during the first period.

$$C = \frac{PC_{T-1,uu} + (1-P)C_{T,ud}}{1+r}$$

Equation (2) is similar to the single period BOPM call pricing model of a non-dividend paying stock (equation (1)) with a slight alterations in a symbolic representation of equation (1).

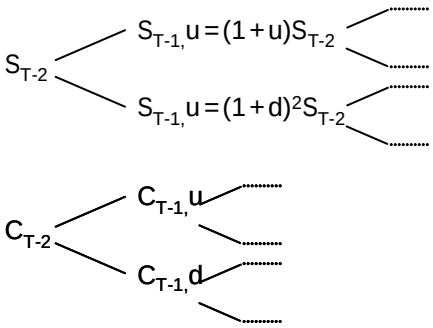
The next assumption is that T-1 is the time period considered with a downtick situation in lieu of uptick in the first period. Then, in such a situation the case would be,



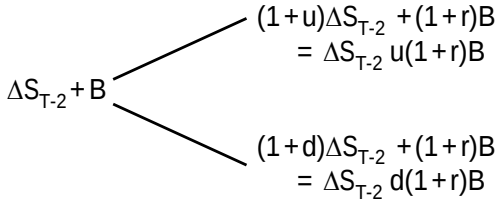
The following is the formula which is used to calculate the value of the call in the downtick situation are computed in which T–2, time period is used an applied in the single period BOPM principle.

$$C_{T-1,d} = \frac{PC_{T,ud} + (1-p)C_{T,dd}}{1+r}$$

At this point of time both the values one at the uptick situation and another at the downtick situation are computed in which T-2, time period is used an applied in the single period BOPM principle.



A levered portfolio can be invested at T–2, time period which would results in the same pay-offs as that of calls at T–1 time period. The starting investment of DS_{T-2} + B will be either of the two values on the basis whether there exists an uptick or a downtick.



Now, equate the time T–1 payoffs of equivalent portfolio with the values of the call at time T – 1.

$\Delta(1 + u)S_{r-2} + (1 + r) B = C_{r-1}, u$

$\Delta(1 + d)S_{r-2} + (1 + r) B = C_{r-1}, d$

In the above equations there are two unknown variables Δ and B. Which needs to be accurately measured. These can be computed in the following manner,

$$\Delta = \frac{C_{T-1}, u - C_{r-1}, d}{(u-d)S_{T-2}} = \frac{C_{r-1}, u - C_{r-1}, d}{S_{T-1,} u - S_{T-1}, d} \quad ...(4)$$

$$B = \frac{(1+u)C_{T-1,} d - (1+d)C_{T-1,} u}{(u-d)(1+r)} \quad ... (5)$$

These equation illustrates the investment in D shares of stock and bounds (but remember that for calls, $B \leq 0$) at time period, T – 2, which results in a portfolio having pay-offs which are indentical to those obtained from the call values at time T – 1.

$$C_{r-2} = \Delta S_{r-2} + B \quad ... (6)$$

Δ and B are defined in equations (4) and (5), After substituting the values obtained from (2), (3), (4) and (5) equation, (6) equation is completed. The resultant would be the call value for two periods before its expiration date.

$$C_{r-2} = \frac{p^2 C_{r,uu} + 2P(1-P)C_{T,nd} + (1-P)^2 C_r, dd}{(1+r)^2} \quad ... (7)$$

Equation (7) contains the known variables on the right hand side of the equation. The value of P can be calculated by the formula (r – d)/(u – d). The time T value of the call can be either any one of these three values.

$C_{T,uu}$ = max [0, $S_{T,uu}$ – k]
= max [0, (1 + u)2 S_{T-2} – k]
$C_{T,ud}$ = max [0, $S_{T,ud}$ – k]
= max [0, (1 + u) (1 + d) S_{T-2} – k]
$C_{T,dd}$ = max [0, $S_{T,dd}$ – k]
= max [0, $(1 + d)^2$ S_{T-2} – k]

Another relevant point is that the portfolio of stocks and bounds can offer the same payoffs as it has been offered by any option. In other words, any option can be replicated through stocks and bonds. This process of replication is a dynamic process. There would be a difference in the values of A and *B* at two different time periods T–2 and T–1. Which makes the composition of equivalent portfolio to be different variable at the end of every time period.

Cash outflows are seen only at two different points of time. Initially, it occurs at the time of purchase of an option while the other is seen at the time of maturity sale of an option.

In case of equating an option with bonds and stocks it must be noted that there should not be any other cash outflow that is found to be associated with an equivalent portfolio, when A and B fluctuates.

The equivalent portfolio possess a unique characteristic of 'self-financing'. Inspite of the fact that A and B fluctuates over fine, there is no extra cash required to continue the dynamic replication process of the value of A increases, then more number of shares needs to be purchased at a new exceeded stock price, which would brings an increment in B's value (which is equal to the product of the change in A and the new stock price). The increase in the borrowing amount would be equated with the value of new shares.

Similarly, if in case the prices of the underlying assets declines, A to will decline and shares needs to be sold in order to carry out the replication process.

In order to maintain an equivalent portfolio, the proceeds obtained from the sales of shares at a novel stock price needs to be maintained equally with the decline in borrowing capacity.

PROBLEMS

13. A stock price is currently ` 40. Over each of the next two 3-month periods it is expected to go up by 10% or down by 10%. The risk-free interest rate is 12% per annum with continuous compounding.

(a) What is the value of a 6-month European put option with a strike price of ` 427

(b) What is the value of a 6-month American put option with a strike price of ` 427

Sol :

Following formulas can be used to calculate the values of six-month. European and American put option.

$$P = \frac{e^{r\Delta t} - d}{u - d}$$

$$f_u = e^{-rDt}[Pf_{uu} + (1 - P)f_{ud}]$$

$$f_d = e^{-rDt}[Pf_{ud} + (1 - P)f_{dd}]$$

$$f = e^{-rDt}[Pf_u + (1 - P)f_d]$$

We have,

$u = 1.1$, $d = 0.9$, $r = 0.12$, $Dt = 0.25$

$T = 0.5$ and $K = 42$

$$P = \frac{e^{r\Delta t} - d}{u - d}$$

$$= \frac{e^{(0.12)(0.25)} - (0.9)}{1.1 - 0.9}$$

$$= ` 0.65$$

$\therefore$ We have $f_{uu} = 0$, $f_{ud} = 2.4$ and $f_{dd} = 9.6$

(a) Calculation of 6 Month European Put Option with a Strike Price of ` 42

$$f_u = e^{-rDt}[Pf_{uu} + (1 - P)f_{ud}]$$

$$= e^{-(0.12)(0.25)}[(0.65 \times 0) + (1 - 0.65) \times 2.4]$$

$$= ` 0.81$$

$$f_d = e^{-rDt}[Pf_{ud} + (1 - P)f_{dd}]$$

$$= e^{-(0.12)(0.25)}[(0.65 \times 2.4) + (1 - 0.65) \times 9.6]$$

$$= ` 4.77$$

$$f = e^{-rDt}[Pf_u + (1 - P)f_d]$$

$$= e^{-(0.12)(0.25)}[(0.65 \times 0.81) + (1 - 0.65) \times 4.77]$$

$$= ` 2.13$$

(b) Calculation of 6 Month American Put Option with a Strike of ` 42

In calculating American put option, situation is almost similar to the calculation of European put option. However, were is one major difference i.e., after one-time step, when the stock falls down then the option value called be ` 6 if one exercise since,

` 6 is more than the fd value i.e., ` 4.77

Therefore,

$f = e^{-rDt}[P_{fu} + (1 - P)f_d]$

$= e^{-(0.12)(0.25)} [(0.65 \times 0.81) + (1–0.65) \times 6]$

= ` 2.55.

---

14. A stock price is currently `40. It is known that at the end of 3 months it will be either `45 or `35. The risk-free rate of interest with quarterly compounding is 8% per annum. Calculate the value of a 3-month European put option on the stock with an exercise price `40. Verify that no-arbitrage arguments and risk-neutral valuation arguments given the same answers.

Sol :

Given that,

Stock price (SP) = `40

Exercise price = `40

R.F.R = 8% or 0.08

$er^t = e^{0.08 \times 3/12} = e^{0.02} = 1.02$

S.P goes up by `45 and goes down by `35.

The value of the option at the end of three months will be `5 if the stock price is `35 or `0 if the stock price is `45.

Note:

In order to get a positive initial investment, the shares are taken as $– \Delta$ and option is taken as + 1 instead of $+\Delta$ and –1. Because the delta Δ of a put option is always negative.

$\therefore$ Consider a portfolio consisting of,

Sares = $– \Delta$

Option = + 1

When the stock price moves down to `35, then the value of portfolio is,

$– 35\Delta + 5$

$– 35 \times – 0.5 + 5 = 22.5$

When the Stock Price moves up to `45 then the value of portfolio is, $– 45\Delta$

$= –45 \times – 0.5 = 22.5$

As both the values are same there exist a riskless portfolio.

(i) Calculation of Present Value Portfolio when Risk Free Rate is 8% i.e., 0.08

Current Value $= -40\Delta + f \times e^{rt} = 22.5$

$= (-40 \times -0.5 + f)\ 1.02$

$= 22.5$

$= (20 \times 1.02) + (f \times 1.02)$

$= 22.5$

$= 20.4 + 1.02\ f = 22.5$

$= 1.02\ f = 22{:}5 - 20.4$

$= 1.02\ f = 2.1$

$$f = \frac{2.1}{1.02}$$

$f = 2.06$

(∴ Present value of option is ` 2.06)

The same is calculated by using risk-neutral valuation.

(ii) Calculation of Risk-neutral Value Option when through probability is 1.

$pf_u + (1 - p)\ fd = Soe^{rT}$

$45\ p + (1 - p)\ 35 = 40\ e0.0853 \times 12$

$45\ p + 35 - 35\ p = 40 \times 1.02$

$45\ p + 35 - 35\ p = 40.8$

$10\ p = 40.8 = 35$

$10\ p = 5.8$

$$p = \frac{5.8}{10}$$

$p = 0.58$

When the Probability is 0

$35\ p + (1 - p)\ 45 = 40.8$

$35\ p = 45 - 45\ p = 40.8$

$-10\ p = -45 + 40.8$

$-10p = -4.2$

$$p = \frac{4.2}{10}$$

$p = 0.42$

Calculation of Expected Option Value

$$0.58 \times 0 + 42 \times 5$$

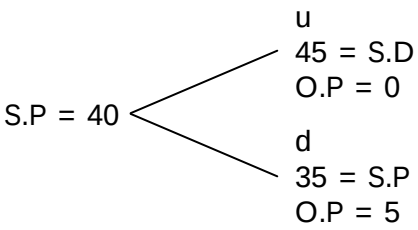
$$= 2.1$$

$$P_v = \frac{2.1}{1.02}$$

$$= 2.06$$

it is uniform/constant with no-arbitrage answer.

Working Notes



Calculation of Δ Value

$$\Delta = \frac{0-5}{45-35} = 0.5$$

$$e^{rT} = e^{0.08\times3+12} = 1.023.$$

15. A stock price is currently $50. It is known that at the end of two months it will be either $53 or $48. The risk free interest rate is 10% per annum with continuous compounding. What is the value of a two month European call option with a strike price of $49?

Sol :

Given that,

Stock Price (SP) = $50

Exercise/strike price = $49

Risk Free Rate (R.F.R) = 10% (or) 0.10

$e^{rt} = e^{0.10\times2/12} = e^{0.016} = 1.016$

Calculation of Value of Portfolio at Both increased (or) Decreased Prices

Stock price may go up by $53 and may go down by $48.

The value of the option at the end of two months will be,

(i) $4 if the stock price is $53

(ii) $0 if the stock price is $48

Consider portfolio consisting of + Δ and –1.

When stock price moves up to \$53 then value of portfolio is,

$53 \times 0.8 - 4 = 38.4$

When stock price moves down to \$48 then value of portfolio is,

$48 \times 0.8 - 0 = 38.4$

As both value are same there exists a riskless portfolio.

Calculation of f Present Value of Portfolio at R.F.R of 10% i.e., 0.10

Current value of portfolio,

$(50 \times 0.8 - f)\, e^{0.10 \times 2/12} = 38.4$

$(40 - f) \times 1.016 = 38.4$

$$40 - f = \frac{38.4}{1.016}$$

$40 - f = 37.79$

$f = 40 - 37.79$

$f = 2.21$

Therefore, the value of option is \$ 2.21.

Exercise Problems

1. Consider the following binomial option pricing problem involving an American Call. This call has two periods to go before expiring. Its stock price is 30, and its exercise price is 25. The risk-free rate is 0.05, the value of u is 1.15, and the value of d is 0.90. The stock pays a dividend at the end of the First period at the rate of 0.06. Find the value of the cell.

   [Ans : C = $ 6.34]

2. A stock has a current price of $115.83. A European call option on the stock expires in eight weeks and has $N(d_1) - 0.33$. If volatility changes by 0.03 approximate the amount the call price is expected to change.

   [Ans : Change in call price is 0.4929]

3. On December 13, a Swiss Franc call option expiring on January 17 had an exercise price of $0.46. The spot exchange rate was $0.4728. The U.S. risk-free rate was 7.1 percent and the Swiss risk-free rate was 3.6 percent. The volatility of the exchange rate was 0.145. Determine whether the call was correctly priced at $0.0163.

   [Ans : With a call value of $0.0163, stock is believed to be undervalued]

4. Find the value of an American put option using the binomial option pricing model. The parameters are S = 62, X = 70, r = 0.08, u = 1.10 and d = 0.95. There are no dividends use n = 2 periods.

   [Ans : Value of an American put option, P = 8]

Short Question and Answers

1. In the money

Ans :

When the strike price of a call option is lower than the underlying price, the option is said to be in the money. It is considered to be in the money since the owner of the option has the right to buy the stock at a price which is lower than the price he has to pay if he had to buy the same from the open market, i.e., if you exercise an in the money option, there will be an immediate cash inflow.

2. Call Option

Ans :

A call option gives the buyer/holder the right to buy a specified quantity of the underlying asset at the strike price on or before expiration date. The seller of the call option, on the other hand, has the obligation to sell the underlying asset if the buyer of the call option decides to exercise his option to buy. For example, in the above case, the first option, which is a call option, gives the buyer the right to buy shares of Reliance at the exercise price of Rs. 480 on or before the expiration date of July by paying a premium of Rs. 50.

3. Put Option

Ans :

A put option gives the buyer/holder the right to sell a specified quantity of the underlying asset at the strike price on or before the expiration date. The -seller of the put option, on the other hand, has the obligation to buy the underlying asset at the strike price if the buyer decides to exercise his option to sell. For example, in the above case, RIL P JUL 520, which is a put option, gives the buyer the right to sell shares of Reliance at the exercise price of Rs. 520 on or before the expiration date of July by paying a premium of Rs. 50.

4. Exercise Price

Ans :

The strike or exercise price of an option is the specified/pre-determined price of the underlying asset at which the same can be bought or sold if the option buyer exercises his right to buy/sell on or before the expiration day. For example, RIL C JUL 480 will have an exercise price of Rs. 480, i.e., the call buyer can buy the stock of Reliance at Rs. 480, while RIL P JUL 520 will have an exercise price of Rs. 520, i.e., the put buyer can sell the stock of Reliance at Rs. 520.

5. What are the features of options?

Ans :

The following features are common in all types of options.

- **Contract :** Option is an agreement to buy or sell an asset obligatory on the parties.
- **Premium :** In case of option a premium in cash is to be paid by one party (buyer) to the other party (seller).
- **Pay off :** From an option in case of buyer is the loss in option price and the maximum profit a seller can have in the options price.
- **Holder and writer :** Holder of an option is the buyer while the writer is known as seller of the option. The writer grants the holder a right to buy or sell a particular underlying asset in exchange for a certain money for the obligation taken by him in the option contract.
- **Exercise price :** There is call strike price or exercise price at which the option holder buys (call) or sells (put) an underlying asset.
- **Variety of underlying asset :** The underlying asset traded as option may be variety of instruments such as commodities, metals, stocks, stock indices, currencies etc.
- **Tool for risk management :** Options is a versatile and flexible risk management tools which can mitigate the risk arising from interest rate, hedging of commodity price risk. Hence options provide custom-tailored strategies to fight against risks.

6. Distinguish between European option and American option.

Ans :

S.No.	Basis of Comparison	European option	American option
1.	**Low/ High premiums**	In the case of European style options, the premium offered is quite low as the holder of the same gets to redeem the option only at its maturity date.	In the case of an American style the holder of the same gets to redeem the option anytime between the date option, the premium offered is high as of option trading and its maturity date.
2.	**Popularity**	European style options are not that popular and this is why these options are less traded.	American style options are very popular and this is why these options are high in demand.
3.	**Trading**	European style options are traded mostly OTC or over the counter.	American style options are traded mostly OTE or over the exchanges.
4.	**Hedging**	It is easier to formulate a hedging strategy in a European style option as the holder of the same can redeem the option at the maturity date which is already known.	It is difficult to formulate a hedging as the holder of the same gets to decide as and whenever the option can be strategy in an American style option redeemed by him or her.
5.	**Risk factor**	As the maturity date is already fixed, the profits or losses can be easily estimated. This is why European style options carry a lower rate of risk.	As the maturity date is decided by the option holder, he or she may choose he or she thinks it quite profitable. This is why American style options carry a to redeem the same as and whenever higher rate of risk.

7. What are the differences between call option and put option?

Ans :

S.No.	Nature	Call Option	Put Option
1.	**Definition**	Buyer of a call has the right, but is not required, to buy an agreed quantity by a certain date for a certain price (the strike price)	Buyer of a put option has the right, but is not required, to sell an agreed quantity by by a certain an agreed quantity by a certain date for the strike price.
2.	**Costs**	Premium paid by buyer	Premium paid by buyer
3.	**Obligations**	Seller (writer of the call option) obligated to sell the underlying asset to the option holder if the option is exercised.	Seller (writer of a put option obligated to buy the underlying asset from the option holder if the option is exercised.
4.	**Value**	Increases as value of the underlying asset increases.	Decreases as of the underlying asset increases.
5.	**Analogies**	Security deposit - allowed to take something at a certain price if the	Insurance - protected against a loss in value.

8. Compare and contract Futures and Options.

Ans :

S.No.	Futures	S.No.	Options
1.	Both the parties are obliged to perform the contract.	1.	Only the seller (writer) is obligated to perform the contract.
2.	Margins deposits are to be required by all the participants.	2.	The buyer pays the seller (writer) a premium.
3.	The holder of the contract is exposed to the entire spectrum of downside risk and has potential for all the upside return.	3.	The buyer's loss is restricted to downside risk to the premium paid, but retains upward indefinite potentials.
4.	The parties of the contract must perform at the settlement date. They are not obligated to perform the date.	4.	The buyer can exercise option any time prior to the expiry date.

9. Black Scholes Option Pricing Model.

Ans :

The Black-Scholes (B-S) option pricing model is probably the most commonly used option pricing model in finance. It was initially developed in 1973 by two academicians, Fisher Black and Myron Scholes and was designed to price European options on non-dividend paying stocks. Later on, since other academicians further modified the model to make it applicable to American option, option on dividend-paying stock, option on other instruments like futures contracts. In this section, we are not explaining the derivation of the model, rather we simply state the B-S model of pricing formula of option and how to use it to price option.

The reason for popularity of the model is that it allows for an analytical solution. It means that there is a formula into which certain values are input and from which an option price is forthcoming. However, this formula when programmed into a computer, it can produce results (option price) within seconds.

10. Assumptions of black scholes option pricing model.

Ans :

The model is based on certain assumptions which are as under :

1. Stock price behaviour corresponds to the log normal distribution which have been explained earlier. It assumes that *u* and dare constant.
2. There are no transaction costs or taxes.
3. All securities/stocks are perfectly divisible.
4. No dividends payments on stock during the life of the option.
5. There are no riskless arbitrage opportunities.
6. Stock trading is continuous.
7. Investors can borrow or lend at the same risk free rate of interest.
8. The short-term risk free interest rate r is constant.

11. What are the limitions of black scholes model?

Ans :

- Assumes constant values for risk-free rate of return and volatility over the option duration. None of those may remain constant in the real world.
- Assumes continuous and costless trading—ignoring liquidity risk and brokerage charges.
- Assumes stock prices to follow a lognormal pattern, e.g., a random walk (or geometric Brownian motion pattern), thus ignoring large price swings that are observed more frequently in the real world.
- Assumes no dividend payout—ignoring its impact on the change in valuations.
- Assumes no early exercise (e.g., fits only European options). That makes the model unsuitable for American options.
- Other assumptions, which are operational issues, include assuming no penalty or margin requirements for short sales, no arbitrage opportunities, and no taxes. In reality, all these do not hold true. Either additional capital is needed or realistic profit potential is decreased.

12. What is binomial pricing model?

Ans :

Another important technique of pricing a stock option is through constructing a binomial tree. This is a tree which represents different possible paths that might be followed by the stock price over the life of the option. This model was advocated by Cox, Ross and Rubinstein in 1979 and takes the form of binomial model. This model, like B and S model does not permit an analytical solution rather solves the problem numerically. It means there is no formula that can be programmed into a computer or calculator; instead a computer must be programmed to ascertain solution.

In this section, we will discuss only the introductory aspect of binomial model. Although the explanation of this model will treat the time to expiry of an option as being one period, or divided into 2 periods, and much large number of periods.

13. Assumptions of bonomial pricing model.

Ans :

The assumptions of Binomial Option Pricing Model are as follows,

1. Options trading is seen in prefect and competitive market which makes the transaction costs margin requirements and takes to be zero.
2. In perfect and competitive markets investors can grab the opportunity of make full use of proceeds from short sales.
3. There exist perfect competition in the market.
4. Does not include transaction cost.
5. Firm will not pay any tax.
6. There is no need for initial payments.
7. The revenue received by the investors from short term sales is completely utilized.
8. Investors are allowed do trade in fractions or proportions of securities which are infinitely divisible.
9. Investors can trade at the prevailing market prices on a daily basis.
10. There is only a single interest rate (r) at which investors lend or borrow money.

Choose the Correct Answer

1. Options are contracts that give the purchasers the [a]
   (a) Option to buy or sell an underlying asset
   (b) The obligation to buy or sell an underlying asset
   (c) The right to hold an underlying asset
   (d) The right to switch payment streams
2. The price specified on an option that the holder can buy or sell the underlying asset is called the [c]
   (a) Premium (b) Call
   (c) Strike price (d) Put
3. The price specified on an option that the holder can buy or sell the underlying asset is called the [d]
   (a) Premium (b) Strike price
   (c) Exercise price (d) both (b) and (c) are true
4. The seller of an option has the [b]
   (a) Right to buy or sell the underlying asset
   (b) The obligation to buy or sell the underlying asset
   (c) Ability to reduce transaction risk.
   (d) Right to exchange one payment stream for another
5. The seller of an option is _____ to buy or sell the underlying asset while the purchaser of an option has the _____ to buy or sell the asset. [a]
   (a) Obligated; right (b) Right; obligation
   (c) Obligated; obligation (d) Right; right
6. The amount paid for an option is the [b]
   (a) Strike price (b) Premium
   (c) Discount (d) Commission
7. An option that can be exercised at any time up to maturity is called a(n) [d]
   (a) Swap (b) Stock option
   (c) European option (d) American option
8. An option that can only be exercised at maturity is called a(n) [c]
   (a) Swap (b) Stock option
   (c) European option (d) American option

9. Options on individual stocks are referred to as [a]

(a) Stock options (b) futures options

(c) American options (d) Individual options

10. Options on futures contracts are referred to as [b]

(a) Stock options (b) Futures options

(c) American options (d) Individual options

11. An option that gives the owner the right to buy a financial instrument at the exercise price within a specified period of time is a [a]

(a) Call option (b) Put option

(c) American option (d) European option

12. A call option gives the owner [c]

(a) The right to sell the underlying security

(b) The obligation to sell the underlying security

(c) The right to buy the underlying security

(d) The obligation to buy the underlying security

13. A call option gives the seller [b]

(a) The right to sell the underlying security

(b) The obligation to sell the underlying security

(c) The right to buy the underlying security

(d) The obligation to buy the underlying security

14. An option allowing the holder to buy an asset in the future is a [b]

(a) Put option (b) Call option

(c) Swap (d) Premium

15. An option that gives the owner the right to sell a financial instrument at the exercise price within a specified period of time is a [b]

(a) Call option (b) Put option

(c) American option (d) European option

16. A put option gives the owner [a]

(a) The right to sell the underlying security

(b) The obligation to sell the underlying security

(c) The right to buy the underlying security

(d) The obligation to buy the underlying security

17. A put option gives the seller [d]
    (a) The right to sell the underlying security
    (b) The obligation to sell the underlying security
    (c) the right to buy the underlying security
    (d) the obligation to buy the underlying security

18. An option allowing the owner to sell an asset at a future date is a [a]
    (a) Put option (b) call option
    (c) Swap (d) forward contract

19. If you buy a call option on treasury futures at 115, and at expiration the market price is 110, [c]
    (a) The call will be exercised (b) The put will be exercised
    (c) The call will not be exercised (d) The put will not be exercised

20. If you buy a call option on treasury futures at 110, and at expiration the market price is 115, [a]
    (a) The call will be exercised (b) The put will be exercised
    (c) The call will not be exercised (d) The put will not be exercised

21. If you buy a put option on treasury futures at 115, and at expiration the market price is 110, [b]
    (a) The call will be exercised (b) The put will be exercised
    (c) The call will not be exercised (d) The put will not be exercised

22. If you buy a put option on treasury futures at 110, and at expiration the market price is 115, [d]
    (a) The call will be exercised (b) The put will be exercised
    (c) The call will not be exercised (d) The put will not be exercised

Fill in the blanks

1. _____ are the important financial derivative where the instruments have additional features of exceeding an option.
2. The price of the underlying is also derived from the _____ .
3. But not the obligation to buy or sell something at a specified date at a _____.
4. Options is _____ management tools which can be mitigate the risk asking from interest rate.
5. Generally large commercial bank's and investment banks trade in _____ option.
6. _____ which are actively trade on the recoginsed exchanges.
7. These _____ options are available on individual stocks & some indexes.
8. Future contracts are on the EURO dollar at _____ and the treasury bond at the CBOT.
9. _____ x contract multiples.
10. Current cash index value multiplex by _____ .

ANSWERS

1. Options
2. Underlying assets
3. Stated price
4. Flexible risk
5. OTC
6. Various assets
7. LEAPS
8. CME
9. Cash index value
10. Contracts multiple

UNIT IV

SWAPS

Swaps: Concept and Nature - Evolution of Swaps Market - Features of Swaps- Types of Financial Swaps: Currency Swap, Interest Rate Swap, Equity Index Swap, Commodity Swap - Using Swap to Manage Risk - Pricing and Valuing Swaps (Including Problems)

4.1 SWAPS

4.1.1 Concept and Nature

Q1. What do you understand by swap? Explain its concept and nature in detail.

Ans :

Meaning

A swap is a contract or an agreement between two parties to exchange future cash flows. In swap, one party gives concept to exchange his set of agreed cash flows with the predetermined set of cash flows to the other party. The parties in a swaps contract that agree to exchange flows are termed as counter parties of the swaps. The rate of cash flows that has to be exchanged are determined on the basis of interest rates, exchange rates or the value of stocks or commodities. The amount swapped between the two parties is termed as "notional principal" of the swap.

The cash flows are swapped by a swap dealer who is one of the party to the contract is also called as market maker or swap facilitator. A swap agreement consist of date on which cash flows have to be exchanged and the way in which their value is determined or calculated. To determine the total amount of swap rate the exchange rates and the future interest rates are taken into consideration.

Definition

A swap is a unique kind of a financial transaction which includes concurrent purchase and sale of,

(a) An underlying asset of similar kind.

(b) Obligation of equal capital amount, where the financial exchange system gives both the parties flexibility and transparency in dealing with each other.

(c) The amount is swapped for a certain number of times for a given period of time.

Concept and Nature

According to the chambers dictionary, the term 'SWAP" or "SWOP" means to exchange or to barter. In business terminology, SWAP are the private agreements made between the two parties for exchanging the cash flows in the future. As this agreement demands the exchange of cash flows or payments, it is termed as financial swap in global financial markets.

The term 'swap' has two meanings with respect to the financial markets i.e.,

(a) Swap is both a purchase and forward sale or vice versa, and

(b) Swap is an agreed exchange of future cash flows.

By this definition it is clear that a study of swaps is a natural extension of the study of forward and futures contracts.

A financial technique that allows a borrower to operate in one market and then to exchange the liability for another type-of liability is termed as 'Financial Swap'.

As swaps deals with the exchange of cash flows, a broad range of cash flows are present in a business firm. For instance, while making interest

payments, the exchange of cash flows arises from a fixed rate of interest to cash flows which arises from the floating rate of interest.

Swaps mostly deals with the exchange of interest or currency exposures or a combination of these two by two or more borrowers.

Different companies and financial institutions can easily access to different financial markets with the existence of swap markets. Example, few firms can easily access in Japanese markets when compare to others; while few other firms have good reputation in U.S markets.

Swap payments are beneficial for both the parties which involves the conversion of one's liability instead of borrowing directly in the desired markets.

In simple words, a private agreement made between two parties for exchanging a prescribed amount of cash flows in future based on the desired predetermined formula along with other terms and conditions is termed as 'swap'.

4.1.2 Evolution of Swaps Market

Q2. Write a detailed note on evolution of swap market.

Ans :

Like most other new products/instruments in the international finance, 'swaps' are not executed in a physical market. Participants and dealers in the swap markets are many and varied in their location, character, and motives in existing swaps. Most of the financial experts agree that the origin of the swap markets can be traced back to 1970s when many countries imposed foreign exchange regulations and restrictions in order to control cross-border capital flows. Some experts are of the opinion that swap markets owe their origin to the exchange rate instability that followed the demise of Bretton Wood System during the years 1971 to 1973. As a result, most of the borrowers and investors at the international level wishing to diversify their assets and liabilities compositions in varied currencies in order to control losses arising due to fluctuations in exchange rates.

In 1980s, a few countries liberalized their exchange regulatory measures; as a result, some of the MNCs' treasurers structured their portfolios and brought-out a new financial product, known as swaps. They replaced their existing contracts like parallel and back-to-back loans with the swap deals which found them more flexible and suitable due to simpler documentation and single jurisdiction. Further, swaps were found to lower financing cost and tax differences. Not only this, the disintermediation process of 1980s, most of the MNCs and other corporate borrowers were approaching to the investors directly rather than through banks, also encourage them to make financial arrangements through swaps.

The first swap contract was negotiated in 1981 between Deutsche Bank and an undisclosed counter party. Since then, the swaps market has grown very rapidly. In the early years, the bankers were only acting as brokers in the swap markets to match the complimentary requirements of the counterparties. The major dramatic change in the swap market has been the emergence of the large banks and performed as aggressive market-makers specifically in dollar interest rate swaps. As market-makers, they provide bid/offer quotes for both interest rate and currency swaps. Subsequently, the banks started to find-out a counter party with exactly or nearly matching requirements to hedge the original swap by entering into a matching swap. Such swap warehousing or running mismatches offered two immediate benefits:

1. For the customer it was possible to cover an exposure almost as soon as the decision to do so; and
2. For the swap bank to quote the most competitive price to their clients in order to get maximum business from the clients.

The formation of the International Swap Dealers Association (ISDA) in 1984 was a significant development to speed-up the growth in the swaps market by standardizing swap documentation.

In 1985, the ISDA published the first standardized swap code. This code was revised in 1986, and in 1987 published its Standard Form Agreements. These contracts are structured as master agreements. As such, all subsequent swaps entered by the same parties are treated as supplements to the original agreement.

A swap is essentially a way of changing risk in future, and the range of risks hedged through swap transactions is expanding day-by-day. For example, currency swaps were first introduced in late 1970s, and then interest rate swaps in 1981, equity and commodity swaps in mid-1980s and credit derivatives in 1990, were floated. Climatic derivatives have also been introduced recently, and further, a few new products have also being examined to include in this market.

Q3. Why do Swap dealers exist ? State the application of Swaps.

Ans : **(May-16)**

The proposed rule provides that a person that meets the definition must register as a swap dealer. The Commission believes the proposed rule will allow each market participant to assess its activities to determine whether it functions as a swap dealer. The proposed rule also permits persons to make an application to be designated as a swap dealer with respect to only specified categories of swaps or activities without being considered a swap dealer for other categories of swaps or activities.

Applications

Nowadays, swaps are an essential part of modern finance. They can be used in the following ways:

1. Risk hedging

One of the primary functions of swaps is the hedging of risks. For example, interest rate swaps can hedge against interest rate fluctuations, and currency swaps are used to hedge against currency exchange rate fluctuations.

2. Access to new markets

Companies can use swaps as a tool for accessing previously unavailable markets. For example, a US company can opt to enter into a currency swap with a British company to access the more attractive dollar-to-pound exchange rate, because the UK-based firm can borrow domestically at a lower rate.

4.1.3 Features of Swaps

Q4. Discuss the features of swap contract.

(OR)

Explain the features of swaps.

Ans :

(i) Counter parties

All swaps involve the exchange of a series of periodic payments between at least two parties. For example, a firm having a loan of ten million dollar payable at ten percent fixed coupon rate for five years, wants to exchange for a floating interest rate with that party who is also interested to exchange its liability from floating to fixed. It means, for a swap agreement, there must be two parties who are ready to exchange their liabilities with each other.

(ii) Facilitators

The amount of cash flow exchange between parties are huge and also the process is complex. Therefore, to facilitate the transaction, an intermediary comes into picture which brings different parties together for big deal.

These may be brokers whose objective is to initiate the counter parties to finalize the swap deal. While swap dealers are themselves counter partied who bear risk and provide portfolio management service.

(iii) Cashflows

The present values of future cash flows are estimated by the counterparties before entering into a contract. Both the parties want to get assurance of exchanging same financial liabilities before the swap deal.

(iv) Less documentation is required in case of swap deals because the deals are based on the needs of parties, therefore, less complex and less risk consuming.

(v) Transaction costs

It has been also 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.

(vi) Benefit to both parties

The swap agreement will be attractive only when parties get benefits of these agreements.

(vii) Termination

Since swap is an agreement between two parties, therefore, it cannot be terminated at one's instance. The termination also requires to be accepted by counter parties.

(viii) Default-risk is higher in swaps than the option and futures because the parties may default the payment.

Q5. What are the advantages and Limitations of Swaps.

Ans :

Advantages

The following advantages can be derived by a systematic use of swap:

1. Borrowing at Lower Cost

Swap facilitates borrowings at lower cost. It works on the principle of the theory of comparative cost as propounded by Ricardo. One borrower exchanges the comparative advantage possessed by him with the comparative advantage possessed by the other borrower. The net result is that both the parties are able to get funds at cheaper rates.

2. Access to New Financial Markets

Swap is used to have access to new financial markets for funds by exploring the comparative advantage possessed by the other party in that market. Thus, the comparative advantage possessed by parties is fully exploited through swap. Hence, funds can be obtained from the best possible source at cheaper rates.

3. Hedging of Risk

Swap cal also be used to hedge risk. For instance, a company has issued fixed rate bonds. It strongly feels that the interest rate will decline in future due to some changes in the economic scene. So, to get the benefit in future from the fall in interest rate, it has to exchange the fixed rate obligation with floating rate obligation. That is to say, the company has to enter into swap agreement with a counterparty, whereby, it has to receive fixed rate interest and pay floating rate interest. The net result is that the company will have to pay only floating rate of interest. The fixed rate it has to pay is compensated by the fixed rate it receives from the counterparty. Thus, risks due to fluctuations in interest rate can be overcome through swap agreements. Similar, agreements can be entered into for currencies also

4. Tool to correct Asset-Liability Mismatch

Swap can be profitably used to manage asset-liability mismatch. For example, a bank has acquired a fixed rate bearing asset on the one hand and a floating rate of interest bearing liability on the other hand. In case the interest rate goes up, the bank would be much affected because with the increase in interest rate, the bank has to pay more interest.

Limitations

1. It is difficult to identify a counter-party to take the opposite side of the transaction. So suppose one company wants to swap $100000 it is not necessary that other company will also be willing to swap the same amount with same maturity and hence it is a shortcoming of swap market.
2. The swap deal cannot be terminated without the mutual agreement of the parties involved in the transactions, also it has significant amount of default risk in it and hence it is risky instrument to use.
3. Secondary market for swap is still not fully developed like that of equity or currency market and hence swaps are illiquid and cannot be easily traded like equities or currencies.

4. Since swap market is an over the counter market and not exchange controlled the parties have to look carefully into the creditworthiness of the counter-party because there is no exchange to guarantee about fulfilling of the obligations of the parties involved in swap.

4.2 TYPES OF FINANCIAL SWAPS

Q6. What are major types of Financial Swaps?

(OR)

Explain briefly about various types of swaps.

Ans : **(Imp.)**

A swap is nothing but a barter or exchange but it plays a very important role in international finance. A swap is the exchange of one set of cash flows for another. A swap is a contract between two parties in which the first party promises to make a payment to the second and the second party promises to make a payment to the first. Both payments take place on specified dates. Different formulas are used to determine what the two sets of payments will be.

Classification of swaps is done on the basis of what the payments are based on.

The different types of swaps are as follows.

1. Interest rate swaps
2. Currency Swaps
3. Commodity swaps
4. Equity swaps

1. Interest Rate Swaps

The interest rate swap is the most frequently used swap. An interest rate swap generally involves one set of payments determined by the Eurodollar (LIBOR) rate. Although, it can be pegged to other rates. The other set is fixed at an agreed-upon rate. This other agreed upon rate usually corresponds to the yield on a Treasury Note with a comparable maturity. Although, this can also be variable.

Additionally, there will be a spread of a pre-determined amount of basis points. This is just one type of interest rate swap. Sometimes payments tied to floating rates are used for interest rate swaps. The notional principal is the exchange of interest payments based on face value. The notional principal itself is not exchanged. On the day of each payment, the party who owes more to the other makes a net payment. Only one party makes a payment.

2. Currency Swaps

A currency swap is an agreement between two parties in which one party promises to make payments in one currency and the other promises to make payments in another currency. Currency swaps are similar yet notably different from interest rate swaps and are often combined with interest rate swaps.

Currency swaps help to eliminate the differences between international capital markets. Interest rates swaps help to eliminate barriers caused by regulatory structures. While currency swaps result in exchange of one currency with another, interest rate swaps help to exchange a fixed rate of interest with a variable rate. The needs of the parties in a swap transaction are diametrically different. Swaps are not traded or listed on exchange but they do have an informal market and are traded among dealers.

A swap is a contract, which can be effectively combined with other type of derivative instruments. An option on a swap gives the party the right, but not the obligation to enter into a swap at a later date.

3. Commodity Swaps

In commodity swaps, the cash flows to be exchanged are linked to commodity prices. Commodities are physical assets such as metals, energy stores and food including cattle. E.g. in a commodity swap, a party may agree to exchange cash flows linked to prices of oil for a fixed cash flow.

Commodity swaps are used for hedging against.

- Fluctuations in commodity prices or
- Fluctuations in spreads between final product and raw material prices (E.g. Cracking spread which indicates the spread between crude prices and refined product prices significantly affect the margins of oil refineries)

A Company that uses commodities as input may find its profits becoming very volatile if the commodity prices become volatile. This is particularly so when the output prices may not change as frequently as the commodity prices change. In such cases, the company would enter into a swap whereby it receives payment linked to commodity prices and pays a fixed rate in exchange. A producer of a commodity may want to reduce the variability of his revenues by being a receiver of a fixed rate in exchange for a rate linked to the commodity prices.

4. Equity Swaps

Under an equity swap, the shareholder effectively sells his holdings to a bank, promising to buy it back at market price at a future date. However, he retains a voting right on the shares.

4.2.1 Currency Swap

Q7. Explain in detail about Currency Swap.

Ans :

A currencyswap is an exchange transaction that involves different types of currencies. In currency swaps one party agrees to make series of payments to the other party at a specific date in exchange for an amount of payment from the other party in different denominated currencies.

In a currency swap, one party has one currency and exchanges it for another currency which is held by another party. The primary difference between interest rate swaps and currency rate swaps is in currency swaps. The notional amounts are usually exchanged on origination date as well as on settlement date, depending upon the starting spot exchange rate. There are certain different types of currency swaps which are as follows.

Example of Currency Swap

Assume that Firm A has a Swiss franc 100 million liability but ^ interested to have a dollar loan instead. Also assume that another Firm B has a $100 million liability but prefers to have a Swiss franc liability instead. There can be a good solution through the currency swap deal and which can be arranged through a financial intermediary (an experienced bank) for a fee. A currency swap in this case can be seen from the following flowchart 11 three steps: [Refer Figs. 13.5(a), 13.6 and 13.7],

Step I : Spot Transaction

This spot transaction is carried out at the prevailing spot rate in the market.

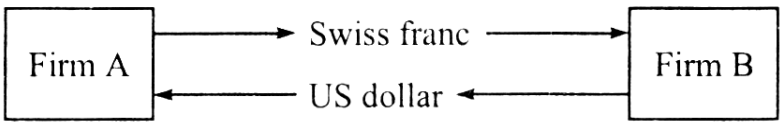


Figure : Transaction under currency swap

Step II : Settlement of Notional Annual Interest

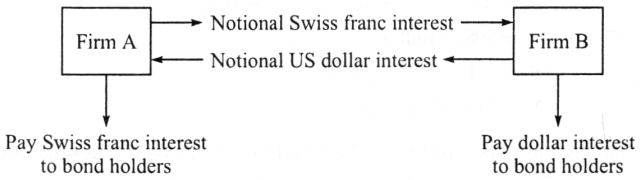


Figure : Transaction under currency swap

Step III : Exchange of final contract

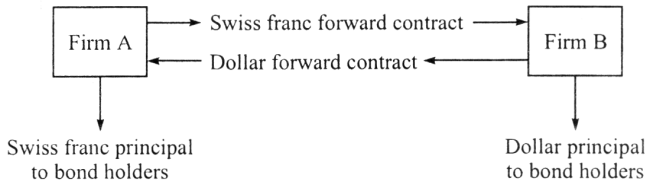


Figure: Transaction under currency swap

From die example, it is noted that exchange of principal amounts, both at the beginning and at the end of swap contract is notional and not real. However, then cash flows resulting from interest rates are real. The benefits arising out of such swap to the counter parties depend upon the movements in underlying currency exchange rates and interest rates there on.

There are certain different types of currency swaps which are as follows.

(a) Fixed-Fixed Currency Swap

In this swap agreement the currencies are exchanged at a fixed rate. A fixed to floating currency swap involves the combinations of a fixed-to-fixed currency swap and floating swap. One party pays to the another at a fixed rate in currency say 'A' and the other party makes the payment at a floating rate in currency say 'B'. In a floating- to-floating swap the counter parties will have payment at floating rate in different currencies.

Example :

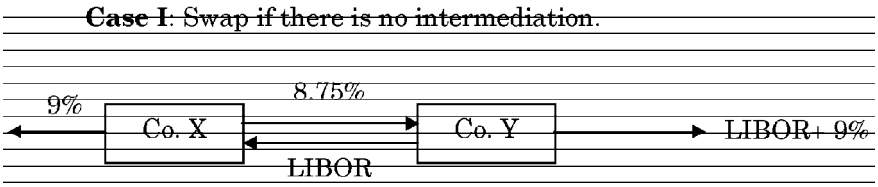
Suppose two companies X and Y want to borrow Rs. 12 crore for 6 years. The company Y wishes to arrange a floating loan. The interest in LIBOR semiannually paid. The following are terms and conditions:

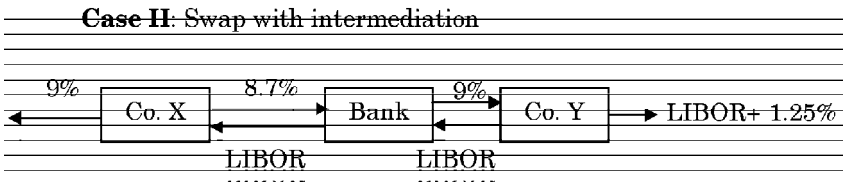
	Fixed Rate	Floating Rate
Company X	9.00%	Six month LIBOR + 25 bp
Company Y	10.00%	Six month LIBOR + 30 bp

Show these transactions with and without intermediary.

Sol:

The company X borrows at fixed rate of 9%, the company Y borrows at floating rate of (LIBOR + 0.25%). They enter into a swap agreement.





Stage I

Party x exchanges an amount of his currency with the currency amount of party *y.* In the first stage, the initial principal amounts are exchanged between the counter parties.

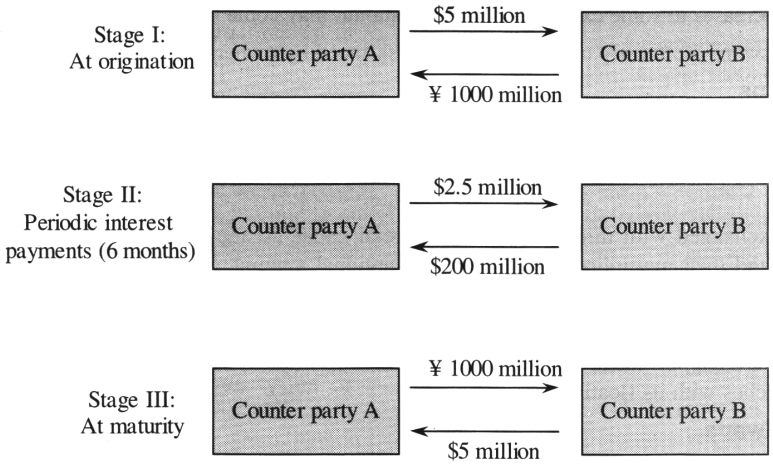
Stage II

In the second stage, monthly or periodic payments are exchanged.

Stage III

The party x returns the amount to party *y* and party *y* gives back the total fixed amount to party x.

The three stages of a fixed-fixed currency swaps are depicted as,



(b) Fixed-Floating Currency Swaps

The cash flows come every six months after the origination of the contract. The time period is of three years; the settlement is done every 6 months from the start of the contract. The currencies are usually exchanged through LIBOR at predetermined rates.

For example, the six months LIBOR are,

Time	6 Month LIBOR
1.0	5.5%
1.5	6%
2.0	6.2%
2.5	6.44%

Thus, at the beginning the amount is swapped at a fixed rate and in the end, returned occurs at a floating exchange rate.

(c) Annuity Swaps/Coupon Only Swaps

When the notional amount is not swapped either at the beginning or at the maturity of a fixed-fixed currency swap, it is then called as annuity swap.

(d) Differential Swaps

Differential swap or differential swap is a kind of floating-floating currency swap. The floating exchange rate is applied to only one currency of exchange, instead of two currencies. This rate is applied to notional amount of that currency. This helps in removing currency risk exposure as only one currency is used to determine the swap exchange amount.

Q8. Explain the advantages and limitations of currency swap.

Ans : **(May-2017)**

Advantages

1. The main advantage of using a currency swap is to lower the risk given by currency pairs moving too aggressively in a specific direction
2. These operations are also called cross-currency swaps and they deal with the exchange of interest in one currency for the same in another currency, and it is supposed to be a foreign exchange transaction. Together with other hedging strategies, currency swaps are main trading tools especially in the B-booking activities when the broker is taking the opposite side of their customer's trades.
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4. Another advantage of currency swaps is that they can be done in multiple ways. If the amount that is being exchanged is fully exchanged when the transaction is initiated, at the maturity date the exchange is being reversed
5. These maturity dates are very flexible, stretching for a long period, several years in most of the cases, and are negotiable

Limitations

1. At first, they were agreements to get around exchange controls, but then after these barriers were eliminated, they are being used mainly to hedge investments.
2. The risk when using a currency swap is that at the time the maturity is being reached, the floating interest rate would represent a bigger cost than the whole purpose of the swap

4.2.2 Interest Rate Swap

Q9. What is Interest Rate Swap contract? Write a note on different types of Interest Rate Swap.

Ans : **(May-18, May-16)**

In interest rate swaps, the counter parties exchanges only the amount of interest payments on the principal loan amount. The interest payment is not mutual, it is paid by one party to the other party. In most of the interest rate swaps the floating interest rate that affects the floating rate of payment is set one year before the payment date. The amount of net payment is made one period after the inception of swaps contract or swap's origination date.

The different types of interest rate swaps are,

(a) Plain Vanilla Swaps

Plain Vanilla Swaps is one of the basic interest rate swaps wherein one party makes interest payments on fixed rate basis and the other on a floating rate option. These are also called as fixed-for-floating interest rate. The amount of interest payment is calculated as a percentage of swap's notional or basic principal amount; this percentage is either fixed, floating or variable. The principal amount is not exchanged, only the interest payment is exchanged. The party who receives the payments is called fixed-rate payer. The interest rates are floating and are determined for a period of three months or so.

In case the rate of interest goes up in the market, the fixed-rate payer receives a greater sum of money and vice-versa if the interest rate decreases. The amount of money received is set-off against the amount paid by the party.

Example

If a fixed-rate payer has to pay $ 1,50,000 and also receive $ 2,00,000 the net payment made is calculated as,

Amount received - Amount paid

$\Rightarrow$ $ 2,00,000 – $ 1,50,000

= 50,000

This difference amount is called as "difference check".

(b) At-market Swaps

These swaps do not have any value at the time of origination of contract, they are adequately priced at market rates. The bid and ask spread is haven't been included in the swaps.

Off-market Swaps

These swaps are not priced at market rates. Firms who wish to pay less amount of interest for the exchange of fixed bonds with floating rate bonds have been said to use off-market swaps.

(c) Amortizing Swaps

In few swaps, the notional principal will differ according to a preset schedule; these are referred to as amortizing swaps whose basic principal amount changes with time. It consist of index-amortizing swap in which the principal amount changes with an interest rate index, say (LIBOR - London Inter Bank Offer Rate) for a period of time.

Example

If LIBOR decreases to some extent, the notional amount may come down to 85% of its original value.

Amortizing swaps are mostly used to hedge the risk faced by owners of mortgage securities.

(d) Basis Swaps

A basis swap consists of change in two interest rates. The parties may wish to maintain two rates or exchange one with another.

Example

LIBOR is exchanged with three months commercial paper. At the maturity day, floating rates of both are determined and then multiplied with the swap's notional amount. This gives two cash flows, both tend to change as per the time changes. Thus, basis swaps are also called as floating swaps and if

one or both of the floating rate is set as long term rate, then the basis swap is termed as yield curve swap.

The basis swaps support the speculator's forecast for shift in yield curve and allows the firms to change index rate that matches with its floating rate payments.

(e) Forward Swaps

In forward swaps, the interest payments are exchanged on a future date for contract implemented on a present day.

(f) Swaption

This is an option in which firms enter into a swaps contract only if it offers some margin of profit to them, when if they trade on a future date. The swaption provides the firm the right but not an obligation to step in a swaps contract to receive a fixed amount of payment up till some specified period.

(g) Callable Swaps

It gives a right to the fixed rate payer to quit from an existing swap contract.

(h) Putable Swaps

It is exactly opposite to callable swap, which gives right to a fixed rate receiver party to exit from an existing swaps contract.

Q10. What are the features of Interest Rate Swap?

Ans : **(May-17)**

The key features of interest rate swaps are stated as follows:

(i) Notional principal

In the interest rate swap agreement, the interest amount whether fixed or floating is calculated on a specified amount borrowed or lent. It is notional because the parties do not exchange this amount at any time. Normally, it remains constant throughout the life of the swap. It is used to compute the sequence of the payment of cash flows.

(ii) Fixed rate

This is the rate, which is used to calculate the size of the fixed payment. Banks or the other financial institutions who make market in interest rate swaps quote the fixed rate, they are willing to pay if they are fixed rate payers in a swap (bid swap rates), they are willing to receive if they are floating rate payers in a swap (ask swap rate). For example, a bank might quote a US dollar floating to fixed 5-year swap rate:

Treasuries + 20 bp/Treasuries + 40 bp. vs. six-month LIBOR

This quote indicates the following:

1. The said bank is willing to make fixed payment at a rate equal to the current yield on 5-year treasury notes plus 20 basis points (0.20 percent) in return for receiving floating payments, say at six-month LIBOR.
2. The bank has offered to accept at a rate equal to 5-year treasury notes plus 40 basis points in return for payment of six month LIBOR.

(iii) Floating rate

Floating rate may be defined as one of the market indexes like LIBOR, SIBOR, MIBOR. Treasury Bill rate, primary rate, etc. on which basis the floating interest rate is determined in the swap agreement. The maturity of the underlying index equals the interval between payment dates.

(iv) Trade date, effective date, reset date and payment date

All the above stated dates are important terms in the swap deal. Therefore, the concept of these dates must be clear to the swap dealers. The fixed rate payments are normally paid semi-annually or annually. For example, it may be March 1, September 1 etc. The trade date may be defined as such date on which the swap deal is concluded. Effective date is that date from which the first fixed and floating payment start to accrue. For example, a 5-year swap is traded on August 30,2002, the effective date may be September 1,2002, and ten payment dates from March 1, 2003 to September 1, 2007. It should be noted that the floating rate payments in a standard swap are set in advance paid in arrears.

Q11. Define the term LIBOR? Explain the Significance.

Ans :

Meaning

LIBOR stands for London Inter Bank Offered Rate. LIBOR is the benchmark/reference for average interest rates – used by the A-Grade banks as "Offer" for lending their funds to the A-Grade banks as unsecured loans in marketable lot in London based interbank transactions.

- LIBOR rates used to be published since 1986 for the then three main currencies of the world, namely United States Dollar (USD), Great Britain Pound (GBP) and Japanese Yen (JPY) for four different maturity periods of one month, three months, six months and one year.
- After the merger of currencies of the European nations into Euro, on January 01, 1999, LIBOR rates started to be published for 10 major currencies of the world and for 15 different maturity periods ranging from overnight to 1 week, 2 weeks, and 12 different months. These 10 (Currencies) x 15 (Different Time Periods) = 150 rates used to be published daily at 11.30 A.M. London Time i.e. 5.00 P.M. (Indian Standard Time).
- The ten constituent currencies of LIBOR used to be USD, GBP, Euro, Swiss Franc, Canadian Dollar, JPY, Danish Krone, Swedish Krona, Australian Dollar and New Zealand Dollar. LIBOR used to be calculated and published by Thomas Reuters on behalf of British Bankers' Association.

Significance

- LIBOR is used by different A-Grade banks either for interbank lending of the surplus funds or for interbank borrowing for meeting their short term liquidity requirements.
- LIBOR has been in use as a reference/ benchmark rate by the financial institutions for deciding interest rates for the different financial instruments.
- The developed countries like Canada, U.K., U.S.A. and Switzerland rely on LIBOR as a reference/benchmark rate. LIBOR is also used by the well-known multinational commercial corporations.

Q12. Define the term MIBOR? Explain its Significance.

Ans :

Meaning

MIBOR stands for Mumbai Interbank Offer Rate, the yardstick of the Indian call money market. It is the rate at which banks borrow unsecured funds from one another in the interbank market. At present, it is used as a reference rate for floating rate notes, corporate debentures, term deposits, interest rate swaps and forward rate agreements. The pricing of overnight indexed swaps, a type of overnight interest rate swap used for hedging interest rate risk is based on overnight MIBOR.

Based on the recommendation of the Committee for the Development of Debt Market, the National Stock Exchange (NSE) launched the Mumbai Interbank Offer Rate (MIBOR) and Mumbai Interbank Bid Rate (MIBID) in June, 1998. Subsequently, the NSE developed a benchmark rate for the term money market, like the 14-day, 1-month and 3-month MIBOR. The same was rechristened as FIMMDA-NSE MIBID/MIBOR rate in due course. The rate is computed by polling a representative panel of 30 banks and primary dealers and summarising the quotes that they provided. The next step involves identifying and isolating the noise by eliminating extreme values of the reference rates.

Significance

MIBOR is used by different Indian banks either for interbank lending of the surplus funds or for interbank borrowing for meeting their short term liquidity requirements.

MIBOR has been in use as a reference/ benchmark rate by the financial institutions for deciding interest rates for the different financial instruments like Interest Rate Swaps, Forward Rate

Agreements, Floating Rate Debentures and Term Deposits, Loans of different maturities and mortgages, etc. MIBOR is also the benchmark for the Call Money Market Rates. But the volumes of MIBOR are quite meagre as compared with the volumes of LIBOR.

Q13. Explain the guidelines issued by RBI for Interest Rate Swaps.

Ans :

1. Scheduled commercial banks (excluding Regional Rural Banks), Primary Dealers and all India Financial Institutions are free to undertake IRS as a product for their own balance sheet management for market making.
2. They may also offer these products to corporates for hedging their own balance sheet exposures.
3. Participants should ensure adequate infrastructure and risk management systems before venturing into market making activities.
4. The Bench Mark rate should necessarily evolve on its own in the market and require market acceptance.
5. The parties are free to use any domestic money or debt market rate as benchmark rate provided the methodology of computing the rate is objective, transparent and mutually acceptable.
6. There is no restriction on the minimum or maximum size of notional principal amounts. Size norms are to emerge in the market with the development of the market.
7. There is no restriction on the tenor as well.
8. Banks, Financial Institutions and Primary Dealers are required to maintain capital for FRAs and IRS.
9. Transactions for hedging and market making purposes should be recorded separately. Positions on account of market making activities should be marked to market at least at fortnightly intervals. Transactions entered into for hedging purposes should be accounted for on accrual basis.
10. Participants could consider using ISDA standard documentation with suitable modifications for transactions in FRAs and IRS.
11. Participants are required to report their operations in FRAs and IRS on a fortnightly basis to Monetary Policy Department of RBI.
12. Capital adequacy for banks and financial institutions for undertaking FRAs and IRS transactions shall be calculated.

Q14. Explain the mechanism of interest rate swaps using a diagram.

Ans :

The mechanism of interest rate swap can be understood through following example.

There are two firms X and F. Firm X is an institution which invests $ 50 million in fixed rate mortgages yielding 9.5 percent. It is assumed that firm X is not a high-rated firm and its assets can be funded by using floating rate loans for the banks i.e., charging one year LIBOR [London Inter Bank Offer Rate] plus 40 basis point [0.40 percent]]. This implies that the profitability of firm X is based on the actual level of the floating interest rate in future which is payable during long-run. Thus, when there is greater fluctuation in interest rates then, the debt service expenses of firm X will increase and accordingly, the profits also decreases. Thus, the firm may lose money if LIBOR is more than 9 percent [9.50 - 0.40] on any reset date.

Firm Y, is also another firm which also borrows $ 50 million for ten years but at a fixed rate. It is assumed that firm Y is high graded firm and is funding its loan portfolio at 7.50 percent coupon. The portfolio of firm Y is generating LIBOR plus 50 basis points. This implies that the profitability of firm ' T is based on the actual floating interest rate which is received on its portfolio. Firm F may lose money if LIBOR is less than 7 percent [7.50 - 0.50] on any reset date. This situation of firm X and F is illustrated below:

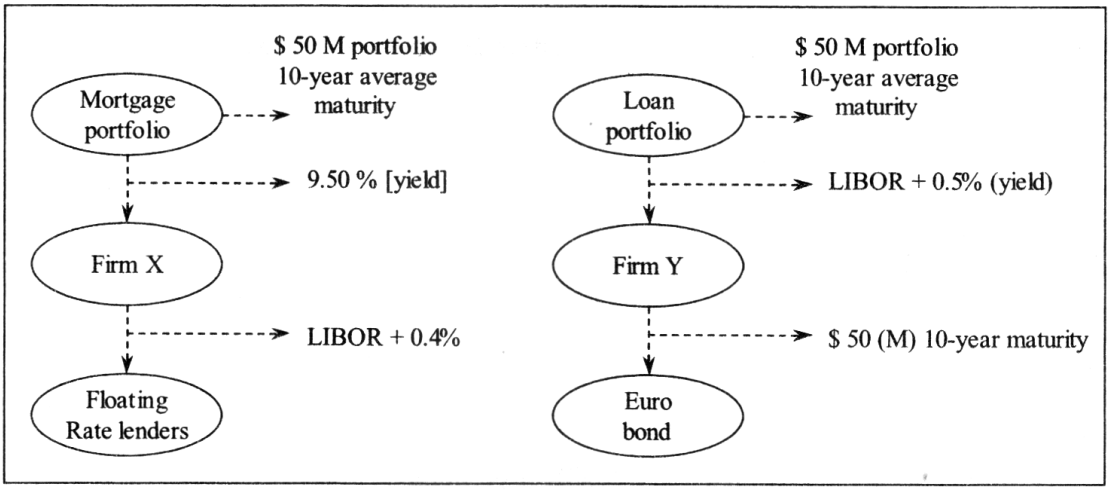

Fig.: Situation of Firm X and Y Before SWAPS

Firm X enter into interest rate swap deal with XYZ bank for removing the interest rate risk. It is assumed that firm X will pay 7.50 percent to XYZ bank for ten years with payments computed by multiplying that rate by $ 50 million notional principal amount. XYZ bank in return for this payment may agree to pay the firm X one-year LIBOR for ten years with reset dates tallying with the resets on its floating rate loan. This is represented in the figure given below.

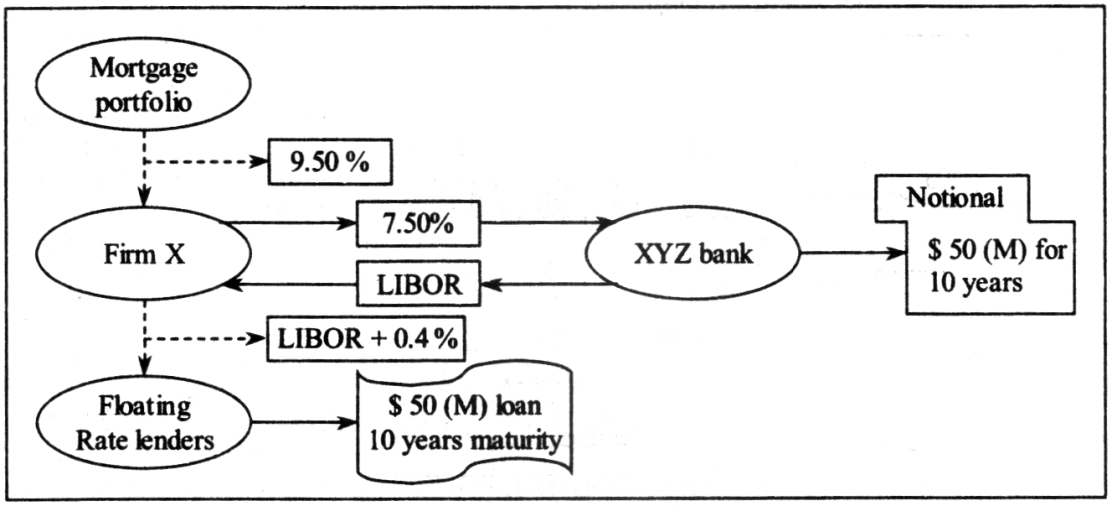

Fig.: FIRM: X Interest Rate Swap Agreement with XYZ Bank

Receipt on portfolio → 9.50%

Pay XYZ bank → 7.50%

Receiving from XYZ bank → LIBOR

Pay on loan	→ [LIBOR + 40 bp]
Cost of fund	→ [7.50 + 50] → 8.00 %
Locked in spread	→ 1.50 %

In the same manner, firm Y also enters into portfolio with XYZ bank and agrees to pay one year LIBOR to XYZ bank on a notional principal amount of $ 50 (M) for ten years in exchange to receive the payments of 7.40 percent. The net outcome to firm Y and swap deal is illustrated below,

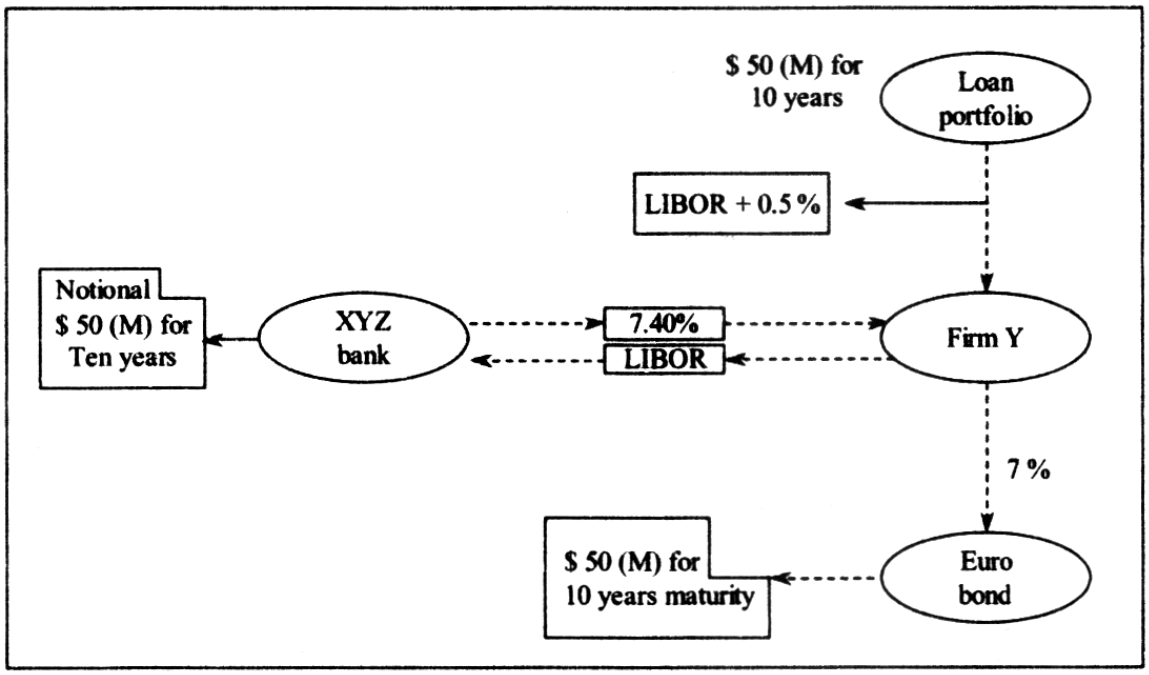

Fig.: Firm T Interest Rate Swap with XYZ Bank

The net result to firm 'F is as follows,

Receipt on portfolio	→	LIBOR + 0.5%
Pay XYZ bank	→	LIBOR
Received from XYZ bank	→	7.40 %
Pay on Euro bond	→	7.00%
Cost of funds	→	{LIBOR - 0.30 %}
Locked in spread	→	0.50 + 0.30 → 0.80 %

Firm Y's cost of funds has been minimized to LIBOR less 30 basis points and as a result, firm T has been locked in spread on its portfolio of 80 basis points.

It is necessary to evaluate the total interest of XYZ bank, who is a financial intermediary in the swap deal where the risk of loss due to interest rate fluctuations has been shifted from the counter party to XYZ bank. As a result, XYZ bank is now interested to enter into the deals with firm X and Y if it is beneficial for the bank. XYZ bank being an intermediary places together both the transactions and ultimate risk net out is left with a speed of 10 basis points. This is represented in the diagram given below.

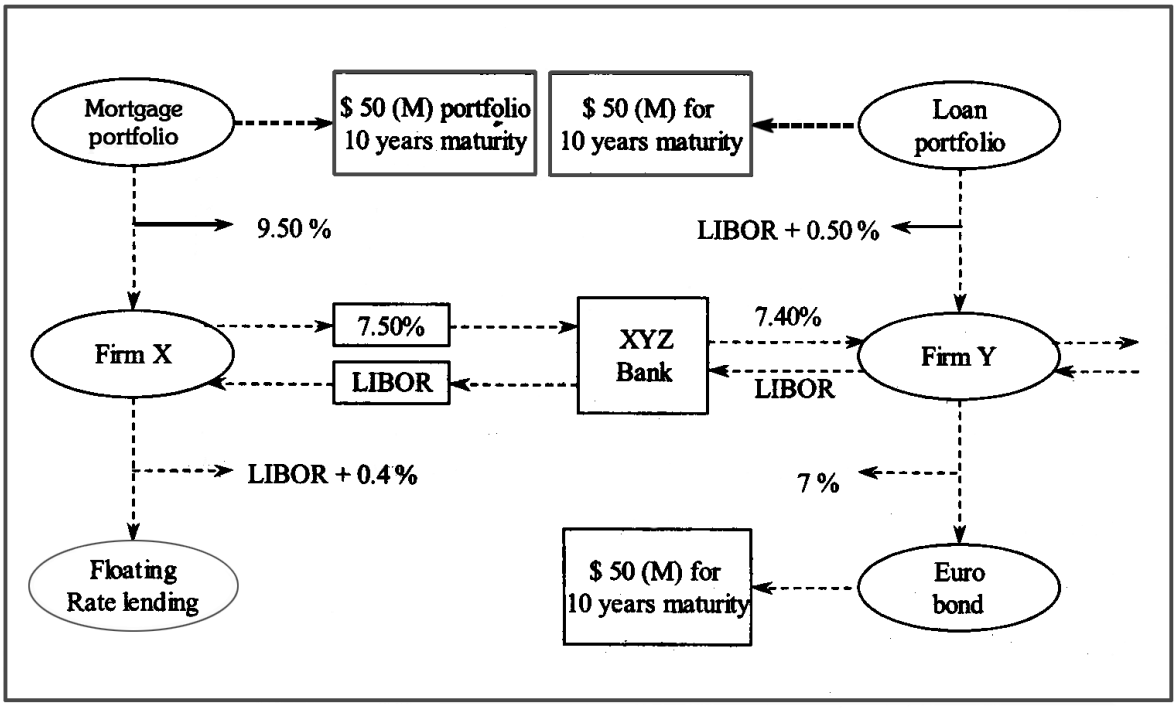

Fig.: Swap Structure

Receive → 7.50 %

Pay → 7.40 %

Receive → LIBOR

Pay → LIBOR

Net → [7.50 – 7.40] → 10 basis points

Hence, XYZ bank will receive compensation equal to $ 1 lac annually for the next ten years on $ 50 million swap deal.

Q15. How interest rates swaps can be done through LIBOR.

Ans :

The "plain vanilla" interest rate swap is one of the most commonly existing swap. A company agrees to pay interest at a fixed rate and receives interest at a floating rate on the notional principal for a specified number of years.

LIBOR

The London Inter Back Offered Rate (LIBOR) is the rate of interest at which banks are prepared to deposit money in the Euro currency market. LIBOR is considered as a floating rate in most of the interest rate swap agreements. All major currencies quote either 1-month, 3-month, 6-month and 12-month LIBOR.

Prime serves as the reference interest rate for floating-rate loans in the domestic financial market, similarly LIBOR serves as the reference interest rate for floating-rate loans in the international market. The following example helps in understanding how the LIBOR is used.

Suppose a 2-year swap agreement has been signed between Toshiba and Sony, on January 2011. As per the agreement Toshiba agrees to pay Sony at a fixed interest rate of 10% per annum on a sum of money ` 10 lakhs and Sony agrees to pay Toshiba at 6-month LIBOR rate on ` 10 lakh, in return. The exchange is to take place every half-yearly. Therefore, the first exchange takes place in the month of June. Toshiba would pay Sony sum of ` 1 lakh at the rate of 10% on 10 lakh and Sony pays at the 6-month LIBOR rate on 10 lakh. Suppose the LIBOR rate is 9.5%, than Sony pays only ` 95,000 to Toshiba. Therefore, Toshiba only pays Sony the sum of ` 5,000 (1,00,000 - 95,000) as per the swap agreement. The next three payments also take place in the similar manner.

Using the Swap to Transform a Liability

The swap can be used by Toshiba for transforming the floating-rate loan into a fixed-rate loan. Suppose, Toshiba has arranged to borrow ? 10 lakh at LIBOR plus 0.1% from outsiders. Once the swap contract has been entered into, Toshiba has the following sets of cash flows,

(a) Pays LIBOR plus 0.1 % to outsiders.

(b) Receives LIBOR as per the terms of swap.

(c) Pays at 10% as per the swap terms.

These sets result in fixed outflow of cash at 10.1%. This transforms Toshiba's borrowings from floating rate of LIBOR + 0.1% into fixed rate of 10.1%.

Similarly, for Sony the fixed-rate load is transformed into floating rate loan. Suppose Sony has a loan of ` 10 lakh outstanding and payable within 2-years @ of 10.2%. After the swap contract has been entered into the following sets of cash flows are available for Sony,

(a) Pays 10.2% to the outsiders.

(b) Pays LIBOR as per the swap terms.

(c) Receives 5% under the swap.

These sets ensure the outflow of cash at LIBOR plus 0.2%. Therefore, Sony transformed its borrowing from fixed 10.2% into floating rate of LIBOR plus 0.2%.

Using the Swap to Transform an Asset

Swaps are also used for transforming the nature of assets. According to our example, Toshiba can use the swap to convert an asset earning fixed rate of interest into an asset earning floating rate of interest. Suppose, Toshiba holds bonds of ` 10 lakh that provide a return of 9.7% per annum for next 2-years. After entering into a swap contract. The following sets of cash flows are available,

(a) Receives interest at 9.7% on the bonds.

(b) Receives LIBOR as per the swap terms.

(c) Pay at 10% as per the swap terms.

Therefore, the swap transforms an asset earning 9.7% into an asset earning LIBOR-0.3%.

Similarly for Sony, an asset earning fixed rate of interest is transformed into an asset earning floating rate of return. Suppose, Sony holds an investment of ` 10 lakh which gives to return of LIBOR-0.2%. Once it has entered into swap contract the following sets of cash flows take place,

(a) Receives return on investment at LIBOR-0.2%.

(b) Pays LIBOR as per the swap terms.

(c) Receives 5% return as per the swap terms.

Therefore, the swap transforms an asset earning LIBOR-O.2% into an asset earning 9.8% return.

Market Makers

Since many companies like to take on opposite positions in the same swap, large financial institutions therefore act as market makers for swaps. These market makers calculate and hedge the risks that is involved and being taken. The swap market makers use instruments such as bonds, forward rate agreements and interest rate futures for hedging.

Day Count Issues

The payment of swaps is also affected by the day count issues. The following example helps in understanding the affect of day count issues on swap payments.

Suppose a six months LIBOR is quoted on the basis of 360 days in a year. The payment on ` 10 lakh when the LIBOR is 9.7% and payment is semiannually will be,

$$10,00,000 \times 0.097 \times \frac{182}{360} = ` 49,038.8$$

$$\cong 49,039$$

Generally, floating rate cash flow on a LIBOR is calculated by PRn/360.

Where

P = Principal

R = Relevant LIBOR rate

n = No. of days since last payment.

The fixed rate specified on the swap transaction is based on number of days and will not be equal for each payment date. The fixed rate is quoted on actual/365 or 30/360 basis. The fixed rate is applied for the complete year and is not comparable with the LIBOR. To compare the two rates either LIBOR rate is multiplied by 365/360 or the fixed rate is multiplied by 360/365.

Q16. Explain the uses and risks associated with Interest Rate Swap.

Ans : **(May-18)**

Uses

- Swapping from fixed to floating may save issure money.
- Protects against adverse movements in interest rates.
- No premium is paid to enter into a swap.
- No Principal amount is exchanged.

Risks

- If interest rates have declined, this will suit for the company just fine, because it would rather keep the fixed-rate interest payment, which is at higher rate, than receive the rate-sensitive payment, which has decline
- A swap contract does not necessarily mean that there is a loss to the other party
  - The company will suffer losses from a default only if interest rates have risen when the default occurs
  - Even then, the loss will be far smaller than the amount of the notional principal because interest payments are far smaller than the amount of the notional principal.
  - The actual loss will equal the present value of the difference in the interest payments that the bank would have received if the swap were still in force as compared to interest payments it receives otherwise.

4.2.3 Equity Index Swap

Q17. Explain briefly about Equity Index Swap.

Ans :

In an equity swap, two parties make a series of payments to each other with atleast one set of payments determined by a stock or index return. The other set of payments can be a fixed or floating rate or the return on another stock or index. Equity swaps are used to substitute for a direct transaction in

stock. With an equity swap, payments are made based on a notional principal. This is an equity portfolio. The payments are fixed and floating. The floating rate sum is based on the return on the relevant index for the period while the fixed rate sum is agreed in advance.

An equity swap is a financial derivative contract (a swap) where a set of future cashflows are agreed to be exchanged between two counterparties at set dates in the future. The two cashflows are usually referred to as "legs" of the swap; one of these "legs" is usually pegged to a floating rate such as LIBOR. This leg is also commonly referred to as the "floating leg". The other leg of the swap is based on the performance of either a share of stock or a stock market index. This leg is commonly referred to as the "equity leg". Most equity swaps involve a floating leg or an equity leg, although some exist with two equity legs. An equity swap involves a notional principal, a specified tenor, and predetermined payment intervals. Equity swaps are typically traded by Delta One trading desks.

Characteristics

Following are the characteristics of equity swaps

1. One party pays the return on an equity, the other pays fixed, floating, or the return on another equity;
2. Rate of return is paid, so payment can be negative; and
3. Payment is not determined until end of period.

Equity index swap is an agreement between two parties to swap two sets of cashflows on predetermined dates for an agreed number of years. The Cashflows will be an equity index value swapped, e.g., with LIBOR. Swaps can one considered as being a relatively straightforward way of gaining exposure to an asset class you require. They can also be relatively cost efficient. In other words, equity swap is a swap in which the total or price return on an equity index, equity basket or single equity is exchanged for a stream of cashflows based on a short-term interest rate index.

For example, a securities dealer who, in the normal course of business carries a $1 00,000,000 inventory of equity securities, whose overall performance should generally correspond with the Wilshire 5000 Index. This dealer wants to earn a profit margin based upon a bid/ask spread and does not want exposure to the market. This dealer wants to eliminate this risk on a long-term basis. Then, there is an insurance company that would like exposure to the stock market. This firm continually experiences cash inflows that it would like to invest quickly. But, due to the logistics of the cheque processing procedure, it runs idle cash balances averaging about $100,00,000.

The dealer and the insurance company are natural counterparties for an equity index swap agreement. When a swap broker puts these two parties together, they could reach a long-term agreement in which the dealer agrees to pay the total return of the Wilshire 5000 index on a notional amount of $100,000,000 to the insurance company; and in return the insurance company would agree to pay the dealer a floating rate of interest that is equal to the U.S. dollar LIBOR on the same notional amount of principal during the tenor (length) of the agreement.

4.2.4 Commodity Swap

Q18. Define Commodity Swap. State the various types of Commodity Swap.

Ans : **(Imp.)**

Commodity swap is a swap, where exchanged cash flows are dependent on the price of an underlying commodity. This is usually used to hedge against the price of a commodity. A commodity swap is an agreement whereby a floating (or market or spot) price is exchanged for a fixed price over a specified period.

In this swap, the user of a commodity would secure a maximum price and agree to pay a financial institution this fixed price. Then in return, the user would get payments based on the market price for the commodity involved. On the other side, a producer wishes to lix his income; find would agree to pay the market price to a financial institution, in return for receiving fixed payments for the commodity.

In commodity swaps, the cash flows to be exchanged are linked to commodity prices. Commodities are physical assets such as metals, energy and agriculture. For example, in a commodity swap, a party may agree to exchange cash flows linked to prices of oil for a fixed cash flow.

Commodity swaps are used for hedging against fluctuations in commodity prices or fluctuations in spreads between final product and raw material prices, e.g., cracking spread which indicates the spread between crude prices and refined product prices significantly affects the margins of oil refineries.

Types

There are two types of commodity swaps

1. Fixed-Floating Swaps

Fixed-floating swaps are just like the fixed-floating swaps in the interest rate swap market with the exception that both indices are commodity based indices.

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

2. Commodity-for-Interest Swaps

Commodity-for-interest swaps are similar to the equity swap in which a total return on the commodity in question is exchanged for some money market rate (plus or minus a spread).

4.3 USING SWAP TO MANAGE RISK

Q19. Explain the different ways to manage risk in swap market.

Ans : **(Imp.)**

Following types of swaps is used to manage risk:

1. Using Interest rate swap
2. Using Currency swap
3. Using Commodity swaps
4. Using Equity swap

1. Using Interest Rate Swap

An interest rate swap, or simply a rate swap, is an agreement between two parties to exchange a series of interest payments without exchanging the underlying debt. In a typical fixed/floating rate swap, the first party promises to pay to the second at designated intervals a stipulated amount of interest calculated at a fixed rate on the "notional principal"; the second party promises to pay to the first at the same intervals a floating amount of interest on the notional principle calculated according to a floating-rate index. The first party in a fixed/floating rate swap, which pays the fixed amount of interest, is known as the fixed-rate paver, while the second party, which pays the fixed amount of interest, is known as the floating-rate payer.

Interest rate swaps arc voluntary market transactions by two parties. In an interest swap, as in all economic transactions, it is presumed that both parties obtain economic benefits. The economic benefits in an interest rate swap are a result of the principle of comparative advantage. Further, in the absence of national and international money and capital market imperfections and in the absence of comparative advantages among different borrowers in these markets, there would be no economic incentive for any firm to engage in an interest rate swap.

Interest rate swaps generally involve two firms with different credit ratings. A Quality Spread Differential (QSD) is observed to exist at different maturities for firm debts with di tie rent credit ratings.

Using Interest Rate Swaps to Manage Interest Rate Risk

Following are the ways by which interest rate risk are managed by interest rate swap

(i) Using Interest Rate Swaps to Lower Borrowing Costs

(ii) Using Interest Rate Swaps to Hedge against Risk of Rising and Falling Interest Rates

(iii) Hedge against Risk of Rising Interest Rates

(iv) Hedge against Risk of Falling Interest Rates

(i) Using Interest Rate Swaps to Lower Borrowing Costs

An interest rate swap, or simply a rate swap, is an agreement between two parties to exchange a series of interest payments without exchanging the underlying debt. In a typical fixed/floating rate swap, the first party promises to pay to the second at designated intervals a stipulated amount of interest calculated at a fixed rate on the "notional principal"; the second party promises to pay to the first at the same intervals a floating amount of interest on the notional principle calculated according to a floating-rate index. The first party in a fixed/floating rate swap, which pays the fixed amount of interest, is known as the fixed-rate paver, while the second party, which pays the fixed amount of interest, is known as the floating-rate payer.

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Interest rate swaps generally involve two firms with different credit ratings. A Quality Spread Differential (QSD) is observed to exist at different maturities for firm debts with di tie rent credit ratings. The quality spread differential allows two firms with different credit ratings to decrease their borrowing costs through interest rate swaps by utilizing their comparative advantage in borrowing in different markets. The credit ratings of firms are determined by credit risk factors such as leverage and volatility of earnings asset value.

(ii) Using Interest Rate Swaps to Hedge against Risk of Rising & Falling Interest Rates

Interest rate swaps are used to hedge interest rate risks as well as to take on interest rate risks. If a treasurer is of the view that interest rates will be falling in the future, he may convert his fixed interest liability into floating interest liability; and also his floating rate assets into fixed rate assets. If he expects the interest rates to go up in the future, he may do *vice versa.* Since there are no movements of principal, these are off balance sheet instruments and the capital requirements on these instruments are minimal.

(iii) Hedge against Risk of Rising Interest Rates

Interest rate swaps without offsetting underlying create interest rate risk. Each counter party in. an interest rate swap is committed to pay a stream of interest payments and receive a different stream of interest payments. A payer of fixed interest rate payments is exposed to the risk of falling interest rates. Similarly, a receiver of fixed interest rate payments is exposed to the risk of rising interest rates.

Floating rate loans expose the debtor to the risk of increasing interest rates. To avoid this risk, he may like to go for a fixed rate loan, but due to the market ' conditions and his credit rating, his fixed rate loans are available only at a very high cost. In that case, he can go for a floating rate liability and then swap the floating rate liability into a fixed rate liability. He can do the swap with another counter party whose requirements are the exact opposite of his or, as is more often the case, can do the swap with a bank.

(iv) Hedge against Risk of Falling Interest Rates

A payer of floating interest rate payments is exposed to the risk of rising interest rates. Similarly, a receiver of floating interest payments is exposed to the risk of falling interest rates. In conclusion, interest rate swaps create an exposure to interest rate movements, if not offset by an underlying exposure.

The figure illustrates the case in which an intermediary, e.g., a bank is involved in a swap deal between two counter parties. Borrower A has a floating rate loan, but would prefer a fixed rate loan. There is another borrower B who has a fixed rate loan, but would prefer a floating rate loan. The intermediary can now match these two borrowers as explained in the following figure.

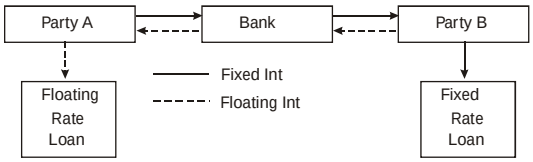


Fig.: Rising and Falling Interest Rate

For example, G Ltd. has an existing fixed rate liability. It feels that interest rates are going to fall (which will raise the capitalized value of the debt) and wishes to hedge against this. H Ltd. has an existing floating rate liability but expects the interest rate to rise, increasing its interest burden. It wishes to hedge against this. G and H enter into a swap through broker M whereby G becomes the floating rate payer and H the fixed rate payer in a swap.

Assume that the interest rate falls as anticipated by G. Its payment under the swap decreases as the floating rate falls, while its receipt remains unchanged. There is a positive cash flow which offsets the increase in the value of the fixed rate debt. As for H, the fall in rates reduces its receipt under the swap while leaving its payment unchanged. There is a negative cash flow in the swap, which offsets H's gain in the cash market.

On the other hand, if the interest rate rises (as anticipated by H), G's payment under the swap increases, with its receipt unchanged. The resulting negative swap cash flow offsets the reduction in the value of the cash market liability. For H, the rise in interest rates means an increased receipt under the swap with unchanged payments. The resulting positive cash flow offsets H's loss in the cash market.

2. Using Currency Swap to Manage Currency Risk

Following are the ways by which currency risk is managed by currency swaps:

(i) Using Currency Swaps to Lower Borrowing Costs in Foreign Country

(ii) Using Currency Swaps to Hedge against Risk of a Decline in Revenue

(iii) Using Currency Swaps to Hedge against the Risk of an Increase in Cost

(iv) Using Currency Swaps to Hedge against the Risk of a Decline in the Value of an Asset

(v) Using Currency Swap to Hedge against the Risk of a Rise in the Value of Liability

(i) Using Currency Swaps to Lower Borrowing Costs in Foreign Country

Interest rate swaps can be mutually beneficial if there is a comparative advantage for the two parties in one market over another. The rationale for currency swaps is similar one party has a comparative advantage in borrowing in one currency while another has an advantage in the other.

For example, a prominent Indian company (TISCO) wants to raise funds in the USA. At the same time, a prominent American company, (Jacobs

Engineering) wants to borrow in Indian rupees for a project in India. TISCO, though a blue chip in India, may not be well known in the US debt market and would therefore have to pay a higher rate of interest than its credentials would otherwise warrant. Similarly, Jacobs Engineering may not receive a rate of interest in India that truly reflects its credit rating because of the obscurity of the name in India.

It would be beneficial to both companies if TISCO borrows in rupees, Jacobs in dollars and the two then swap the liabilities.

Sometimes, comparative advantage could run in the opposite direction. A British company might have already borrowed heavily in the sterling bond market. As a result, the market may demand a premium on further borrowings, as they would not prefer a concentration of holdings in one company. On the other hand, it may be able to raise funds relatively cheap in the Indian rupee debt market because it has no previous exposure.

(ii) Using Currency Swaps to Hedge against Risk of a Decline in Revenue

For example, U.S. Apple, a U.S.-based firm that exports apples and sells them for yen in Japan. An abbreviated form of its income statement is:

$$\text{Revenues} = P\,Q - \text{Expenses} = \frac{\text{Expenses}}{\text{Operating Income}}$$

Where, P is the price, the firm receives for the apples it sells in Japan (¥),

Q is the quantity of apples it sells in Japan, and expenses are in U.S. dollars.

The goal of U.S. Apple is to maximize its dollar profits, typical for a U.S.- based firm. U.S. Apple is exposed to the risk that the $/¥ exchange rate will fall. If the $/¥ declines, the dollar value of the firm's yen revenues will be less, and its dollar profits will be less.

U.S. Apple can use a fixed-for-fixed currency swap to hedge' its risk exposure. It can estimate its yen-denominated revenues for the next several years, and agree to pay fixed yen and receive fixed U.S. dollars in each of the next several years.

U.S. Apple will still be exposed to the risk of fluctuation in the quantity of apples it sells in Japan. The number of apples it can sell in Japan, will vary at its crop size (in the United States) varies, as the selling price of apples grown and sold in Japan varies, as the prices of other competing fruits in Japan varies, as import/export laws change, and as tastes change in Japan.

(iii) Using Currency Swaps to Hedge against the Risk of an Increase in Cost

For example, Choco swiss is a Swiss manufacturer of liqueur-filled chocolates. It must import all its liqueurs from France, and it pays for the liqueurs in euros. However, it sells its product in Switzerland only. Choco swiss want to maximize its profits, which are denominated in Swiss Francs (SFR). An abbreviated version of Choco swiss' income statement is:

$$\text{Revenues} = (\text{in SFR}) = \frac{\text{Expenses (a significant portion is in euros)}}{\text{Operatin Income}}$$

Choco swiss faces the risk that the SFR/€ will rise. If the SFR/€ rate rises, then the SFR cost of its imports will rise. As costs rise (denominated in SFR), SFR-denominated profits for Choco swiss will decline. To hedge its currency risk exposure, Choco swiss can use a fixed-for-fixed currency swap in which it pays SFR and receives euros. There is no need to exchange principal amounts.

(iv) Using Currency Swaps to Hedge against the Risk of a Decline in the Value of an Asset

For example, a U.S. company has a three-year £50 million investment (an asset) that yield` 7% annually (in GBP) and pays interest twice per year. The current exchange rate is $1.60/£. The U.S. corporate treasurer thinks that the dollar will strengthen against the pound sterling. Equivalently, this means that the dollar value of the GBP will decline (the S/£ exchange rate will decline), which means that the dollar value of any GBP-denominated assets will decline.

If the treasurer is correct, each future interest inflow of £1,750,000 will purchase less than $2,800,000. For example, if the exchange rate is $1.50/£, the interest payment of £1,750,000 will purchase only $2,625,000. However, because the current three-year interest rate in the United States is 7.40%. The treasurer does not want to swap each subsequent interest payment £1,750,000 for only $2,800,000. Not only will the decline in the value of the GBP mean that the value of the interest rates will be less, but the dollar value of the U.S. firm's investment decline, too.

The treasurer finds a swap dealer willing to swap interest payments each six months £1,750,000 for $2,940,000 over the next three years. In addition, there will be a final swap of £50 million for $80 million. Under this swap, the U.S. company has transformed its three-year £50 million investment that yields 7% into a three-year S80 million investment that yields 7.35%.

For example, a Japanese company that owns some real estate in the United States; i.e., the Japanese company has a dollar-denominated asset. If the ¥/$ exchange rate declines, the value of this asset, in yen, will decline. To hedge, the Japanese company can buy. Then futures or forwards. Alternatively, the Japanese company can enter into a swap, paying dollars and receiving yen.

(v) Using Currency Swap to Hedge against the Risk of a Rise in the Value of Liability

If the value of a firm's liability rises and its asset values remain unchanged, it follows that the value of the firm's stock must decline. This must be the case because:

Assets = Liabilities + Owners' Equity.

For example, a U.S. company has a two-year debt (a liability) of € 100,000,000 at 7.7% annually and interest is paid quarterly. The current exchange rate is € 0.9720/$. The U.S. corporate treasurer's staff is predicting that the dollar will weaken against the euro (i.e., the €/$ exchange rate will fall). This is equivalent to predicting that the $/€ rate will rise. If the dollar price of the euro rises, then the dollar-denominated value of this firm's liability will rise.

If the staff is correct, each future interest payment of € 1,925,000 will cost more than $1,980,453. For example, if the exchange rate changes to € 0.9400/$, the interest payment of € 1,925,000 will cost the firm $2,047,872.

The treasurer finds a swap dealer willing to swap quarterly cash flows of € 1,925,000 for $2,004,750 over the next two years. In addition, there will be a final swap of € 100,000,000 for $102,880,658. Under this swap, the U.S. company has transformed its two-year 7.7% debt for € 100,000,000 into a 2- year $102,880,658 debt with an interest rate of 7.79%.

3. Using Commodity Swaps

Commodity swap is a swap in which exchanged cash flows are dependent on the price of an underlying commodity. A commodity swap is usually used to hedge against the price of a commodity.

The vast majority of commodity swaps involve oil. So, for example, a company that uses a lot of oil might use a commodity swap to secure a maximum price for oil. In return, the company receives payments based on the market price (usually an oil price index).

On the other side, if a producer of oil wishes to fix its income, it would agree to pay the market price to a financial institution in return for receiving fixed payments for the commodity.

4. Using Equity Swaps

Equity swaps are versatile tools and have many applications for companies, banks and institutional investors. Because they are over-the-counter deals negotiated directly between the two parties, they can be tailored or customized to suit the needs of clients. A dealer will normally agree to pay the return on almost any basket of shares.' Provided some means can be found to hedge or atleast to mitigate the risks on the transaction.

This can be useful, for example, for an investor who wishes to gain exposure to a basket of foreign shares but faces certain restrictions on ownership. A swap dealer will agree to pay the return on the shares (positive and negative) every month or every three months for a fixed period of time. In return, the investor will pay a floating or fixed rate of interest applied to the notional principal. The deal can be structured such that all the payments are made in a familiar currency such as the U.S. dollar or the euro.

In this kind of case, it is possible that if the investor actually bought the underlying shares then, as a foreigner, the divided income would be taxable. If so, the investor can enter into an equity swap with a dealer who is not subject to the tax or can reclaim it. The dealer borrows money to buy the shares, and in the swap the dealer pays the total return on the shares to the investor, including gross dividends. In return the investor pays a funding rate which the dealer uses in part to service the loan and in part to make a profit on the transaction.

Corporate executives typically have a significant investment in the stock of their employers. Given that so much of their compensation and portfolio wealth is tied to the performance of a single company, their investments are poorly diversified. A few executives have used swaps to effectively sell some of the exposure in their stock, while maintaining their position in the stock.

PROBLEMS

1. Two British companies both wish to borrow 10 million pounds. Company A is a giant conglomerate with an excellent credit rating. Company B is a medium sized company of ten years standing with a lower credit rating. Both companies have the option of borrowing either at fixed rates or at floating rates. Company A would prefer a fixed rate obligation while company B prefers a floating rate. The quoted rates of interest to the two companies are as follows:

Company	Quoted Interest Rate	
	Fixed (%)	Floating (%)
A	7.5	LIBOR + 0.5%
B	9.0	LIBOR + 3.5%

Sol :

B's cost of funds is higher than A whether the loan is on fixed rate or on floating rate basis. However, in the fixed rate case, B's extra cost is 1.5% (9.0% – 7.5%) while in the floating rate market the extra cost is 3%. (In economic terms, A has an absolute advantage over B in both fixed and floating rate markets, but B has a comparative advantage in the fixed rate market).

C Ltd., a broker, comes forward and arranges a swap. Under this arrangement, A actually borrows 10 million pounds from a bank at LIBOR + 0.5% and B borrows 10 million pounds from a bank at 9.0%. As a separate transaction (which constitutes the swap) A, B and C agree as follows:

1. A will pay C a fixed rate of 7.0%
2. A will receive from C a floating rate of LIBOR + 0.5%
3. B will pay C a floating rate of LIBOR + 0.5%
4. B will receive from C a fixed rate of 6.5%

The transactions (1) to (4) constitute the 'swap'. It should be noted that the swap is independent of the borrowing initially undertaken by A and B and the banks which lent the funds to A and B are in no way concerned with the swap. A remains liable for all obligations to its bank and likewise B to its bank. The swap binds only A, B and C.

To understand the benefits from the swap, consider the net cash flows of A, B and C, given in table.

Table

Party	Outflow on Loan from Bank	Swap	Swap Inflow	Total
	Outflow			
	1	2	3	4
	(%)	(%)	(%)	(%)
A	– (LIBOR + 0.5)	–7.0	– (LIBOR + 0.5)	– 7.0
B	– 9.0	– (LIBOR + 0.5)	+ 6.5	– (LIBOR + 3.0)
C	NIL	– (LIBOR + 0.5)	– (LIBOR + 0.5)	
		– 6.5	+7.0	+0.5

It may be seen that the net result is:

1. For A, a fixed rate obligation at 7% (this is better than the 7.5% which A would have paid if it had directly taken a fixed rate loan);
2. For B, a floating rate obligation at LIBOR +3.0% (this is better than the LIBOR + 3.5% which B would have paid if it had directly taken a floating rate loan);
3. For C, a profit of 0.5% for arranging the transaction.

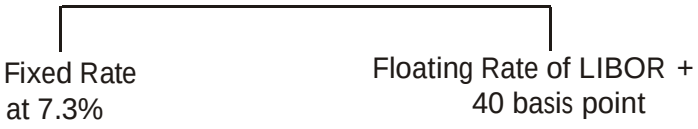
It was noted earlier that the interest differential on floating rate debt was 3% while on fixed rate debt it was 1.5%. The gap between the differentials was (3 - 1.5) % = 1.5%. It is this 1.5% which has been shared as gains by A, B and C, each getting 0.5%.

2. Electronic Business Machines (EBM) needs to borrow $20. million immediately. It can borrow for three years at a fixed rate of 7.5% or at a floating rate of LIBOR + 40 basis points. Plain vanilla fixed-for- floating three year swaps are priced at 7.3% fixed, in exchange for floating LIBOR. If EBM believes that interest rates are about to rise sharply, what should it do? If EBM believes that interest rates are about to decline sharply, what should it do?

Sol :

Computing cash flows that would result from various spot rates ; (fixed).

EBM enters into plain vanilla fixed for floating three year swaps having 2 options as,



We know that 1% = 100 b.p

∴ 100 b.p. = 1%

40 b.p. = ?

0.4% or 0.004

∴ Floating rate = 0.4% or 0.004

As the maturity of the borrowed fund is 3 years. Now consider that the payment is made in every 6 months of swap contract depending on this, the US fixed rates of funds for 3 years (semi-annually) is given by,

Time	Spot US 3 years Rate	Payment to Swap Dealer (A)	Receipt from Swap Dealer (B)	Net Cash Inflow Outflow (B-A)
Now	6.5%	$0	$0	$0
1st year 6	6.25%	$ 6,90,000	$ 7,30,000	40,000
1st year 12	6.00%	$ 6,65,000	$ 7,30,000	65,000
2nd year 18	6.25%	$ 6,40,000	$ 7,30,000	90,000
2nd year 24	6.35%	$ 6,65,000	$ 7,30,000	65,000
3rd year 30	6.75%	$ 6,75,000	$ 7,30,000	55,000
3rd year 36	7.00%	$ 7,15,000	$ 7,30,000	15,000
42		$ 7, 40,000	$ 7,30,000	(10,000)

Working Notes

[(Fixed rate of previous period + Floating rate)/2] × Principal amount

= [(0.065 + 0.004)/2] × $20,000,000

= $6, 90,000

Fixed rate of swap)/2] × Principal amount

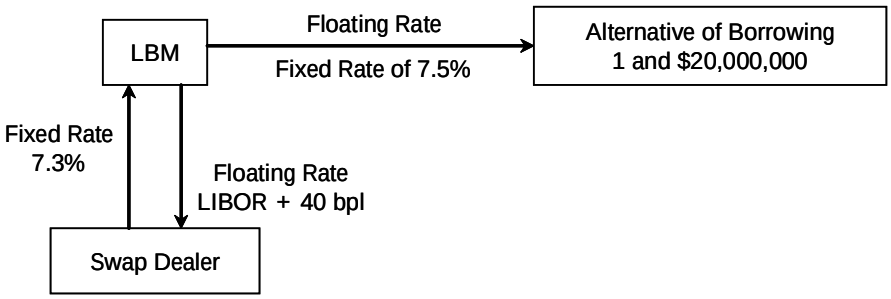
= (0.073/2) × $20,000,000 = $7, 30,000.

1. If EBM Believes Interest Rates to Rise Sharply

It is a general phenomenon that when only firm borrows funds from others, it faces the risk of change in floating interest rate.

Initially EBM borrows at floating rate of LIBORS + 40 basis points with a tenure of the debt as 3 years then simultaneously, it enters in a swap market and borrows at fixed rate of 7.3% Where swap dealer acts as an intermediate in turn swap dealer gives him a floating rate LIBOR + 40 basis points. In this way the debt of floating rate is transformed to fixed dept.

The increased rate of interest puts losses to the firm which can be offset by the profits earned in swap market by paying interest at a fixed rate of 7.3%.



2. If EBM Believes Interest Rates to Decline Sharply

As EBM borrow funds at floating rate and the duration to repay the funds is 3 years.

In order to safeguard against losses, firm EBM has to enter into swap market simultaneously. In this agreement it is able to receive a fixed amount of interest from swap dealer.

Hence, it helps in offsetting losses and safeguard firm from risk.

3. Companies A and B have been offered the following rates per annum on a $ 20 million 5-year loan :

	Fixed rate	Floating rate
Company A	**5.0%**	**LIBOR + 0.1%**
Company B	**6.4%**	**LIBOR + 0.6%**

Company A requires a floating -rate loan; company B requires a fixed - rate loan. Design a swap that will net a bank, acting as intermediary, 0.1% per annum and that will appear equally attractive to both companies.

Sol :

Company 'A' has a benefit over company 'B' under fixed rate and also at floating rate, but it has substantially more advantage in fixed rate (1.4%) as against 0.5%. The net profit that can be obtained by a swap is 1.40% – 0.5% = 0.9%.

Out of this profit of 0.9%, 0.1% is payable to the swap dealer. The left over gain 0.8% or 0.008 may be shared equally (0.4% or 0.004) by 'A' and 'B' companies. The swap arrangement would be,

	Interest	Swap Inflow	Swap outflow	Net
'A' company	5.0%	5.40%	LIBOR + 0.1%	LIBOR – 0.3%
'B' company	LIBOR + 0.6%	LIBOR + 0.1%	5.50%	0.1%
Dealer	–	5.40%	5.50%	0.1%
		LIBOR + 1%	LIBOR + 0.1%	–

4. Companies ABC and PQR have been offered the following rates per annum on a ` 100 lacs 10 years loan.

	Fixed rate	Floating rate
Company ABC	**10%**	**MIBOR + 0.5%**
Company PQR	**11.8%**	**NIBOR + 1.0%**

Company ABC requires a floating rate loan, company PQR requires a fixed rate loan.

(i) How can the two companies enter into a swap arrangement in which each benefits equality ?

(ii) What risk could the arrangement generate ?

Sol :

As swap contracts are facilitated by a swap dealer, firms have to pay certain commission to him, hence a basic of 10% commission needs to be assumed in this situation.

ABC company has a benefit over PQR company under fixed rate and also at floating rate, but it has substantially more advantage in fixed rate i.e., 1.8% as against 0.5%. The net profit that can be obtained by a swap contract is 1.8 to 0.5% i.e., 1.3%.

Out of this profit of 1.3%, it must be shared equality of ABC company and PQR company i.e., 0.65% each. The swap arrangement would be as follows,

	Interest	Swap inflow	Swap Outflow	Net
ABC company	10.0%	10.65	MIBOR + 0.1%	MIBOR – 0.55%
PQR company	NIBOR + 1.0%	NIBOR + 0.1%	10.75%	0.1%
Swap dealer	–	10.65	10.75	0.1%
		NIBOR + 1%	NIBOR + 0.1%	

5. Currency X is based in the United Kingdony and would like to borrow $50 million at a fixed rate of interest for 5 years in US funds. Because the company is not well known in the United States, this has proved to be impossible. However, the company has been quoted 12% per annum on fixed-rate 5 year sterling funds. Company Y is based in the United States and would like to borrow the equivalent of $50 million in sterling funds for 5 years at a fixed rate of interest. It has been unable to get a quote but has been offered US dollar funds at 10.5% per annum. Five-year government bonds currency yield 9.5% per annum in the United States and 10.5% in the United Kingdom. Suggest an appropriate currency swap that will net the financial intermediary 0.5% per annum.

Sol :

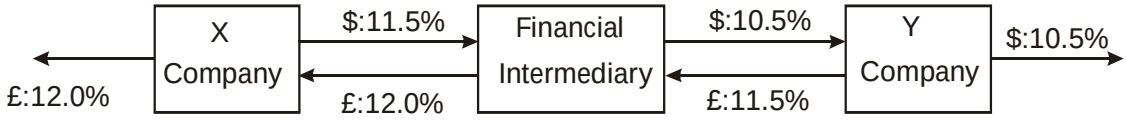


Fig (1) : First Swap

The difference between the currency yield on dollar and sterling 5 years bond is 1%. The financial institution can make use of this 1% difference at the time of designing a swap. For instance as shown in figure (1), above the financial intermediary may, (i) enable *X* company to borrow dollars @ 1% p.a which is more when compared to the sterling funds rate offered i.e., 11% p.a and (ii) enable *Y* company to borrow sterling @1% p.a which is less when compared to the dollar fund rate offered i.e., 11.5% p.a.

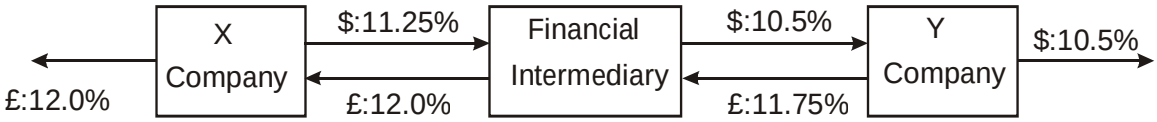


Figure (2): Final Swap

In this swap the financial institutions will be subjected to a foreign exchange risk. Which can be hedged with the help of forward contracts. It can be observed from the above figure (figure 2) that the financial institutions added 0.25% per annum to the rates paid by *X and Y* in order to make it 0.5% p.a, i.e., *X* may pay 11.25% p.a for dollars and *Y* may pay 11.75% p.a for sterling and give rise to a swap.

4.4 Pricing and Valuing Swaps

Q20. Discuss how Interest rates swaps are priced at the time of origination.

Ans :

In a plain vanilla swap, which is a fixed-for-floating interest rate swap, one of the party in the swaps contract promises to make fixed payments to the other party and the other party pays a floating rate payment to that party. The objective of swap pricing is to identify the fixed interest rate that is equal to present value of fixed payments to the Present Value (P.V) of variable income. If a swap is correctly priced then it carries 'zero value'.

Determining the present value of the fixed payment requires the present annuity value for a year, this is not as difficult as the fixed payments which are known immediately when the swap price is agreed. But only one cash flow is known in case of floating cash inflows, with this the succeeding cash flows have to be found. These cash flows have to be either estimated, either accurately or set out nearly equal to that agreed by the swap dealer in case if the swap is hedged.

Pricing Interest Rate Swaps at Origination of Contract

The pricing of market fixed for floating interest rate swaps states that the value of a floating rate debenture is closely equal to its original value, as the further cash flows are priced at a current market interest rates to reflect the changes in the interest rates.

Q21. Explain how an Interest rates swaps is valued after origination.

Ans :

The interest rates will actually change after the swap contract has been originated; this will also change the value of the swaps.

Importance of Valuing Swaps after Origination

Following are the importance of valuing swaps after origination,

1. To understand the current financial position of the firms.
2. To find the default risk that can arise in future and if the firm employs swap as its asset, then they will become more worried about the risk associated with the counter parties.
3. As most of the swaps are priced at market rates, it becomes necessary to value swaps after origination.

There are two methods for valuing an interest rate swap after origination.

Method 1

Identify the present value of the left over fixed cash payments and the present value of the left over expected floating receipts.

Method 2

In the second method, the swap market-maker quotes a price at a fixed rate for a maturity period of three years, this price is set after a year of origination of swaps contract. This price is then exchanged for one year LIBOR. The amount of difference between face value of swaps fixed payments and the current fixed payments is equal to the original value of the swap.

Q22. Discuss how currency swaps are priced at the time of origination.

Ans :

In a fixed-for-floating currency swap, the notional amounts that are denominated in two different currencies are swapped at the beginning of the contract, but this involves only a normal exchange with some profit or gain. There are no pricing or valuing difficulties at the time of initial exchange for both the parties.

In a currency swap the payments are either fixed or floating. It is the same with a company issuing bond, expressed in one currency and purchasing it in a different currency. When these two amounts are transformed at the current spot exchange rate, the assets and liabilities of both the firms will be the same.

The pricing of a currency swap is similar to the pricing of an interest rate swap, that is, the present value of receipt and payments have been ought to be zero at the time of origination of the contract. In a currency swap, the notional amounts are also exchanged at the time of maturity of the contract; this amount is included in the valuation of currency swaps. The present, values are computed in any one currency and the relationship between two present values is the spot rate at origination.

Pricing a Fixed -floating Currency Swap

To value a fixed -to-floating currency swap, we must determine a fixed rate that makes the present value of floating cash flows, equal to that of P.Vs of fixed cash flows. The forward floating cash flows are predicted as future prices that the swap market maker will be paying or receiving at the time of managing and protecting the risk, by entering in a foreign exchange contract or a futures contract.

Q23. Explain how an currency swaps is valued after origination.

Ans :

Consider that at origination a plain vanilla currency swap, in which fixed U.S dollars are exchanged for fluctuating ¥, is currently priced at 6.54%. The maturity period is 3 years, the principal amount is $1 million, payments are made semiannually and the spot exchange rate is $ 0.50/¥.

After an year of swap's contract origination, the 2 year fixed U.S $ for variable ¥ swaps are priced at 7.74%, i.e., (the fixed U.S interest rate). The swaps U.S interest rates after origination of swap contract are,

Maturity Period	Interest Rate (%)
0.50	8.25
1.00	8.20
1.50	8.00
2.00	7.90

As interest rates are available only for the U.S $ and no interest rates are provided for ¥ (Japan), we can determine the present value of the left out fixed U.S dollar payments of the existing swap and then relate it with the present value of fixed U.S dollar payments on a freshly originated swap. Thus, the difference between these two present values gives the value of the swap.

Q24. Discuss about pricing and valuing of equity swaps.

Ans :

Equity swaps includes exchange of many payments which are ascertained through return on stock or stock index for the receipts depending fixed rate return, floating rate return or return on other stock/index. Usually, equity swap are designed in the way that matches with returns that could be earned from purchase of stock by selling other stock or borrowing at a fixed rate or borrowing at a floating rate.

Equity Swap helps in avoiding risk on stock or index from portfolio and facilitates investors by preventing transaction cost incurred for creating equity portfolios in a market. It also helps the investors to form a synthetic portfolio which can match with return on index or stock without any portfolio asset in real.

Equity swaps are same as interest rate swaps but also have some differences. Equity swaps depends on notional principal amount which is not exchanged between swap counterparties. The notional principal amount is utilized to calculate swap payments and receipts during swap period at specific time intervals. In both the types of swaps cash is exchanged through netting where in due amounts is transferred from one firm to another.

In over the counter markets, there are many types of equity swaps such as swap of index return for fixed income, swap of index return for another index return and swap of index return for floating return.

Datermining the Fixed - Percentage Swap Rate

The pricing of equity swap is same as interest rate swap pricing which ascertain fixed rate and leads to no-arbitrage situation in the market. In this present value of cash flows are balanced with payment and receipt relating to swap. The present value of the payments and receipts for a fixed percentage swap can be represented as,

Where,

$$P \times \sum_{t=1}^{T} \frac{C_t}{1+r_t} = P \times fx \sum_{t=1}^{T} \frac{C_t}{(1+r_t)}$$

$$fx = \frac{\sum_{t=1}^{T} \frac{C_t}{(1+r_t)}}{\sum_{t=1}^{T} \frac{1}{(1+r_t)}}$$

Where,

C_t = Cash flows

r_t = Discount rate

fx = Swap rate

Q25. Explain briefly about pricing and valuing of commodity swap.

Ans : **(Imp.)**

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

Commodity swaps are characterized by some distinctive peculiarities, though, these include the following factors which should be given due consideration:

1. The cost of hedging,
2. The institutional structure of the particular commodity market in question,
3. The liquidity of the underlying commodity market,
4. Seasonality and its effects on the underlying commodity market,
5. The variability of the futures bid/offer spread,
6. Brokerage fees,
7. Credit risk, capital costs and administrative costs.

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

PROBLEMS

6. Assuming the necessary data show the computations to value the foreign currency swap of `100 crore for a period of three years, with semiannual cash flows.

Sol :

Valuation of Foreign Currency Swap

Notional amount = `100 crores

Swap tenor = 3 years

Interest payments = Semiannual

Suppose that at origination of a swaps contract, a fixed-floating currency swap in which fixed Indian rupees are swapped for floating U.S dollars is priced at 5% (India fixed interest rate). The spot exchange rate is Rs. 47.38/$ U.S.

Two years fixed rupees for floating U.S. dollars are being quoted at 8% (fixed Indias interest rate) and one year after spot India interest rates and U.S interest rates are as follows,

Year to Maturity	U.S Interest Rates	Indian Interest Rates
0.50	6.00 %	5 %
1.00	7.00 %	5.5 %
1.50	8.00 %	5.3 %
2.00	9.00 %	6.00 %

Computation to value foreign currency swap of Rs. 100 crore, we need to compare the present value of the rupees interest rates of the existing swap and compare to the present value of U.S $ interest rate.

$$= \frac{(0.05/2)(Rs.100,000,000)}{(1.05)^{0.5}} + \frac{(0.05/2)(Rs.100,000,000)}{(1.055)}$$

$$+ \frac{(0.05/2)(\text{Rs.}\,100,000,000)}{(1.053)^{1.5}} + \frac{(0.05/2)(\text{Rs.}\,100,000,000)}{(1.06)^2}$$

$$+ \frac{100,000,000}{(1.06)^2}$$

= 2,439,750.812 + 2,369,668.246 + 2,313,648.885

+ 2224991.1 + 88,999,644.

= 98,347,702.41.

The second series of cash flow is the present value of the fixed U.S dollar payment.

$$= \frac{(0.08/2)(\$100,000,000)}{(1.08)^{1.5}} + \frac{(0.08/2)(\$100,000,000)}{(1.06)}$$

$$+ \frac{(0.08/2)(\$100,000,000)}{(1.08)^{1.5}} + \frac{(0.08/2)(\$100,000,000)}{(1.08)^2}$$

$$+ \frac{(\$100,000,000)}{(1.08)^2}$$

= 3,885,143.449 + 3,773, 584,906 + 3,563,890.551 + 3,429,355.281

+ 85,733,882.03

= 100,385,856.2

The value of the foreign currency swap is the difference between the two present values of Rs. and $.

i.e., 100,385,856.2 – 98,347,702.41

= ` 2,038,153.79

Thus, the value of the swap for paying fixed party dealing in foreign currency swap is Rs. 2,038,153.79. The pay-fixed party of the existing swap will be paying the cash flows at P.V of only Rs. 98,3457,702.41, when the other party requires the payment totalling Rs. 100,385,856.2.

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7. Bhakti Ltd and Sita Ltd have to borrow Rs. 50 lakhs each. The required interest rates are as follows,

	Fixed Rate	Floating Rate
Bhakti Ltd	**14.0%**	**LIBOR + 0.2%**
Sita Ltd	**15.3%**	**LIBOR + 0.5%**

Bhakti Ltd is interested to borrow at a floating rate while Sita Ltd is willing to borrow at a fixed rate obligations. You are required to design an appropriate swap. The swap dealer must get a commission of 0.1% and profit needs to be shared equally by 2 companies.

Sol :

Bhakti Ltd has a benefit over Sita Ltd under fixed rate and also at floating rate, but it has substantially more advantage in fixed rate (1.3%) as against 0.3%. The net profit that can be obtained by a swap is 1.3% - 0.3%, i.e., 1.00%.

Out of this profit of 1%, 0.1% is payable to the swap dealer. The left over gain 0.009 may be shared equally (0.0045 or 0.45%) by Bhakti and Sita Ltd. The swap arrangement would be,

	Interest	Swap Inflow	Swap Outflow	Net
Bhakti	14.0%	14.45	LIBOR + 0.1%	LIBOR-035%
Sita	LIBOR + 0.5%	LIBOR + 0.1%	14.55%	?
Dealer	-	14.45	14.55	0.1%
		LIBOR+ 1%	LIBOR + 0.1%	-

8. Firm A is a US based multinational firm whereas Firm B is a France-based multinational firm. Both companies till now have borrowed exclusively from their base countries. Now both need to raise capital for their new ventures. Due to scarcity, Firm A can issue five-year US$ bond at 7.5% and five-year French franc (FFc) bond in French market at 11% fixed. Firm B can issue five-year US$ bond in US market at 7% and five-year FFc bond in French market at 12%. Firm A requires US$100 million whereas Firm B needs FFc 550 million. Current exchange rate is FFc 5.5 = US$1.

(a) What kind of swap can Firm A and B enter into?

(b) What will be the total cost and saving for each party ?

Sol :

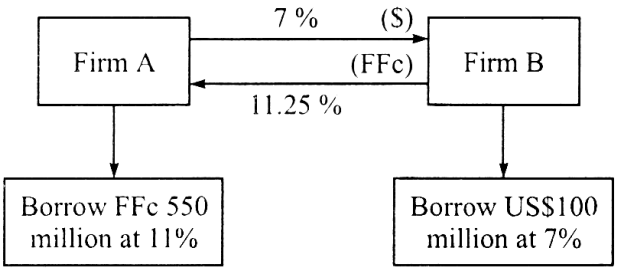
Firm A and firm B can enter into currency swap. In the US$ market, Firm B has 0.5% interest rate advantage over Firm A while in FFc market, Firm A has 1 % interest rate advantage over Firm B. Thus, it is possible for A and B to engage in mutually beneficially trade.

Firm A borrows 550 million francs at 11%.

Firm B borrows $100 million at 7%.

Firm A lends FFc 550 million to Firm B, charging 11.25%.

Firm B lends US$100 million to Firm A, charging 7%.



Net cost to Firm A = 11 % + 7% –11.25% = 6.75%

Net cost to Firm B = 7% + 11.25% – 7% = 11.25%

Saving to Firm A = 0.75%(7.50 – 6.75)

Saving to Firm B = 0.75%(12.00 – 11.25)

Total Savings = 1.5%

9. Companies A and B have been offered the following rate per annum on a $20 million five-year loan:

	Fixed rate	Floating rate
Company A	**12%**	**LIBOR + 0.1%**
Company B	**13.4%**	**LIBOR + 0.6%**

Company A requires a floating rate loan, Company B requires a fixed rate loan. Design a swap that will not a bank acting as intermediary 0.1% per annum and be equally attractive to both companies.

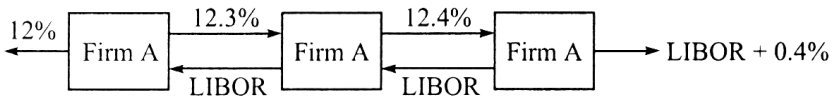
Sol :

A has a comparative advantages in fixed rate markets buf wants to borrow floating, B has a comparative advantage in floating rate markets but wants to borrow fixed. There is a 1.4% per annum differential between the fixed rates offered to the two companies and a 0.5% per annum differential between the floating rate offered to the two companies. Total gain to all parties from the swap is, therefore, 1.4 – 0.5 = 0.9% per annum. Since bank gets 0.1 %, the swap should make each of A and B 0.4% per annum better off.

So A borrowing cost = LIBOR - 0.3

and B borrowing cost = 13%

As shown in following diagram



10. Company X and Y both wish to borrow Rs 10 crore for 5 years. Company Y wants to arrange a floating rate loan. The rate of interest is six-month LIBOR. Company Y wants to arrange a fixed rate loan. They have been offered the following terms:

	Fixed rate	Floating rate
Company X	**10.0%**	**Six-month LIBOR+ 0.3%**
Company Y	**11.2%**	**Six-month LIBOR + 1.0%**

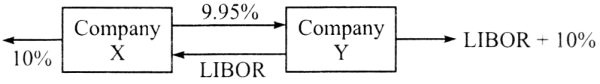
Show the transaction without intermediary and with intermediary.

Sol :

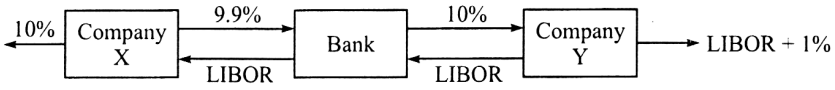
Company X borrows fixed rate funds at 10% per annum.

1. Company Y borrow floating rate funds at LIBOR + 1.0% per annum.
2. They enter in a swap agreement.

Swap with no intermediary



Swap with no intermediary

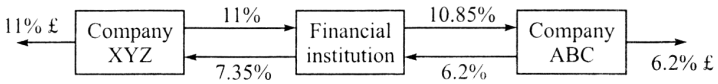


11. Company XYZ, a British manufacturer, wished to borrow US dollar at fixed rate of interest. Company ABC, a US MC, wished to borrow sterling at fixed rate of interest. The rates are as follows:

	Sterling	US Dollars
Company XYZ	**11%**	**7.50%**
Company ABC	**10.6%**	**6.2%**

Design a swap that will have a bank, acting as intermediary, 10 basis points per annum and which will produce a gain of 15 basis point per annum for each of the two companies.

Sol :



Swap structure with the help of bank

Swap structure with the help of bank

12. Sun Pharmaceutical Ltd. wishes to borrow Rs 20 crore at a fixed rate for 5 years and has been offered either 11% fixed or six-month LIBOR + l%.CIPLA Ltd. wishes to borrow Rs 20 crore at a floating rate for 5 years and has been offered either six-month LIBOR + 0.5% or 10% fixed. On the basis of above figure:

(a) How may they enter into swap arrangement in which each benefits equally?

(b) What risk may this arrangement generate?

Sol :

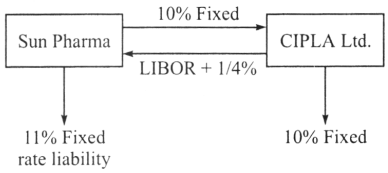
(a) By directly borrowing on the required basis, the total interest paid by Sun Pharma and CIPLAis: Rs 20 crore × (11 + LIBOR + 0.5%)

By borrowing according to comparative advantage, total interest paid:

Rs 20 crore × (10 + LIBOR + 1%)

Borrowing according to comparative advantage provides a total saving of Rs 20 crore x Vi% to be shared between Sun Pharma and CIPLA Ltd. Both have a '4% reduction in interest charge.

Swap transaction



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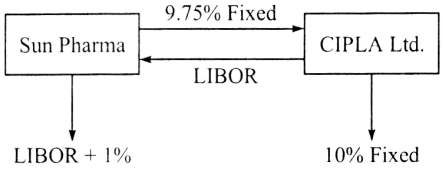

(b) CIPLA Lid at risk from LIBOR rising is at risk from an opportunity loss in event Sun Pharma of fall in LIBOR. Both are at risk from default by the other.

13. Company ABC and XYZ face the following rates.

	ABC	XYZ
US Dollar (Floating rate)	**LIBOR + 0.5%**	**LIBOR + 1.5%**
Japanese Yen (Fixed rate)	**6.0%**	**7.5%**

Assume that ABC want to borrow dollars at floating rate and XYZ wants to borrow Japanese Yen at fixed rate. A financial institution is planning to arrange a swap and requires a 75 basis points spread.

If the swap is equally attractive to ABC and XYZ, what rates of interest ABC and XYZ end up paying.

Sol : **(May-17)**

The value of swap is given by

$V = SBF - BD$

$B_D = 0.8\, e^{-0.06} + 0.8\, e^{-0.06 \times 2} + 10.6\, e^{-0.06 \times 3}$

$B_F = 0.75\, e^{0.09} + 0.75\, e^{-0.09 \times 2}$

14. The swap interest rates are flat in both Japan and the U.S. The Japanese rate is 4% p.a. and the U.S. rate is 9% p.a. A financial institution has entered into a currency swap in which it receives 5% p.a. in a year and pays 85 p.a. in dollars once a year. The principles in the two countries are $ 10 million and 1200 million yen. The swap will last for another 3 years and the current exchange rate is 110 Yen = $1. What is the value of swap in dollars ?

Sol : **(May-16)**

The value of swap is given by

$V = SBF - BD$

$$B_D = 0.8.e^{-0.09} + 0.8\ e^{-0.09\times 2} + 10.8e^{-0.09\times 3}$$

$$= 9.64 \text{ millions}$$

$$B_F = 60.e^{-0.04} + 60.e^{-0.04\ \times\ 2} + 1260\ e^{-0.04\times 3}$$

$$= 1230.55 \text{ millions}$$

$$V = \frac{1230.55}{110} - 9.64 = 1.55 \text{ millions}$$

If the bank is paying yen and receiving the US $, the value of swap would have been 1.55 millions.

Exercise Problems

1. Suppose that the spot (zero) interest rates with continuous compounding are as follows:

Maturity (Years)	Rate (96 per annum)
1	12.00
2	13.00
3	13.70
4	14.20
5	14.50

Calculate forward interest rates for the second, third, fourth and fifth year.

[**Ans :** 2nd year- 14%, 3rd year-14.9%, 4th year-15.7%, 5th year-17.7%.]

2. PK Bank has funded a one year US$ 10 million floating rate loan on 6-month 'LIBOR +' basis. Expecting a decline in LIBOR, the PK Bank is planning to sell 6-12 FRA which is being quoted at 2.60 - 2.70 percent. If the actual LIBOR settles at 2.45 pc on the settlement date, find the present value of compensation to be received by PK Bank.

[**Ans :** $7059.]

3. CAN Bank has funded a one year ? 50 crores floating rate loan on 6-month 'MIBOR+' basis. Expecting a decline in MIBOR, the CAN Bank is seeking protection by selling 6-12 FRA which is being quoted at 5.40-5.50 percent. If actual MIBOR settles at 5.28 percent on the settlement date, find the present value of compensation to be received by CAN Bank.

[**Ans :** ` 2,99,050.]

4. Suppose that, under the terms of a swap, a company has agreed to receive six-month MIBOR and pay 8.4 percent per annum (with semi-annual compounding) on a notional principal of *X* 100 million. The swap has remaining life of 1.25 years. Zero rates for 3-month, 9-month and 1.25 year maturities are 8.0%, 8.5% and 9.0% respectively. The 6-month MIBOR rate at the last payment was 6.5%(with semi-annual compounding). Determine the value of interest-rate swap.

[**Ans :** ` 35,300 or 0.0353.]

5. A$100 million interest rate swap has a remaining life of 10 months. Under the terms of the swap, 6-month LIBOR is exchanged for 7% per annum (compounded semiannually). The average of the bid-offer rate being exchanged for 6-month LIBOR in swaps of all maturities is currently 5% per annum with continuous compounding. The 6-month LIBOR rate was 4.6% per annum 2 months ago. What is the current value of the swap to the party paying floating? What is its value to the party paying fixed?

[**Ans :** Value of swap to party paying floating = $ 2.109 million Value of swap to party paying fixed = - $ 2.109 million.]

Short Question and Answers

1. What is Interest Rate Swap ?

Ans :

In interest rate swaps, the counter parties exchanges only the amount of interest payments on the principal loan amount. The interest payment is not mutual, it is paid by one party to the other party. In most of the interest rate swaps the floating interest rate that affects the floating rate of payment is set one year before the payment date. The amount of net payment is made one period after the inception of swaps contract or swap's origination date.

2. What do you understand by swap?

Ans :

Meaning

A swap is a contract or an agreement between two parties to exchange future cash flows. In swap, one party gives concept to exchange his set of agreed cash flows with the predetermined set of cash flows to the other party. The parties in a swaps contract that agree to exchange flows are termed as counter parties of the swaps. The rate of cash flows that has to be exchanged are determined on the basis of interest rates, exchange rates or the value of stocks or commodities. The amount swapped between the two parties is termed as "notional principal" of the swap.

The cash flows are swapped by a swap dealer who is one of the party to the contract is also called as market maker or swap facilitator. A swap agreement consist of date on which cash flows have to be exchanged and the way in which their value is determined or calculated. To determine the total amount of swap rate the exchange rates and the future interest rates are taken into consideration.

Definition

A swap is a unique kind of a financial transaction which includes concurrent purchase and sale of,

(a) An underlying asset of similar kind.

(b) Obligation of equal capital amount, where the financial exchange system gives both the parties flexibility and transparency in dealing with each other.

(c) The amount is swapped for a certain number of times for a given period of time.

3. Explain the features of swaps.

Ans :

(i) Counter parties

All swaps involve the exchange of a series of periodic payments between at least two parties. For example, a firm having a loan of ten million dollar payable at ten percent fixed coupon rate for five years, wants to exchange for a floating interest rate with that party who is also interested to exchange its liability from floating to fixed. It means, for a swap agreement, there must be two parties who are ready to exchange their liabilities with each other.

(ii) Facilitators

The amount of cash flow exchange between parties are huge and also the process is complex. Therefore, to facilitate the transaction, an intermediary comes into picture which brings different parties together for big deal.

These may be brokers whose objective is to initiate the counter parties to finalize the swap deal. While swap dealers are themselves counter partied who bear risk and provide portfolio management service.

(iii) Cashflows

The present values of future cash flows are estimated by the counterparties before entering into a contract. Both the parties want to get assurance of exchanging same financial liabilities before the swap deal.

(iv) Less documentation is required in case of swap deals because the deals are based on the needs of parties, therefore, less complex and less risk consuming.

4. Explain the advantages and limitations of currency swap.

Ans :

Advantages

1. The main advantage of using a currency swap is to lower the risk given by currency pairs moving too aggressively in a specific direction

2. These operations are also called cross-currency swaps and they deal with the exchange of interest in one currency for the same in another currency, and it is supposed to be a foreign exchange transaction. Together with other hedging strategies, currency swaps are main trading tools especially in the B-booking activities when the broker is taking the opposite side of their customer's trades.

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4. Another advantage of currency swaps is that they can be done in multiple ways. If the amount that is being exchanged is fully exchanged when the transaction is initiated, at the maturity date the exchange is being reversed

5. These maturity dates are very flexible, stretching for a long period, several years in most of the cases, and are negotiable

Limitations

1. At first, they were agreements to get around exchange controls, but then after these barriers were eliminated, they are being used mainly to hedge investments.

2. The risk when using a currency swap is that at the time the maturity is being reached, the floating interest rate would represent a bigger cost than the whole purpose of the swap

5. What are the features of Interest Rate Swap?

Ans :

The key features of interest rate swaps are stated as follows:

(i) Notional principal

In the interest rate swap agreement, the interest amount whether fixed or floating is calculated on a specified amount borrowed or lent. It is notional because the parties do not exchange this amount at any time. Normally, it remains constant throughout the life of the swap. It is used to compute the sequence of the payment of cash flows.

(ii) Fixed rate

This is the rate, which is used to calculate the size of the fixed payment. Banks or the other financial institutions who make market in interest rate swaps quote the fixed rate, they are willing to pay if they are fixed rate payers in a swap (bid swap rates), they are willing to receive if they are floating rate payers in a swap (ask swap rate). For example, a bank might quote a US dollar floating to fixed 5-year swap rate:

6. Define the term LIBOR.

Ans :

Meaning

LIBOR stands for London Inter Bank Offered Rate. LIBOR is the benchmark/reference for average interest rates – used by the A-Grade banks as "Offer" for lending their funds to the A-Grade banks as unsecured loans in marketable lot in London based interbank transactions.

- LIBOR rates used to be published since 1986 for the then three main currencies of the world, namely United States Dollar (USD), Great Britain Pound (GBP) and Japanese Yen (JPY) for four different maturity periods of one month, three months, six months and one year.
- After the merger of currencies of the European nations into Euro, on January 01, 1999, LIBOR rates started to be published for 10 major currencies of the world and for 15 different maturity periods ranging from overnight to 1 week, 2 weeks, and 12 different months. These 10 (Currencies) x 15 (Different Time Periods) = 150 rates used to be published daily at 11.30 A.M. London Time i.e. 5.00 P.M. (Indian Standard Time).
- The ten constituent currencies of LIBOR used to be USD, GBP, Euro, Swiss Franc, Canadian Dollar, JPY, Danish Krone, Swedish Krona, Australian Dollar and New Zealand Dollar. LIBOR used to be calculated and published by Thomas Reuters on behalf of British Bankers' Association.

7. Define the term MIBOR.

Ans :

Meaning

MIBOR stands for Mumbai Interbank Offer Rate, the yardstick of the Indian call money market. It is the rate at which banks borrow unsecured funds from one another in the interbank market. At present, it is used as a reference rate for floating rate notes, corporate debentures, term deposits, interest rate swaps and forward rate agreements. The pricing of overnight indexed swaps, a type of overnight interest rate swap used for hedging interest rate risk is based on overnight MIBOR.

Based on the recommendation of the Committee for the Development of Debt Market, the National Stock Exchange (NSE) launched the Mumbai Interbank Offer Rate (MIBOR) and Mumbai Interbank Bid Rate (MIBID) in June, 1998. Subsequently, the NSE developed a benchmark rate for the term money market, like the 14-day, 1-month and 3-month MIBOR. The same was rechristened as FIMMDA-NSE MIBID/MIBOR rate in due course. The rate is computed by polling a representative panel of 30 banks and primary dealers and summarising the quotes that they provided. The next step involves identifying and isolating the noise by eliminating extreme values of the reference rates.

8. Define Commodity Swap.

Ans :

Commodity swap is a swap, where exchanged cash flows are dependent on the price of an underlying commodity. This is usually used to hedge against the price of a commodity. A commodity swap is an agreement whereby a floating (or market or spot) price is exchanged for a fixed price over a specified period.

In this swap, the user of a commodity would secure a maximum price and agree to pay a financial institution this fixed price. Then in return, the user would get payments based on the market price for the commodity involved. On the other side, a producer wishes to lix his income; find would agree to pay the market price to a financial institution, in return for receiving fixed payments for the commodity.

In commodity swaps, the cash flows to be exchanged are linked to commodity prices. Commodities are physical assets such as metals, energy and agriculture. For example, in a commodity swap, a party may agree to exchange cash flows linked to prices of oil for a fixed cash flow.

Commodity swaps are used for hedging against fluctuations in commodity prices or fluctuations in spreads between final product and raw material prices, e.g., cracking spread which indicates the spread between crude prices and refined product prices significantly affects the margins of oil refineries.

9. Explain how an Interest rates swaps is valued after origination.

Ans :

Following are the importance of valuing swaps after origination,

1. To understand the current financial position of the firms.
2. To find the default risk that can arise in future and if the firm employs swap as its asset, then they will become more worried about the risk associated with the counter parties.
3. As most of the swaps are priced at market rates, it becomes necessary to value swaps after origination.

There are two methods for valuing an interest rate swap after origination.

Method 1

Identify the present value of the left over fixed cash payments and the present value of the left over expected floating receipts.

Method 2

In the second method, the swap market-maker quotes a price at a fixed rate for a maturity period of three years, this price is set after a year of origination of swaps contract. This price is then exchanged for one year LIBOR. The amount of difference between face value of swaps fixed payments and the current fixed payments is equal to the original value of the swap.

10. Explain briefly about pricing and valuing of commodity swap.

Ans :

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

Commodity swaps are characterized by some distinctive peculiarities, though, these include the following factors which should be given due consideration:

1. The cost of hedging,
2. The institutional structure of the particular commodity market in question,
3. The liquidity of the underlying commodity market,

4. Seasonality and its effects on the underlying commodity market,

5. The variability of the futures bid/offer spread,

6. Brokerage fees,

7. Credit risk, capital costs and administrative costs.

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

Choose the Correct Answers

1. A back - to - back loan usually involves _____ companies in _____ different countries. [c]

   (a) Two, two (b) Four, four
   (c) Three, three (d) Both a and b

2. A currency swap bank is usually [b]

   (a) An end user (b) A financial intermediary
   (c) A currency speculator (d) Both a and b

3. A currency swap broker is a swap bank who [c]

   (a) Uses his or her own account in completing transactions
   (b) Is strictly an agent to take orders from her client
   (c) A currency speculator

4. An interest rate floor in currency swaps sets [c]

   (a) A maximum rate on floating interest rate payments
   (b) A maximum rate on fixed interest rate payments
   (c) A minimum rate on floating interest rate payments
   (d) A minimum rate on fixed interest rate payments

5. Call swaptions are attractive when interests are expected to [b]

   (a) Fall (b) Rise
   (c) Stay the same (d) A and B

6. Comparative advantages usually exist because [a]

   (a) Market imperfections
   (b) US banks may not have the same information as British banks have
   (c) Differences in risk
   (d) All of the above

7. Currency swaps involve [b]

   (a) One currency (b) Two currencies
   (c) Foreign stocks (d) B and C

8. Currency swaps overcome the shortcomings of parallel and back -to- back loans because of [a]

   (a) Specialized swap dealers and brokers
   (b) Their simplicity
   (c) Their cost effectiveness
   (d) A and B

9. Financial swap markets have emerged in recent years because of the following reasons [d]
   (a) Exchange rates fluctuate widely
   (b) Interest rates fluctuate widely
   (c) Forward markets may not function properly
   (d) All of the above

10. Financial swaps are used by the following organizations [d]
   (a) Multinational companies (b) Commercial banks
   (c) World organizations (d) All of the above

11. Interest rate swaps are usually possible because international financial markets in different countries are [c]
   (a) Efficient (b) Perfect
   (c) Imperfect (d) Both a and b

12. Interest rate swaps involve counterparties who want to [a]
   (a) Exchange a floating rate commitment for a fixed rate loan
   (b) Exchange debt for stock
   (c) Exchange a short term loan for a long - term loan
   (d) Both a and b

13. Mortgage companies may use interest rate swaps mainly because [a]
   (a) They have short-term liabilities and long -term assets
   (b) They have long-term debt
   (c) They have mortgage loans
   (d) Both a and b

14. Parallel and back to back loans attained prominence in the 1970s when [c]
   (a) The U.S. had trade deficits
   (b) Japan had trade surpluses
   (c) The British Government imposed taxes on foreign currency transactions
   (d) The British government devalued its currency

15. Proper risk management involves a three-stage process. Which of the following is one of those stages [a]
   (a) Identify where the risks lie
   (b) Select the right tools to execute the strategy
   (c) Design an appropriate strategy for managing risks
   (d) All of the above

16. The amount of outstanding interest rate swap is _____ than that of outstanding currency swaps [c]

(a) Smaller (b) Neither larger nor smaller

(c) Large (d) Two times larger

17. The basic motivations for swaps are shown below [d]

(a) To provide protection against future changes in exchange rates

(b) To Eliminate interest rate risks arising from normal commercial operations

(c) To reduce financing costs

(d) All of the above

18. The first currency swap between the World Bank and IBM was arranged in 1981 by [c]

(a) Citicorp (b) Bank America

(c) Solomon Brothers (d) Merrill Lynch

19. The origins of the swap market are usually regarded as an outgrowth of the following financial instruments [d]

(a) Parallel loans (b) Back to back loans

(c) Commercial paper (d) Both a and b

20. The shortcomings of parallel and back to back loans are [d]

(a) Difficulty of finding counterparties

(b) A non-compliance by one of the parties

(c) Difficulty of finding exact matching needs

(d) All of the above

Fill in the blanks

1. A _____ is a contract or an agreement between two parties to exchange future cash flows.
2. The cash flows are swapped by a swap dealer who is one of the party to the contract is also called as _____ .
3. An _____ generally involves one set of payments determined by the Eurodollar (LIBOR) rate.
4. A _____ swap is an agreement between two parties in which one party promises to make payments in one currency and the other promises to make payments in another currency.
5. The _____ exchange rate is applied to only one currency of exchange, instead of two currencies.
6. _____ Swaps is one of the basic interest rate swaps wherein one party makes interest payments on fixed rate basis and the other on a floating rate option.
7. The _____ provides the firm the right but not an obligation to step in a swaps contract to receive a fixed amount of payment up till some specified period.
8. LIBOR Stands for _____
9. MIBOR stands for _____
10. _____ to day, takes place. the most significant development in the global financing market.
11. The have created a major impact on the _____ .
12. The meaning word "Swap" or "swop" on the chambers' dictionary are to barte to give or _____.
13. A swap is a contract or an agreement between two parties to exchange futures _____ .
14. A swap _____ consists of date on which cash flows have to be exchange or determined to calculated.
15. A SWAP is an a _____ kind of a financial transaction which instruct concurrent purchase.
16. The dictionary meaning of swap is to _____ .
17. The first swap contract was negotiated in _____.
18. Want to exchange for a _____ rate with that party.
19. Swap transactions in comparison to _____ .

ANSWERS

1. Swap market
2. Corporate treasure
3. Exchange
4. Cash flow's

5. Agreement
6. Unique
7. Exchange something
8. 1981
9. Floating interest
10. Loan agreements
11. Swap
12. Market maker
13. Interest rate swap
14. Currency
15. Floating
16. Plain Vanilla
17. Swaption
18. London Inter Bank Offered Rate
19. Mumbai Interbank Offer Rate

UNIT V

STOCK INDEX FUTURES

Stock Index Futures: Concept of Stock Index - Stock Index Futures - Stock Index Futures as a Portfolio Management Tool – Speculation and Stock Index Futures - Stock Index - Futures Trading in Indian Stock Market (Including Problems)

5.1 Stock Index Futures

5.1.1 Concept of Stock Index

Q1. What do you understand by stock index?

(OR)

Define stock index. Explain the features of stock index.

OR)

What is stock index?

Ans : **(May-18)**

Introduction

Indices are an attempt to create order and direction out of diversity. Index numbers are used to capture the collective movement of many economic variables like price levels, wages, exchange rates and stock market. And stock market indices are not an exception - they are intended to pull together the incongruent movements of different share prices, each reacting to a multitude of individual pressures, to find out the direction of the market. Traditionally, stock indices are used to measure the change of direction and magnitude of the general stock market. These indices are also considered as benchmarks that are used to gauge the performance of a group of stocks.

In India, the popularly followed indices are Sensex and Nifty. Stock market indices may be classified in many ways. A broad-base index represents the performance of a whole stock market and by proxy, reflects investor sentiment on the state of the economy. Other classes of indices may track the performance of specific sectors of the market.

For example, BSE PSU Index a stock index that tracks the performance of the listed PSU stocks and CNX IT Sector *index* that focusses on IT companies' performance on the market. When the stock index value goes up, it means the stocks in the index are generally moving up. When the value drops, then the stocks are generally going down. These indices let us to see how the market is doing as a group. Sensex is an index based on the prices of thirty stocks while the Nifty index comprises fifty stocks. The sample size is determined in such a way that it should be a significant fraction of the population under study. A larger sample generally gives a clearer indication about where the underlying population is headed for, while a larger sample poses problems in maintenance. So, a trade-off is to be made in such a way that the number of scrips selected is a hetero-geneous mixture of elements representing all sections of the population. The constituents of an index are selected based on some broad criteria like market capitalization, liquidity, trading frequency, industry representation, track record, etc. However, these are only broad guidelines and each index compiler sets its own criteria.

Meaning

A stock index or stock market index is a portfolio consisting of a collection of different stocks. In others words, a stock index is just like a portfolio of different securities' proportions traded on a particular stock exchange like NIFTY S&P CNX traded on National Stock Exchange of India, the S&P 500 Index is composed of 500 common stocks, etc.

These indices provide summary measure of changes in the value of particular segments of the stock markets which is covered by the specific index. This means that a change in a particular index

reflects the change in the average value of the stocks included in that index. The number of stocks included in a particular index may depend upon its objective, and thus, the size varies index to index.

For example, the number of stocks included in SENSEX is 30 whereas 500 stocks are covered in Standard and Poor's 500.

Features

1. A stock index contains a specific number of stocks, i.e., specification of certain sector number of stocks like 30,50,100,200,500 and so on.
2. Selection of a base period on which index is based. Starting value of base of index is set to large round like 100,1000, etc.
3. The method or rule of selection of a stock for inclusion in the index to determine the value of the index.
4. There are several methods commonly used to combine the prices of individual stock like arithmetic average, weighted average, etc.
5. There are three types of index construction like price weighted index, return equally weighted index and market capitalization weighted index.
6. A stock index represents the change in the value of a set of stocks which constitute the index. Hence, it is a relative value expressed as weighted average of prices at a specific date.
7. The index should represent the market and be able to represent the returns obtained by a typical portfolio of that market.
8. A stock index acts as a barometer for market behaviour, a benchmark for portfolio performance. Further, it also reflects the changing expectations about the market.
9. The index components should be highly liquid, professionally maintained and accurately calculated. In the present section, we will not discuss the mechanism of construction of a stock index. However, it is beneficial to understand thoroughly the details of construction of an stock index particularly in which the investor is interested to trade. Because when the differences and inter-relationships among the indexes are understood, it will be easier to understand the differences among the futures contracts that are based on those indexes.

5.1.2 Stock Index Futures

Q2. What are the Stock Index Futures?

(OR)

Write a note on Stock Index Futures?

Ans : **(May-17, May-16,)**

Stock index future is an index derivative that draws its value from an underlying stock index like Nifty or Sensex. They were first pioneered by Kansas City Board of Trade on 24th February, 1982 and the contract is based on Value Line Composite Index. Subsequently, in April 1982, CME introduced trading in S & P 500 index futures and this was followed by New York Futures Exchange's contract on NYSE Composite Index. Though all the contracts were almost similar in design, S & P 500 index future became the most actively traded contract. Consequent up on their successful trading on the U.S. exchanges, many other exchanges worldwide launched equity index futures. Table lists some of the major stock index futures traded currently on various exchanges across the world.

Stock exchange	Index futures contract
Korea Stock Exchange	KOSP1 200
Chicago Mercantile Exchange	S & P 100
Chicago Board Of Trade	Major Market
Toronto Futures Exchange	TSE 300
Sydney Futures Exchange	All Ordinaries
Singapore Exchange Ltd.	Nikkei 225 index
Hong Kong Exchanges and Clearing Limited	Hang Seng
BM&F	Ibovespa
Osaka Securities Exchange	Nikkei 300
Kuala Lumpur Stock Exchange	KLSE Composite
New York Futures Exchange	NYSE Composite

Table : Major Stock Index Futures

A stock index futures contract gives the buyer (seller) the right and obligation to buy (sell) the portfolio of stocks represented by the index. Stock index futures contract is one type of contract that requires traders to settle it in cash, i.e., by taking an offsetting position. The reason for the non-existence of physical delivery is that it would be impractical for a trader to deliver all the stocks in exactly the same proportion as they make up the index. Therefore, operationally the stock index future contract is an agreement to pay or receive a fixed rupee amount times the difference between the index level when the position was initiated and at closure resulting gains and losses to be paid/received in cash.

5.2 STOCK INDEX FUTURES AS A PORTFOLIO MANAGEMENT TOOL

Q3. "Stock index futures are the derivative instruments which are used by large portfolio managers for hedging their risks". Explain the statement in the light of features of stock index futures.

(OR)

How do you value stock index futures? Explain.

(OR)

Explain how speculators and arbitrageotis can profitability use stock index futures.

Ans : **(May-17, May-16)**

Funds managers or money managers use stock index futures basically for three purposes; hedging, asset allocation and yield enhancement.

Stock index futures as a hedging tool

First of all, we should know who need the stock index futures for using them as a hedging tool. All such investors, specifically managing a huge pool of funds or public funds like pension funds, mutual funds, life insurance companies, investment and finance companies, banks, endowment funds, public provident funds, etc. would like to reduce their fund's exposure to a fall in stock values caused due to uncertainties about futures market developments. This can be done by selling the shares and repurchasing them at a later time, but this strategy is not so appropriate because it would incur substantial transaction costs. As a result, funds managers prefer to hedge with stock index futures instead of altering their portfolio structure, directly and repeatedly. Hedging is also done through stock index options.

Before proceeding to the discussion regarding hedging, one needs to understand some background on risks relating to stock investments and portfolio management. There are two types of risks associated with holding a security:

1. Systematic risk
2. Unsystematic risk

All the stocks are exposed to such factors which are not controlled by the firm itself, these are called market risk factors like changes in the interest rates, inflation rates, government trade policies, economic activities, political factors, changes in tax laws and so on. Such risk is termed as market risk or systematic risk. On the other hand, unsystematic or firm specific risk is related to the particular firm or an industry.

This risk can be diversified by having diversified portfolio of many shares. Market risk cannot be eliminated by diversification since each of the stock moves with the market to some degree. Thus, stock index futures can be used to hedge or manage this risk.

(i) Measuring market risk

Beta is a measure of the systematic risk. It measures the sensitivity of the scrip (asset) vis-a-vis index movements. Beta (β) is defined as the Covariance (Cov.) between a stock's return and the return on the overall market divided by the variance (var) of return on the market.

The formula of a beta (β) of a security (i) is as under :

$$\beta_i = \frac{Cov(R_i, R_m)}{Var(R_m)}$$

where R_m is return on market portfolio (or market return) and R_i is return on the security (i).

Stock betas can be estimated with the regression equation (also called linear regression line) as follows:

$$R_{i.t} = a + b \times R_{m.t} + - e_{i.t}$$

where R,, is observed returns over a period t for stock i, a is the constant return, b is the estimate of the beta of stocks, $e_{i\,t}$ is the usual error term and R_m is return on market portfolio (or market return).

A portfolio of stocks has its own beta. Individual betas are used to calculate the portfolio beta. It is weighted average of the betas of the individual scrips in the portfolio where weights are based on the proportion of investment of scrips in the portfolio. If the value of a beta is more than one, the stock is more volatile than the market, and if beta is less than one, then stock will be less volatile than the market. Further detail on this model can be studied from the CAPM and Sharpe Single Index Model.

(ii) The minimum-variance hedge ratio

Hedging that the hedger is to determine the appropriate hedge ratio (HR)—which is the ratio of the futures position to the cash position being hedged. We have seen that a benchmark ratio is the minimum-variance hedge ratio (HR) or the value of HR that can be expected to reduce the fluctuations in the total

portfolio to the minimum possible. In this section, we will discuss the determination of HR in the context of the 'stock index futures contracts'.

$$HR = \frac{\text{Value of hedged portfolio}}{\text{Price of the futures contract}} \times B_i$$

$$HR = \frac{\text{\% change in weighted average portfolio price}}{\text{\% change of future index}}$$

Example :

Value of BSE index = 3000

Value of portfolio = 6,08,000

Risk-free interest rate = 10 percent per annum

Dividend yield on index = 6 percent per annum

Beta of the portfolio = 1.5

We assume that a futures contract on the BSE index with four months to maturity is used to hedge the value of the portfolio over the next three months. Our futures contract is for delivery of Rs 50 times the index. Calculate the HR from the above information also calculate the gain on short futures position if index turns out to be 2700 in three months.

Sol :

Current futures price of the index

$$F_{t,T} = S_t + S_t(C_l - d_t)\frac{T-t}{365}$$

$$= \text{Rs } 3000 + \text{Rs } 3000\ (0.10 - 0.06)\ 4/12$$

$$= \text{Rs } 3000 + \text{Rs } 40 = \text{Rs } 3040$$

Price of the futures contract = Rs 50 × 3040 = Rs 1,52,000

Using Equation the HR or number of the futures contracts that should be shorted to hedge the portfolio is:

$$HR = \frac{6,08,000}{1,52,000} \times 1.5 = 6$$

Suppose the index turns out to be 2700 in three months. The futures price will be

$$= 2700 + 2700(0.10 - 0.06)\ 1/3$$

$$= 2700 + 36 = 2736$$

The gain from the short futures position is, therefore,

$$6 \times (3040 - 2736) \times 50 = \text{Rs } 91,200$$

In the example, the loss on index is 10 percent. The index pays a dividend of 6 percent per annum or 1.5 percent per three months. When dividend are taken into account, an investor in the index would cash. Therefore earn 9 percent in the three-month period. The risk free interest is approximately 2.5 percent per three months. Since the portfolio has β of 1.5, expected return of portfolio will be equal to:

$= \beta \times$ (Return on portfolio – Risk free interest rate)

$= 1.5 \times$ (Return on index – Risk free interest rate)

Using the formula, the expected return on the portfolio is:

$= 2.5 + [1.5x(9.0-2.5)]$

$= 2.5 + (-17.25) = 14.75\%$

The expected value of the portfolio (inclusive of dividends) at the end of the three months is, therefore,

Rs. 6,08,000 × (1 – 0.1475) = Rs. 5,18,320

It follows that the expected value of the hedger's position including the gain on the hedge is:

Rs. 5,18,320 + Rs 91,200 = Rs 6,09,520

Changing beta

Sometimes, the stock index futures contracts are used to change the beta of a portfolio to some value other than zero. In general to change the beta of the portfolio from β to β^* where $\beta > \beta^*$, a short position is

$$(\beta - \beta^*) = \left[\frac{\text{Value of hedged portfolio}}{\text{Price of the futures contract}}\right]$$

Rolling the hedged forward

Sometimes, it happens that the expiration date of the hedge is later than the delivery dates of all the futures contracts that can be used. In this situation, the hedger must then roll the hedge forward. In other words, it means that closing out one futures contract and taking the same position in a futures contract with a later delivery date. Hence, the hedge can be rolled forward many limes. Consider a company which intends to use a short hedge to reduce the risk associated with the price to be received for an asset at time T. Assume, if there are futures contracts 1,2,3,..., n (not all necessary in existence at the present time), the company can use the following strategy:

Time t_1 = Short futures contract 1

Time r_2 = Close out futures contract 1

= Short futures contract 2

Timer_3 = Close out futures contract 2

= Short futures contract 3

Time T_n = Close out futures contract *(n* – 1)

= Short futures contract n

Time *T* = Close out futures contract *n*

Example:

Suppose in April 2002 a company realize that it will have 1,00,000 barrels of oil to sell in June 2003 and it decides to hedge its risk with a hedge ratio of 1.0. The current spot price is $ 19. Futures contract are traded for every month of the year up to one year in future, we suppose that only the first six delivery months have suifficient liquidity to meet the company's needs. Company, therefore, shorts 100 October 2002 contract. In September, it rolls the hedge forward into March 2003 contract. In February 2003, it rolls the hedge forward again into the July 2003 contract. The contract size is 1000 barrels.

Company uses the following strategy to hedge the risk:

April 2002:	The company shorts 100 October 2002 contracts.
September 2002:	The company closes out the 100 October 2002 contracts.
	The company shorts 100 March 2003 contracts.
February 2003:	The company closes out the 100 March 2003 contracts.
	The company shorts 100 July 2003 contracts.
July 2003:	The company closes out the 100 July 2003 contracts.
	The company sells 1,00,000 barrels of oil.

It is evident from the above that when there is no liquid and futures contract which matures later than the expiration of the hedge, a strategy known as rolling the hedge forward may be followed. This involves entering into a sequence of futures contracts as shown above. Rolling the hedge will be appropriate if there is a close correlation between changes in the futures prices and the changes in spot prices.

Asset allocation by the funds managers

The term asset allocation refers to the distribution of portfolio assets among equity shares, bonds, debentures and other money market instruments. It means that how to divide funds among broad asset classes like 60 percent in equities and 40 percent in treasury bills is an asset allocation decision. Usually it does include changing of the assets from one equity to other equity asset rather concentrates on asset allocation from equity to debt or treasury bills and 'vice versa. Further asset allocation focuses on the macro level commitment of funds to various asset classes and the shifting of funds among these major asset classes.

It is often preferable to use stock index futures to change the portfolio mix, even though portfolio managers structure and restructure their portfolio by buying and selling the different assets using futures because it is cheaper. It has been noted that equity stock index and interest rate futures trading cost are less in comparison to the direct trading in stocks.

Let us see this with an example given in Table.

Table.Transaction Costs Associated with Stock Versus Stock Futures Index

Particulars	Stocks	Stock index futures
Average price per share/contract	$60	$35
Number of shares/units 2933*	500	
Market value of portfolio/contract	$1,76,000	$1,76,000
Round-trip commission per share/contract	$0.07	$15
Commission cost	$205.31	$15
Bid/ask spread costs	0.125	0.05 index point or
	index points/share	I tick per contract
	2933 × 0.125 = 366.33	500 × 0.05 = $25
Total transaction cost commission plus	$571.94	$40
bid/ask spread		

Yield enhancement

Yield enhancement refers to the portfolio strategies of holding a 'synthetic' stock index fund that is capable of earning higher return than a cash stock index fund. A portfolio consisting of a long position in stock index futures and treasury bills will produce the same return (with the same risk) structured as stock portfolio to mirror the stock index underlying the futures. However, a portfolio of stock index futures and treasury hills (synthetic stock) can be constructed to out perform the corresponding stock portfolio (higher return with the similar risk), if stock index futures are correctly priced or their actual value is higher or lower than their theoretical (fair) value. In this way, with the use of stock index futures, a yield enhancement strategy be followed to enhance the return on a portfolio.

5.3 Speculation and Stock Index Futures

Q4. Explain the how speculators can profitability use stock index futures.

Ans : **(Imp.)**

The basic objective of the speculators is to earn super profit by going either bullish or bearish in the market. Index futures permits them an ideal instrument where the vagaries of individual stocks, settlement cycles, etc. do not have so much of an impact as they do on specific stock. The speculators can select a strategy where they can have a bullish view and go long on futures. Similarly, they can have a bearish view and go short in futures.

Earlier before the stock index futures came into existence, the speculators had two alternatives. Firstly, they can select the liquid stocks which would move with the index so that they can take a position in them for the expected move. But this move would be too risky. Secondly, they can select the entire stocks as in the index and trade in all of them. The basic of liquid stocks may mimic the index to some extent but still individual stock variations will affect the returns, and moreover, it is too costly with high amount of commission, etc. But now with the introduction of stock index futures, such limitations mentioned are taken care of. Now the speculators can take up either long position on the contract, paying a small margin, and seek to ride the expected trend and vice-versa for the bearish view-sell short index contract and cover when the index falls lower.

5.4 Stock Index Futures Trading in Indian Stock Market

Q5. List out various stock index traded on various stock exchanges world wide with their specifications.

Ans : **(Imp.)**

SEBI Board accepted the recommendations of Dr. L.C. Gupta Committee on May 11, 1998 and approved introduction of derivatives trading in India in the phased manner. The recommendation sequence was stock index futures, index options and options on stocks. The Board also approved the suggestive bye-laws recommended by the Committee for regulation and control of derivatives trading in India. As a result, both the stock exchanges, National Stock Exchange of India (NSE) and Bombay Stock Exchange of India (BSE) took the initiative to introduce futures trading in India. The brief particulars of their products are given here as under

(i) NSE's N FUTIDX NIFTY (NIFTY)

The National Stock Exchange of India introduced futures named 'NIFTY' on June 12,2000. The salient features of this instrument are:

1. Name of the instrument is N FUTIDX NIFTY.

2. The underlying index S&P CNX NIFTY (NSE 500).

3. **Contract size:** The index futures will be quoted as per the underlying asset which means that it will quote just like the Nifty in points. The value of the contract (contract size), a multiplier of 200 is applied to the index. It means that the value of a contract will be (Rs 200x index value) on that particular date. The multiplier can be thought of as the market lot for the futures contract. This can be changed from time to time.

4. **NSE** has introduced three contracts for one month, two months and three months maturities. These contracts of different maturities may be called near month (one month), middle month (two months) and far month (three months) contracts. The month in which the contract will expire is called the contract month, for example, contract month of April 2003 contract will be April, 2003.

5. **Expiry:** Each contract would have a specific code for representation purpose on the system. All these contracts will expire on a specific day of the month and currently they are fixed for the last Thursday of the month. As soon as the near month contract expires, middle contract will become near and so on.

6. **Tick size/price step.** Tick size is the minimum difference between two quotes of similar nature. Since the index futures would be traded in term of index points, the tick size is to be defined in points only. The Nifty tick size is Rs 0.05 which will be converted into points.

7. **Position limits:** Present, both types of contracts as for speculation and hedging purposes are allowed to be traded. However, these are subject to change from time to time.

8. **Trading hours:** Trading hours are 10.30 a.m. to 3.30 p.m.

9. Margins: NSE fixes the minimum margin requirements and price limits on daily basis which are subject to change periodically.

10. Settlement: Position remaining open at the close of business on the last day of trading are marked-to-market according to the official opening level of the NSE-NIFTY on the following day. There is daily settlement also on the closing of futures contract.

11. Volumes and open interest: Futures contracts have a unique way of reporting volumes and it is called open interest. It provides the information about the number of outstanding/unsettled positions in the market as a whole at a specific point of time. In the futures market, total long positions would be equal to the total short positions, hence, only one side of the contracts are counted for determining the open interest position. Major stock exchanges of the world publish the open interest position regularly.

(ii) BSE's BSX

The Bombay Stock Exchange introduced stock index futures trading on June 9,2000 with the name of the instrument as BSX with the underlying BSE Sensitive Index (SENSEX). The features regarding its trading are more or less same with the NSE's NIFTY index futures. A few important features are given in brief here as under:

1. Date of start	June 9,2000
2. Security name	BSX
3. Underlying security	BSE Sensitive Index (SENSEX)
4. Contract size	Sensex value × 50
5. Tick size	0.1 point of Sensex (equivalent to Rs 5)
6. Minimum price fluctuation	Rs 5
7. Price band	Not applicable
8. Expiration months	Three months
9. Trading cycle	A maximum of three months, the near month, next month and far month.
10. Last trading day/Expiry day	Last Thursday of the month or the preceding trading day.
11. Settlement	In cash on T + 1 basis.
12. Final settlement	Index closing price on the last trading days
13. Daily settlement price	Closing of futures contract price
14. Trading hours	9.30 a.m. to 3.30 p.m.
15. Margin	Up front margin on daily basis y

PROBLEMS

1. An investor has a portfolio consisting of shares given as follows:

	No. of shares	Share price (£)	Share beta (β)
Bank of conventry	**20,000**	**350**	**0.9**
Conventry motors	**30,000**	**100**	**1.5**
Numeration manufacturing	**10,000**	**500**	**1.3**
Cheyles more stores	**20,000**	**300**	**0.8**

On 15 March and April FTSE futures price is 3000.

(a) How can an investor hedge two portfolio with futures?

(b) What factors might reduce the effectiveness of the measures taken in (a)?

Sol :

(a) Calculation of market exposure of portfolio:

No. of shares (1)	Share price (£) (2)	Share beta(β) Market exposure(£) (3) = 2 × 3
20,000 × 350 P	0.9	6.3 million
30,000 × 100 P	1.5	4.5 million
10,000 × 500 P	1.3	6.5 million
20,000 × 300 P	0.8	4.8 million
Total market exposure		£ 22.1 million

The market exposure provided by one contract (futures) is:

$$3000 \times £\ 25 = £\ 75{,}000$$

Hedging the portfolio with futures would be value selling:

$$\frac{£221,0000}{£75,000} = 2.946 \text{ contracts}$$

Since futures contracts are indivisible, this would indicate three contracts,

(b) Factors that could reduce hedge effectiveness include basis risk, the indivisibility of beta and presence of firm or sector, specific risk (i.e. non-systematic risk).

2. A fund manager anticipates the receipt of $1 million on January 10 and intends to use it to buy a balanced portfolio of UK equities. He fears, one month earlier that stock price will rise before the money is received. Current FTSE-100 futures contract is at a price of 2200. The new FTSE 100 index is at 2300, show how index futures can be used to hedge the price increase risk?

Sol :

Cash (Spot market)	Futures market
December 10	**December 10**
Anticipates receipt of $1 million on January 10. Current FTSE 100 index is 2200, fears a rise in the index.	Buy March 18 FTSE futures contract at a price of 2200. He thereby notionally commits him self to paying $ 9,90,000. (18 x 2200 x $25)
March 18	**March 18**
The new FTSE 100 index is 2300.	Close out by selling March 18 FTSE futures contracts at a price of 2300. He notionally guarantees a receipt of 10,35,000 (18 × 2300 × $ 25) upon maturity of the contracts.
Requires an additional $45,455 in order to buy the quantity of stock that $1 million would have bought	Profit from futures by $45,000 on December 10.

3. Value of S & P 500 index = 200

Value of portfolio = $ 20,40,000

Risk-free interest rate =10% p.a.

Dividend yield on S and P 500 = 4% p.a.

Calculate the number of contract (futures) that should be shorted to hedge the portfolio.

Sol :

Current futures price of the index is given by

$$F_{t,T} = S_t + S_t(C_t - d_t)\ \frac{ft}{365}$$

$$= 200 + 200\ (0.10 - 0.04) \times \frac{4}{12}$$

$$= 200 + \frac{12}{3} = 200 + 4 = \$204$$

Price of futures contract = 204 × 500 = $ 1,02,000

$$\text{Hedge ratio} = \frac{\$20,40,000}{\$1,02,000} = 20$$

Thus, the number of contracts to be shorted is 20.

4. The FTSE 100 is 3000. Three-month interest rate is 8% p.a. and expected rate of dividend yield over the next three months is 4% p.a. What is fair futures price for a futures contract maturing in three-month's time?

Sol :

Fair futures premium FTSE 100 = $3000 + 3000 (0.08 - 0.04) \frac{3}{12} = 3000 + 30$

So, the fair price is 3000 + 30 = 3030.

5. From the following information, calculate the value of a price equally weighted index.

Stocks	Base period price	Current period price
HLL	50	70
SBI	100	90
HDFC	80	90
	Rs. 230	Rs. 250

The current divisor for these three stocks is 5.

Sol :

(i) Base period index value = $\frac{230}{5}$ = Rs. 46

(ii) Current period index value = $\frac{250}{5}$ = Rs 50

6. Determine the value of weighted index for three stocks with following prices and capitalization. The current index divisor is 0.10.

Stock	Share out standing	Price base period	Current price
HLL	1000	50	70
SBI	800	100	90
HDFC	500	80	90

Sol :

Stock	Share out standing	Price base period	Capitalization (Rs)	Current price	Current capitalization
HLL	1000	50	50,000	70	70,000
SBI	800	100	80,000	90	72,000
HDFC	500	80	40,000	90	45,000
			1,70,000		2,17,000

Current divisor = 0.10

$$\text{Index} = \left(\frac{1}{\text{Divisior}}\right)\left(\frac{\sum_{i=1}^{N} n_i P_i}{\sum_{i=1}^{M} n_i^b P_i^b}\right)$$

$$= \left(\frac{1}{0.10}\right)\left(\frac{\text{Rs.}2,17,000}{\text{Rs.}1,70,000}\right)$$

$$= 10 \times 1.276 = 12.76$$

7. Suppose a return equally-weighted index contains the three stocks and have a previous day value of 270. Compute the index's value today.

Stock	Previous day's price	Current price
HLL	70	77
SBI	90	108
HDFC	90	95

Sol :

To calculate the index's value, we have to calculate 1 plus rate of change.

Stock	Previous day's price	Current price	1 Plus rate of change
HLL	70	77	1.10
SBI	90	108	1.20
HDFC	90	95	1.05

Average of 1 plus rate of change = $\frac{1.10+1.2+1.05}{3}$

$= \frac{3.35}{3} = 1.116$

Index = Inex (– 1) $\left(\frac{1}{N}\right)\left(\sum_{i=1}^{N}\left[\frac{P_i}{P_i - 1}\right]\right)$

So, (– 1 refers to the previous day's value.)

= 270 (1.1166) = 301.50

Current index value = 301.50

8. From the following figure, calculate the hedge ratio, using individual stock betas.

Stock	Shares price (Rs)	Shares outstanding	Value (Rs)	Beta	Proportion of portfolio
Bank of Baroda	**115**	**1,000**	**1,15,000**	**0.95**	**40%**
ACC	**160**	**2,000**	**3,20,000**	**1.20**	**40%**
Bata	**40**	**4,000**	**1,60,000**	**1.40**	**10%**
Ballarpur Industry	**50**	**6,000**	**3,00,000**	**1.30**	**10%**
Total Value			**8,95,000**		

Sol : **(May-18)**

Beta of entire portfolio is:

= (0.40 × 0.95) + (0.40)(1.20) + (0.10)(1.40) + (0.10)(1.3)

= 0.38 + 0.48 + 0.14 + 0.13

= 1.13

Value of NIFTY 50 index = 5,00,000

So, Hedge ratio = $\left(\frac{P_c}{P_t}\right)\beta_p$

where P_C is market value of portfolio (firm), P_t is spot value of index and B_p is beta of portfolio

Then Hedge ratio = $\left(\frac{8,95,000}{5,00,000}\right)$ 1.13

= 2.0227 contract on NSE NIFTY 50 index So

Hedge ratio = 2 Contracts of NIFTY 50.

9. Suppose an investor goes long in a July futures contract on the NSE NIFTY. The current index value is 1100.70. Suppose that often the contract is mark-to-market, futures price has increased by the minimum trading price change (one tick) to 1100.75. Calculate the minimum price change in value.

Sol :

Current NSE 500 index =1100.70

Minimum price change = 1000(1100.75 – 1100.70)

Contract size in Rs = 1000 × 0.05 = Rs 50

We multiply by 1000 because contract size in Rs is 1000 times the NIFTY 50 price index.

10. From the following figures, calculate the futures price of the index.

Value of BSE index = 4000

Value of portfolio = Rs 10,00,000

Risk-free interest rate = 8%

Dividend yield on index = 6% per annum

Beta of the portfolio (b) = 1.5

Also assume that futures contract on the BSE index with five months to maturity is used to hedge the value of portfolio over the next three months. One futures contract is for delivery of Rs 50 times the index.

Sol :

$$F_{t,T} = S_t + S_t (C_t - d_t) \frac{T - t}{365}$$

$$= 4000 + 4000 (0.08 - 0.06)$$

$$= 4000 + 80 \times \frac{5}{12}$$

$$= 4000 + 33.33$$

$$= 4033.33 = 4034$$

Price of futures contract = Rs. 50 × 4034 = Rs. 2,01,700

11. From the following figures, calculate the futures price of the index.

Value of BSE index = 4000

Value of portfolio = Rs 10,00,000

Risk-free interest rate = 8%

Dividend yield on index = 6% per annum

Beta of the portfolio (b) = 1.5

Calculate the hedge ratio that should be shorted to hedge the portfolio. What happens if index turns to be 3500 in three months.

Sol :

Price of futures contract = 50 × 4034 = 2,01,700

$$\text{Hedge ratio} = \frac{\text{Value of hedge portfolio}}{\text{Price of the futures contract}} \times \beta_1$$

Here Value of hedged portfolio = 10,00,000

Price of futures contract = 2,01,700

β(Beta) of portfolio = 1.5

$$\text{Hedge ratio} = \frac{10,00,000}{2,01,700} \times 1.5$$

$$= 7.43 = 8 \text{ contract}$$

Suppose index after three months falls to 3500. Futures price will be

$$= 3500 + 3500\ (0.08 - 0.06) \times \frac{5}{12}$$

$$= 3500 + 29.16 = 3530$$

The gain/loss from the short futures position is:

$$= 8 \times (4034 - 3530) \times 50$$

$$= 8 \times (504) \times 50$$

$$= 2,01,600$$

Gain on short position = Rs. 2,01,600

12. Value of S & P 500 index = 200

Value of portfolio = Rs. 10,20,000

Risk-free interest rate = 10% p.a.

Dividend yield on S & P 500 = 4% p.a

Calculate the number of contract futures that should be shorted to hedge the portfolio.

Sol : **(May-17)**

Given spot price = 200

R = 10%

q = 4%

$T = \frac{4}{12} = 0.33$

$F = S.e^{(r-q)T} = 200 \cdot e^{(0.10-0.04)}\ 0.35$

$= 200 \cdot e^{(0.06)\,0.33} = 200\, e^{0.0198}$

= 200 × 0.0198 = futures price = Rs. 3.96

13. A stock index is currently at 820. The continuously compounding risk free rate of return is 9% p.a. and the dividend yield on the index is 3 per cent per annum. What should the futures price for a contract with 3 months to expiration be ?

Sol : **(May-16)**

Given spot price = 820

R_f = 9%

q = 3%

T = 3/12 = 0.25

$F = S.e^{(r-q)T} = 820.\ e^{(0.09-0.03)\,0.25}$

$= 820.\ e^{(0.06)\,0.25} = 820.\ e^{0.015}$

= 820 × 1.015, Future price = `. 832

Exercise Problems

1. Calculate the market exposure from the following data :

Stock	Share price (Rs)	No. of shares	Share beta
BankofBaroda	140	1,000	0.9
HLL	120	3,000	1.5
BHEL	50	5,000	1.3
ACC	140	10,000	0.8
Reliance Petroleum	470	12,000	0.8

2. Assume that in December an investor has Rs 10,00,000 to invest, but he want to keep that invest-ment fairly liquid. Investor is also of the belief that blue chip stocks will appreciate. Current (February) NSE S & P CNX NIFTY futures is at 1500. What strategy will be appropriate for investor? Also calculate the profit/loss on expiration from index. Futures price in December is 1600.

3. Suppose you have a portfolio of primarily blue chip stock valued at Rs 5,00,000. You believe the market has peaked and expected a near term correction. Today's price of NSE S & P NIFTY is 1400. It is December 2002. February 2003 NSE S & P NIFTY futures is at 1450 and contract size of NIFTY futures is 200. What strategy you like to take in futures market?

4. XYZ sold a February-NIFTY futures contract for Rs 2,69,000. Each NIFTY futures contract is for delivery of 200 shares. On expiry, index closed at 1260. What is profit/loss amount to XYZ?

5. In July, A bought an August NIFTY futures contract which costs him Rs 3,00,000. Initial margin paid by him was 20,000. Each NIFTY futures contract is for delivery of 200 shares. On expiry, index closed at 1530. How much profit did A make?

6. A long position of 20 market lots of NIFTY September futures is purchased at 1000 and held till expiry when the NIFTY closes at expiry in September at 1025. Calculate profit/loss on this position.

Short Question and Answers

1. What is stock index?

Ans :

Introduction

Indices are an attempt to create order and direction out of diversity. Index numbers are used to capture the collective movement of many economic variables like price levels, wages, exchange rates and stock market. And stock market indices are not an exception they are intended to pull together the incongruent movements of different share prices, each reacting to a multitude of individual pressures, to find out the direction of the market. Traditionally, stock indices are used to measure the change of direction and magnitude of the general stock market. These indices are also considered as benchmarks that are used to gauge the performance of a group of stocks.

In India, the popularly followed indices are Sensex and Nifty. Stock market indices may be classified in many ways. A broad-base index represents the performance of a whole stock market and by proxy, reflects investor sentiment on the state of the economy. Other classes of indices may track the performance of specific sectors of the market.

For example, BSE PSU Index a stock index that tracks the performance of the listed PSU stocks and CNX IT Sector *index* that focusses on IT companies' performance on the market. When the stock index value goes up, it means the stocks in the index are generally moving up. When the value drops, then the stocks are generally going down. These indices let us to see how the market is doing as a group. Sensex is an index based on the prices of thirty stocks while the Nifty index comprises fifty stocks. The sample size is determined in such a way that it should be a significant fraction of the population under study. A larger sample generally gives a clearer indication about where the underlying population is headed for, while a larger sample poses problems in maintenance. So, a trade-off is to be made in such a way that the number of scrips selected is a hetero-geneous mixture of elements representing all sections of the population. The constituents of an index are selected based on some broad criteria like market capitalization, liquidity, trading frequency, industry representation, track record, etc. However, these are only broad guidelines and each index compiler sets its own criteria.

Meaning

A stock index or stock market index is a portfolio consisting of a collection of different stocks. In others words, a stock index is just like a portfolio of different securities' proportions traded on a particular stock exchange like NIFTY S&P CNX traded on National Stock Exchange of India, the S&P 500 Index is composed of 500 common stocks, etc.

2. What are the Stock Index Futures?

Ans :

Stock index future is an index derivative that draws its value from an underlying stock index like Nifty or Sensex. They were first pioneered by Kansas City Board of Trade on 24th February, 1982 and the contract is based on Value Line Composite Index. Subsequently, in April 1982, CME introduced trading in S & P 500 index futures and this was followed by New York Futures Exchange's contract on NYSE Composite Index. Though all the contracts were almost similar in design, S & P 500 index future became the most actively traded contract. Consequent up on their successful trading on the U.S. exchanges, many other exchanges worldwide launched equity index futures.

3. Features of stock index.

Ans :

1. A stock index contains a specific number of stocks, i.e., specification of certain sector number of stocks like 30,50,100,200,500 and so on.
2. Selection of a base period on which index is based. Starting value of base of index is set to large round like 100,1000, etc.
3. The method or rule of selection of a stock for inclusion in the index to determine the value of the index.

4. There are several methods commonly used to combine the prices of individual stock like arithmetic average, weighted average, etc.

5. There are three types of index construction like price weighted index, return equally weighted index and market capitalization weighted index.

6. A stock index represents the change in the value of a set of stocks which constitute the index. Hence, it is a relative value expressed as weighted average of prices at a specific date.

7. The index should represent the market and be able to represent the returns obtained by a typical portfolio of that market.

4. The minimum-variance hedge radio

Ans :

hedge ratio (HR)—which is the ratio of the futures position to the cash position being hedged. We have seen that a benchmark ratio is the minimum-variance hedge ratio (HR) or the value of HR that can be expected to reduce the fluctuations in the total portfolio to the minimum possible. In this section, we will discuss the determination of HR in the context of the 'stock index futures contracts'.

$$HR = \frac{\text{Value of hedged portfolio}}{\text{Price of the futures contract}} \times B_i$$

$$HR = \frac{\text{\% change in weighted average portfolio price}}{\text{\% change of future index}}$$

5. Yield enhancement

Ans :

Yield enhancement refers to the portfolio strategies of holding a 'synthetic' stock index fund that is capable of earning higher return than a cash stock index fund. A portfolio consisting of a long position in stock index futures and treasury bills will produce the same return (with the same risk) structured as stock portfolio to mirror the stock index underlying the futures. However, a portfolio of stock index futures and treasury hills (synthetic stock) can be constructed to out perform the corresponding stock portfolio (higher return with the similar risk), if stock index futures are correctly priced or their actual value is higher or lower than their theoretical (fair) value. In this way, with the use of stock index futures, a yield enhancement strategy be followed to enhance the return on a portfolio.

6. Explain the how speculators can profitability use stock index futures.

Ans :

The basic objective of the speculators is to earn super profit by going either bullish or bearish in the market. Index futures permits them an ideal instrument where the vagaries of individual stocks, settlement cycles, etc. do not have so much of an impact as they do on specific stock. The speculators can select a strategy where they can have a bullish view and go long on futures. Similarly, they can have a bearish view and go short in futures.

Earlier before the stock index futures came into existence, the speculators had two alternatives. Firstly, they can select the liquid stocks which would move with the index so that they can take a position in them for the expected move. But this move would be too risky. Secondly, they can select the entire stocks as in the index and trade in all of them. The basic of liquid stocks may mimic the index to some extent but still individual stock variations will affect the returns, and moreover, it is too costly with high

amount of commission, etc. But now with the introduction of stock index futures, such limitations mentioned are taken care of. Now the speculators can take up either long position on the contract, paying a small margin, and seek to ride the expected trend and vice-versa for the bearish view-sell short index contract and cover when the index falls lower.

7. Rolling the hedged forward

Ans :

Sometimes, it happens that the expiration date of the hedge is later than the delivery dates of all the futures contracts that can be used. In this situation, the hedger must then roll the hedge forward. In other words, it means that closing out one futures contract and taking the same position in a futures contract with a later delivery date. Hence, the hedge can be rolled forward many limes. Consider a company which intends to use a short hedge to reduce the risk associated with the price to be received for an asset at time T. Assume, if there are futures contracts 1,2,3,..., n (not all necessary in existence at the present time), the company can use the following strategy:

Time t_1 = Short futures contract 1

Time r_2 = Close out futures contract 1

= Short futures contract 2

Timer$_3$ = Close out futures contract 2

= Short futures contract 3

Time T_n = Close out futures contract $(n - 1)$

= Short futures contract n

Time T = Close out futures contract n

8. Asset allocation by the funds managers

Ans :

The term asset allocation refers to the distribution of portfolio assets among equity shares, bonds, debentures and other money market instruments. It means that how to divide funds among broad asset classes like 60 percent in equities and 40 percent in treasury bills is an asset allocation decision. Usually it does include changing of the assets from one equity to other equity asset rather concentrates on asset allocation from equity to debt or treasury bills and 'vice versa. Further asset allocation focuses on the macro level commitment of funds to various asset classes and the shifting of funds among these major asset classes.

It is often preferable to use stock index futures to change the portfolio mix, even though portfolio managers structure and restructure their portfolio by buying and selling the different assets using futures because it is cheaper. It has been noted that equity stock index and interest rate futures trading cost are less in comparison to the direct trading in stocks.

9. Measuring market risk

Ans :

Beta is a measure of the systematic risk. It measures the sensitivity of the scrip (asset) vis-a-vis index movements. Beta (β) is defined as the Covariance (Cov.) between a stock's return and the return on the overall market divided by the variance (var) of return on the market.

The formula of a beta (β) of a security (i) is as under :

$$\beta_i = \frac{Cov(R_i, R_m)}{Var(R_m)}$$

where R_m is return on market portfolio (or market return) and R_i is return on the security (i).

Stock betas can be estimated with the regression equation (also called linear regression line) as follows:

$$R_{i.t} = a + b \times R_{m.t} + - e_{i.t}$$

where R,, is observed returns over a period t for stock i, a is the constant return, b is the estimate of the beta of stocks, $e_{i\,t}$ is the usual error term and R_m is return on market portfolio (or market return).

A portfolio of stocks has its own beta. Individual betas are used to calculate the portfolio beta. It is weighted average of the betas of the individual scrips in the portfolio where weights are based on the proportion of investment of scrips in the portfolio. If the value of a beta is more than one, the stock is more volatile than the market, and if beta is less than one, then stock will be less volatile than the market. Further detail on this model can be studied from the CAPM and Sharpe Single Index Model.

10. Stock index futures as a hedging tool

Ans :

First of all, we should know who need the stock index futures for using them as a hedging tool. All such investors, specifically managing a huge pool of funds or public funds like pension funds, mutual funds, life insurance companies, investment and finance companies, banks, endowment funds, public provident funds, etc. would like to reduce their fund's exposure to a fall in stock values caused due to uncertainties about futures market developments. This can be done by selling the shares and repurchasing them at a later time, but this strategy is not so appropriate because it would incur substantial transaction costs. As a result, funds managers prefer to hedge with stock index futures instead of altering their portfolio structure, directly and repeatedly. Hedging is also done through stock index options.

Choose the Correct Answer

1. The two most common ways weighting state [b]
   (a) Equal value (b) Value equal
   (c) Equal weighting (d) None
2. They were first pioneered by knases city board trade on [b]
   (a) 23rd feb 1982 (b) 24 feb 1982
   (c) 12 feb 1981 (d) 10th feb 1985
3. There are two types of risks associated with holding security [b]
   (a) Systematic risk (b) Systematic & un systematic risk
   (c) None (d) All the three
4. In mean's that how to divide funds among broad asset classes like [c]
   (a) 60 percent (b) 40 treasury bill
   (c) 60 percent equity & 40 treasure bill (d) Treasure asset
5. They can select the liquid stocks which would move with the index so that they position [a]
   (a) Firstly (b) Secondly
   (c) Thirdly (d) None
6. They can select the entire stocks as in the index and trade in all of them [c]
   (a) Thirdly (b) Firstly
   (c) Secondly (d) Lastly
7. SEBI board accepted the recommendation of Dr L.C gupta committee on [b]
   (a) On 12 may 1998 (b) On 11 may 1998
   (c) On 10th may 1995 (d) On 11 may 1996
8. Trading hours are [c]
   (a) 3.30 am to 10 pm (b) 10.30 to 11.30 pm
   (c) 10.30 am to 3.30 pm (d) None of the above
9. The Bombay stock exchange introduction stock index futures trading on [b]
   (a) June 10th 2000 (b) June 9th 2000
   (c) June 9, 2010 (d) June 9th 2001
10. Settlement position remaining open at the close of business on the [a]
   (a) Last day (b) First day
   (c) Third day (d) None

Fill in the blanks

1. _____ are used to measure the change of direction & magnitude of the general stock market.
2. In India, the popularly followed indices are _____ .
3. _____ index a stock index that tracks the performance of the market.
4. _____ is an index based on the prices of thirty with nifty index.
5. Index construction involves the making two major direction regarding the method of averaging pertaing to the _____ .
6. The Index should represent the market and be able to represent returns obtained by _____ of the market.
7. Future it also reflects the changing expectations about the _____ .
8. _____ or money managers use stock index futures basically for the three purposes.
9. _____ is also done through stock index options
10. The stock index futures can be used to hedge or _____ .

ANSWERS

1. Stock indices
2. Sensex & nifty
3. BSEPSU
4. Sensex
5. Weight scheme
6. Typical portfolio
7. Market
8. Funds managers
9. Hedging
10. Manage this risk

FACULTY OF COMMERCE

M.Com - II Year, IV - Semester (CBCS) Examination

May / June - 2018

FINANCIAL DERIVATIVES

Time : 3 Hours] [Max. Marks : 80

PART - A (5 × 4 = 20 Marks)

ANSWERS

Note : Answer all the questions in not more than one page each.

1. What is a financial derivative. **(Unit-I, SQA.1)**
2. What is a futures contract. **(Unit-II,SQA.1)**
3. What is ITM? **(Unit-III,SQA.1)**
4. What is interest rate swap? **(Unit-IV,SQA.1)**
5. What is stock index. **(Unit-V,SQA.1)**

PART - B (5 × 12 = 60 Marks)

Note: Answer all the questions by using internal choice

6. (a) Explain the uses of financing derivatives. **(Unit-I, Q.No.4)**

OR

(b) Explain the types of financial derivatives. **(Unit-I, Q.No.3)**

7. (a) What are the differences between futures and forwards? **(Unit-II, Q.No.8)**

OR

(b) Briefly explain the growth of futures market in India? **(Unit-II, Q.No.11)**

8. (a) Explain the assumptions of Black-Scholes option pricing model. **(Unit-III, Q.No.)**

OR

(b) The current stock price for ACG Ltd is Rs. 85. A European call option with an exercise price of Rs. 85 will expire in 160 days. The yield on a 160-day Treasury bill is 5.18%. The standard deviation of annual returns on ACG's stock is 44%. Compute the premium for a call option on this stock. **(Unit-III, Prob.12)**

9. (a) Explain the uses and risks associated with interest rate swaps. **(Unit-IV, Q.No.16)**

OR

(b) Companies A and B have been offered the following rate per annum on a $ 20 million five year loan.

Company	Fixed Rate	Floating Rate
A	12%	LIBOR + 0.1%
B	13.4$	LIBOR + 0.6%

Company A requires a floating rate loan company B requires a fixed rate loan. Design a swap that a bank acting as intermediary at a commission of 0.1% per annum. It shall be equally attractive to both companies. **(Unit-IV, Prob.3)**

10. (a) Explain the features of stock index. **(Unit-V, Q.No.1)**

OR

(b) From the following data, calculate the hedge ratio, using individual stock betas.

Stock	Share Price (Rs.)	Shares Outstanding	Beta	Proportion of Portfolio
ITC	115	1,000	0.95	40%
BATA	160	2,000	1.20	40%
SBI	40	4,000	1.40	10%
AB	50	6,000	1.30	10%

(Unit-V, Prob.8)

FACULTY OF COMMERCE

M.Com. IV - Semester (CBCS) Examination

May- 2017

FINANCIAL DERIVATIVES

Time : 3 Hours Max. Marks: 80

PART - A (5 × 4 = 20 Marks)

ANSWERS

Note : Answer all the questions in not more than one page each.

1. What are the reasons for the growth of financial derivatives market? **(Unit-I,SQA.2)**
2. What are features of futures contracts? **(Unit-II,SQA.3)**
3. What is call option? **(Unit-III,SQA.2)**
4. What are the features of interest rate swaps? **(Unit-IV,SQA.5)**
5. Write a note on stock index futures. **(Unit-V,SQA.2)**

PART - B (5 × 12 = 60 Marks)

Note: Answer all the questions by using internal choice

6. (a) What are the advantages and disadvantages of financial derivatives? **(Unit-I, Q.No. 9,10)**

OR

(b) What are the myths and truths of financial derivatives? Explain. **(Unit-I, Q.No.1)**

7. (a) What are the differences between forwards and futures? Explain **(Unit-II, Q.No.8)**

OR

(b) Explain the recommendations of L.C. Gupta committee on introduction of financial derivatives in India. **(Unit-II, Q.No.17)**

8. (a) What are the factors that determine the value of options? Explain. **(Unit-III, Q.No.10)**

OR

(b) From the following information, calculate call option value.

Current market price = Rs. 100 per share

Exercise price = Rs. 80 per share

Volatility of share price = 30%

Risk free interest rate 10% p.a

Time to expiration = 3 months

Use back-scholes options pricing model. **(Unit-III, Prob.11)**

9. (a) Explain the advantages and limitations of currency swap. **(Unit-IV, Q.No.8)**

OR

(b) Company ABC and XYZ face the following rates.

	ABC	XYZ
US Dollar (Floating rate)	LIBOR + 0.5%	LIBOR + 1.5%
Japanese Yen (Fixed rate)	6.0%	7.5%

Assume that ABC want to borrow dollars at floating rate and XYZ wants to borrow Japanese Yen at fixed rate. A financial institution is planning to arrange a swap and requires a 75 basis points spread. If the swap is equally attractive to ABC and XYZ, what rates of interest ABC and XYZ end up paying. **(Unit-IV, Prob.13)**

10. (a) How do you value stock index futures? Explain. **(Unit-V, Q.No.3)**

OR

(b) Value of S & P 500 index = 200

Value of portfolio = Rs. 10,20,000

Risk-free interest rate = 10% p.a.

Dividend yield on S & P 500 = 4% p.a

Calculate the number of contract futures

that should be shorted to hedge the portfolio. **(Unit-V, Prob.2)**

FACULTY OF COMMERCE

M.Com. IV - Semester (CBCS)Examination

May/June- 2016

FINANCIAL DERIVATIVES

Time : 3 Hours Max. Marks: 80

PART - A (5×4=20 Marks)

ANSWERS

Note : Answer all the questions in not more than one page each.

1. Derivative market **(Unit-I, SQA.1)**
2. Forwards **(Unit-II, SQA.2)**
3. Exercise price **(Unit-III, SQA.4)**
4. Interest rate swap **(Unit-IV, SQA.1)**
5. Index future **(Unit-V, SQA.2)**

PART - B (5×12=60 Marks)

Note: Answer all the questions by using internal choice

6. (a) Explain briefly the evolution of derivatives in India. **(Unit-I, Q.No.8)**

OR

(b) Explain the benefits of derivatives. **(Unit-I, Q.No.9)**

7. (a) Discuss the characteristics of futures contracts. **(Unit-II, Q.No.5)**

OR

(b) Explain the growth of futures market in India. **(Unit-II, Q.No.11)**

8. (a) What are options ? What are the factors that determine the price of option. **(Unit-III, Q.No.1, 10)**

OR

(b) Determine the value of a call option using the Black and Scholes model :

The share is currently selling at Rs. 80 and the standard deviation of the stock's rate of return is 0.7. The call has an exercise price of Rs. 90 and has 6 months to for expiration. The continuously compounding rate of return is 8% of per annum. **(Unit-III, Prob.10)**

9. (a) Why do swap dealers exist ? State the applications of swaps. **(Unit-IV, Q.No.3)**

OR

(b) The swap interest rates are flat in both Japan and the U.S. The Japanese rate is 4% p.a. and the U.S. rate is 9% p.a. A financial institution has entered into a currency swap in which it receives 5% p.a. in a year and pays 85 p.a. in dollars once a year. The principles in the two countries are $ 10 million and 1200 million yen. The swap will last for another 3 years and the current exchange rate is 110 Yen = $1. What is the value of swap in dollars ? **(Unit-IV, Prob.14)**

OR

10. (a) What are the stock index futures ? Explain how the speculators and arbitrageurs can profitability use stock index futures. **(Unit-V, Q.No.1,3)**

(b) A stock index is currently at 820. The continuously compounding risk free rate of return is 9% p.a. and the dividend yield on the index is 3 per cent per annum. What should the futures price for a contract with 3 months to expiration be ? **(Unit-V, Prob.13)**

FACULTY OF COMMERCE

M.Com - II Year, IV - Semester (CBCS) Examination

May / June - 2018

FINANCIAL DERIVATIVES

Time : 3 Hours] [Max. Marks : 80

PART - A (5 × 4 = 20 Marks)

ANSWERS

Note : Answer all the questions in not more than one page each.

1. What is a financial derivative. **(Unit-I, SQA.1)**
2. What is a futures contract. **(Unit-II,SQA.1)**
3. What is ITM? **(Unit-III,SQA.1)**
4. What is interest rate swap? **(Unit-IV,SQA.1)**
5. What is stock index. **(Unit-V,SQA.1)**

PART - B (5 × 12 = 60 Marks)

Note: Answer all the questions by using internal choice

6. (a) Explain the uses of financing derivatives. **(Unit-I, Q.No.4)**

OR

(b) Explain the types of financial derivatives. **(Unit-I, Q.No.3)**

7. (a) What are the differences between futures and forwards? **(Unit-II, Q.No.8)**

OR

(b) Briefly explain the growth of futures market in India? **(Unit-II, Q.No.11)**

8. (a) Explain the assumptions of Black-Scholes option pricing model. **(Unit-III, Q.No.)**

OR

(b) The current stock price for ACG Ltd is Rs. 85. A European call option with an exercise price of Rs. 85 will expire in 160 days. The yield on a 160-day Treasury bill is 5.18%. The standard deviation of annual returns on ACG's stock is 44%. Compute the premium for a call option on this stock. **(Unit-III, Prob.12)**

9. (a) Explain the uses and risks associated with interest rate swaps. **(Unit-IV, Q.No.16)**

OR

(b) Companies A and B have been offered the following rate per annum on a $ 20 million five year loan.

Company	Fixed Rate	Floating Rate
A	12%	LIBOR + 0.1%
B	13.4$	LIBOR + 0.6%

Company A requires a floating rate loan company B requires a fixed rate loan. Design a swap that a bank acting as intermediary at a commission of 0.1% per annum. It shall be equally attractive to both companies. **(Unit-IV, Prob.3)**

10. (a) Explain the features of stock index. **(Unit-V, Q.No.1)**

OR

(b) From the following data, calculate the hedge ratio, using individual stock betas.

Stock	Share Price (Rs.)	Shares Outstanding	Beta	Proportion of Portfolio
ITC	115	1,000	0.95	40%
BATA	160	2,000	1.20	40%
SBI	40	4,000	1.40	10%
AB	50	6,000	1.30	10%

(Unit-V, Prob.8)

FACULTY OF COMMERCE

M.Com. IV - Semester (CBCS) Examination

May- 2017

FINANCIAL DERIVATIVES

Time : 3 Hours Max. Marks: 80

PART - A (5 × 4 = 20 Marks)

ANSWERS

Note : Answer all the questions in not more than one page each.

1. What are the reasons for the growth of financial derivatives market? **(Unit-I,SQA.2)**
2. What are features of futures contracts? **(Unit-II,SQA.3)**
3. What is call option? **(Unit-III,SQA.2)**
4. What are the features of interest rate swaps? **(Unit-IV,SQA.5)**
5. Write a note on stock index futures. **(Unit-V,SQA.2)**

PART - B (5 × 12 = 60 Marks)

Note: Answer all the questions by using internal choice

6. (a) What are the advantages and disadvantages of financial derivatives? **(Unit-I, Q.No. 9,10)**

OR

(b) What are the myths and truths of financial derivatives? Explain. **(Unit-I, Q.No.1)**

7. (a) What are the differences between forwards and futures? Explain **(Unit-II, Q.No.8)**

OR

(b) Explain the recommendations of L.C. Gupta committee on introduction of financial derivatives in India. **(Unit-II, Q.No.17)**

8. (a) What are the factors that determine the value of options? Explain. **(Unit-III, Q.No.10)**

OR

(b) From the following information, calculate call option value.

Current market price = Rs. 100 per share

Exercise price = Rs. 80 per share

Volatility of share price = 30%

Risk free interest rate 10% p.a

Time to expiration = 3 months

Use back-scholes options pricing model. **(Unit-III, Prob.11)**

9. (a) Explain the advantages and limitations of currency swap. **(Unit-IV, Q.No.8)**

OR

(b) Company ABC and XYZ face the following rates.

	ABC	XYZ
US Dollar (Floating rate)	LIBOR + 0.5%	LIBOR + 1.5%
Japanese Yen (Fixed rate)	6.0%	7.5%

Assume that ABC want to borrow dollars at floating rate and XYZ wants to borrow Japanese Yen at fixed rate. A financial institution is planning to arrange a swap and requires a 75 basis points spread. If the swap is equally attractive to ABC and XYZ, what rates of interest ABC and XYZ end up paying. **(Unit-IV, Prob.13)**

10. (a) How do you value stock index futures? Explain. **(Unit-V, Q.No.3)**

OR

(b) Value of S & P 500 index = 200

Value of portfolio = Rs. 10,20,000

Risk-free interest rate = 10% p.a.

Dividend yield on S & P 500 = 4% p.a

Calculate the number of contract futures

that should be shorted to hedge the portfolio. **(Unit-V, Prob.2)**

FACULTY OF COMMERCE

M.Com. IV - Semester (CBCS)Examination

May/June- 2016

FINANCIAL DERIVATIVES

Time : 3 Hours Max. Marks: 80

PART - A (5×4=20 Marks)

ANSWERS

Note : Answer all the questions in not more than one page each.

1. Derivative market **(Unit-I, SQA.1)**
2. Forwards **(Unit-II, SQA.2)**
3. Exercise price **(Unit-III, SQA.4)**
4. Interest rate swap **(Unit-IV, SQA.1)**
5. Index future **(Unit-V, SQA.2)**

PART - B (5×12=60 Marks)

Note: Answer all the questions by using internal choice

6. (a) Explain briefly the evolution of derivatives in India. **(Unit-I, Q.No.8)**

OR

(b) Explain the benefits of derivatives. **(Unit-I, Q.No.9)**

7. (a) Discuss the characteristics of futures contracts. **(Unit-II, Q.No.5)**

OR

(b) Explain the growth of futures market in India. **(Unit-II, Q.No.11)**

8. (a) What are options ? What are the factors that determine the price of option. **(Unit-III, Q.No.1, 10)**

OR

(b) Determine the value of a call option using the Black and Scholes model :

The share is currently selling at Rs. 80 and the standard deviation of the stock's rate of return is 0.7. The call has an exercise price of Rs. 90 and has 6 months to for expiration. The continuously compounding rate of return is 8% of per annum. **(Unit-III, Prob.10)**

9. (a) Why do swap dealers exist ? State the applications of swaps. **(Unit-IV, Q.No.3)**

OR

(b) The swap interest rates are flat in both Japan and the U.S. The Japanese rate is 4% p.a. and the U.S. rate is 9% p.a. A financial institution has entered into a currency swap in which it receives 5% p.a. in a year and pays 85 p.a. in dollars once a year. The principles in the two countries are $ 10 million and 1200 million yen. The swap will last for another 3 years and the current exchange rate is 110 Yen = $1. What is the value of swap in dollars ? **(Unit-IV, Prob.14)**

OR

10. (a) What are the stock index futures ? Explain how the speculators and arbitrageurs can profitability use stock index futures. **(Unit-V, Q.No.1,3)**

(b) A stock index is currently at 820. The continuously compounding risk free rate of return is 9% p.a. and the dividend yield on the index is 3 per cent per annum. What should the futures price for a contract with 3 months to expiration be ? **(Unit-V, Prob.13)**

FACULTY OF COMMERCE

M.Com - II Year, IV - Semester (CBCS) Examination

May / June - 2018

FINANCIAL DERIVATIVES

Time : 3 Hours] [Max. Marks : 80

PART - A (5 × 4 = 20 Marks)

ANSWERS

Note : Answer all the questions in not more than one page each.

1. What is a financial derivative. **(Unit-I, SQA.1)**
2. What is a futures contract. **(Unit-II,SQA.1)**
3. What is ITM? **(Unit-III,SQA.1)**
4. What is interest rate swap? **(Unit-IV,SQA.1)**
5. What is stock index. **(Unit-V,SQA.1)**

PART - B (5 × 12 = 60 Marks)

Note: Answer all the questions by using internal choice

6. (a) Explain the uses of financing derivatives. **(Unit-I, Q.No.4)**

OR

(b) Explain the types of financial derivatives. **(Unit-I, Q.No.3)**

7. (a) What are the differences between futures and forwards? **(Unit-II, Q.No.8)**

OR

(b) Briefly explain the growth of futures market in India? **(Unit-II, Q.No.11)**

8. (a) Explain the assumptions of Black-Scholes option pricing model. **(Unit-III, Q.No.)**

OR

(b) The current stock price for ACG Ltd is Rs. 85. A European call option with an exercise price of Rs. 85 will expire in 160 days. The yield on a 160-day Treasury bill is 5.18%. The standard deviation of annual returns on ACG's stock is 44%. Compute the premium for a call option on this stock. **(Unit-III, Prob.12)**

9. (a) Explain the uses and risks associated with interest rate swaps. **(Unit-IV, Q.No.16)**

OR

(b) Companies A and B have been offered the following rate per annum on a $ 20 million five year loan.

Company	Fixed Rate	Floating Rate
A	12%	LIBOR + 0.1%
B	13.4$	LIBOR + 0.6%

Company A requires a floating rate loan company B requires a fixed rate loan. Design a swap that a bank acting as intermediary at a commission of 0.1% per annum. It shall be equally attractive to both companies. **(Unit-IV, Prob.3)**

10. (a) Explain the features of stock index. **(Unit-V, Q.No.1)**

OR

(b) From the following data, calculate the hedge ratio, using individual stock betas.

Stock	Share Price (Rs.)	Shares Outstanding	Beta	Proportion of Portfolio
ITC	115	1,000	0.95	40%
BATA	160	2,000	1.20	40%
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AB	50	6,000	1.30	10%

(Unit-V, Prob.8)

FACULTY OF COMMERCE

M.Com. IV - Semester (CBCS) Examination

May- 2017

FINANCIAL DERIVATIVES

Time : 3 Hours Max. Marks: 80

PART - A (5 × 4 = 20 Marks)

ANSWERS

Note : Answer all the questions in not more than one page each.

1. What are the reasons for the growth of financial derivatives market? **(Unit-I,SQA.2)**
2. What are features of futures contracts? **(Unit-II,SQA.3)**
3. What is call option? **(Unit-III,SQA.2)**
4. What are the features of interest rate swaps? **(Unit-IV,SQA.5)**
5. Write a note on stock index futures. **(Unit-V,SQA.2)**

PART - B (5 × 12 = 60 Marks)

Note: Answer all the questions by using internal choice

6. (a) What are the advantages and disadvantages of financial derivatives? **(Unit-I, Q.No. 9,10)**

OR

(b) What are the myths and truths of financial derivatives? Explain. **(Unit-I, Q.No.1)**

7. (a) What are the differences between forwards and futures? Explain **(Unit-II, Q.No.8)**

OR

(b) Explain the recommendations of L.C. Gupta committee on introduction of financial derivatives in India. **(Unit-II, Q.No.17)**

8. (a) What are the factors that determine the value of options? Explain. **(Unit-III, Q.No.10)**

OR

(b) From the following information, calculate call option value.

Current market price = Rs. 100 per share

Exercise price = Rs. 80 per share

Volatility of share price = 30%

Risk free interest rate 10% p.a

Time to expiration = 3 months

Use back-scholes options pricing model. **(Unit-III, Prob.11)**

9. (a) Explain the advantages and limitations of currency swap. **(Unit-IV, Q.No.8)**

OR

(b) Company ABC and XYZ face the following rates.

	ABC	XYZ
US Dollar (Floating rate)	LIBOR + 0.5%	LIBOR + 1.5%
Japanese Yen (Fixed rate)	6.0%	7.5%

Assume that ABC want to borrow dollars at floating rate and XYZ wants to borrow Japanese Yen at fixed rate. A financial institution is planning to arrange a swap and requires a 75 basis points spread. If the swap is equally attractive to ABC and XYZ, what rates of interest ABC and XYZ end up paying. **(Unit-IV, Prob.13)**

10. (a) How do you value stock index futures? Explain. **(Unit-V, Q.No.3)**

OR

(b) Value of S & P 500 index = 200

Value of portfolio = Rs. 10,20,000

Risk-free interest rate = 10% p.a.

Dividend yield on S & P 500 = 4% p.a

Calculate the number of contract futures

that should be shorted to hedge the portfolio. **(Unit-V, Prob.2)**

FACULTY OF COMMERCE

M.Com. IV - Semester (CBCS)Examination

May/June- 2016

FINANCIAL DERIVATIVES

Time : 3 Hours Max. Marks: 80

PART - A (5×4=20 Marks)

ANSWERS

Note : Answer all the questions in not more than one page each.

1. Derivative market **(Unit-I, SQA.1)**
2. Forwards **(Unit-II, SQA.2)**
3. Exercise price **(Unit-III, SQA.4)**
4. Interest rate swap **(Unit-IV, SQA.1)**
5. Index future **(Unit-V, SQA.2)**

PART - B (5×12=60 Marks)

Note: Answer all the questions by using internal choice

6. (a) Explain briefly the evolution of derivatives in India. **(Unit-I, Q.No.8)**

OR

(b) Explain the benefits of derivatives. **(Unit-I, Q.No.9)**

7. (a) Discuss the characteristics of futures contracts. **(Unit-II, Q.No.5)**

OR

(b) Explain the growth of futures market in India. **(Unit-II, Q.No.11)**

8. (a) What are options ? What are the factors that determine the price of option. **(Unit-III, Q.No.1, 10)**

OR

(b) Determine the value of a call option using the Black and Scholes model :

The share is currently selling at Rs. 80 and the standard deviation of the stock's rate of return is 0.7. The call has an exercise price of Rs. 90 and has 6 months to for expiration. The continuously compounding rate of return is 8% of per annum. **(Unit-III, Prob.10)**

9. (a) Why do swap dealers exist ? State the applications of swaps. **(Unit-IV, Q.No.3)**

OR

(b) The swap interest rates are flat in both Japan and the U.S. The Japanese rate is 4% p.a. and the U.S. rate is 9% p.a. A financial institution has entered into a currency swap in which it receives 5% p.a. in a year and pays 85 p.a. in dollars once a year. The principles in the two countries are $ 10 million and 1200 million yen. The swap will last for another 3 years and the current exchange rate is 110 Yen = $1. What is the value of swap in dollars ? **(Unit-IV, Prob.14)**

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(b) A stock index is currently at 820. The continuously compounding risk free rate of return is 9% p.a. and the dividend yield on the index is 3 per cent per annum. What should the futures price for a contract with 3 months to expiration be ? **(Unit-V, Prob.13)**

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May / June - 2018

FINANCIAL DERIVATIVES

Time : 3 Hours] [Max. Marks : 80

PART - A (5 × 4 = 20 Marks)

ANSWERS

Note : Answer all the questions in not more than one page each.

1. What is a financial derivative. **(Unit-I, SQA.1)**
2. What is a futures contract. **(Unit-II,SQA.1)**
3. What is ITM? **(Unit-III,SQA.1)**
4. What is interest rate swap? **(Unit-IV,SQA.1)**
5. What is stock index. **(Unit-V,SQA.1)**

PART - B (5 × 12 = 60 Marks)

Note: Answer all the questions by using internal choice

6. (a) Explain the uses of financing derivatives. **(Unit-I, Q.No.4)**

OR

(b) Explain the types of financial derivatives. **(Unit-I, Q.No.3)**

7. (a) What are the differences between futures and forwards? **(Unit-II, Q.No.8)**

OR

(b) Briefly explain the growth of futures market in India? **(Unit-II, Q.No.11)**

8. (a) Explain the assumptions of Black-Scholes option pricing model. **(Unit-III, Q.No.)**

OR

(b) The current stock price for ACG Ltd is Rs. 85. A European call option with an exercise price of Rs. 85 will expire in 160 days. The yield on a 160-day Treasury bill is 5.18%. The standard deviation of annual returns on ACG's stock is 44%. Compute the premium for a call option on this stock. **(Unit-III, Prob.12)**

9. (a) Explain the uses and risks associated with interest rate swaps. **(Unit-IV, Q.No.16)**

OR

(b) Companies A and B have been offered the following rate per annum on a $ 20 million five year loan.

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Company A requires a floating rate loan company B requires a fixed rate loan. Design a swap that a bank acting as intermediary at a commission of 0.1% per annum. It shall be equally attractive to both companies. **(Unit-IV, Prob.3)**

10. (a) Explain the features of stock index. **(Unit-V, Q.No.1)**

OR

(b) From the following data, calculate the hedge ratio, using individual stock betas.

Stock	Share Price (Rs.)	Shares Outstanding	Beta	Proportion of Portfolio
ITC	115	1,000	0.95	40%
BATA	160	2,000	1.20	40%
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(Unit-V, Prob.8)

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M.Com. IV - Semester (CBCS) Examination

May- 2017

FINANCIAL DERIVATIVES

Time : 3 Hours Max. Marks: 80

PART - A (5 × 4 = 20 Marks)

ANSWERS

Note : Answer all the questions in not more than one page each.

1. What are the reasons for the growth of financial derivatives market? **(Unit-I,SQA.2)**
2. What are features of futures contracts? **(Unit-II,SQA.3)**
3. What is call option? **(Unit-III,SQA.2)**
4. What are the features of interest rate swaps? **(Unit-IV,SQA.5)**
5. Write a note on stock index futures. **(Unit-V,SQA.2)**

PART - B (5 × 12 = 60 Marks)

Note: Answer all the questions by using internal choice

6. (a) What are the advantages and disadvantages of financial derivatives? **(Unit-I, Q.No. 9,10)**

OR

(b) What are the myths and truths of financial derivatives? Explain. **(Unit-I, Q.No.1)**

7. (a) What are the differences between forwards and futures? Explain **(Unit-II, Q.No.8)**

OR

(b) Explain the recommendations of L.C. Gupta committee on introduction of financial derivatives in India. **(Unit-II, Q.No.17)**

8. (a) What are the factors that determine the value of options? Explain. **(Unit-III, Q.No.10)**

OR

(b) From the following information, calculate call option value.

Current market price = Rs. 100 per share

Exercise price = Rs. 80 per share

Volatility of share price = 30%

Risk free interest rate 10% p.a

Time to expiration = 3 months

Use back-scholes options pricing model. **(Unit-III, Prob.11)**

9. (a) Explain the advantages and limitations of currency swap. **(Unit-IV, Q.No.8)**

OR

(b) Company ABC and XYZ face the following rates.

	ABC	XYZ
US Dollar (Floating rate)	LIBOR + 0.5%	LIBOR + 1.5%
Japanese Yen (Fixed rate)	6.0%	7.5%

Assume that ABC want to borrow dollars at floating rate and XYZ wants to borrow Japanese Yen at fixed rate. A financial institution is planning to arrange a swap and requires a 75 basis points spread. If the swap is equally attractive to ABC and XYZ, what rates of interest ABC and XYZ end up paying. **(Unit-IV, Prob.13)**

10. (a) How do you value stock index futures? Explain. **(Unit-V, Q.No.3)**

OR

(b) Value of S & P 500 index = 200

Value of portfolio = Rs. 10,20,000

Risk-free interest rate = 10% p.a.

Dividend yield on S & P 500 = 4% p.a

Calculate the number of contract futures

that should be shorted to hedge the portfolio. **(Unit-V, Prob.2)**

FACULTY OF COMMERCE

M.Com. IV - Semester (CBCS)Examination

May/June- 2016

FINANCIAL DERIVATIVES

Time : 3 Hours Max. Marks: 80

PART - A (5×4=20 Marks)

ANSWERS

Note : Answer all the questions in not more than one page each.

1. Derivative market **(Unit-I, SQA.1)**
2. Forwards **(Unit-II, SQA.2)**
3. Exercise price **(Unit-III, SQA.4)**
4. Interest rate swap **(Unit-IV, SQA.1)**
5. Index future **(Unit-V, SQA.2)**

PART - B (5×12=60 Marks)

Note: Answer all the questions by using internal choice

6. (a) Explain briefly the evolution of derivatives in India. **(Unit-I, Q.No.8)**

OR

(b) Explain the benefits of derivatives. **(Unit-I, Q.No.9)**

7. (a) Discuss the characteristics of futures contracts. **(Unit-II, Q.No.5)**

OR

(b) Explain the growth of futures market in India. **(Unit-II, Q.No.11)**

8. (a) What are options ? What are the factors that determine the price of option. **(Unit-III, Q.No.1, 10)**

OR

(b) Determine the value of a call option using the Black and Scholes model :

The share is currently selling at Rs. 80 and the standard deviation of the stock's rate of return is 0.7. The call has an exercise price of Rs. 90 and has 6 months to for expiration. The continuously compounding rate of return is 8% of per annum. **(Unit-III, Prob.10)**

9. (a) Why do swap dealers exist ? State the applications of swaps. **(Unit-IV, Q.No.3)**

OR

(b) The swap interest rates are flat in both Japan and the U.S. The Japanese rate is 4% p.a. and the U.S. rate is 9% p.a. A financial institution has entered into a currency swap in which it receives 5% p.a. in a year and pays 85 p.a. in dollars once a year. The principles in the two countries are $ 10 million and 1200 million yen. The swap will last for another 3 years and the current exchange rate is 110 Yen = $1. What is the value of swap in dollars ? **(Unit-IV, Prob.14)**

OR

10. (a) What are the stock index futures ? Explain how the speculators and arbitrageurs can profitability use stock index futures. **(Unit-V, Q.No.1,3)**

(b) A stock index is currently at 820. The continuously compounding risk free rate of return is 9% p.a. and the dividend yield on the index is 3 per cent per annum. What should the futures price for a contract with 3 months to expiration be ? **(Unit-V, Prob.13)**

FACULTY OF COMMERCE

M.Com - II Year, IV - Semester (CBCS) Examination

May / June - 2018

FINANCIAL DERIVATIVES

Time : 3 Hours] [Max. Marks : 80

PART - A (5 × 4 = 20 Marks)

ANSWERS

Note : Answer all the questions in not more than one page each.

1. What is a financial derivative. **(Unit-I, SQA.1)**
2. What is a futures contract. **(Unit-II,SQA.1)**
3. What is ITM? **(Unit-III,SQA.1)**
4. What is interest rate swap? **(Unit-IV,SQA.1)**
5. What is stock index. **(Unit-V,SQA.1)**

PART - B (5 × 12 = 60 Marks)

Note: Answer all the questions by using internal choice

6. (a) Explain the uses of financing derivatives. **(Unit-I, Q.No.4)**

OR

(b) Explain the types of financial derivatives. **(Unit-I, Q.No.3)**

7. (a) What are the differences between futures and forwards? **(Unit-II, Q.No.8)**

OR

(b) Briefly explain the growth of futures market in India? **(Unit-II, Q.No.11)**

8. (a) Explain the assumptions of Black-Scholes option pricing model. **(Unit-III, Q.No.)**

OR

(b) The current stock price for ACG Ltd is Rs. 85. A European call option with an exercise price of Rs. 85 will expire in 160 days. The yield on a 160-day Treasury bill is 5.18%. The standard deviation of annual returns on ACG's stock is 44%. Compute the premium for a call option on this stock. **(Unit-III, Prob.12)**

9. (a) Explain the uses and risks associated with interest rate swaps. **(Unit-IV, Q.No.16)**

OR

(b) Companies A and B have been offered the following rate per annum on a $ 20 million five year loan.

Company	Fixed Rate	Floating Rate
A	12%	LIBOR + 0.1%
B	13.4$	LIBOR + 0.6%

Company A requires a floating rate loan company B requires a fixed rate loan. Design a swap that a bank acting as intermediary at a commission of 0.1% per annum. It shall be equally attractive to both companies. **(Unit-IV, Prob.3)**

10. (a) Explain the features of stock index. **(Unit-V, Q.No.1)**

OR

(b) From the following data, calculate the hedge ratio, using individual stock betas.

Stock	Share Price (Rs.)	Shares Outstanding	Beta	Proportion of Portfolio
ITC	115	1,000	0.95	40%
BATA	160	2,000	1.20	40%
SBI	40	4,000	1.40	10%
AB	50	6,000	1.30	10%

(Unit-V, Prob.8)

FACULTY OF COMMERCE

M.Com. IV - Semester (CBCS) Examination

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FINANCIAL DERIVATIVES

Time : 3 Hours Max. Marks: 80

PART - A (5 × 4 = 20 Marks)

ANSWERS

Note : Answer all the questions in not more than one page each.

1. What are the reasons for the growth of financial derivatives market? **(Unit-I,SQA.2)**
2. What are features of futures contracts? **(Unit-II,SQA.3)**
3. What is call option? **(Unit-III,SQA.2)**
4. What are the features of interest rate swaps? **(Unit-IV,SQA.5)**
5. Write a note on stock index futures. **(Unit-V,SQA.2)**

PART - B (5 × 12 = 60 Marks)

Note: Answer all the questions by using internal choice

6. (a) What are the advantages and disadvantages of financial derivatives? **(Unit-I, Q.No. 9,10)**

OR

(b) What are the myths and truths of financial derivatives? Explain. **(Unit-I, Q.No.1)**

7. (a) What are the differences between forwards and futures? Explain **(Unit-II, Q.No.8)**

OR

(b) Explain the recommendations of L.C. Gupta committee on introduction of financial derivatives in India. **(Unit-II, Q.No.17)**

8. (a) What are the factors that determine the value of options? Explain. **(Unit-III, Q.No.10)**

OR

(b) From the following information, calculate call option value.

Current market price = Rs. 100 per share

Exercise price = Rs. 80 per share

Volatility of share price = 30%

Risk free interest rate 10% p.a

Time to expiration = 3 months

Use back-scholes options pricing model. **(Unit-III, Prob.11)**

9. (a) Explain the advantages and limitations of currency swap. **(Unit-IV, Q.No.8)**

OR

(b) Company ABC and XYZ face the following rates.

	ABC	XYZ
US Dollar (Floating rate)	LIBOR + 0.5%	LIBOR + 1.5%
Japanese Yen (Fixed rate)	6.0%	7.5%

Assume that ABC want to borrow dollars at floating rate and XYZ wants to borrow Japanese Yen at fixed rate. A financial institution is planning to arrange a swap and requires a 75 basis points spread. If the swap is equally attractive to ABC and XYZ, what rates of interest ABC and XYZ end up paying. **(Unit-IV, Prob.13)**

10. (a) How do you value stock index futures? Explain. **(Unit-V, Q.No.3)**

OR

(b) Value of S & P 500 index = 200

Value of portfolio = Rs. 10,20,000

Risk-free interest rate = 10% p.a.

Dividend yield on S & P 500 = 4% p.a

Calculate the number of contract futures

that should be shorted to hedge the portfolio. **(Unit-V, Prob.2)**

FACULTY OF COMMERCE

M.Com. IV - Semester (CBCS)Examination

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FINANCIAL DERIVATIVES

Time : 3 Hours Max. Marks: 80

PART - A (5×4=20 Marks)

ANSWERS

Note : Answer all the questions in not more than one page each.

1. Derivative market **(Unit-I, SQA.1)**
2. Forwards **(Unit-II, SQA.2)**
3. Exercise price **(Unit-III, SQA.4)**
4. Interest rate swap **(Unit-IV, SQA.1)**
5. Index future **(Unit-V, SQA.2)**

PART - B (5×12=60 Marks)

Note: Answer all the questions by using internal choice

6. (a) Explain briefly the evolution of derivatives in India. **(Unit-I, Q.No.8)**

OR

(b) Explain the benefits of derivatives. **(Unit-I, Q.No.9)**

7. (a) Discuss the characteristics of futures contracts. **(Unit-II, Q.No.5)**

OR

(b) Explain the growth of futures market in India. **(Unit-II, Q.No.11)**

8. (a) What are options ? What are the factors that determine the price of option. **(Unit-III, Q.No.1, 10)**

OR

(b) Determine the value of a call option using the Black and Scholes model :

The share is currently selling at Rs. 80 and the standard deviation of the stock's rate of return is 0.7. The call has an exercise price of Rs. 90 and has 6 months to for expiration. The continuously compounding rate of return is 8% of per annum. **(Unit-III, Prob.10)**

9. (a) Why do swap dealers exist ? State the applications of swaps. **(Unit-IV, Q.No.3)**

OR

(b) The swap interest rates are flat in both Japan and the U.S. The Japanese rate is 4% p.a. and the U.S. rate is 9% p.a. A financial institution has entered into a currency swap in which it receives 5% p.a. in a year and pays 85 p.a. in dollars once a year. The principles in the two countries are $ 10 million and 1200 million yen. The swap will last for another 3 years and the current exchange rate is 110 Yen = $1. What is the value of swap in dollars ? **(Unit-IV, Prob.14)**

OR

10. (a) What are the stock index futures ? Explain how the speculators and arbitrageurs can profitability use stock index futures. **(Unit-V, Q.No.1,3)**

(b) A stock index is currently at 820. The continuously compounding risk free rate of return is 9% p.a. and the dividend yield on the index is 3 per cent per annum. What should the futures price for a contract with 3 months to expiration be ? **(Unit-V, Prob.13)**

FACULTY OF COMMERCE

M.Com - II Year, IV - Semester (CBCS) Examination

May / June - 2018

FINANCIAL DERIVATIVES

Time : 3 Hours] [Max. Marks : 80

PART - A (5 × 4 = 20 Marks)

ANSWERS

Note : Answer all the questions in not more than one page each.

1. What is a financial derivative. **(Unit-I, SQA.1)**
2. What is a futures contract. **(Unit-II,SQA.1)**
3. What is ITM? **(Unit-III,SQA.1)**
4. What is interest rate swap? **(Unit-IV,SQA.1)**
5. What is stock index. **(Unit-V,SQA.1)**

PART - B (5 × 12 = 60 Marks)

Note: Answer all the questions by using internal choice

6. (a) Explain the uses of financing derivatives. **(Unit-I, Q.No.4)**

OR

(b) Explain the types of financial derivatives. **(Unit-I, Q.No.3)**

7. (a) What are the differences between futures and forwards? **(Unit-II, Q.No.8)**

OR

(b) Briefly explain the growth of futures market in India? **(Unit-II, Q.No.11)**

8. (a) Explain the assumptions of Black-Scholes option pricing model. **(Unit-III, Q.No.)**

OR

(b) The current stock price for ACG Ltd is Rs. 85. A European call option with an exercise price of Rs. 85 will expire in 160 days. The yield on a 160-day Treasury bill is 5.18%. The standard deviation of annual returns on ACG's stock is 44%. Compute the premium for a call option on this stock. **(Unit-III, Prob.12)**

9. (a) Explain the uses and risks associated with interest rate swaps. **(Unit-IV, Q.No.16)**

OR

(b) Companies A and B have been offered the following rate per annum on a $ 20 million five year loan.

Company	Fixed Rate	Floating Rate
A	12%	LIBOR + 0.1%
B	13.4$	LIBOR + 0.6%

Company A requires a floating rate loan company B requires a fixed rate loan. Design a swap that a bank acting as intermediary at a commission of 0.1% per annum. It shall be equally attractive to both companies. **(Unit-IV, Prob.3)**

10. (a) Explain the features of stock index. **(Unit-V, Q.No.1)**

OR

(b) From the following data, calculate the hedge ratio, using individual stock betas.

Stock	Share Price (Rs.)	Shares Outstanding	Beta	Proportion of Portfolio
ITC	115	1,000	0.95	40%
BATA	160	2,000	1.20	40%
SBI	40	4,000	1.40	10%
AB	50	6,000	1.30	10%

(Unit-V, Prob.8)

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M.Com. IV - Semester (CBCS) Examination

May- 2017

FINANCIAL DERIVATIVES

Time : 3 Hours Max. Marks: 80

PART - A (5 × 4 = 20 Marks)

ANSWERS

Note : Answer all the questions in not more than one page each.

1. What are the reasons for the growth of financial derivatives market? **(Unit-I,SQA.2)**
2. What are features of futures contracts? **(Unit-II,SQA.3)**
3. What is call option? **(Unit-III,SQA.2)**
4. What are the features of interest rate swaps? **(Unit-IV,SQA.5)**
5. Write a note on stock index futures. **(Unit-V,SQA.2)**

PART - B (5 × 12 = 60 Marks)

Note: Answer all the questions by using internal choice

6. (a) What are the advantages and disadvantages of financial derivatives? **(Unit-I, Q.No. 9,10)**

OR

(b) What are the myths and truths of financial derivatives? Explain. **(Unit-I, Q.No.1)**

7. (a) What are the differences between forwards and futures? Explain **(Unit-II, Q.No.8)**

OR

(b) Explain the recommendations of L.C. Gupta committee on introduction of financial derivatives in India. **(Unit-II, Q.No.17)**

8. (a) What are the factors that determine the value of options? Explain. **(Unit-III, Q.No.10)**

OR

(b) From the following information, calculate call option value.

Current market price = Rs. 100 per share

Exercise price = Rs. 80 per share

Volatility of share price = 30%

Risk free interest rate 10% p.a

Time to expiration = 3 months

Use back-scholes options pricing model. **(Unit-III, Prob.11)**

9. (a) Explain the advantages and limitations of currency swap. **(Unit-IV, Q.No.8)**

OR

(b) Company ABC and XYZ face the following rates.

	ABC	XYZ
US Dollar (Floating rate)	LIBOR + 0.5%	LIBOR + 1.5%
Japanese Yen (Fixed rate)	6.0%	7.5%

Assume that ABC want to borrow dollars at floating rate and XYZ wants to borrow Japanese Yen at fixed rate. A financial institution is planning to arrange a swap and requires a 75 basis points spread. If the swap is equally attractive to ABC and XYZ, what rates of interest ABC and XYZ end up paying. **(Unit-IV, Prob.13)**

10. (a) How do you value stock index futures? Explain. **(Unit-V, Q.No.3)**

OR

(b) Value of S & P 500 index = 200

Value of portfolio = Rs. 10,20,000

Risk-free interest rate = 10% p.a.

Dividend yield on S & P 500 = 4% p.a

Calculate the number of contract futures

that should be shorted to hedge the portfolio. **(Unit-V, Prob.2)**

FACULTY OF COMMERCE

M.Com. IV - Semester (CBCS)Examination

May/June- 2016

FINANCIAL DERIVATIVES

Time : 3 Hours Max. Marks: 80

PART - A (5×4=20 Marks)

ANSWERS

Note : Answer all the questions in not more than one page each.

1. Derivative market **(Unit-I, SQA.1)**
2. Forwards **(Unit-II, SQA.2)**
3. Exercise price **(Unit-III, SQA.4)**
4. Interest rate swap **(Unit-IV, SQA.1)**
5. Index future **(Unit-V, SQA.2)**

PART - B (5×12=60 Marks)

Note: Answer all the questions by using internal choice

6. (a) Explain briefly the evolution of derivatives in India. **(Unit-I, Q.No.8)**

OR

(b) Explain the benefits of derivatives. **(Unit-I, Q.No.9)**

7. (a) Discuss the characteristics of futures contracts. **(Unit-II, Q.No.5)**

OR

(b) Explain the growth of futures market in India. **(Unit-II, Q.No.11)**

8. (a) What are options ? What are the factors that determine the price of option. **(Unit-III, Q.No.1, 10)**

OR

(b) Determine the value of a call option using the Black and Scholes model :

The share is currently selling at Rs. 80 and the standard deviation of the stock's rate of return is 0.7. The call has an exercise price of Rs. 90 and has 6 months to for expiration. The continuously compounding rate of return is 8% of per annum. **(Unit-III, Prob.10)**

9. (a) Why do swap dealers exist ? State the applications of swaps. **(Unit-IV, Q.No.3)**

OR

(b) The swap interest rates are flat in both Japan and the U.S. The Japanese rate is 4% p.a. and the U.S. rate is 9% p.a. A financial institution has entered into a currency swap in which it receives 5% p.a. in a year and pays 85 p.a. in dollars once a year. The principles in the two countries are $ 10 million and 1200 million yen. The swap will last for another 3 years and the current exchange rate is 110 Yen = $1. What is the value of swap in dollars ? **(Unit-IV, Prob.14)**

OR

10. (a) What are the stock index futures ? Explain how the speculators and arbitrageurs can profitability use stock index futures. **(Unit-V, Q.No.1,3)**

(b) A stock index is currently at 820. The continuously compounding risk free rate of return is 9% p.a. and the dividend yield on the index is 3 per cent per annum. What should the futures price for a contract with 3 months to expiration be ? **(Unit-V, Prob.13)**

FACULTY OF COMMERCE

M.Com - II Year, IV - Semester (CBCS) Examination

May / June - 2018

FINANCIAL DERIVATIVES

Time : 3 Hours] [Max. Marks : 80

PART - A (5 × 4 = 20 Marks)

ANSWERS

Note : Answer all the questions in not more than one page each.

1. What is a financial derivative. **(Unit-I, SQA.1)**
2. What is a futures contract. **(Unit-II,SQA.1)**
3. What is ITM? **(Unit-III,SQA.1)**
4. What is interest rate swap? **(Unit-IV,SQA.1)**
5. What is stock index. **(Unit-V,SQA.1)**

PART - B (5 × 12 = 60 Marks)

Note: Answer all the questions by using internal choice

6. (a) Explain the uses of financing derivatives. **(Unit-I, Q.No.4)**

OR

(b) Explain the types of financial derivatives. **(Unit-I, Q.No.3)**

7. (a) What are the differences between futures and forwards? **(Unit-II, Q.No.8)**

OR

(b) Briefly explain the growth of futures market in India? **(Unit-II, Q.No.11)**

8. (a) Explain the assumptions of Black-Scholes option pricing model. **(Unit-III, Q.No.)**

OR

(b) The current stock price for ACG Ltd is Rs. 85. A European call option with an exercise price of Rs. 85 will expire in 160 days. The yield on a 160-day Treasury bill is 5.18%. The standard deviation of annual returns on ACG's stock is 44%. Compute the premium for a call option on this stock. **(Unit-III, Prob.12)**

9. (a) Explain the uses and risks associated with interest rate swaps. **(Unit-IV, Q.No.16)**

OR

(b) Companies A and B have been offered the following rate per annum on a $ 20 million five year loan.

Company	Fixed Rate	Floating Rate
A	12%	LIBOR + 0.1%
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Company A requires a floating rate loan company B requires a fixed rate loan. Design a swap that a bank acting as intermediary at a commission of 0.1% per annum. It shall be equally attractive to both companies. **(Unit-IV, Prob.3)**

10. (a) Explain the features of stock index. **(Unit-V, Q.No.1)**

OR

(b) From the following data, calculate the hedge ratio, using individual stock betas.

Stock	Share Price (Rs.)	Shares Outstanding	Beta	Proportion of Portfolio
ITC	115	1,000	0.95	40%
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(Unit-V, Prob.8)

FACULTY OF COMMERCE

M.Com. IV - Semester (CBCS) Examination

May- 2017

FINANCIAL DERIVATIVES

Time : 3 Hours Max. Marks: 80

PART - A (5 × 4 = 20 Marks)

ANSWERS

Note : Answer all the questions in not more than one page each.

1. What are the reasons for the growth of financial derivatives market? **(Unit-I,SQA.2)**
2. What are features of futures contracts? **(Unit-II,SQA.3)**
3. What is call option? **(Unit-III,SQA.2)**
4. What are the features of interest rate swaps? **(Unit-IV,SQA.5)**
5. Write a note on stock index futures. **(Unit-V,SQA.2)**

PART - B (5 × 12 = 60 Marks)

Note: Answer all the questions by using internal choice

6. (a) What are the advantages and disadvantages of financial derivatives? **(Unit-I, Q.No. 9,10)**

OR

(b) What are the myths and truths of financial derivatives? Explain. **(Unit-I, Q.No.1)**

7. (a) What are the differences between forwards and futures? Explain **(Unit-II, Q.No.8)**

OR

(b) Explain the recommendations of L.C. Gupta committee on introduction of financial derivatives in India. **(Unit-II, Q.No.17)**

8. (a) What are the factors that determine the value of options? Explain. **(Unit-III, Q.No.10)**

OR

(b) From the following information, calculate call option value.

Current market price = Rs. 100 per share

Exercise price = Rs. 80 per share

Volatility of share price = 30%

Risk free interest rate 10% p.a

Time to expiration = 3 months

Use back-scholes options pricing model. **(Unit-III, Prob.11)**

9. (a) Explain the advantages and limitations of currency swap. **(Unit-IV, Q.No.8)**

OR

(b) Company ABC and XYZ face the following rates.

	ABC	XYZ
US Dollar (Floating rate)	LIBOR + 0.5%	LIBOR + 1.5%
Japanese Yen (Fixed rate)	6.0%	7.5%

Assume that ABC want to borrow dollars at floating rate and XYZ wants to borrow Japanese Yen at fixed rate. A financial institution is planning to arrange a swap and requires a 75 basis points spread. If the swap is equally attractive to ABC and XYZ, what rates of interest ABC and XYZ end up paying. **(Unit-IV, Prob.13)**

10. (a) How do you value stock index futures? Explain. **(Unit-V, Q.No.3)**

OR

(b) Value of S & P 500 index = 200

Value of portfolio = Rs. 10,20,000

Risk-free interest rate = 10% p.a.

Dividend yield on S & P 500 = 4% p.a

Calculate the number of contract futures

that should be shorted to hedge the portfolio. **(Unit-V, Prob.2)**

FACULTY OF COMMERCE

M.Com. IV - Semester (CBCS)Examination

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FINANCIAL DERIVATIVES

Time : 3 Hours Max. Marks: 80

PART - A (5×4=20 Marks)

ANSWERS

Note : Answer all the questions in not more than one page each.

1. Derivative market **(Unit-I, SQA.1)**
2. Forwards **(Unit-II, SQA.2)**
3. Exercise price **(Unit-III, SQA.4)**
4. Interest rate swap **(Unit-IV, SQA.1)**
5. Index future **(Unit-V, SQA.2)**

PART - B (5×12=60 Marks)

Note: Answer all the questions by using internal choice

6. (a) Explain briefly the evolution of derivatives in India. **(Unit-I, Q.No.8)**

OR

(b) Explain the benefits of derivatives. **(Unit-I, Q.No.9)**

7. (a) Discuss the characteristics of futures contracts. **(Unit-II, Q.No.5)**

OR

(b) Explain the growth of futures market in India. **(Unit-II, Q.No.11)**

8. (a) What are options ? What are the factors that determine the price of option. **(Unit-III, Q.No.1, 10)**

OR

(b) Determine the value of a call option using the Black and Scholes model :

The share is currently selling at Rs. 80 and the standard deviation of the stock's rate of return is 0.7. The call has an exercise price of Rs. 90 and has 6 months to for expiration. The continuously compounding rate of return is 8% of per annum. **(Unit-III, Prob.10)**

9. (a) Why do swap dealers exist ? State the applications of swaps. **(Unit-IV, Q.No.3)**

OR

(b) The swap interest rates are flat in both Japan and the U.S. The Japanese rate is 4% p.a. and the U.S. rate is 9% p.a. A financial institution has entered into a currency swap in which it receives 5% p.a. in a year and pays 85 p.a. in dollars once a year. The principles in the two countries are $ 10 million and 1200 million yen. The swap will last for another 3 years and the current exchange rate is 110 Yen = $1. What is the value of swap in dollars ? **(Unit-IV, Prob.14)**

OR

10. (a) What are the stock index futures ? Explain how the speculators and arbitrageurs can profitability use stock index futures. **(Unit-V, Q.No.1,3)**

(b) A stock index is currently at 820. The continuously compounding risk free rate of return is 9% p.a. and the dividend yield on the index is 3 per cent per annum. What should the futures price for a contract with 3 months to expiration be ? **(Unit-V, Prob.13)**

FACULTY OF COMMERCE

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May / June - 2018

FINANCIAL DERIVATIVES

Time : 3 Hours] [Max. Marks : 80

PART - A (5 × 4 = 20 Marks)

ANSWERS

Note : Answer all the questions in not more than one page each.

1. What is a financial derivative. **(Unit-I, SQA.1)**
2. What is a futures contract. **(Unit-II,SQA.1)**
3. What is ITM? **(Unit-III,SQA.1)**
4. What is interest rate swap? **(Unit-IV,SQA.1)**
5. What is stock index. **(Unit-V,SQA.1)**

PART - B (5 × 12 = 60 Marks)

Note: Answer all the questions by using internal choice

6. (a) Explain the uses of financing derivatives. **(Unit-I, Q.No.4)**

OR

(b) Explain the types of financial derivatives. **(Unit-I, Q.No.3)**

7. (a) What are the differences between futures and forwards? **(Unit-II, Q.No.8)**

OR

(b) Briefly explain the growth of futures market in India? **(Unit-II, Q.No.11)**

8. (a) Explain the assumptions of Black-Scholes option pricing model. **(Unit-III, Q.No.)**

OR

(b) The current stock price for ACG Ltd is Rs. 85. A European call option with an exercise price of Rs. 85 will expire in 160 days. The yield on a 160-day Treasury bill is 5.18%. The standard deviation of annual returns on ACG's stock is 44%. Compute the premium for a call option on this stock. **(Unit-III, Prob.12)**

9. (a) Explain the uses and risks associated with interest rate swaps. **(Unit-IV, Q.No.16)**

OR

(b) Companies A and B have been offered the following rate per annum on a $ 20 million five year loan.

Company	Fixed Rate	Floating Rate
A	12%	LIBOR + 0.1%
B	13.4$	LIBOR + 0.6%

Company A requires a floating rate loan company B requires a fixed rate loan. Design a swap that a bank acting as intermediary at a commission of 0.1% per annum. It shall be equally attractive to both companies. **(Unit-IV, Prob.3)**

10. (a) Explain the features of stock index. **(Unit-V, Q.No.1)**

OR

(b) From the following data, calculate the hedge ratio, using individual stock betas.

Stock	Share Price (Rs.)	Shares Outstanding	Beta	Proportion of Portfolio
ITC	115	1,000	0.95	40%
BATA	160	2,000	1.20	40%
SBI	40	4,000	1.40	10%
AB	50	6,000	1.30	10%

(Unit-V, Prob.8)

FACULTY OF COMMERCE

M.Com. IV - Semester (CBCS) Examination

May- 2017

FINANCIAL DERIVATIVES

Time : 3 Hours Max. Marks: 80

PART - A (5 × 4 = 20 Marks)

ANSWERS

Note : Answer all the questions in not more than one page each.

1. What are the reasons for the growth of financial derivatives market? **(Unit-I,SQA.2)**
2. What are features of futures contracts? **(Unit-II,SQA.3)**
3. What is call option? **(Unit-III,SQA.2)**
4. What are the features of interest rate swaps? **(Unit-IV,SQA.5)**
5. Write a note on stock index futures. **(Unit-V,SQA.2)**

PART - B (5 × 12 = 60 Marks)

Note: Answer all the questions by using internal choice

6. (a) What are the advantages and disadvantages of financial derivatives? **(Unit-I, Q.No. 9,10)**

OR

(b) What are the myths and truths of financial derivatives? Explain. **(Unit-I, Q.No.1)**

7. (a) What are the differences between forwards and futures? Explain **(Unit-II, Q.No.8)**

OR

(b) Explain the recommendations of L.C. Gupta committee on introduction of financial derivatives in India. **(Unit-II, Q.No.17)**

8. (a) What are the factors that determine the value of options? Explain. **(Unit-III, Q.No.10)**

OR

(b) From the following information, calculate call option value.

Current market price = Rs. 100 per share

Exercise price = Rs. 80 per share

Volatility of share price = 30%

Risk free interest rate 10% p.a

Time to expiration = 3 months

Use back-scholes options pricing model. **(Unit-III, Prob.11)**

9. (a) Explain the advantages and limitations of currency swap. **(Unit-IV, Q.No.8)**

OR

(b) Company ABC and XYZ face the following rates.

	ABC	XYZ
US Dollar (Floating rate)	LIBOR + 0.5%	LIBOR + 1.5%
Japanese Yen (Fixed rate)	6.0%	7.5%

Assume that ABC want to borrow dollars at floating rate and XYZ wants to borrow Japanese Yen at fixed rate. A financial institution is planning to arrange a swap and requires a 75 basis points spread. If the swap is equally attractive to ABC and XYZ, what rates of interest ABC and XYZ end up paying. **(Unit-IV, Prob.13)**

10. (a) How do you value stock index futures? Explain. **(Unit-V, Q.No.3)**

OR

(b) Value of S & P 500 index = 200

Value of portfolio = Rs. 10,20,000

Risk-free interest rate = 10% p.a.

Dividend yield on S & P 500 = 4% p.a

Calculate the number of contract futures

that should be shorted to hedge the portfolio. **(Unit-V, Prob.2)**

FACULTY OF COMMERCE

M.Com. IV - Semester (CBCS)Examination

May/June- 2016

FINANCIAL DERIVATIVES

Time : 3 Hours Max. Marks: 80

PART - A (5×4=20 Marks)

ANSWERS

Note : Answer all the questions in not more than one page each.

1. Derivative market **(Unit-I, SQA.1)**
2. Forwards **(Unit-II, SQA.2)**
3. Exercise price **(Unit-III, SQA.4)**
4. Interest rate swap **(Unit-IV, SQA.1)**
5. Index future **(Unit-V, SQA.2)**

PART - B (5×12=60 Marks)

Note: Answer all the questions by using internal choice

6. (a) Explain briefly the evolution of derivatives in India. **(Unit-I, Q.No.8)**

OR

(b) Explain the benefits of derivatives. **(Unit-I, Q.No.9)**

7. (a) Discuss the characteristics of futures contracts. **(Unit-II, Q.No.5)**

OR

(b) Explain the growth of futures market in India. **(Unit-II, Q.No.11)**

8. (a) What are options ? What are the factors that determine the price of option. **(Unit-III, Q.No.1, 10)**

OR

(b) Determine the value of a call option using the Black and Scholes model :

The share is currently selling at Rs. 80 and the standard deviation of the stock's rate of return is 0.7. The call has an exercise price of Rs. 90 and has 6 months to for expiration. The continuously compounding rate of return is 8% of per annum. **(Unit-III, Prob.10)**

9. (a) Why do swap dealers exist ? State the applications of swaps. **(Unit-IV, Q.No.3)**

OR

(b) The swap interest rates are flat in both Japan and the U.S. The Japanese rate is 4% p.a. and the U.S. rate is 9% p.a. A financial institution has entered into a currency swap in which it receives 5% p.a. in a year and pays 85 p.a. in dollars once a year. The principles in the two countries are $ 10 million and 1200 million yen. The swap will last for another 3 years and the current exchange rate is 110 Yen = $1. What is the value of swap in dollars ? **(Unit-IV, Prob.14)**

OR

10. (a) What are the stock index futures ? Explain how the speculators and arbitrageurs can profitability use stock index futures. **(Unit-V, Q.No.1,3)**

(b) A stock index is currently at 820. The continuously compounding risk free rate of return is 9% p.a. and the dividend yield on the index is 3 per cent per annum. What should the futures price for a contract with 3 months to expiration be ? **(Unit-V, Prob.13)**

FACULTY OF COMMERCE

M.Com - II Year, IV - Semester (CBCS) Examination

May / June - 2018

FINANCIAL DERIVATIVES

Time : 3 Hours] [Max. Marks : 80

PART - A (5 × 4 = 20 Marks)

ANSWERS

Note : Answer all the questions in not more than one page each.

1. What is a financial derivative. **(Unit-I, SQA.1)**
2. What is a futures contract. **(Unit-II,SQA.1)**
3. What is ITM? **(Unit-III,SQA.1)**
4. What is interest rate swap? **(Unit-IV,SQA.1)**
5. What is stock index. **(Unit-V,SQA.1)**

PART - B (5 × 12 = 60 Marks)

Note: Answer all the questions by using internal choice

6. (a) Explain the uses of financing derivatives. **(Unit-I, Q.No.4)**

OR

(b) Explain the types of financial derivatives. **(Unit-I, Q.No.3)**

7. (a) What are the differences between futures and forwards? **(Unit-II, Q.No.8)**

OR

(b) Briefly explain the growth of futures market in India? **(Unit-II, Q.No.11)**

8. (a) Explain the assumptions of Black-Scholes option pricing model. **(Unit-III, Q.No.)**

OR

(b) The current stock price for ACG Ltd is Rs. 85. A European call option with an exercise price of Rs. 85 will expire in 160 days. The yield on a 160-day Treasury bill is 5.18%. The standard deviation of annual returns on ACG's stock is 44%. Compute the premium for a call option on this stock. **(Unit-III, Prob.12)**

9. (a) Explain the uses and risks associated with interest rate swaps. **(Unit-IV, Q.No.16)**

OR

(b) Companies A and B have been offered the following rate per annum on a $ 20 million five year loan.

Company	Fixed Rate	Floating Rate
A	12%	LIBOR + 0.1%
B	13.4$	LIBOR + 0.6%

Company A requires a floating rate loan company B requires a fixed rate loan. Design a swap that a bank acting as intermediary at a commission of 0.1% per annum. It shall be equally attractive to both companies. **(Unit-IV, Prob.3)**

10. (a) Explain the features of stock index. **(Unit-V, Q.No.1)**

OR

(b) From the following data, calculate the hedge ratio, using individual stock betas.

Stock	Share Price (Rs.)	Shares Outstanding	Beta	Proportion of Portfolio
ITC	115	1,000	0.95	40%
BATA	160	2,000	1.20	40%
SBI	40	4,000	1.40	10%
AB	50	6,000	1.30	10%

(Unit-V, Prob.8)

FACULTY OF COMMERCE

M.Com. IV - Semester (CBCS) Examination

May- 2017

FINANCIAL DERIVATIVES

Time : 3 Hours Max. Marks: 80

PART - A (5 × 4 = 20 Marks)

ANSWERS

Note : Answer all the questions in not more than one page each.

1. What are the reasons for the growth of financial derivatives market? **(Unit-I,SQA.2)**
2. What are features of futures contracts? **(Unit-II,SQA.3)**
3. What is call option? **(Unit-III,SQA.2)**
4. What are the features of interest rate swaps? **(Unit-IV,SQA.5)**
5. Write a note on stock index futures. **(Unit-V,SQA.2)**

PART - B (5 × 12 = 60 Marks)

Note: Answer all the questions by using internal choice

6. (a) What are the advantages and disadvantages of financial derivatives? **(Unit-I, Q.No. 9,10)**

OR

(b) What are the myths and truths of financial derivatives? Explain. **(Unit-I, Q.No.1)**

7. (a) What are the differences between forwards and futures? Explain **(Unit-II, Q.No.8)**

OR

(b) Explain the recommendations of L.C. Gupta committee on introduction of financial derivatives in India. **(Unit-II, Q.No.17)**

8. (a) What are the factors that determine the value of options? Explain. **(Unit-III, Q.No.10)**

OR

(b) From the following information, calculate call option value.

Current market price = Rs. 100 per share

Exercise price = Rs. 80 per share

Volatility of share price = 30%

Risk free interest rate 10% p.a

Time to expiration = 3 months

Use back-scholes options pricing model. **(Unit-III, Prob.11)**

9. (a) Explain the advantages and limitations of currency swap. **(Unit-IV, Q.No.8)**

OR

(b) Company ABC and XYZ face the following rates.

	ABC	XYZ
US Dollar (Floating rate)	LIBOR + 0.5%	LIBOR + 1.5%
Japanese Yen (Fixed rate)	6.0%	7.5%

Assume that ABC want to borrow dollars at floating rate and XYZ wants to borrow Japanese Yen at fixed rate. A financial institution is planning to arrange a swap and requires a 75 basis points spread. If the swap is equally attractive to ABC and XYZ, what rates of interest ABC and XYZ end up paying. **(Unit-IV, Prob.13)**

10. (a) How do you value stock index futures? Explain. **(Unit-V, Q.No.3)**

OR

(b) Value of S & P 500 index = 200

Value of portfolio = Rs. 10,20,000

Risk-free interest rate = 10% p.a.

Dividend yield on S & P 500 = 4% p.a

Calculate the number of contract futures

that should be shorted to hedge the portfolio. **(Unit-V, Prob.2)**

FACULTY OF COMMERCE

M.Com. IV - Semester (CBCS)Examination

May/June- 2016

FINANCIAL DERIVATIVES

Time : 3 Hours Max. Marks: 80

PART - A (5×4=20 Marks)

ANSWERS

Note : Answer all the questions in not more than one page each.

1. Derivative market **(Unit-I, SQA.1)**
2. Forwards **(Unit-II, SQA.2)**
3. Exercise price **(Unit-III, SQA.4)**
4. Interest rate swap **(Unit-IV, SQA.1)**
5. Index future **(Unit-V, SQA.2)**

PART - B (5×12=60 Marks)

Note: Answer all the questions by using internal choice

6. (a) Explain briefly the evolution of derivatives in India. **(Unit-I, Q.No.8)**

OR

(b) Explain the benefits of derivatives. **(Unit-I, Q.No.9)**

7. (a) Discuss the characteristics of futures contracts. **(Unit-II, Q.No.5)**

OR

(b) Explain the growth of futures market in India. **(Unit-II, Q.No.11)**

8. (a) What are options ? What are the factors that determine the price of option. **(Unit-III, Q.No.1, 10)**

OR

(b) Determine the value of a call option using the Black and Scholes model :

The share is currently selling at Rs. 80 and the standard deviation of the stock's rate of return is 0.7. The call has an exercise price of Rs. 90 and has 6 months to for expiration. The continuously compounding rate of return is 8% of per annum. **(Unit-III, Prob.10)**

9. (a) Why do swap dealers exist ? State the applications of swaps. **(Unit-IV, Q.No.3)**

OR

(b) The swap interest rates are flat in both Japan and the U.S. The Japanese rate is 4% p.a. and the U.S. rate is 9% p.a. A financial institution has entered into a currency swap in which it receives 5% p.a. in a year and pays 85 p.a. in dollars once a year. The principles in the two countries are $ 10 million and 1200 million yen. The swap will last for another 3 years and the current exchange rate is 110 Yen = $1. What is the value of swap in dollars ? **(Unit-IV, Prob.14)**

OR

10. (a) What are the stock index futures ? Explain how the speculators and arbitrageurs can profitability use stock index futures. **(Unit-V, Q.No.1,3)**

(b) A stock index is currently at 820. The continuously compounding risk free rate of return is 9% p.a. and the dividend yield on the index is 3 per cent per annum. What should the futures price for a contract with 3 months to expiration be ? **(Unit-V, Prob.13)**

FACULTY OF COMMERCE

M.Com - II Year, IV - Semester (CBCS) Examination

May / June - 2018

FINANCIAL DERIVATIVES

Time : 3 Hours] [Max. Marks : 80

PART - A (5 × 4 = 20 Marks)

ANSWERS

Note : Answer all the questions in not more than one page each.

1. What is a financial derivative. **(Unit-I, SQA.1)**
2. What is a futures contract. **(Unit-II,SQA.1)**
3. What is ITM? **(Unit-III,SQA.1)**
4. What is interest rate swap? **(Unit-IV,SQA.1)**
5. What is stock index. **(Unit-V,SQA.1)**

PART - B (5 × 12 = 60 Marks)

Note: Answer all the questions by using internal choice

6. (a) Explain the uses of financing derivatives. **(Unit-I, Q.No.4)**

OR

(b) Explain the types of financial derivatives. **(Unit-I, Q.No.3)**

7. (a) What are the differences between futures and forwards? **(Unit-II, Q.No.8)**

OR

(b) Briefly explain the growth of futures market in India? **(Unit-II, Q.No.11)**

8. (a) Explain the assumptions of Black-Scholes option pricing model. **(Unit-III, Q.No.)**

OR

(b) The current stock price for ACG Ltd is Rs. 85. A European call option with an exercise price of Rs. 85 will expire in 160 days. The yield on a 160-day Treasury bill is 5.18%. The standard deviation of annual returns on ACG's stock is 44%. Compute the premium for a call option on this stock. **(Unit-III, Prob.12)**

9. (a) Explain the uses and risks associated with interest rate swaps. **(Unit-IV, Q.No.16)**

OR

(b) Companies A and B have been offered the following rate per annum on a $ 20 million five year loan.

Company	Fixed Rate	Floating Rate
A	12%	LIBOR + 0.1%
B	13.4$	LIBOR + 0.6%

Company A requires a floating rate loan company B requires a fixed rate loan. Design a swap that a bank acting as intermediary at a commission of 0.1% per annum. It shall be equally attractive to both companies. **(Unit-IV, Prob.3)**

10. (a) Explain the features of stock index. **(Unit-V, Q.No.1)**

OR

(b) From the following data, calculate the hedge ratio, using individual stock betas.

Stock	Share Price (Rs.)	Shares Outstanding	Beta	Proportion of Portfolio
ITC	115	1,000	0.95	40%
BATA	160	2,000	1.20	40%
SBI	40	4,000	1.40	10%
AB	50	6,000	1.30	10%

(Unit-V, Prob.8)

FACULTY OF COMMERCE

M.Com. IV - Semester (CBCS) Examination

May- 2017

FINANCIAL DERIVATIVES

Time : 3 Hours Max. Marks: 80

PART - A (5 × 4 = 20 Marks)

ANSWERS

Note : Answer all the questions in not more than one page each.

1. What are the reasons for the growth of financial derivatives market? **(Unit-I,SQA.2)**
2. What are features of futures contracts? **(Unit-II,SQA.3)**
3. What is call option? **(Unit-III,SQA.2)**
4. What are the features of interest rate swaps? **(Unit-IV,SQA.5)**
5. Write a note on stock index futures. **(Unit-V,SQA.2)**

PART - B (5 × 12 = 60 Marks)

Note: Answer all the questions by using internal choice

6. (a) What are the advantages and disadvantages of financial derivatives? **(Unit-I, Q.No. 9,10)**

OR

(b) What are the myths and truths of financial derivatives? Explain. **(Unit-I, Q.No.1)**

7. (a) What are the differences between forwards and futures? Explain **(Unit-II, Q.No.8)**

OR

(b) Explain the recommendations of L.C. Gupta committee on introduction of financial derivatives in India. **(Unit-II, Q.No.17)**

8. (a) What are the factors that determine the value of options? Explain. **(Unit-III, Q.No.10)**

OR

(b) From the following information, calculate call option value.

Current market price = Rs. 100 per share

Exercise price = Rs. 80 per share

Volatility of share price = 30%

Risk free interest rate 10% p.a

Time to expiration = 3 months

Use back-scholes options pricing model. **(Unit-III, Prob.11)**

9. (a) Explain the advantages and limitations of currency swap. **(Unit-IV, Q.No.8)**

OR

(b) Company ABC and XYZ face the following rates.

	ABC	XYZ
US Dollar (Floating rate)	LIBOR + 0.5%	LIBOR + 1.5%
Japanese Yen (Fixed rate)	6.0%	7.5%

Assume that ABC want to borrow dollars at floating rate and XYZ wants to borrow Japanese Yen at fixed rate. A financial institution is planning to arrange a swap and requires a 75 basis points spread. If the swap is equally attractive to ABC and XYZ, what rates of interest ABC and XYZ end up paying. **(Unit-IV, Prob.13)**

10. (a) How do you value stock index futures? Explain. **(Unit-V, Q.No.3)**

OR

(b) Value of S & P 500 index = 200

Value of portfolio = Rs. 10,20,000

Risk-free interest rate = 10% p.a.

Dividend yield on S & P 500 = 4% p.a

Calculate the number of contract futures

that should be shorted to hedge the portfolio. **(Unit-V, Prob.2)**

FACULTY OF COMMERCE

M.Com. IV - Semester (CBCS)Examination

May/June- 2016

FINANCIAL DERIVATIVES

Time : 3 Hours Max. Marks: 80

PART - A (5×4=20 Marks)

ANSWERS

Note : Answer all the questions in not more than one page each.

1. Derivative market **(Unit-I, SQA.1)**
2. Forwards **(Unit-II, SQA.2)**
3. Exercise price **(Unit-III, SQA.4)**
4. Interest rate swap **(Unit-IV, SQA.1)**
5. Index future **(Unit-V, SQA.2)**

PART - B (5×12=60 Marks)

Note: Answer all the questions by using internal choice

6. (a) Explain briefly the evolution of derivatives in India. **(Unit-I, Q.No.8)**

OR

(b) Explain the benefits of derivatives. **(Unit-I, Q.No.9)**

7. (a) Discuss the characteristics of futures contracts. **(Unit-II, Q.No.5)**

OR

(b) Explain the growth of futures market in India. **(Unit-II, Q.No.11)**

8. (a) What are options ? What are the factors that determine the price of option. **(Unit-III, Q.No.1, 10)**

OR

(b) Determine the value of a call option using the Black and Scholes model :

The share is currently selling at Rs. 80 and the standard deviation of the stock's rate of return is 0.7. The call has an exercise price of Rs. 90 and has 6 months to for expiration. The continuously compounding rate of return is 8% of per annum. **(Unit-III, Prob.10)**

9. (a) Why do swap dealers exist ? State the applications of swaps. **(Unit-IV, Q.No.3)**

OR

(b) The swap interest rates are flat in both Japan and the U.S. The Japanese rate is 4% p.a. and the U.S. rate is 9% p.a. A financial institution has entered into a currency swap in which it receives 5% p.a. in a year and pays 85 p.a. in dollars once a year. The principles in the two countries are $ 10 million and 1200 million yen. The swap will last for another 3 years and the current exchange rate is 110 Yen = $1. What is the value of swap in dollars ? **(Unit-IV, Prob.14)**

OR

10. (a) What are the stock index futures ? Explain how the speculators and arbitrageurs can profitability use stock index futures. **(Unit-V, Q.No.1,3)**

(b) A stock index is currently at 820. The continuously compounding risk free rate of return is 9% p.a. and the dividend yield on the index is 3 per cent per annum. What should the futures price for a contract with 3 months to expiration be ? **(Unit-V, Prob.13)**

FACULTY OF COMMERCE

M.Com. IV - Semester(CBCS) Examination

MODEL PAPER - I

FINANCIAL DERIVATIVES

Time : 3 Hours | Max. Marks: 80

PART - A (5 × 4 = 20 Marks)

ANSWERS

Note : Answer all the questions in not more than one page each.

1. What are the important features of financial derivaties? **(Unit-I,SQA.3)**
2. What is a future contract? **(Unit-II,SQA.1)**
3. Exercise Price **(Unit-III,SQA.4)**
4. Define the term LIBOR. **(Unit-IV,SQA.6)**
5. The minimum-variance hedge radio **(Unit-V,SQA.4)**

PART - B (5 × 12 = 60 Marks)

Note: Answer all the questions by using internal choice

6. (a) Explain the term Financial Derivative. What are the important features of financial derivaties? **(Unit-I, Q.No.1,2)**

OR

(b) What are the myths and truths of financial derivatives? Explain. **(Unit-I, Q.No.11)**

7. (a) Briefly explain the growth of Futures Market in India. **(Unit-II, Q.No.11)**

OR

(b) Explain the Recommendations of L.C. Gupta Committee on introduction of financial derivatives in India. **(Unit-II, Q.No.17)**

8. (a) What are various assumptions of Black Scholes Option Pricing Model? **(Unit-III, Q.No.12)**

OR

(b) A stock price is currently `40. It is known that at the end of 3 months it will be either `45 or `35. The risk-free rate of interest with quarterly compounding is 8% per annum. Calculate the value of a 3-month European put option on the stock with an exercise price `40. Verify that no-arbitrage arguments and risk-neutral valuation arguments given the same answers. **(Unit-III, Prob.14)**

9. (a) Explain the advantages and limitations of currency swap. **(Unit-IV, Q.No.8)**

OR

(b) Companies ABC and PQR have been offered the following rates per annum on a ` 100 lacs 10 years loan.

	Fixed rate	Floating rate
Company ABC	10%	MIBOR + 0.5%
Company PQR	11.8%	NIBOR + 1.0%

Company ABC requires a floating rate loan, company PQR requires a fixed rate loan.

(i) How can the two companies enter into a swap arrangement in which each benefits equality ?

(ii) What risk could the arrangement generate ? **(Unit-IV, Prob.4)**

10. (a) Explain how speculators and arbitrageotis can profitability use stock index futures. **(Unit-V, Q.No.3)**

OR

(b) From the following figures, calculate the futures price of the index.

Value of BSE index = 4000

Value of portfolio = Rs 10,00,000

Risk-free interest rate = 8%

Dividend yield on index = 6% per annum

Beta of the portfolio (b) = 1.5

Calculate the hedge ratio that should be shorted to hedge the portfolio.

What happens if index turns to be 3500 in three months. **(Unit-V, Prob.11)**

FACULTY OF COMMERCE

M.Com. IV - Semester(CBCS) Examination

MODEL PAPER - II

FINANCIAL DERIVATIVES

Time : 3 Hours Max. Marks: 80

PART - A (5 × 4 = 20 Marks)

ANSWERS

Note : Answer all the questions in not more than one page each.

1. Forward contracts **(Unit-I,SQA.4)**
2. Speculators **(Unit-II,SQA.9)**
3. Black Scholes Option Pricing Model. **(Unit-III,SQA.9)**
4. Define Commodity Swap. **(Unit-IV,SQA.8)**
5. Rolling the hedged forward **(Unit-V,SQA.7)**

PART - B (5 × 12 = 60 Marks)

Note: Answer all the questions by using internal choice

6. (a) What are the benefits of derivatives? **(Unit-I, Q.No.9)**

OR

(b) Explain the different types of financial derivatives along with their features in brief. **(Unit-I, Q.No.3)**

7. (a) Discuss the characteristics of future contracts. **(Unit-II, Q.No.5)**

OR

(b) What are the differences between futures and forwards? Explain. **(Unit-II, Q.No.8)**

8. (a) Mr. Shaker wants to earn by writing call option on RIL's stock the current price of stock is Rs. 28 and shaker wants to write a four month call option with the strike price of Rs. 30/- Mr. shaker wants to determine the appropriate premium to charge for call option. The stock S.D is 30% the risk less rate of interest is 10% p.a. determine the premium value of call option. **(Unit-III, Prob.2)**

OR

(b) Explain the different classification of options. **(Unit-III, Q.No.3)**

9. (a) What is Interest Rate Swap contract? Write a note on different types of Interest Rate Swap. **(Unit-IV, Q.No.9)**

OR

(b) Sun Pharmaceutical Ltd. wishes to borrow Rs 20 crore at a fixed rate for 5 years and has been offered either 11% fixed or six-month LIBOR +

l%.CIPLA Ltd. wishes to borrow Rs 20 crore at a floating rate for 5 years and has been offered either six-month LIBOR + 0.5% or 10% fixed. On the basis of above figure :

(a) How may they enter into swap arrangement in which each benefits equally?

(b) What risk may this arrangement generate? **(Unit-IV, Prob.12)**

10. (a) List out various stock index traded on various stock exchanges world wide with their specifications. **(Unit-V, Q.No.5)**

OR

(b) Suppose a return equally-weighted index contains the three stocks and have a previous day value of 270. Compute the index's value today.

Stock	Previous day's price	Current price
HLL	70	77
SBI	90	108
HDFC	90	95

(Unit-V, Prob.7)

FACULTY OF COMMERCE

M.Com. IV - Semester(CBCS) Examination

MODEL PAPER - III

FINANCIAL DERIVATIVES

Time : 3 Hours Max. Marks: 80

PART - A (5 × 4 = 20 Marks)

ANSWERS

Note : Answer all the questions in not more than one page each.

1. What are the disadvantages of financial derivatives? **(Unit-I,SQA.10)**
2. Interest Rate Future **(Unit-II,SQA.5)**
3. What is binomial pricing model? **(Unit-III,SQA.12)**
4. What is Interest Rate Swap ? **(Unit-IV,SQA.1)**
5. Asset allocation by the funds managers **(Unit-V,SQA.8)**

PART - B (5 × 12 = 60 Marks)

Note: Answer all the questions by using internal choice

6. (a) Explain briefly the evolution of derivatives in India. **(Unit-I, Q.No.1)**

OR

(b) Explain the trading mechanism of derivatives at National Stock Exchange (NSE) and Bombay Stock Exchange(BSE). **(Unit-I, Q.No.13)**

7. (a) Explain Determination of Future Prices of various assets. **(Unit-II, Q.No.14)**

OR

(b) Explain the various theory of Futures Prices. **(Unit-II, Q.No.16)**

8. (a) Determine the value of a call option using the Black and Scholes model :

The share is currently selling at Rs. 80 and the standard deviation of the stock's rate of return is 0.7. The call has an exercise price of Rs. 90 and has 6 months to for expiration. The continuously compounding rate of return is 8% of per annum. **(Unit-III, Prob.10)**

OR

(b) What are the factors that determines the value of options? Explain. **(Unit-III, Q.No.10)**

9. (a) Explain in detail about Currency Swap. **(Unit-IV, Q.No.7)**

OR

(b) Bhakti Ltd and Sita Ltd have to borrow Rs. 50 lakhs each. The required interest rates are as follows,

	Fixed Rate	Floating Rate
Bhakti Ltd	14.0%	LIBOR + 0.2%
Sita Ltd	15.3%	LIBOR + 0.5%

Bhakti Ltd is interested to borrow at a floating rate while Sita Ltd is willing to borrow at a fixed rate obligations. You are required to design an appropriate swap. The swap dealer must get a commission of 0.1% and profit needs to be shared equally by 2 companies. **(Unit-IV, Prob.7)**

10. (a) List out various stock index traded on various stock exchanges world wide with their specifications. **(Unit-V, Q.No.5)**

OR

(b) Determine the value of weighted index for three stocks with following prices and capitalization. The current index divisor is 0.10.

Stock	Share out standing	Price base period	Current price
HLL	1000	50	70
SBI	800	100	90
HDFC	500	80	90

(Unit-V, Prob.6)

FACULTY OF COMMERCE

M.Com. IV - Semester (CBCS) Examination

July - 2021

FINANCIAL DERIVATIVES

Time : 2 Hours] [Max. Marks : 80

PART - A (4 × 5 = 20 Marks)

ANSWERS

Note : Answer any four questions.

1. Explain the benefits of Financial Derivatives. **(Unit-I, Q.No.9)**
2. What do you mean by Futures Contract? **(Unit-II, SQA.1)**
3. What are the assumptions of BOPM? **(Unit-III, SQA.13)**
4. Explain the features of Swaps **(Unit-IV, SQA.3)**
5. What is Stock index Futures? **(Unit-V, SQA.1)**

PART - B (4 × 15 = 60 Marks)

Note: Answer any four questions

6. Discuss the history and evolution of Financial Derivatives in India. **(Unit-I, Q.No.6,8)**
7. Explain the advantages and limitations of Financial Derivatives. **(Unit-I, Q.No.9,10)**
8. State the procedure for determination of future prices of Specific Assets. **(Unit-II, Q.No.14)**
9. Explain the trading mechanism of Forward Market. **(Unit-II, Q.No.3)**
10. Discuss Black Scholes Option Pricing Model. **(Unit-III,Q.No.12)**
11. From the following data calculate call option value with the help of BOPM:

Types of Option	: Call
Style of Option	: European
Up factor	: 1.25
Down factor	: 0.80
Spot Price	: 100
Exercise Price	: 150
Probability of Exp	: 0.50
Risk-free interest Rate	: 10% p.a.
Life of the option	: 1 Year
Stage	: 2 (six months each)

Sol :

The price of undderlying and the pay off of the call option at the end of 1st year equals.

up 150 × 1.25 = 187.5

down 150 × 0.80 = 120

Option Value at the end of 1st year

$$e^{+} = \frac{0.5 \times 187.5 + (1 - 0.5) \times 0}{1 + 10\%}$$

$$= \frac{93.75 + 0}{1.1}$$

$$= 85.23$$

$$e^{-} = \frac{0.5 \times 120 + (1 - 0.5) \times 0}{1 + 10\%}$$

$$= \frac{60 + 0}{1.1}$$

$$= 54.55$$

12. Explain the difference between Currency Swap and Interest Rate Swap

Sol :

S.No.	Nature	Currency Swap	Interest Rate Swap
1.	**Definition**	The currency swap is a method that involves exchanging the cash flows that are generated from two currencies in order to hedge against the fluctuations in the exchange	The interest rate swaps deal with the exchange of cash flows between two parties generated at two rates of interest. rate.
2.	**Focus**	The main focus of the currency swaps involves the exchange of any amount in one currency to another currency.	The main focus of the interest rate swaps involves the exchanging of interest payments between different parties.
3.	**Type of contract**	Currency swaps are foreign exchange agreements between the two parties.	Interest rate swaps are financial derivative contracts between two parties.

13. Consider a 3-year plain vanilla Fixed - Floating Interest Swap. The motional principal is $20 Million. The swap fixed rate is 6%. The floating rate is 6 month LIBOR. The payment dates are very six months beginning six month hence. On the origin date, six month LIBOR is 5.5%, the day Count basis for both the fixed rate and the floating rate is 30/360. on sub sequent dates, the six month LIBOR is

Time :	0.5	1.0	1.5	2.0	2.5
6 month LIBOR	5.25%	5.50%	6.0%	6.20%	5.44%

Compute the Cash Flows that are exchanged between the two counter parties.

Sol :

1st year

Fixed rate payer pays

(20000000) (0.06) (30/360) = 1,00,000

Fixed party receives

(20000000) (0.525) (30/360) = 8,75,000

Floating rate payer pays

(20000000) (0.525) (30/360) = 8,75,000

Floating rate payer receives

(2000000) (0.06) (30/360) = 10,000

14. Explain the Futures trading procedure in Indian Stock Market. **(Unit-V, Q.No.3)**

15. What are the three ways in which futures contracts reduce Credit Risk? **(Unit-V,Q.No.5)**