



MFP-4 CURRENCY AND DEBT MARKETS



Currency Derivatives &
Risk Management

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“ शिक्षा मानव को बन्धनो से मुक्त करती है और आज के युग में तो यह लोकतंत्र की भावना का आधार भी है। जन्म तथा अन्य कारणो से उत्पन्न जाति एंव वर्गगत विषमताओं को दूर करते हुए मनुष्य को इन सबसे ऊपर उठाती है ”

—इंदिरा गांधी



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“Education is a liberating force, and in our age it is also a democratising force, cutting across the barriers of caste and class, smoothing out inequalities imposed by birth and other circumstance.”

--Indira Gandhi



Block

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BLOCK 2 CURRENCY DERIVATIVES AND RISK MANAGEMENT

Derivatives have the characteristic of Leverage or Gearing. With a small initial outlay of funds (a small percentage of the entire contract value) one can deal big volumes. Pricing and trading in derivatives are complex and a thorough understanding of the price behaviour and product structure of the underlying is an essential pre-requisite before one can venture into dealing in these products. Derivatives, by themselves, have no independent value. Their value is derived out of the underlying instruments. In this block, how derivatives help in managing currency risk is explained in the following units.

Unit 5 provides an overview of the over the counter foreign exchange products in the Indian currency markets such as currency swaps, FRAs, option, etc. It also briefly summarizes the main differences between exchange traded products and over the counter products. It also illustrates the use of OTC products in hedging currency exposures.

Unit 6 explains different types of forward contracts such as Fixed forward contracts and option forward contracts and also explains how forward rate is calculated by banks. RBI guidelines on booking and cancellation of forward contract is also explained in detail. Non-deliverable forward contract is also covered in detail.

Unit 7 focuses exclusively on currency futures with special reference to trading, clearing and settlement. It also covers the participants in the futures market. Trading strategies are also explained.

Unit 8 deals with currency option, different types of options, trading strategies, option pricing, etc. It also covers calculation of option pricing using Black-Scholes formula.

UNIT 5 OVER THE COUNTER AND EXCHANGE TRADED PRODUCTS

Objectives

After studying this unit, you should be able to:

- understand OTC Derivatives, its features and uses;
- differentiate between OTC and Exchange Traded Derivatives Markets;
- understand Forward Rate Agreements;
- explain Currency Swaps; and
- describe the process of Currency Exposure Management.

Structure

- 5.1 Introduction
- 5.2 Functions and Features of Derivatives
- 5.3 OTC Derivatives
- 5.4 Currency Swaps
- 5.5 Forward Rate Agreements (FRA)
- 5.6 Risks Associated with Hedging Instruments
- 5.7 Currency Exposure Management
- 5.8 Summary
- 5.9 Self Assessment Questions
- 5.10 Further Readings

5.1 INTRODUCTION

A derivative is an instrument whose value depends on the values of other more basic underlying variables. The underlying variables could be such as stock prices, exchange rates, interest rates etc and these underlying assets are called cash market variables. The payoff that one may receive from the derivative contract is dependent or derived on the underlying variable.

Derivatives have the characteristic of Leverage or Gearing. With a small initial outlay of funds (a small percentage of the entire contract value) one can deal big volumes. Pricing and trading in derivatives are complex and a thorough understanding of the price behaviour and product structure of the underlying is an essential pre-requisite before one can venture into dealing in these products. Derivatives, by themselves, have no independent value. Their value is derived out of the underlying instruments.

5.2 FUNCTIONS AND FEATURES OF DERIVATIVES

Functions

Derivatives shift the risk from the buyer of the derivative product to the seller and as such are very effective risk management tools. Derivatives improve the liquidity of the underlying instrument. Derivatives perform an important economic function *viz.* price

discovery. They provide better avenues for raising money. They contribute substantially to increasing the depth of the markets.

Hedgers, Traders and Speculators use derivatives for different purposes. Hedgers use derivatives to protect their assets/positions from erosion in value due to market volatility. Traders look for enhancing their income by making a two-way price for other market participants. Speculators set their eyes on making quick money by taking advantage of the volatile price movements.

Hedging is a mechanism by which an investor seeks to protect his asset from erosion in value due to adverse market price movements. A Hedger is usually interested in streamlining his future cash flows. He is most concerned when the market prices are very volatile. He is not concerned with future positive potential of the value of underlying asset.

Normally, a speculator has no asset in his possession to protect. He is not concerned with stabilising his future cash flows. He is interested only in making quick money by taking advantage of the price movements in the market. He is quite happy with volatility. In fact, volatility is his daily bread and butter.

Arbitrageurs also form a segment of the financial markets. They make riskless profit by exploiting the price differentials in different markets. For example, if companies' shares were trading at Rs. 3500 in Mumbai market and Rs. 3498 in Delhi market, an arbitrageur will buy it in Delhi and sell it in Mumbai to make a riskless profit of Rs. 2 (transaction cost is ignored for the purpose of this example). Successive such transactions will iron out the difference in prices and bring equilibrium in the market.

However, arbitraging is not a very safe way of making money as was proved in the case of Barings Bank where unscrupulous arbitraging between Osaka and Tokyo exchanges in Nikkei Stock index futures drove the Bank to bankruptcy.

Features of Derivatives

Financial Derivatives are products whose values are derived from the values of the underlying assets. Derivatives have the characteristics of high leverage and of being complex in their pricing and mechanism. Derivatives enable price discovery, improve the liquidity of the underlying asset, serve as effective hedge instruments and offer better ways of raising money. The main players in a financial market include hedgers, speculators, arbitrageurs and traders. Hedging can be done in two ways *viz.*, fixing a price (the linear way) and taking an insurance (non-linear or asymmetric way). There are a number of derivative contracts and the most prominent are forwards, futures and options. Forwards are definitive purchases and/or sales of a currency or commodity for a future date. Forward contracts are contracted for a particular value and should be transacted on a given date. Forwards are useful in avoiding liquidity risk, price variations and locking in avoiding a downside. However, forwards has the limitation that the contract has to be performed in full and has attendant credit risk and market risk. Forwards are most useful in forex transactions where a spot transaction can be covered by a contrary move in the forward market.

5.3 OTC DERIVATIVES MARKET

All over the world, Over-the-counter (OTC) derivatives have come to play an important role in the financial systems. These instruments allow users to unbundle risks and allocate them to investors most willing and able to assume them. This has brought substantial benefits to the commercial community in facilitating hedging and, hence, business planning more generally, and have enabled the financial institutions to offer a progressively wider range of services and greater efficiency in the intermediation process as well as to exploit market imperfections and other trading opportunities for their own gain.

The factors generally attributed as the major driving force behind growth of financial derivatives are:

OTC and Exchange Traded Products

- 1) Increased volatility in asset prices in financial markets,
- 2) Increased integration of national financial markets with the international markets,
- 3) Marked improvement in communication facilities and sharp decline in their costs,
- 4) Development of more sophisticated risk management tools, providing economic agents a wider choice of risk management strategies, and
- 5) Innovations in derivatives markets which optimally combine the risks and returns over a large number of financial assets leading to higher returns, reduced risk as well as transaction costs.

The over-the-counter (OTC) derivative market is one of the largest and fastest-growing financial markets in the world. It is a market of complex, sophisticated and potentially high-risk transactions. Yet, inspite of spectacular market losses suffered by names such as Procter & Gamble and Long-term Capital Management (LTCM), the use of OTC derivatives continues to surge. The increased use of and reliance upon OTC derivatives are partly due to their special appeal: industrial corporations that want to hedge business risks are – as likely to use OTC derivatives as speculators such as hedge funds and other sophisticated financial institutions. OTC derivatives can be used to hedge risks or engage in speculation with respect to movements in the rates, prices, or indices in diverse areas such as interest rates, foreign currencies, commodities, or equities, among others. A derivative can be based on either a standardized or a customized contract. Standardized contracts are typically traded over an exchange such as the NSE or BSE or MCX SX.

The most common types of exchange derivatives are currency futures and commodity futures. In a futures transaction, the parties agree to the sale and purchase of a designated commodity or financial instrument at a set price in the future. An option is similar to a future, with a party purchasing the right to buy or sell property at an agreed-upon price. In an option, however, the purchaser has no obligation to exercise its option. Futures and option contracts are based on currency prices, and an active exchange may trade up to a million contracts a day. Both transactions are also typically cash settled through the exchange as opposed to being settled by delivery of the actual commodity.

Parallel to the derivative transactions conducted through exchanges for currencies and commodities, a huge market has developed in derivative transactions that are customized by large commercial banks and similar large financial institutions. This activity is commonly referred to as the “over-the-counter” derivatives market, in which various kinds of customized derivative instruments are traded. An OTC derivative can take any number of different forms or structures. The more common structures include a swap, cap, floor, collar, corridor, or option. Further, OTC derivatives can range in complexity from “plain vanilla” interest rate swaps to more complex derivatives such as credit default swaps commonly referred to as “credit derivatives”. All three have been created to hedge credit risks of various kinds.

Standardization vs. customization

The contractual differences between the exchange and OTC derivatives market are substantial. In an exchange market such as the NSE and MCX SX, derivatives such as futures and options are highly standardized. The contract size, maturity, expiration date, and underlying asset or index are all fixed in advance and traded through centralized markets. In addition, these exchange derivatives are settled through clearing houses. In contrast, OTC derivatives provide more flexibility. None of the business terms of an OTC derivative are standardized. A participant can enter into an OTC derivative based upon any amount, timeframe, underlying index, or price that can be negotiated with another party. In addition, all payments are made directly between the two parties, with

no clearing house acting as an intermediary. Also, OTC derivatives can involve any rate, index, or price involving interest rates or currencies.

Development of the OTC derivative market

The OTC derivative market has expanded and evolved over the past two decades. The International Swaps and Derivatives Association (ISDA), the OTC industry's trade group, estimates that the notional amount outstanding in the OTC market as of mid-2004 for interest rate swaps, currency swaps, and interest rate options alone was more than \$165 trillion as compared to the notional amount of only \$4.4 trillion 12 years earlier.

OTC derivative participants

The market has evolved to embrace many different types of participants. Now, not only do large financial institutions participate, but also smaller and less sophisticated participants such as small investors from different types of businesses and industries. The OTC derivative industry comprises primarily of three different categories of participants: dealers, end-users, and speculators.

- i) **Dealers:** The most active participants are dealers who act as intermediaries, although they may also periodically trade for their own account. In this capacity, the dealer acts as a middleman between thousands of end-users on both sides of OTC derivatives. The dealer takes one side of a trade with one end-user and then enters into an offsetting trade with another end-user. The dealer earns profits both through fees and through the spread by acting as an intermediary between the various end-users needing OTC derivative products. Many of the earliest OTC derivative products relate to interest rates products, an area in which banks already had a strong presence because of their status as lenders. In addition, these banks had customer contacts with thousands of potential end-users and OTC derivatives provided a unique opportunity for commercial banks to establish profitable trading activities that were not subject to securities regulation.
- ii) **End-users:** Dealers' customers are generally referred to as end-users. End-users enter into OTC derivative transactions for a specific purpose such as hedging a particular risk or managing their assets and liabilities. End-users can range in size from big corporations to closely held SMEs. End-users typically employ OTC derivatives to hedge business risks such as the volatility of variable interest rates and currency prices. The size and sophistication of the end-user affects its approach to derivative transactions. The large sophisticated end-user often seeks out a dealer to provide it with a quotation on a particular type of transaction. Often, the end-user also solicits competing quotations from a number of other dealers before entering into the transaction. Alternatively, a dealer may approach an end-user with a particular OTC derivative product that the dealer is trying to market. Smaller end-users typically use OTC derivatives to hedge interest rate risk. Often a smaller end-user is approached by its lending bank.
- iii) **Speculators:** Speculators are those taking positions on the movement of various rates, prices, and indices. This group typically includes hedge funds and other similar sophisticated financial institutions, but may also include dealers or end-users attempting to profit from market movements. Others include the proprietary trading operations at commercial or investment banks and the proliferating number of hedge funds. Some end-users, however, have also taken unhedged market positions through the use of OTC derivatives, occasionally suffering severe losses.

Role of International Swaps & Derivatives Association (ISDA)

ISDA is also a major participant in the OTC derivatives industry and ISDA is the principal trade group for the OTC derivatives industry. Its membership includes approximately 200 of the largest financial institutions in the world, referred to as primary members, which act as dealers in the OTC derivatives market. Service firms such as law firms,

software companies, and accounting firms participate as associate members. Non-dealers such as corporations, financial institutions, and government entities can participate as subscriber members. Through ISDA, participants in the market have developed standard forms of documentation for use in the OTC derivatives market. Indeed, the ISDA Master Agreement has become ubiquitous in the area, being used to document virtually every contractual relationship governing the use of OTC derivatives. In fact, it becomes impossible to discuss the legal issues and concerns in documenting OTC derivatives without referring to the provisions of the ISDA Master Agreement and other ISDA standard documentation. In addition to drafting standard forms of documentation, ISDA conducts significant worldwide lobbying activities on behalf of its members to lobby for important changes in laws and regulations governing OTC derivatives. ISDA also provides extensive training for its members.

5.4 CURRENCY SWAPS

The first currency swap is said to be the 1981 World Bank – IBM swap which allowed the Bank to achieve its desired Swiss Franc funding and IBM, its preferred Dollar funding at substantial cost saving to each relative to traditional direct bond issuance. Indeed, the currency swap between the World Bank and IBM was a strong catalyst to the development of the currency swap market. The prestige of these names heightened awareness of the new product and built confidence in its legitimacy. The arbitrage of yield and credit differential provides the most common and compelling motivation for swap activity.

Currency swaps involve at least two currencies where cash flows in one or more currencies are exchanged for cash flows in another currency. In a straight currency swap, two counterparties will exchange principal amounts of different currencies usually at the prevailing spot rate. This exchange of principal can be either notional or actual. On the maturity of the swaps the principal amounts will be re-exchanged at the same swap rate. Over the term of the swap the counterparties will make periodic exchanges of fixed rate interest in the different currencies.

The effect of the transaction is similar to the swap deal undertaken by foreign exchange dealers (i.e., in a spot purchase and a forward sale of currency or *vice versa*) except that the interest rate differential is accounted for by periodic exchanges of interest as opposed to being expressed in the difference between spot and forward rates.

A swap can be simply described as the transformation of one stream of future cash flows into another stream of future cash flows with different features. The essence of a swap contract is the binding of two counter parties to exchange two different payment streams over time, the payments being tied at least in part to market price developments. The prices concerned have been ‘exchange rates’ or ‘interest rates’. Thus, ‘Swap’ in simple terms is an exchange of currency cash flows or interest rate obligations with another party. The important players in this market are banks, financial, institutions and large sized corporates. In majority cases the banks which are active in this field act as intermediary since locating a suitable party with matching amount, maturity, amortization etc., is an onerous task.

Today’s financial swaps market offers a large/varied number of products to meet any of the following:

- Cost saving,
- Yield enhancement on existing activity,
- The hedging of existing risk,
- Opportunities for new activity judged advantageous.

Some of the reasons for undertaking a Swap are:

- i) Borrowers having floating rate exposure may desire to fix their financing cost and remove uncertainty.
- ii) Expectations of Interest rate rising.
- iii) Borrowers may wish to distribute their debt portfolio in a basket of currencies.
- iv) Borrowers may wish to swap their loan obligations into a currency which will match the currency of their revenue.
- v) As a cost reduction strategy.

Swaps and the theory of comparative advantage to reduce cost of borrowing

A swap can take place where each party can access a particular market (either currency or interest basis) on comparatively better terms than the others. An intermediary, normally a bank, organizes the swap arrangement for two counterparties. This comparative advantage is then shared between the parties and any intermediaries arranging transactions to lower their funding costs. The parties will enter the markets where they have the advantage and will agree to exchange payments and receipts between them, which will result in better terms in their preferred market than if they had entered it directly themselves. Thus, the swap market has extended the principle of the theory of comparative advantage from the domain of commodities and services market to the international financial markets. An example of a currency swap is given below:

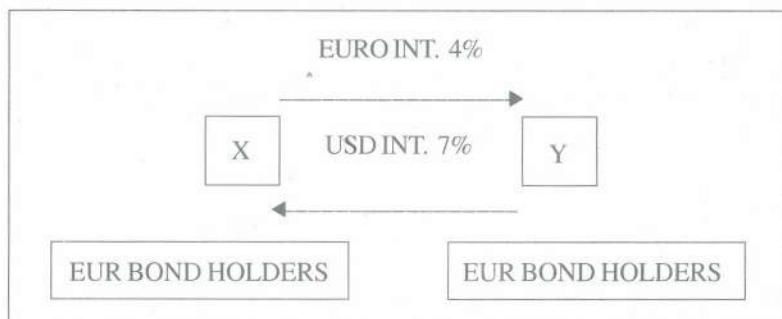
Company X has Euro liability of EUR 1 million at fixed rate 4% which it wishes to swap into USD. Company Y wishes to issue 5 year Dollar bonds for USD 1.25 million with a coupon fixed at 7% and swap into Euro liability. Both X & Y agree to swap their liabilities. X will exchange Euro spot to Y against Dollars. On maturity, say, 5 years later, they would reverse this transaction on the same spot rate used in initial exchange of currencies.

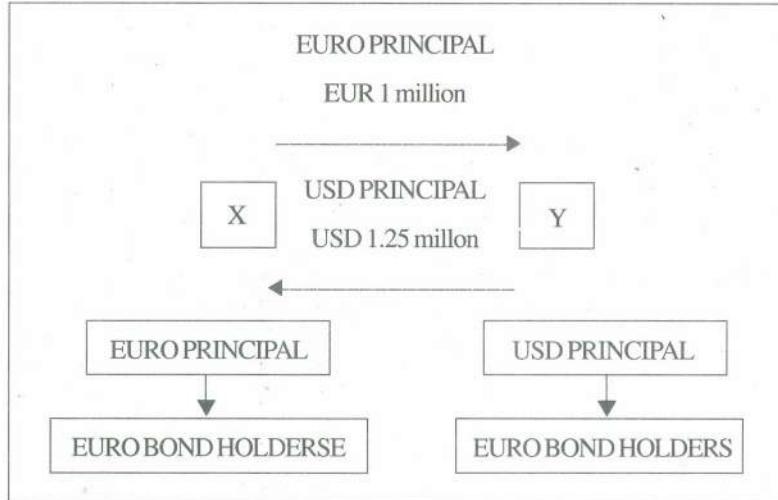
The structure will be:

INITIAL EXCHANGE AT SPOT say EUR 1=USD1.25



DURING THE LIFE OF TRANSACTION





Cross currency swap is a variation on the straight currency swap, an asset or liability at a floating rate in one currency is converted into a fixed interest rate in a different currency and vice versa.

Benefits:

- i) Lowering the cost of funding – By entering into a currency swap a company might be able to significantly lower its cost of funds.
- ii) Hedging of foreign exchange risk Companies with medium or long-term currency flow mismatches often resort to currency swaps to either reduce or eliminate foreign exchange risk.
- iii) Access to new markets – A company can access an inaccessible or overly expensive market via a transaction where the desired funding is obtained either directly or by a bank say in Dollars and accompanied by a currency swap between the desired currency and the Dollar.
- iv) Swaps permit an active liability management as the interest profile of debt can be easily changed.
- v) Swaps are a cost effective alternative derivative product.

5.5 FORWARD RATE AGREEMENTS (FRA)

Due to tremendous volatility in the interest rates, new instruments have been created to control risks and manage the adverse consequences of the volatility of the interest rates. One such instrument is ‘Forward Rate Agreement’ (FRA). FRA is a financial contract between two parties to exchange interest payment for a ‘Notional Principal’ amount for a specified period from start date to maturity date.

Example: A firm plans today (say 1.7.2009) to borrow, US\$ 5 million, 3 months hence (i.e., on 1.10.2009) for a period of 6 months (i.e., from 1.10.2009 to 31.3.2010). Being apprehensive of future interest rate increase may like to lock in the effective interest costs to day itself by buying a 3/9 FRA. This 3/9 FRA means that ‘from 3 months from today, for borrowing for a period of 6 months.

Accordingly, on the settlement date (i.e., on 1.10.2009 in the above example), cash payments based on contract (fixed) rate and the settlement rate, are made by the parties to one another. The settlement rate is the agreed bench-mark/reference rate prevailing on the settlement date.

Characteristics of FRA

- a) It involves quoting interest rate from a certain future date to a further future date as opposed to cash money market where rates are always quoted from the spot date.
- b) Although the agreement is always with reference to a certain (notional) principal sum, the principal amount is never exchanged.
- c) Since no exchange of principal takes place under FRAs, the purchaser of the FRA has still to borrow in the cash market. (if used as hedging strategy).
- d) On the relevant date the actual LIBOR is compared with the FRA rate and only the difference between the two rates is received or paid, as the case may be, on the principal amount agreed.

Thus, if an FRA is contracted for US\$ 10 million for 3-6 months period at an agreed rate of 5.5 % p.a., at the end of the 3 months period (i.e., the commencement date of the FRA period) the three months LIBOR is compared with FRA rate. If the LIBOR on that day for 3 months is say 6%, the difference between the settlement rate (6%) and the contracted rate (5.5%) is due to the purchaser. Accordingly, an amount of US\$ 12500 would be received by the purchaser of the FRA from the counter party in settlement of the contract.

It will be observed that an FRA enables a borrower or lender to protect himself against interest rate movements – upwards or downwards — for a specific future period and enables it to fix its cost in advance and lock its profit or limit its loss.

An agreement can be struck between two banks or a bank and its corporate client. The agreement covering a three-month period that begins six months from the date of contract is called a “six against nine” and one that covers a six-month period beginning six months from the date of contract is called a “six against twelve”.

FRAs can also be bought to lock in the effective interest cost where new debt securities are to be issued at a later date to reduce interest rate exposure if higher interest rates are forecasted. FRAs can be sold, inter alia, to hedge against interest rates decline on future money market investments.

FRA Example

A firm plans to borrow US\$ 10 million for a period of 6 months, after 3 months from now. The current 6 month euro dollar rate is 8 1/16%. The firm has to pay LIBOR. Apprehensive of future rate increase the firm buys a 3/9 FRA at 8 1/2%.

Now suppose, six month LIBOR has risen to 10 1/2 per cent. The firm receives the difference between the actual LIBOR and the agreed forward rate ($10\frac{1}{2}\% - 8\frac{1}{2}\% = 2\%$) on \$ 10,000,000 for six months, discounted to take account of the fact that it is paid at the start rather than at the end of the six month loan period. This comes to:

$$\frac{\$ 10,000,000 \times 2\% \times 6}{(12 \times 100) + (10.5 \times 6)} = \$ 95,011.88$$

The firm can invest \$ 95,011.88 for the six months, which along with interest becomes the total compensation.

Features of FRA

The FRA is a derivative instrument in which its market price is derived from interest rates in the cash deposit markets. It is very similar to an interest rate futures contract but with no margin calls. FRA fixes in advance the interest rates for future payments. It is traded in the OTC market. It is issued in all convertible currencies. As per extant

FEMA guidelines, FRA is permitted for cross currency transactions only i.e., where rupee leg is not involved. FRA is issued for notional principal only (i.e., principal is not exchanged) and only interest differential is paid or received on the notional principal on the settlement day on a discounted basis and Interest applied are LIBOR rates. The contract currency, amount, contract rate, settlement date are specified in advance and a (3 × 6) “Three Sixes” FRA denotes an interest rate for 3 months to start in 3 months from the date of contract. Compensation is paid in cash at the beginning of the notional loan or deposit period known as the settlement date. The buyer of an FRA is not obliged to borrow or the seller is not obliged to lend funds at any time. The prospective borrower or depositor is free to go anywhere in the market and seek the best rate at which he can raise or place funds. This arrangement is independent of the FRA contract. Like a forward forex contract, there is no upside to an FRA hedge. If the future interest rates fall, the buyer will have to compensate his counter party thereby foregoing any benefit from lower interest costs. If the interest rates rise, it is the seller who compensates the buyer. Thus, the future borrowers and lenders effectively lock into a fixed future rate of interest. As the contract does not involve any exchange of principal, the credit risk on an FRA is limited to the potential cost of finding replacement counter-party, should the original one fail. The risk is therefore on any profit made on the FRA rather than on the notional amount. An FRA is an irrevocable contract between two parties and can be cancelled only with the agreement of both parties. In the circumstances, FRA positions are often closed with offsetting contracts.

Advantages

Hedge: Bank can hedge its future lending/deposit operations whether as lender or a borrower and fix future rates in a simple and efficient manner.

- 1) **Credit Risk:** Typically, this risk is low and arises if the rates move in favour of the bank and the client is not able/willing to pay compensation to the bank. A credit line is therefore required to be established. The credit risk in entering Forward Rate Agreement is negligible as the Bank’s exposure is only to the extent of interest variations. On a US\$ 10 million FRA for 3 months period assuming a 1% movement in interest rates, the credit risk amounts only to 1/4% of US\$ 10 million which is US\$ 25,000 only.
- 2) **Opportunity Cost:** When the client buys an FRA, he is locked into an interest rate and therefore there is an opportunity loss whenever the rates move favourably for him.
- 3) **Flexibility:** There is always an opportunity to reverse or square the position by making offsetting contracts.
- 4) **Balance Sheet:** Since there is no exchange of principal amount, FRAs are treated as off balance sheet items.

A judicious combination of FRA and market borrowing can enable a borrower-bank reduce its funding cost as compared to the cost in the cash market.

On a particular date, if the market quotes USD FRAs as; 1/4 - 6.19/15. This means that ‘for one month from today for the next three months, the market “offers” (sells) USD Forward Rate at 6.19% and “bids” (buys) USD Forward Rate at 6.15%.

An FRA contract form usually contains the following terms:

- a) **Contract currency and amount:** The currency and amount of the notional loan or deposit.
- b) **Contract period:** The term of the notional loan or deposit. This is the period from settlement date to maturity date.
- c) **Settlement Date:** This is the date on which the contract period commences and cash compensation is paid.

- d) **Maturity Date:** The date on which the contract period ends.
- e) **Contract Rate:** The agreed rate of interest for the contract period or the FRA price.
- f) **Fixing Date:** Two business days before the settlement date when the reference rate on which the settlement amount will be calculated is established.

A person resident in India who has borrowed foreign exchange in accordance with the provisions of Foreign Exchange Management (Borrowing and Lending in Foreign Exchange) Regulations, 2000 , may enter into an Interest Rate Swap or Currency Swap or Coupon Swap or Foreign Currency Option or Interest Rate Cap or Collar (purchases) or Forward Rate Agreement (FRA) contract with an authorised dealer in India or with a branch outside India of a bank authorized to deal in foreign exchange in India or with an Off-shore Banking Unit in India for hedging his loan exposure and unwinding from such hedges, provided that —

- i) The contract does not involve the rupee.
- ii) Final approval has been accorded or loan identification number issued by the Reserve Bank for borrowing in foreign currency.
- iii) The notional principal amount of the hedge does not exceed the outstanding amount of the foreign currency loan.
- iv) The maturity of the hedge does not exceed the unexpired maturity of the underlying loan.

These contracts may be freely cancelled and rebooked.

Pricing

- FRA is a one-time fixed-floating swap.
- If you want to fix your future borrowing rate you receive floating, pay fixed (buy a FRA).
- If you want to fix your future investment rate you pay floating, receive fixed (sell a FRA).

Pricing FRA

Conceptual mechanics of 4×10 FRA (bank pays LIBOR receives fixed)

Bank borrows at $t=0$ an amount ‘X’ at fixed rate for 10 months at 10 month LIBOR prevailing at $t=0$. ‘X’ is an amount that will grow to USD 100 mio 4 months from now @ 4-month MIBOR prevailing at $t=0$. At $t=4$, invest USD 100 MIO for 6 months at 6-month LIBOR prevailing then

Bank passes on LIBOR to the FRA buyer and receives a fixed rate in interest. At $t = 10$, USD 100 MIO is received back. This along with fixed interest received from the FRA buyer should be sufficient to pay off the 10-month borrowing of ‘X’ MIO along with interest

4-month LIBOR 5.36%

10 month LIBOR 5.45%

$t=0$: borrow $100/(1+0.0536/12*4)=$ USD.98.245 MIO for 10 months at 5.45%

$t=0$: Invest 98.245 at 5.36% for 4 months at $t=0$

$t=4$: Invest USD 100 MIO at LIBOR for 6 months

$t=10$: Pass on LIBOR to FRA counterparty

$100 + r*100 = 98.245(1+0.0545*10/12)$

$100*(1+r)=102.70696$ or $r = 102.70696/100 - 1 = 2.706\%$ for 6 months

5.4139% p.a.

5.6 RISKS ASSOCIATED WITH HEDGING INSTRUMENTS

Hedging instruments are intended to reduce risks resulting from changes in foreign currency exchange rates and interest rates. However, the hedging instruments themselves generate specific risks. Risks associated with hedging instruments include:

- Correlation risk,
- Basis risk,
- Credit risk, and
- Opportunity cost.

Correlation Risk

Correlation risk is the risk that the gain on the hedge position will not offset the loss on the hedged item to the extent anticipated because the hedge and the hedged item did not move in tandem.

Basis Risk

Basis risk is the risk that the difference between the spot price of the hedged item and the price of the hedging instrument will increase or decrease over time. The basis is sometimes also referred to as the spread.

Credit Risk

Credit risk is the risk that the counterparty to the transaction (e.g., another hedger that is taking the opposite position or a broker/dealer or banker who arranged the transaction) will not honor its commitments. The creditworthiness of the other party is particularly important when dealing in instruments not traded on a securities or commodities exchange, such as forwards, swaps, and privately negotiated options. Even with exchange-traded instruments such as futures and publicly traded options, companies need to assess the creditworthiness of the broker employed.

Opportunity Cost

In exchange for protection from currency fluctuations, hedgers must generally be willing either to give up profits when currency moves in their favour or pay the premium on an option for the right to exercise. Hedgers must pay the related commissions and fees to the banker or broker who arranged the hedge. An analysis of the total costs associated with a hedging strategy is critical to understanding its overall economics.

Proper hedging strategies can enable a company to reduce risks associated with exposures. At the same time, if things are not well planned or if events do not transpire as expected, a company could find itself increasing rather than decreasing its exposure to losses. For example, the hedge may not correlate properly and losses may result from basis changes or the counterparty to the hedge position may default. While the opportunities to hedge are always present, the potential risks and/or costs may be too great relative to potential gains. There will be other situations when it will be appropriate to hedge. However, many recently publicised financial losses have been attributed directly to the lack of understanding of the risk inherent in hedging strategies and the lack of appropriate internal control procedures to assess and monitor the implications of new and innovative hedging strategies. For those companies that are exposed to risks, identification of the risk is critical to effective management. The enterprise should periodically monitor its overall exposure to risk.

5.7 CURRENCY EXPOSURE MANAGEMENT

Currency exposure refers the part of the currency portfolio i.e., denominated in a currency other than the home currency and is not hedged. The different types of currency exposure normally identified are:

- i) **Transaction exposure:** There will be a change in the foreign currency income and expenditure values between the dates of recognition of the transaction and maturity thereof i.e., date of actual receipt or payment if the exchange rates fluctuate.
- ii) **Translation exposure** also known as balance sheet exposure – A corporate with foreign currency exposures needs to periodically revalue its assets and liabilities. In the case of forex exposures, these will produce adjusting items, which may pass through profit and loss account or the balance sheet directly.
- iii) **Economic exposure also known as competitive exposure:** Such an exposure can be active or passive. In the active type, the corporate may be relying on imported raw materials or may be involved in the export of finished goods. If the exchange rates move adversely, then the cost or market share will be affected and it may become necessary to change the source or the market. In the passive type of exposure, the corporate will find his market share being affected due to his competitor getting affected by the exchange rate movements.

Of the three types of exposure, the transaction risk is most commonly recognised and receives the most attention. Translation issues are considered at the time of taking decision on overseas investments. Economic exposure is a major factor in deciding the location of manufacturing facilities. A wide range of methods are used to manage forex exposure and these can be broadly classified into two groups, **internal** and **external** techniques. Internal techniques are methods which are part of the corporates own financial management within the group of companies concerned, and do not resort to contractual relationships with parties outside the group. External techniques are where outside entities would be involved in contractual obligations in the chosen method.

1) Internal techniques of exposure management

Internal techniques of exposure management include netting, matching, leading and lagging, pricing policies and asset / liability management. Any particular method may be constrained by local law like exchange controls and other restrictions.

a) Netting

A company having both export and import business has to make a calculated move to take care of its currency exposure. In case the company can match his own inflow and outflow (especially when both are in the same currency) then on the matched position it has little exchange risk. A company based on its management philosophy and its approach to risk management can either choose to hedge its import and export exposures separately or to hedge only the net short or long position.

Netting involves associated companies, which trade with one another. The technique is simple. Group companies settle indebtedness for the net amount owing. Gross intra group trade receivables and payables are netted out. Netting basically reduces the number of inter-company payments and receipts, which pass over the forex. The system is fairly straightforward to operate. The only problem is regarding the decision about what currency to use for settlement. Netting reduces bank costs but increases centralized control of inter-company settlements.

Incidentally, An Mongul Dealers (ADs) in India may allow requests received from exporters for “Netting Off” of export receivables against import payments for units located in Special Economic Zone subject to certain conditions which interalia includes

that such Netting Off is in respect of the same Indian entity and the overseas buyers/suppliers (bilateral netting).

b) Matching

The terms netting and matching tend to be used interchangeably but the two are distinct. Netting is a term applied to potential flows within a group of companies whereas matching can be applied to other intragroup and to third party balancing. Matching is a mechanism whereby a company matches its foreign currency inflows with its foreign currency outflows in respect of amount and approx. timing. Receipts in a particular currency are used to make payments in that currency thereby reducing the need to go through the forex markets to the extent of unmatched portion of forex cash flows.

The prerequisite for a matching operation is a two way cash flow in the same foreign currency which gives rise to a potential for natural matching. The practical mechanics of matching involve the group treasury and there is a need for centralized information system. The practical problems arise on account of uncertainty of timing of third party receipts and payments. Successful matching depends on accurate and realistic prediction of cash flows. The constraints also include the exchange control regulations of some countries.

c) Leads and Lags

Leading and Lagging refers to the adjustment of credit terms between group companies. Leading means paying an obligation before due date and lagging means delaying payment of an obligation beyond due date. Leading and lagging are forex exposure management strategies designed to take advantage of expected devaluation / revaluation of currencies. Decisions on leading and lagging also need to take into account relative interest rates along with the expected currency movements. The third dimension to be taken into account is the effective tax rate on interest in the different countries. As with netting and matching the group treasury needs to be involved to ensure appropriate timing of the inter company settlements.

The use of leading and lagging as an exposure management technique has the following constraints:

- 1) Exchange control regulations.
- 2) Conflict of interest in case one of the companies has a significant local interest in its total equity.

d) Price Variation

Price variation involves increasing the selling price to control the adverse effect of exchange rates. The question such a tactic raises is why prices were not raised if the company was able to. However, there may be circumstances under which this is the only method available. Pricing in intercompany trade is called as transfer pricing. As an exposure management technique transfer price variation refers to the arbitrary price of intercompany sales at a higher or lower price rather than fair, arm's length price. Normally taxation authorities, customs and excise departments require that arm's length pricing be used and the authorities in most countries are authorized to impute a fair price where price manipulation is suspected. Nevertheless, multinationals attempt to maximize after-tax group cash flows through transfer pricing.

e) Invoicing in foreign currency

Companies engaged in the import / export business are concerned with the selection of currency for raising invoices. Invoicing in foreign currency gives rise to foreign currency exposure. Invoicing in the home currency has the advantages of simplicity and avoidance

of exchange risk. However, the currency of invoice tends to be determined by several factors like –

- i) Overall marketing package.
- ii) Buyer's preference.
- iii) Market trends for the particular item e.g., oil is priced in USD.

If the seller has to choose a currency other than own home currency, then he should choose a currency in which there is an active market, both spot and forward. Currencies, which have limited convertibility and are chronically weak, should be avoided as the external hedging technique option will be closed out in such cases.

2) External techniques of managing foreign exchange exposure

External techniques of exposure management involve entering into contractual relationships which comprises outside of the group in order to reduce the risk of foreign exchange losses. External techniques include forward exchange contracts; short term borrowing; futures contracts; currency options; discounting bills receivables; factoring receivables; currency swaps; and government exchange risk guarantees. In this unit, we shall consider the above methods except currency swaps, futures and options, which will be considered separately in subsequent units.

a) Forward exchange contract

There are active forward markets in all the major currencies of the world. In some currencies it may be hard to deal in forward markets with very long dates, say, ten years and beyond, but there is an active forward market upto 10 years in the more widely traded currencies like, the USD, GBP, EUR, CHF, JPY. A forward foreign exchange contract is essentially a contract between tow parties to exchange one currency for another at a future date. The rate of exchange, the delivery date, and the amount involved are fixed at the time of entering into the agreement. A forward contract is usually completed by actual delivery of the currency involved. By entering into a forward Exchange contract, a corporate is able to fix the price and eliminate forex risk. The downside of taking such an action is that the corporate will have to forego any benefit that may accrue on account of favourable exchange rate movement. In practice, the receipts and payments are not always made on the expected dates and result in some additional cost / benefit. We need to understand the relationship of spot exchange rates with forward rates for the forward exchange contract to be used effectively as a hedging tool.

Foreign exchange rates are basically the value of one currency expressed in terms of another currency. To arrive at the relationship between spot rates and between spot and forward rates, we need to look at free market conditions i.e., where there are no restraints on mobility of capital.

b) Interest Parity Theory

The theory states that the interest rate differential between two countries is equal to the differential between the forward exchange rate and the spot exchange rate. Interest rate parity plays an important role in foreign exchange markets, connecting interest rates, spot exchange rates and foreign exchange rates.

If a corporate has say GBP one million to be paid after one year, it has two options:

- Option 1: (a) Invest the amount of GBP one million in one year deposit.
 (b) Calculate the interest on the deposit.
- Option 2: (a) Convert GBP one million into USD at the spot rate.

- (b) Invest US Dollar proceeds in a deposit for one year.
- (c) Simultaneously Sell US Dollar (together with the interest to be accrued) – One year forward.

The results of both the options should be the same. If it is not so, the investors would borrow in one centre, convert and invest the proceeds in another centre to make a profit. There would be an arbitrage opportunity if the exchange rate remains the same for a period of one year.

Example: Interest for US \$ @ 5% per annum

AUD @ 7% per annum
Spot USD 1 = AUD 1.35

- 1) Borrow USD 1000 at 5% for one year
- 2) Sell USD 1000 at spot against AUD...receive AUD 1350
- 3) Invest AUD 1350 at 7%- Total receipt after one year will be AUD 1444.50(1350+94.50 int)
- 4) Convert AUD 1444.50 at the spot rate of 1.35 into USD and receive USD 1070
- 5) Repay the borrowing of USD 1000 with interest at 5%...i.e., Repay USD 10506. Net Gain USD 20 (1070 minus 1050).
- 6) Forward exchange rate for USD/AUD will be adjusted by taking into account the interest differentials and the forward rate will thus be 1444.50/1050 i.e., USD 1= AUD 1.3757.
- 7) The difference of 0.0257 represents the forward differential between spot and one year forward. Thus when capital flows are free from restrictions, the interest rate differentials affect the forward differentials.

c) Short Term Borrowing

In order to use this method of managing exposure, it is a precondition that local credit is available and also that exchange control regulations permit the proposed transaction. The technique involves borrowing short term as soon as the exposure is undertaken. The funds should be borrowed in the currency of exposure and the amount should be such that the expected interest is sufficient to repay the principle sum along with interest. The amount borrowed is then converted into the home currency and placed on deposit. The amount of interest to be received is sold forward and the amount is used to cover accrued interest. All the transactions can be tied up initially on undertaking exposure and thus avoid forex risk. The method outlined above can best be understood by way of an illustration.

Suppose an exporter in UK has a 3 month exposure i.e., he is to receive Euro 5 million in 3 months from today say 01.01.2009. Settlement is expected on 01.04.2009. Then he can use the short term borrowing route as follows:

On 01.01.2009

- 1) Borrow EUR @ 4% p.a. for 3 months.
- 2) Since he needs to repay it in 3 months and he is to receive EUR 5 million in 3 months time, he can use the receipt of EUR 5 million from the export transaction for repayment of the loan.
- 3) In order to match the transaction, he should borrow only EUR 4,950,500- which @ 4% p.a. for 3 months will be equal to EUR 5,000,000- on 01.04.2009.
- 4) He should convert the borrowed EUR into GBP at the spot exchange rate say GBP 1 = EUR 1.4400 yielding GBP 3,437,847.
- 5) Place this GBP i.e., 3,437,837– on deposit for 3 months at say 5.25% p.a.

On 01.04.2009

- 1) Receive EUR 5 million from customer.
- 2) Repay loan in EUR with the above funds.
- 3) Receive maturity proceeds of deposit of GBP 3,482,969.

Thus the exporter has avoided exchange risk and has locked himself into cash flows which are certain.

d) Discounting Bills receivables

Where an export is to be settled by a bill of exchange, the exporter can discount the bill and thereby receive payment before due date. The process of discounting can be undertaken either in the exporter's country or importers country. The exporter stands relieved of exchange risk in either case, the cost to him being the discount rate charged by the bank.

e) Factoring foreign currency receivables

When export receivables are to be settled on open account basis, then factoring can be used to cover forex exposure. The procedure involves assignment of receivables to a factor for financing. The service normally provides protection against exchange risk although in highly volatile situations, variations in the factoring contract are usually made. The costs involved are cost of financing and the cost of covering exchange risk. The offsetting benefits are obtaining export finance and reducing sales accounting and collection cost.

Derivative instruments have become increasingly important to the overall risk profile and profitability of banking organizations throughout the world. Derivatives transactions include a wide assortment of financial contracts, including forwards, futures, swaps, options. In addition, other traded instruments incorporate derivatives characteristics. The use of the derivative instruments allows the transfer of various financial risks to parties who are more willing or better suited to take or manage them.

Derivatives are legitimate and valuable tools that provide an excellent way to reduce financial risks for business and government. They are a flexible and efficient way to hedge against the volatility of market conditions and adjust risk exposures with more precision, greater efficiency and often at a lower cost than was previously possible.

Activity 1

- 1) Define FRA.

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- 2) Define currency swap can be used to hedge currency exposure

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5.8 SUMMARY

Financial Derivatives are products whose values are derived from the values of the underlying assets.

Forward Rate Agreements, Financial Futures and Interest Rate Swaps are linear derivatives. Forward Rate Agreements are over the counter type derivatives which are used to hedge short term interest rate risk. A Forward Rate Agreement is a contract between two parties by which they agree to settle between them the interest differential on a notional principal on a future settlement date for a specified future period.

Currency exposure refers to that part of the currency portfolio that is denominated in a currency other than the home currency and is not hedged.

Currency swaps involve at least two currencies where cash flows in one or more currencies are exchanged for cash flows in another currency. In a straight currency swap, two counterparties will exchange principal amounts of different currencies usually at the prevailing spot rate. This exchange of principal can be either notional or actual. On the maturity of the swaps the principal amounts will be re-exchanged at the same swap rate. Over the term of the swap the counterparties will make periodic exchanges of fixed rate interest in the different currencies.

5.9 SELF ASSESSMENT QUESTIONS

- 1) What are the features of financial derivatives?
- 2) How is OTC derivatives markets different from Exchange Traded derivatives?
- 3) Explain how FRAs can be used to hedge currency risk?
- 4) What are the reasons for entering into a currency swap?
- 5) What are the types of currency exposure?

5.10 FURTHER READINGS

- *An Introduction to Foreign Exchange & Money Markets* - The Reuters Financial Training Series.
- Heinz Riehl & Rita M. Rodrigue, *Foreign Exchange & Money Markets* - Managing Foreign and Domestic Currency Operations.
- Rudi Weisweiller, *Foreign Exchange & Money Market Operations* - Managing a Foreign Exchange Department.
- A.V. Rajwade, *Foreign Exchange International Finance & Risk Management*.
- C. Jeevanandam, *Foreign Exchange & Risk Management*.
- H.P. Bhardwaj, *Foreign Exchange Handbook*.

UNIT 6 FORWARD CONTRACTS

Objectives

After studying this unit, you should be able to:

- understand definition and mechanics of forward contracts;
- differentiate between forwards and futures;
- discuss exchange control regulations relating to forward contracts;
- calculation of forward premium and discount; and
- explain non-deliverable forwards.

Structure

- 6.1 Introduction
- 6.2 Forward Purchase and Forward Sale Contracts
- 6.3 Fixed and Option Forwards
- 6.4 Exchange Control Regulations
- 6.5 Booking and Cancellation of Forward Contracts
- 6.6 Overseas Direct Investment
- 6.7 Delivery Under Forward Contracts
- 6.8 Differences Between Futures Contract and Forward Contracts
- 6.9 Non-deliverable Forwards
- 6.10 Forward Rates: Premium and Discount
- 6.11 Application of Forward Rates
- 6.12 Summary
- 6.13 Self Assessment Questions
- 6.14 Further Readings

6.1 INTRODUCTION

Forward contract is a contractual agreement between the buyer and seller to exchange an underlying asset for mutually negotiated price on a pre-determined date. These contracts are traded on the OTC markets. In India, OTC forward contracts in currency market are traded in the Inter-bank market. Corporate, importers, exporters, banks usually enter into forward contracts to lock into the currency price for purchase or sale of USD and other major currencies.

A forward foreign exchange transaction is one which is executed today at a rate but settlement takes place at an agreed future time. The outright Forward Rate calculated as a combination of spot exchange rate and interest rates over a period of time in the future.

As an example, consider a importer who has to make a USD payment 6 months from now. Thus, he would have to buy USD exactly 6 months from now. However, he is not sure what the USD/INR rate would be. Hence, he enters into a contract to buy USD 6 months from now at a pre-determined rate. Thus, a forward contract is an agreement where 2 parties agree to specified trade at a specified point in future.

In a forwards contract:

- The contract is negotiated directly by the buyer and seller. It is an OTC (over the counter) agreement.
- Terms of the contract can be tailored to suit the needs of each party.
- No money changes hands when contract is first negotiated and it is settled at maturity.
- Neither party can walk away unilaterally from the contract, i.e., both parties are obliged to fulfil their contractual terms.

6.2 FORWARD PURCHASE AND FORWARD SALE CONTRACT

A forward contract is a hedging device which helps primarily the exporters, importers and others with underlying currency exposure to hedge their foreign exchange risk. A Forward Exchange Contract can be Forward Sale Contract or a Forward Purchase Contract. For determining a contract as Purchase Contract or Sale Contract, the transaction is to be viewed from the angle of the bank which is the counterparty and not from the angle of the customer. Generally, exporters enter into Forward Purchase Contracts and the Importers enter into Forward Sales Contract. It is generally between a bank and customer to buy or sell a certain amount of foreign currency on a specified future date at a pre determined exchange rate of exchange.

In a forward exchange contract, the foreign exchange is delivered at a future date. Rule 7 of FEDAI (Foreign Exchange Dealers Association of India), prescribes such future date is to be computed with reference to the spot value date of the transaction. For example, if a forward contract is entered on 23 Dec, 2009, deliverable after one month, the date of delivery will fall on 25 Jan, 2010, the reason being the spot value of the (T+2) transaction falls due on 25th Jan, 2010.

6.3 FIXED AND OPTION FORWARD CONTRACTS

Where the forward contract stipulates that the delivery of foreign exchange would take place on a specified future date, it is called a Fixed Forward Contract. For example, if on 24th Dec, 2009 a forward contract is entered with delivery period after two months, the delivery has to take place on 26th Feb, 2010. The delivery cannot take place on any date prior to or after this date.

If the forward contract stipulates that the delivery of FX can take place on any day during a given period, it is called Option Forward Contract. For instance, if on 24th Dec 2009 the customer enters into a two months forward contract with option over February month , the customer can deliver foreign exchange on any day between 1st Feb to 28th Feb 2010.This period is called option period.

As per rule 7 of FEDAI (Foreign Exchange Dealers Association of India), the option period should not exceed beyond a month in a forward option contract, between a bank and a customer, the option to deliver on any date lies with the customer and not with the bank.

Activity 1

- 1) What is the difference between forward purchase and sale contract?

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- 2) What is option forward contract?

6.4 EXCHANGE CONTROL REGULATIONS

A person resident in India may can enter into a forward contract with a bank in India (an Authorized Dealer Category-I (AD)) to hedge an exposure to exchange risk in respect of a transaction for which sale and/or purchase of foreign exchange is permitted under the FEMA (Foreign Exchange Management Act) subject to the following terms and conditions:

- 1) The AD bank through verification of documentary evidence is satisfied about the genuineness of the underlying exposure, irrespective of the transaction being a current or a capital account transaction;
- 2) Full particulars of contract should be marked on such documents under proper authentication and copies thereof retained by banks for verification by RBI;
- 3) In order to enable resident individuals to manage / hedge their foreign exchange exposures arising out of actual or anticipated remittances, both inward and outward, RBI has decided to permit them to book forward contracts, without production of underlying documents, up to a limit of USD 100,000, based on self declaration. The contracts booked under this facility would normally be on a deliverable basis;
- 4) However, in case of mismatches in cash flows or other exigencies, the contracts booked under this facility may be allowed to be cancelled and re-booked. The notional value of the outstanding contracts should not exceed USD 100,000 at any time. Further, the contracts may be permitted to be booked upto tenors of one year only.
- 5) Maturity of the hedge does not exceed the maturity of the underlying transaction;
- 6) Currency of hedge and tenor are left to the choice of the customer;
- 7) Where the exact amount of the underlying transaction is not ascertainable, the contract is booked on the basis of a reasonable estimate;
- 8) Foreign currency loans/bonds will be eligible for hedge only after final approval is accorded by the Reserve Bank where such approval is necessary;
- 9) Global Depository Receipts (GDRs) will be eligible for hedge after the issue price has been finalized;
- 10) All forward contracts with rupee as one of the currencies, booked to cover foreign exchange exposures falling due within one year can be freely cancelled and rebooked. All forward contracts, involving the rupee as one of the currencies, booked by residents to hedge current account transactions, regardless of tenor, will be allowed to be cancelled and rebooked freely. This relaxation will not be applicable to forward contracts booked on past performance basis without documents as also forward contracts booked to hedge transactions denominated in foreign currency but settled in INR, where the current restrictions will continue;
- 11) All non-INR forward contracts can be freely re-booked on cancellation;

- 12) Substitution of contracts for hedging trade transactions is permitted by an authorised dealer on being satisfied with the circumstances under which such substitution has become necessary;
- 13) AD banks may also allow importers and exporters to book forward contracts on the basis of a declaration of an exposure and based on past performance up to the average of the previous three financial years' (April to March) actual import/export turnover or the previous year's actual import/export-turnover, whichever is higher, subject to the following conditions;
- 14) The forward contracts booked in the aggregate during the year and outstanding at any point of time should not exceed the eligible limit i.e., the average of the previous three financial years' (April to March) actual import/export turnover or the previous year's actual import/export turnover, whichever is higher. Contracts booked in excess of 75 per cent of the eligible limit will be on deliverable basis and cannot be cancelled. These limits shall be computed separately for import/export transactions;
- 15) Any forward contract booked without producing documentary evidence will be marked off against this limit;
- 16) Importers and exporters should furnish a declaration to the AD banks regarding amounts booked with other authorised dealer's category-I under this facility;
- 17) An undertaking is taken from the customer to produce supporting documentary evidence at the time of cancellation / before the maturity of the forward contract;
- 18) Outstanding forward contracts higher than 50 per cent of the eligible limit may be permitted by the AD bank on being satisfied about the genuine requirements of their constituents after examination of the following documents:
 - i) A certificate from the Chartered Accountant of the customer that all guidelines have been adhered to while utilizing this facility.
 - ii) A certificate of import/export turnover of the customer during the past three years duly certified by their Chartered Accountant/bank.
- 19) In the case of an exporter, the amount of overdue bills should not be in excess of 10 per cent of the turnover, to avail the above facility.

6.5 BOOKING AND CANCELLATION OF FORWARD CONTRACTS

For booking a forward contract, the customer submits the application to a bank along with documentary evidence (i.e., sale Contract) for the underlying exposure. The bank quotes forward rate to the customer and, if agreed, the bank issues a forward contract indicating serial number of the contract, delivery period, amount, delivery due date, etc.

A customer can cancel a forward contract earlier booked by him. A contract can be cancelled either on the due date of delivery or before the due date by the customer and if the contract is not cancelled on the due date, it is automatically cancelled on the 15th day from the due date of delivery by the bank as per FEDAI Rule 8.

When the contract is cancelled, the difference between original contracted rate and the prevailing rate is either recovered from him or passed on to him. In the case of a purchase contract for USD 10,000, if the original contracted rate is Rs. 47.10 per dollar and on the date of cancellation the rate is 47.05, the difference of 5 paise is recovered from the customer per dollar and for USD 10,000, it amounts to Rs. 500.

Cancellation and Rebooking

A forward contract cancelled with one AD bank can be rebooked with another AD bank subject to the following conditions:

- i) The switch is warranted by competitive rates on offer, termination of banking relationship with the AD bank with whom the contract was originally booked, etc;
- ii) The cancellation and rebooking are done simultaneously on the maturity date of the contract;
- iii) The responsibility of ensuring that the original contract has been cancelled rests with the AD bank who undertakes rebooking of the contract.

6.6 OVERSEAS DIRECT INVESTMENT

Residents having overseas direct investments (in equity and loan) are permitted to hedge the exchange risk arising out of such investments. AD banks may enter into forward contracts with residents for hedging such investments subject to verification of exposure. Contracts covering overseas direct investments can be cancelled or rolled over on the due dates. However, AD banks may permit rebooking only to the extent of 50% of the cancelled contracts.

If a hedge becomes naked in part or full owing to shrinking of the market value of the overseas direct investment, the hedge may continue to the original maturity. Roll over on due date shall be permitted up to the extent of the market value as on that date. AD banks may also enter into forward contracts with residents in respect of transactions denominated in foreign currency but settled in Indian Rupees including hedging the economic (currency indexed) exposure of importers in respect of customs duty payable on imports. These contracts shall be held till maturity and cash settlement would be made on the maturity date by cancellation of the contracts. Forward contracts covering such transactions once cancelled, are not eligible to be rebooked. However, in the event of change in the rate of customs duties due to government notifications, importers are allowed to cancel and / or rebook the forward contracts before maturity.

6.7 DELIVERY UNDER FORWARD CONTRACTS

Delivery on Due Date: Where the delivery takes place on the due date, the contract will be settled at the originally contracted rate irrespective of the prevailing rate in the market on the date of delivery.

Delivery before due date: In case delivery takes place before the due date (early delivery),the contract will be executed on the originally contracted rate but the customer will be charged separately for:

- Swap difference,
- Interest on outlay of funds, and
- Handling charges.

● Swap Gain/Loss: When a bank enters into a forward sales contract with the customer, it eliminates its exchange risk by entering into a matching forward purchase contract in the inter bank market. Assume a bank agrees to sell forward USD 20000 delivery due on 31st Dec and now ,if a customer wants to take early delivery, say on 15th, the bank has to do the following:

- 1) Buy USD 20000 at spot rate to deliver the customer at contracted rate.

- 2) Enter into a fresh forward sales contract for the same amount with delivery due on 31st Dec to meet the forward purchase contract already entered into with another bank.

The combined effect of these two transactions is a swap transaction i.e., simultaneous purchase and sale of the same currency for the same amount. If the transaction results in a net gain, it is passed on to the customer. If the transaction leads to a swap loss, it is recovered from the customer.

- **Interest on outlay of funds:** In the above example, (early delivery on 15th Dec), the bank honours its sale contract and sells the foreign exchange to customer at the originally contracted rate. For doing this, the bank makes spot purchase of foreign exchange by paying in rupees and this is known as outlay of funds. The bank will recover interest from the customer from the date of early delivery till the original due date.
- **Handling Charges:** This will vary from bank to bank and normally Rs.100 will be charged for early delivery.

6.8 DIFFERENCE BETWEEN FUTURES CONTRACT AND FORWARD CONTRACT

Futures contracts differ considerably from simple forward contracts. To trade in Futures contracts, one has to become a member of the Exchange by paying an Initial Margin i.e., normally based on the price volatility of the underlying instrument. The variable margin account has to be maintained with the Exchange so that the daily profit or loss on the outstanding position on account of marking to market or the actual profit or loss arising out of closing out of open positions may be accounted for. The size of the contract too is standardised. The difference between a forward contract and a futures contract can be summarised in Table 6.1.

6.9 NON-DELIVERABLE FORWARDS (NDF)

The Non-deliverable Forwards (NDF) markets have generally evolved for currencies with foreign exchange convertibility restrictions, particularly in the emerging Asian economies, viz., Taiwan, Korea, Indonesia, India, China, Philippines, etc. With controls imposed by local financial regulators and consequently the non-existence of a natural forward market for non-domestic players, private companies and investors investing in these economies look for alternative avenues to hedge their exposure to such currencies. In this context, non deliverable forwards have become popular derivative instruments catering to the offshore investors' demand for hedging. NDFs are types of derivatives for trading in non-convertible or restricted currencies without delivery of the underlying currency.

Trading in the NDF market generally takes place in offshore centres. In this market, no exchange takes place of the two currencies' principal sums; the only cash flow is the movement of the difference between the NDF rate and the prevailing spot market rate and this amount is settled on the settlement date in a convertible currency, generally in US dollars, in an offshore financial centre. The other currency, usually an emerging market currency with capital controls, is non-deliverable. In this particular respect, NDFs are similar to commodities futures market where commodities, like, wheat or corn, are traded in organized futures markets and positions are later settled in dollars, wheat or corn being non-deliverable.

The NDF prices are generally determined by the perceived probability of changes in foreign exchange regime, speculative positioning, conditions in local onshore interest

Table 6.1: Difference between Future Contracts and Forward Contracts

	<i>Futures Contracts</i>	<i>Forward Contracts</i>
Meaning	A futures contract is a contractual agreement between two parties to buy or sell a standardized quantity and quality of asset on a specific future date on a futures exchange.	A forward contract is a contractual agreement between two parties to buy or sell an asset at a future date for a predetermined mutually agreed price while entering into the contract. A forward contract is not traded on an exchange.
Trading place	A futures contract is entered on the centralized trading platform of an exchange.	A forward contract is traded in an OTC market.
Size of the contract	A futures contract is standardized in terms of quantity as specified by the exchange.	Size of the forward contract is customized as per the terms of agreement between buyer and seller.
Transparency in contract price	The contract price of a futures contract is transparent as it is available on the centralized trading screen of the exchange.	The contract price of a forward contract is not transparent, as it is not publicly disclosed.
Valuations of open position and margin requirement	In a futures contract, valuation of open position is calculated as per the official closing price on a daily basis and the MTM margin requirement exists.	In a forward contract, valuation of open position is not calculated on a daily basis and there is no requirement of MTM on daily basis since the settlement of contract is only upon maturity date of forward contract.
Liquidity	Liquidity is the measure of frequency of trades that occur in a particular currency futures contract. A futures contract is more liquid as it is traded on the exchange.	A forward contract is less liquid due to its customized nature.
Counter party default risk	In futures contracts, the exchange clearinghouse provides trade guarantee. Therefore, counter-party risk is almost eliminated.	In forward contracts, counter-party risk is high due to the customized nature of the transaction.
Regulations	A regulatory authority and the exchange regulate a futures contract.	A forward contract is not regulated by any exchange.
Settlement	Futures contract is usually cash-settled, but the option of physical settlement is available on some of the exchanges. In exchanges which do not facilitate delivery settlement, this results in hedgers squaring off the open (hedge) position in the exchange platform, and buying / selling in the spot market at the end of the hedge period.	A forward contract may be settled by delivery of the underlying currency, or cash settled.

rate markets, the relationship between the offshore and onshore currency forward markets and central bank policies.

Being offshore, the market has remained outside the regulatory purview of the local monetary authorities. Yet, considering the linkages that prevail between the onshore spot and forward markets and the offshore NDF market, activity in these markets has

always been of interest to the regulators. However, studies on NDF markets are rather limited and in India, this aspect has remained unexplored.

Trading platform and offshore centre

NDFs are primarily over-the-counter, thus making it difficult to gauge the volume of contracts traded, who trades the contracts, and where they are traded. At the international level, New York tends to dominate trading in Latin American NDFs, Singapore (and to a lesser extent Hong Kong) dominate trading in non-Japan Asian NDFs, while London spans these markets. The INR NDF is largely concentrated in Singapore and Hong Kong, with small volumes being traded in the Middle East (Dubai and Bahrain) as well.

NDF Market Regulation

At present, there are no controls on the offshore participation in INR NDF markets. The onshore financial institutions in India, however, are not allowed to transact in the NDF markets. Domestic banking entities are allowed specific open position and gap limits for their foreign exchange exposures and through these limits domestic entities could play in the NDF markets to take advantage of any arbitrage or even speculate. This itself restricts the extent to which domestic banks could participate in NDF markets. The objective has been that allowing domestic banks to participate in the NDF markets would require an enhanced level of intervention from the Reserve Bank of India (RBI) to protect Indian rupee from any speculative attack.

Market Players

NDF market players generally operate with an objective of hedging, speculating and arbitraging. While the INR NDF market has been around for over the last 10 years or so, the characteristics of this market seem to have evolved over this period in tandem with the onshore exchange controls and regulations. In the late 1990s the NDF market was provided liquidity by foreign residents who had a genuine exposure to the Indian rupee but were unable to hedge their exposure in the domestic market due to existing controls. However, with the gradual relaxation of the exchange controls, reasonable hedging facilities are available to offshore non-residents who have exposures to the rupee, especially when compared with the hedging facilities provided by some other competitor Asian countries such as China. Hence, the INR NDF market presently derives its liquidity largely from (i) Non-residents wishing to speculate on the Indian rupee without any exposure to the country, and (ii) arbitrageurs who try to exploit the differentials in the prices in the two markets without any outlay of capital on their part by two offsetting transactions. For the Indian rupee it is believed that arbitrage is profitable when there is difference of around 10 paise in the forwards prices. Such opportunities are not very common, but tend to occur whenever speculative actions increase. The behaviour of NDF market players depends critically on their objective for participation. Foreign investors who participate in the NDF market to hedge their exposures generally take long positions e.g., multinational companies. Speculators, on the other hand, operate mostly in the short end of the market e.g., hedge funds, also corporates entities with an international presence who undertake speculative or arbitrage trades, jewel exporters and manufacturers that constitute another group who are active arbitraging between domestic and NDF markets.

As reported by market participants, some of the foreign banks which trade in the rupee NDFs include Deutsche Bank, UBS AG, Standard Chartered Bank, Citibank, JP Morgan Chase, ABN Amro, Barclays, ANZ Investment bank and BNP.

Settlement period

The settlement period refers to the gap between the day the NDF contract is fixed and the actual delivery date. The fixing date is the day on which the comparison between

the NDF rate and the prevailing spot rate is made. The settlement date is the day whereby the difference is paid or received. Depending on the currencies dealt, there are variations whereby for some currencies, the settlement period is one day whereas for others it is two business days. Generally, the spot rate used in the NDF market is based on a reference page on Reuters or Telerate with a fallback of calling four leading dealers in the relevant market for a quote. For the Indian rupee NDF, the RBI reference rate is generally used as the fixing rate.

Bid Offer Spreads

Markets are generally, perceived as efficient when market prices reflect all available information, so that it is not possible for any trader to earn excess profits in a systematic manner. The efficiency/ liquidity of the foreign exchange market is often gauged in terms of bid/offer spreads. The bid-ask spread refers to the transaction costs and operating costs involved with the transaction of the currency. With the increase in the volume of transaction of the currency, these costs/bid-ask spreads may reduce. In India, the spread is almost flat and very low in the spot segment of the foreign exchange market. The spread in the NDF segment remains higher than that of the spot and forward market reflecting lower liquidity in the NDF market. As compared with other Asian currencies, the spreads for Indian rupee NDFs remain lower than that of Indonesian Rupiah and Philippine peso, but higher than that of Chinese yuan (renminbi) and Korean won reflecting the higher liquidity available in the latter two currencies

Current Uses of the NDF Market

Currently, estimates vary but many major market participants estimate as much as 60 to 80 per cent of NDF volume is generated by speculative interest, noting growing participation from international hedge funds. Major financial institutions generally are primarily involved in NDF markets through their market-making activities. These market-making activities are a service to their customers for which the firm is compensated by a bid/ask spread as well as effective management of the firm's NDF book. Currently, major international banks primarily offset NDF positions incurred through market-making activities with other major banks through the broker market, but also deal directly with other banks and onshore market players and exchanges. NDF contracts were not considered as having any element of sovereign risk even though NDF contracts usually specify settlement to a locally posted spot exchange rate ("fixing rate"), often generated by an official sector onshore entity.

As intermediaries, market-making firms are exposed to basis risk — the potential that offsetting contracts settle at different rates in the event of a disruption to the posting or perceived accuracy of the local rate. However, under normal market conditions, this risk generally does not significantly limit firms' market-making activities.

Limitations of NDFs as Risk Management Tools

Despite the growth of NDF markets, particularly for currencies of countries attracting significant foreign investment but with some capital controls remaining, market participants cite a variety of limitations of NDFs as risk management tools. In general, market participants suggest that NDFs do not exhibit sufficient correlation with broader and more significant country risks beyond currency risk. In fact, NDFs only offer protection against fluctuations in the "fixing rate" for a currency. Often this rate is a rate generated and posted by onshore authorities based on local spot market trading. The NDF offers no guarantee that the holder of the contract will actually be able to trade foreign exchange at the fixing rate. Indeed, when a change in exchange rate regime is increasingly likely, there is often a greater likelihood that the validity of the fixing rate as an indication of where the spot market is trading or a price where a major trade can be transacted is significantly diminished.

Even of local market trading and fixing rate posting continue amid a currency crisis, there are additional concerns about the usefulness of NDFs as a hedging product in periods of market stress. NDFs do not ensure spot market convertibility near the NDF fixing price to which they are settled. Although NDFs compensate the holder of a short local currency position after a depreciation of the local currency, this compensation in no way provides assurance that the underlying local exposure that was hedged can be converted to dollars at the NDF fixing price, or even at any price. In a crisis situation, market liquidity usually decreases. Amid decreased liquidity, a large trade to repatriate onshore exposure is highly likely to move the spot market, making the protection originally provided by the NDF position less significant. A firm hedging onshore local currency receivables or equity investment remains dependent on a functioning local country foreign exchange market to convert its receipts or proceeds back to dollars. Given the limitations of NDF contracts discussed above, major international banks generally do not use NDFs themselves to hedge the exchange rate exposure generated by their own foreign direct investment into emerging markets. This is partly due to the fact that NDF contracts with one year or greater maturity tend to have bid/ask spreads seen as unattractive. In addition, banks generally see country risks, such as increased restrictions on capital convertibility, as much more significant risks to their long-term investment returns than exchange rate fluctuations. They suggest that NDF prices and even the local spot market exchange rate are not well correlated with the broader country risks which include tightened currency convertibility restrictions.

Outlook

Given the likely ongoing existence of convertibility restrictions for currencies of countries with significant foreign investor involvement, a global NDF market is likely to continue. NDF prices can be a useful market monitoring tool, reflecting market forces that cannot be manifested in onshore markets. Once a country moves to a more convertible exchange rate regime and onshore counterparties are permitted to transact in NDFs with international counterparties, NDF market liquidity can potentially contribute to liquidity and volume in onshore currency product markets. Once a currency becomes fully convertible, NDF markets tend to disappear. NDF markets can be seen as an intermediate tool in the progress of market development from limited to fuller capital convertibility

Activity 1

- 1) What is non deliverable forward contract?

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- 2) Explain swap gain with an example.

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6.10 FORWARD RATES: PREMIUM AND DISCOUNT

Forward rate is the rate payable for the currency on the future delivery date which is derived from spot rate as shown below:

$$\text{Forward rate} = \text{Spot Rate} + \text{Premium or Discount}$$

Outright Forward Transactions are necessary in the foreign exchange markets as they serve number of purposes, like:

- 1) One can hedge or cover an existing future financial, commercial or trade related exchange risk.
- 2) These types of deals, in combination of spot deals, are used for money market operation through ‘swap transactions’.
- 3) Taking a view of the market, these can be used for speculation.

Premium

When a currency is costlier in future (forward) as compared to spot, the currency is said to be in premium vis-à-vis to another currency.

In ‘Direct Rate’ premium is always added to both buying and selling rate and in ‘Indirect Rate’ premium is always deducted from both, buying and selling rate.

Discount

When a currency is cheaper in future (forward) as compared to spot, the currency is said to be at a discount vis-à-vis another currency.

In ‘Direct Rate’ discount is always deducted from both buying and selling rate and in ‘Indirect Rate’ discount is always added to both, buying and selling rate. It may be mentioned here that to avoid confusion, it is the base currency for which the premium/discount is always mentioned. Base currency is the currency which is being bought and sold, and the other currency is just incidental.

To illustrate

In a cable rate £ 1 = US\$ 1.6520-1.6527, it is £ which is being bought and sold against US\$.

If the forward rate is more than the spot rate, it is usually referred to as forward premium. On the other hand, if the forward rate is less than the spot rate, it is forward discount.

Example of currency with forward rate premium:

Spot USD CHF		1 Month Forward Points		1 Month Forward Rate	
Bid	Ask	Bid	Ask	Bid	Ask
1.1675	1.1678	12	14	1.1687	1.1692

In the above example, the forward points are in pips. Due to the positive interest differential of CHF Libor as compared to USD Libor rates, the forward rate is at premium.

Example of currency with forward rate discount

Spot GBP/USD		1 Month Forward Points		1 Month Forward Rate	
Bid	Ask	Bid	Ask	Bid	Ask
1.4856	1.4858	20	17	1.4836	1.4851

It may be noted that the forward points are in pips. The interest rate differential between GBP and USD is such that the forward rate is at a discount for the GBP/USD currency pair. When the forward rate is at a discount, it may be noted that the forward points for bid is higher than the forward points in the ask side.

a) Illustration: Calculation of Forward Selling Rate

ABC Bank has to sell dollars forward to their customer. Delivery Date 30, November, 2009.

USD/INR:

Spot/August	0300/400
Spot/September	1100/1300
Spot/November	2700/3100

Spot/October	1900/2200
Spot/December	3500/4000

Calculate the rate to be quoted to the customer keeping an exchange margin of 5 paise.

Solution

We have to quote forward Sale Rate delivery option throughout the month of November (Option Forward Contract). The forward margin is in premium and therefore it is to be added to spot rate. In case of selling rate we would like to make the rate high as it would enable us to receive more in rupees. Therefore we take premium upto November i.e., 0.3100.

The Interbank spot selling rate

On 5 th Aug. 09 =USD 1	=	35,3800
Add premium upto November	=	(+) 3100
		35,6900
Add exchange margin 5 paise		0.0500
Forward Rate USD 1	=	Rs. 35,7400
Rate to be quoted : USD 1	=	Rs. 35.74

b) Illustration: Forward rate calculation

Interbank Market quotes

Spot US\$1 = EUR 1.8235-1.8245

Forwards	Spot/1 Month	17/18
	Spot/2 Month	35/37
	Spot/3 Month	53/56
	Spot/6 Month	99/106

Calculate USD/EUR forward buying and selling rate.

Solution

If one were to buy US\$. against EUR from the market, one month forward, the price would be constructed in the following manner:

Spot US\$1 = EUR 1.8245

One month premium + 0.0018.

Premium to be added =EUR 1.8263

Market is taking EUR while selling US\$, therefore will take more EUR and hence higher of the two figures in one month premium will be added.

Similarly, if one were to sell US\$ against EUR to the market, one month forward, the price would be constructed in the following manner:

Spot US\$1 = EUR 1.8235

One month premium + 0.0017

Premium to be added =EUR 1.8252

The market's one month outright forward quote would be:

1 Month Forward US\$1 = EUR 1.8252-1.8263

Note: If the forward differentials are in ascending order i.e., the first figure is lower than the second figure the base currency is at a premium.

6.11 APPLICATION OF FORWARD RATES

On 2nd March, 2009 M/s Star Exporters have received export order for USD 2 million for shipment to Germany in between 15th March and 30th March, 2009. The letter of credit to that extent was received by the exporters and the documents were required to be submitted within 15 days from the date of shipment. The payment terms are 90 days sight.

Rates on 2nd March, 2009 (Spot Date 6th March, 2009) are as follows:

Spot USD 44.3500/ 44.3800

Forward Differences (Paise)

Mar	9/10
Apr	21/22
May	32/33
June	38/39
July	44/45
Aug	50/51

What rate would be applicable from the option given below?

- A) 44.6950
- B) 44.8000
- C) 44.3500
- D) 44.7550

Ans: A. 44.6950

The rate applicable will be calculated as follows:

For this transaction spot rate applicable will be bank's Bid (buying) rate i.e., 44.35

Swap Points applicable will be calculated upto 13th June, 2009 i.e., earliest date of expected delivery, as follows:

Spot May 0.32/.33

Spot June 0.38/.39

The Premium (Bid) is 32 Paise for May and 38 Paise for June.

Thus, Premium for entire month of June i.e. 30 Days is 6 Paise.

We need to calculate premium for 13 Days

No. of Days	Premium (Paise)
30	6
13	?

Premium for 13 days = $30 \times 6 / 13 = 2.60$ Paise

Which is rounded down to 2.50 Paise since forward premium is quoted to nearest Quarter Paise. For this transaction, applicable swap points will be spot May plus premium for 13 days of june.

(Small/Big Premium Add)
i.e., $32 + 2.50 = 34.50$

Spot Rate	44.3500
Plus forward premium	0.3450
Forward rate	44.6950

The applicable forward rate is 44.6950

6.12 SUMMARY

Forward contract is a contractual agreement between the buyer and seller to exchange an underlying asset for mutually negotiated price on a pre-determined date. These contracts are traded on the OTC markets. In India, OTC forward contracts in currency market are traded in the Inter-bank market. Corporate, importers, exporters, banks usually enter into forward contracts to lock into the currency price for purchase or sale of USD and other major currencies.

In a forwards contract:

- The contract is negotiated directly by the buyer and seller. It is an OTC (over the counter) agreement T.
- Terms of the contract can be tailored to suit the needs of each party.
- No money changes hands when contract is first negotiated and it is settled at maturity.
- Neither party can walk away unilaterally from the contract, i.e., both parties are obliged to fulfil their contractual terms.

6.13 SELF ASSESSMENT QUESTIONS

- 1) What are the differences between fixed forwards and option forward contracts?
- 2) List down the major differences between forward contracts and futures contracts?
- 3) What is meant by "outlay of funds"?
- 4) What is a non deliverable forward?
- 5) How outright forward rate is calculated?

Problem

Your customer has booked a forward contract to meet an import bill during May, 2009 for USD 5,25,000. However, on the due date she seeks cancellation. The contract was booked at USD 1 = 44.25. Interbank rate on the date of cancellation is Spot rate USD/INR: 42.4350/4450

You need an exchange margin 0.1% and Rs.100 towards cancellation charges?

Solution

It is Forward Sale Contract and a Forward Sale Contract cancelled on due date is to be cancelled at TT Buying Rate of the Bank. The TT Buying Rate of the bank is found out from Inter-Bank Spot Buying Rate less exchange margin.

$$\begin{aligned}
 \text{Inter-bank Spot Buying Rate USD} &= \text{Rs. } 42,4350 \\
 &= \underline{\text{Rs. } 00.0424} \\
 &= \text{Rs. } 42.3926
 \end{aligned}$$

Quotation to be given in nearest .0025 and hence USD 1= Rs. 42.3925

The amount recoverable from customer if

Original USD 5,25,000 @ Rs. 44.2500 Rs. 23,331,250

The amount now payable on account of

Purchase due to cancellation is

USD 5,25,000 @ Rs. 42,3925 Rs. 22,256,062.50

So excess amount recoverable from

Customer is Rs. 975,187.50

Add Flat charges recoverable Rs. 100

Total amount recoverable due to cancellation is Rs. 975,287.50

6.14 FURTHER READINGS

- 1) Bishop & Dixon, *Foreign Exchange Handbook*.
- 2) Adrian Buckley, *Multinational Finance*.
- 3) *An Introduction to Foreign Exchange & Money Markets* -The Reuters Financial Training Series
- 4) Heinz Riehl & Rita M. Rodriguez, *Foreign Exchange & Money Markets - Managing Foreign and Domestic Currency Operations*.
- 5) Rudi Weisweiller, *Foreign Exchange & Money Market Operations-Managing a Foreign Exchange Department*.
- 6) A.V. Rajwade, *Foreign Exchange International Finance & Risk Management*.
- 7) C. Jeevanandam, *Foreign Exchange & Risk Management*.

UNIT 7 CURRENCY FUTURES TRADING

Objectives

After studying this unit, you should be able to:

- understand Meaning and Mechanics of Currency Futures;
- analyse Currency Futures Market Practices;
- discuss application of currency futures for risk mitigation; and
- explain trading and Investment Strategies.

Structure

- 7.1 Introduction
- 7.2 Basics of Currency Futures
- 7.3 Advantages of Currency Futures
- 7.4 Disadvantages of Currency Futures
- 7.5 Participants
- 7.6 Role of Clearing House
- 7.7 Margin
- 7.8 USD/INR Currency Futures Contract Specifications
- 7.9 Currency Futures Market Practices
- 7.10 Trading, Clearing and Settlement Process
- 7.11 Pricing of Currency Futures Contracts
- 7.12 Hedging Strategies
- 7.13 Investment Strategies in Futures Markets
- 7.14 Spread Trading
- 7.15 Summary
- 7.16 Self Assessment Questions
- 7.17 Further Readings

7.1 INTRODUCTION

Currency Futures were first introduced in the International Money Market at Chicago, USA in the year 1972 and in India these were introduced in Aug 2008 .Currency Futures are contracts where there is a commitment to deliver or take delivery of one currency against receipt or payment in another currency at an exchange rate agreed to at the time of entering into the contract. This definition may look very similar to a forward contract. Currency Futures are available in the major exchanges in the world viz. The London International Financial Futures Exchange (LIFFE), The Tokyo International Financial Futures Exchange, Chicago Board of Trade, and Singapore International Monetary Exchange (SIMEX). The contracts have standard sizes and the prices are normally quoted in US Dollar terms. The standard sizes are 125000 per contract for Euro, Dem, NLG, CHF, etc, 62500 for Pound Sterling and 12.5 Mio for Japanese Yen. The price movements are calibrated to move with a minimum tick size. The tick size is 0.01 % or 0.0001 per unit of the currency. Hence, if the exchange rate

moves by 1 pip, the loss or profit for this unit movement in price is the product of 0.0001 and the contract size.

Futures are forward contracts traded in a futures exchange. Under a futures contract the seller agrees to deliver to the buyer a specified security / currency or commodity on a specified date. Futures relating to exchange rates (currency futures), Interest rates (bond futures) and equity prices (stock / index futures) are known as financial futures, as distinct from commodity futures (oil / metal/ agro-products etc.). Futures contracts are of standard sizes with pre-fixed settlement dates. The futures are bought and sold only through the members of the exchange, for each transaction the exchange being the counter-party. A distinct feature of futures is that the contracts are marked to market daily, and the members are required to pay margin equivalent to daily loss, if any. This way the possibility of default on settlement date is avoided. The exchange guarantees all trades routed through its members, and in case of default / insolvency of any member, the exchange will meet the payment obligations from its trade protection fund. For instance, when Nick Leeson, the trader of Bearings Bank, defaulted billions of dollars at Singapore Monetary Exchange (since merged with Singapore Stock Exchange), the default led to the collapse of Bearings Bank, but none of the counter-parties who traded with Bearings Bank lost money, as all settlements were the responsibility of SME.

Currency futures serve the same purpose as forward contracts, conventionally issued by banks in foreign exchange business. Futures are in fact forward contracts, except that they are standardized and are traded on exchanges, while forward contracts are customized OTC contracts. Exporters and importers prefer to use forward contracts as they can hedge their exchange risk precisely, in terms of size and duration. Futures are used by traders and speculators with large volumes.

Activity 1

- 1) List five differences between forward and futures contract.

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- 2) What is a currency future?

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7.2 BASICS OF CURRENCY FUTURES

A futures contract is a standardized contract, traded on an exchange, to buy or sell a certain underlying asset or an instrument at a certain date in the future, at a specified price. Where the underlying asset happens to be a commodity, the futures contract is termed as ‘commodity futures’ whereas in cases where the underlying happens to be a financial asset or instrument, the resultant futures contract is referred to as ‘financial futures’. A currency futures contract, also called an FX future, is a type of financial futures contract where the underlying is an exchange rate. In other words, it is a futures contract to exchange one currency for another at a specified date in the future at a price (exchange rate) that is fixed on the last trading date. The buyer or seller in a futures market locks into an exchange rate for a specific value date or delivery date. In other words, currency futures are used primarily as a price setting mechanism rather than for

physical exchange of currencies. The future date is called the delivery date or final settlement date. The pre-set price is termed as future price, while the price of the underlying asset on the delivery date is termed as the settlement price. The future price normally converges towards the spot price on the settlement date. The futures contract gives the holder the right to buy or sell, in contrast to the option contract which gives the holder the right, but not the obligation to buy or sell the underlying. Thus, both the parties of the futures contract must fulfill their contractual obligations on the settlement date. However, such contracts do provide options to deliver the underlying asset or settle the difference in cash. The holder of a contract could exit from his commitment prior to the settlement date by either selling a long position or buying back a short position (offset or reverse trade). The futures contracts are exchange traded derivatives and the exchange's clearing house acts as counterparty to all contracts, sets margin requirements, etc.

Futures contracts are essentially traded through an exchange and are very liquid. The size and maturities of a futures contract are standardized. Marking to market of outstanding positions at the end of each trading day is a special feature of futures markets. Initial and Variable margins are to be maintained with the exchange by participants of futures market. Physical delivery of futures contracts is minimal and positions are normally closed out by opposite trades. The futures exchange guarantees the settlement between various parties to the market and hence counter party risk is absent. Futures are available on currencies, bonds, interest rates, stock indices, commodities etc. Each of the futures contracts has its own specifications and procedures.

7.3 ADVANTAGES OF CURRENCY FUTURES

The exchange traded currency futures offer different advantages over OTC market. The advantages are:

- 1) Transparency and efficient price discovery. The market brings together divergent categories of buyers and sellers.
- 2) Elimination of counterparty credit risk.
- 3) Access to all types of market participants.
- 4) Standardized products.
- 5) Transparent trading platform.

7.4 DISADVANTAGES OF CURRENCY FUTURES

The futures are also disadvantageous in a few areas when compared to OTC market. The major disadvantages are:

- 1) Standardization it is not possible to obtain a perfect hedge in terms of amount and timing.
- 2) Cost forwards have no upfront cost, while margining requirements may effectively drive the cost of hedging in futures up.
- 3) Small lots- not possible to hedge small exposures generally.

7.5 PARTICIPANTS

Traditionally, the futures market meets the needs of the three distinct sets of market users, those who wish to discover price information, those who wish to speculate and those who wish to hedge. Though speculation may not be a socially useful activity, the three types of users contribute to price discovery and hedging as well as add to liquidity. A speculator is a trader who enters the futures market, with no initial risk in pursuit of

profit, thereby accepting an increase in risk. A hedger is a trader with a pre-existing risk who enters the futures market to reduce or eliminate his currency exposure.

There is a category of speculators called scalpers who have an extremely short horizon view – ranging from a few seconds to a few minutes. Since, they are not looking for huge profits, they manage to generate a large volume of trades and contribute to increase in liquidity. Day traders take a far sighted approach to the market attempting to profit from the price movements that may take place over the course of a trading day. Position trader maintains positions overnight, weeks or months.

7.6 ROLE OF CLEARING HOUSE

The margin system functions through a hierarchy of market participants that links the clearing house with the individual trader. The members of an exchange may be classified as clearing members or non clearing members. A clearing member is a member of the exchange and the clearing house. The clearing house deals with clearing members only. Any non-clearing member has to clear his transactions through a clearing member.

The clearing house collects margin deposits from clearing members to cover all futures positions that are on account of the particular member. For e.g., if a bank is a member of the clearing house, it has to maintain margins on account of all the trades executed through it. In turn the clearing member would insist on receiving margins from all traders whose trade it handles and thus the margin requirements travel down the chain to brokers and actual traders.

The clearing house does not take any active positions on the exchange, but interposes itself between two parties to a trade. The number of contracts bought in a futures market must therefore be exactly equal to the number of contracts sold. Without the clearing house, it would have been difficult for two totally unknown parties separated geographically to trust each other and trade. Because of the clearing house, the two parties to the trade are only concerned with the financial soundness of the clearing house.

The clearing house is invariably a large well capitalized financial institution. In the history of futures, there has never been a known failure of the clearing house.

There are four identifiable tiers in the futures market - the broker, the exchange, clearing house, and the government agency. The KYC of the customer is the broker's responsibility. He is also responsible to the clearing house for all accounts handled by him directly or indirectly. Any restrictions on specific types of trades or limits on positions, etc laid down for smooth functioning and free determination of price have to be implemented through brokers. A broker has a duty to report any violation or attempt at price manipulation to the exchange. A code of conduct for brokers framed by the exchange, regulator or a self regulatory agency is generally put in place.

The futures exchange and the clearing house are themselves self regulated entities. They prescribe and enforce rules for trading and clearing on the exchange. Exchange rules inter alia prohibit fictitious trading, rumour mongering, disclosure of customer positions, false declarations and statements, etc. by members. Any attempt at price manipulation by pre-arranged trades is strictly forbidden. Brokers are also forbidden from a practice called front running where a broker trades on his own account to the detriment of the customer. Futures exchanges can also set daily price limits, position limits and margin requirements. These will be within the framework of any limits set by the higher level regulator.

Often the various futures exchanges in a market form a self regulatory association. This helps promote just and equitable principles of trade, remove impediments to free and

open futures trading and generally protect public interest. Such associations undertake the tasks of screening and testing applicants for membership, prescribe record keeping and disclosure standards, etc.

7.7 MARGINS

The credit risk in futures market is assumed by the exchange. In order to minimize the credit risk to the exchange, traders are required to post margins, typically in the range of 5 per cent to 15 per cent of the contracts' value. In some jurisdictions, different margin regimes are followed for hedgers and speculators. There are three types of margins, namely: *initial margin*, *maintenance margin* and the *variation margin*. The initial deposit called the initial margin is the amount a trader (buyer and seller), must deposit before trading in any futures. This normally is approximately taken as the maximum daily price fluctuation permitted for the contract being traded. The initial margin can be kept so small because of the safeguard built into the system of daily mark to market. Whenever the position held on the exchange shows a loss on mark to market, the same is deducted from the margin deposited. When this drops below a threshold level called the maintenance margin, established by the exchange, a margin call is made on the trader to replenish the margin and the additional amount deposited is called the variation margin.

7.8 USD/INR CURRENCY FUTURES CONTRACT SPECIFICATION

The contract specifications of USD/INR Currency futures traded in Stock Exchanges of India is listed below:

- **Underlying:** US dollar-Indian rupee (USD/INR) rate.
- **Trading Days:** The Exchange operates on all days except Saturdays, Sundays, and Exchange-specified holidays. The Exchange notifies a list of holidays for each calendar year in advance.
- **Trading Hours:** The trading on currency futures is from 9:00 a.m. to 5:00 p.m.
- **Size of the Contract:** The minimum size of the currency futures contract is US\$ 1,000. The contract size would be periodically aligned to ensure that the size of the contract remains close to the minimum size.
- **Quotation:** The currency futures contract is quoted in rupee terms. However, the outstanding positions would be in dollar terms.
- **Tenor of the Contract:** The currency futures contract shall have a maximum maturity of 12 months.
- **Available Contracts:** All monthly maturities from 1 month to 12 months are made available.
- **Settlement Mechanism:** The currency futures contract shall be settled in cash in Indian rupee.
- **Settlement Price:** The settlement price would be the RBI reference rate on the date of expiry. The methodology of computation and dissemination of the reference rate may be publicly disclosed by the RBI.
- **Final Settlement Day:** The currency futures contract would expire on the last working day (excluding Saturdays) of the month. The last working day would be taken to be the same as that for Interbank Settlements in Mumbai. The rules for Interbank Settlements, including those for known holidays and subsequently declared holidays would be those as laid down by FEDAI.

7.9 CURRENCY FUTURES MARKET PRACTICES

Trading Parameters

i) Base Price

Base price of the USD/INR Futures Contracts on the first day shall be the theoretical futures price. The base price of the Contracts on subsequent trading days will be the daily settlement price of the USD/INR futures contracts.

ii) Closing Price

At the end of the day's trading session, the system calculates the closing price of each and every contract traded on the system. The logic for calculation of the closing price is as follows:

- a) Closing price is equal to the weighted average price of all the trades done during the last 30 minutes of a trading session.
- b) If the numbers of trades during the last 30 minutes are less than 5, then the closing price is based on the weighted average price of the last 5 trades executed during the day.
- c) If the number of trades during the day are less than 5, then the closing price is taken as the weighted average of all trades executed during the day.
- d) If no trades have been executed in a contract for the entire day, then the official closing price of the last session is taken as the official closing price. In such cases, if there is high volatility of spot prices of the underlying, the Exchange will have the right to modify the closing price for the purpose of marking to market and making the open positions closer to the market.

Dissemination of Open, High, Low, and Last-Traded Prices

During a trading session, the Exchange continuously disseminates open, high, low, and last-traded prices through its trading system on real time basis.

Life of a Futures Contract

The life of a contract means the period when the contract will be available for futures trading, i.e., the period between the start of trading and the day it expires. This period is also known as the 'trading cycle' of the contract. The currency future contract will be available for trading with a maximum maturity of 12 months.

Expiry Date

All contracts expire on the last working day (excluding Saturdays) of the contract months. The last day for the trading of the contract shall be two working days prior to the final settlement.

Final Settlement Rate

The Final Settlement rate would be the Reserve Bank reference rate on the date of expiry.

Types of Orders

In the trading system, the best buy order (order with the highest bid price) is matched with best sell order (order with the lowest offer price) on price-time priority basis. Quantity and price for any type of order are entered into the system as per the trading unit and the base value unit.

Price-Related Condition Orders

- a) **Limit Order:** Specifies the rate at (or better than) which the trade should be executed. Limit orders are placed to either enter into a new trade or to exit from an existing trade. For a buy order the limit is placed below the existing market price, and for a sell order the limit is placed above the existing market price.
- b) **Market Order:** Will be executed at whatever is the prevailing rate on or after submission of such an order. If there are no trades at that point of time, the system takes the last-traded price as the market order and the order remains in the system unexecuted.
- c) **Stop-Loss Orders:** There are usually placed to minimize losses by closing out existing positions or to create a new position. Stop-loss buy orders are placed above the current market price, and stop-loss sell orders are placed below the current market price. A trigger price is also specified to allow the system to activate the stop-loss order once the last traded price breaches the trigger price. Stop-loss orders are kept by the system in suspended or abeyance mode and are activated only on the trigger of a price as defined by the member. The advantage of a stop order is that any sudden adverse movement in the market can limit losses to a great extent. The disadvantage is that the stop price could be activated by a short-term fluctuation in the price. The solution is to choose a stop-loss percentage those factors in a day-to-day fluctuation while preventing as much downside risk as possible.

Once the trigger price is reached, your stop order becomes a market order; the price at which you sell may be much different from the stop price. This is especially true in a fast-moving market where prices can change rapidly.

Stop-loss orders can be used to lock-in profits, in which case it is sometimes referred to as a trailing stop. The most basic technique for establishing an appropriate exit point is the trailing stop technique. Very simply, the trailing stop maintains a stop-loss order at a precise percentage below the market rate (or above, in the case of a short position). The stop-loss order is adjusted continually based on fluctuations in the market rate, always maintaining the same percentage below (or above) the market rate. The trader is then “guaranteed” to know the exact minimum profit that his position will garner. Using a trailing stop allows you to let profits run while at the same time guaranteeing at least some realized capital gain.

Benefits of stop-loss order

Stop-loss orders do not cost anything to the client. The regular member / broker's commission is charged only once the stop-loss price has been reached and the order is executed. Hence, it functions like an insurance policy. Secondly, but most importantly, a stop-loss order allows decision making to be free from any emotional influences. People tend to believe that the market may bounce back from an adverse movement. This causes the trader to procrastinate and delay the action to cut losses. This ensures discipline in trading.

Time-Related Condition Orders

- a) **Day Orders (or End-of-Session Orders)** are available for execution during the current trading session. They remain in the system until executed or cancelled. All day orders will get cancelled at the end of the trading session during which such orders were submitted.

- b) **Immediate or Cancel (IOC)** is an order requiring all or part of the order to be executed immediately after it has been placed. Any portion not executed immediately is automatically cancelled. This is used for large orders where filling quickly can be difficult. Such orders will not remain in the order book.

Modification and Cancellation of Orders

A Member is permitted to modify or cancel his orders. The order can be modified by effecting changes in the order input parameters. Time priority for an order modification will not change due to decrease in its quantity or decrease in disclosed quantity. In other circumstances, the time priority of the order will change. An unexecuted pending order can be cancelled.

Risk Management Measures

In exchange-traded derivative contracts, the clearing corporation acts as a central counterparty to all trades and performs full novation. The risk to the clearing corporation can only be taken care of through a stringent margining framework. Also, since derivatives are leveraged instruments, margins also act as a cost and discourage excessive speculation. A robust risk management system should, therefore, not only impose margins on the members of the clearing corporation but also enforce collection of margins from the clients.

Price Limit Circuit Filter

There shall be no daily price bands applicable for Currency Futures contracts. However, in order to prevent erroneous order entry by members, operating ranges will be kept at +/-3% of the base price for contracts with tenure up to 6 months and 5% for contracts with tenure greater than 6 months. In respect of orders that have come under price freeze, the members would be required to confirm to the Exchange that there is no inadvertent error in the order entry and that the order is genuine. On such confirmation, the Exchange may take appropriate action.

Margin Requirements

The initial security deposit paid by a member is considered as his initial margin for the purpose of allowable exposure limits. Initially, every member is allowed to take exposures up to the level permissible on the basis of such an initial deposit. However, if a member wishes to create more exposure, he has to deposit additional margins. If there is surplus deposit lying with the Exchange toward margins, it is not refunded to the member unless a written request is received from the member for refund. However, the member receives additional exposure limit on account of such additional / surplus deposit. In case of receipt of written request for refund of additional deposit, the same may be refunded within three working days. The different types of margins collected by the Exchange are as follows:

- a) **Initial Margin:** The Initial Margin requirement is based on a worst case loss of a portfolio of an individual client across various scenarios of price changes. The various scenarios of price changes would be so computed so as to cover a 99% Value at Risk (VaR) over a one-day horizon. In order to achieve this, the price scan range may initially be fixed at 3.5 standard deviation. The initial margin so computed would be subject to a minimum of 1.75% on the first day of currency futures trading and 1% thereafter. The initial margin shall be deducted from the liquid net worth of the clearing member on an online, real-time basis.
- b) **Portfolio-Based Margining:** The Standard Portfolio Analysis of Risk (SPAN) methodology is adopted to take an integrated view of the risk involved in the portfolio of each individual client comprising his positions in futures contracts across different

maturities. The client-wise margin is grossed across various clients at the Trading / Clearing Member level. The proprietary positions of the Trading / Clearing Member are treated as that of a client.

c) **Calendar Spread Margins:** A currency futures position at one maturity which is hedged by an offsetting position at a different maturity is treated as a calendar spread. The calendar spread margin is at a value of Rs. 250 for all months of spread. The benefit for a calendar spread continues till expiry of the near-month contract. For a calendar spread position, the extreme loss margin is charged on one-third of the mark-to-market value of the far-month contract.

d) **Extreme Loss Margin:** Extreme loss margin is computed at 1% on the mark-to-market value of the Gross Open Position. It shall be deducted from the liquid assets of the Clearing Member.

e) **Liquid Networth:** The initial margin and the extreme loss margin are deducted from the liquid assets of the clearing member. The clearing member's liquid net worth after adjusting for the initial margin and extreme loss margin requirements must be at least Rs. 50 lakhs at all points in time. The minimum liquid networth is treated as a capital cushion for days of unforeseen market volatility.

f) **Liquid Assets:** The liquid assets for trading in currency derivatives are maintained separately in the currency derivatives segment of the clearing corporation. However, the permissible liquid assets, the applicable haircuts and minimum cash equivalent norms would be mutatis mutandis applicable from the equity derivatives segment.

g) **Mark-to-Market Settlement:** The mark-to-market gains and losses are settled in cash before the start of trading on T+1 day. If mark-to-market obligations are not collected before start of the next day's trading, the clearing corporation collects correspondingly higher initial margin to cover the potential for losses over the time elapsed in the collection of margins.

The daily closing price of currency futures contract for mark-to-market settlement is calculated on the basis of the last half an hour weighted average price of the futures contract. In the absence of trading in the last half an hour the theoretical price is taken.

h) **Margin collection and enforcement:** The client margins (initial margin, extreme-loss margin, calendar-spread margin, and mark-to-market settlements) are compulsorily collected and reported to the Exchange by the members. The Exchange imposes stringent penalty on members who do not collect margins from their clients. The Exchange also conducts regular inspections to ensure margin collection from clients.

Position Limits

In order to avoid building up of huge open positions, the regulator has specified the maximum allowable open position limit across all members of the Exchange.

Rules with respect to monitoring and enforcement of position limits in the currency derivatives market:

- Positions during the day are monitored based on the total open interest at the end of the previous day's trade.
- The above monitoring is for both client level positions (based on the unique client code) and for trading member level positions.
- The Exchange treats violation of position limits as an input for further surveillance action. Upon detecting large open positions, the Exchange conducts detailed analysis based on the overall nature of positions, the trading strategy, positions in the underlying market, the positions of related entities (concept of persons acting in concert would be applied), etc.

- The violators of position limits are accountable for their large positions and are asked to submit detailed information pertaining to their trading activities whenever the information is sought by the Exchange. The clearing member is accountable for positions of all trading members and clients of trading members clearing through him. Similarly, the trading member is accountable for the positions of his clients. The Exchange also calls for information directly from the client himself.

The following position limits would be applicable in the currency derivatives market:

- **Client Level:** The gross open positions of the client across all contracts should not exceed 6% of the total open interest or 10 million USD, whichever is higher. The Exchange will disseminate alerts whenever the gross open position of the client exceeds 3% of the total open interest at the end of the previous day's trade.
- **Trading Member Level:** The gross open positions of the trading member across all contracts should not exceed 15% of the total open interest or 50 million USD, whichever is higher.
- **Clearing Member Level:** No separate position limit is prescribed at the level of clearing member. However, the clearing member shall ensure that his own trading position and the positions of each trading member clearing through him are within the limits specified above.

Activity 2

- 1) What is stop loss order?

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- 2) What is Initial margin?

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7.10 TRADING, CLEARING AND SETTLEMENT PROCESS

In the trading system of currency exchanges, the best buy order (order with the highest bid price) is matched with best sell order (order with the lowest offer price) on price-time priority basis. Quantity and price for any type of order are entered into the system as per the trading unit and the base value unit. The following types of orders are submitted based on price-related conditions and time-related conditions.

i) Price-Related Condition Orders

- a) **Limit Order:** The specifies the rate at (or better than) which the trade should be executed. Limit orders are placed to either enter into a new trade or to exit from an existing trade. For a buy order the limit is placed below the existing market price, and for a sell order the limit is placed above the existing market price.
- b) **Market Order:** This will be executed at whatever is the prevailing rate on or after submission of such an order. If there are no trades at that point of time, the system takes the last-traded price as the market order and the order remains in the system unexecuted.

c) **Stop-Loss Orders:** These are usually placed to minimize losses by closing out existing positions or to create a new position. Stop-loss buy orders are placed above the current market price, and stop-loss sell orders are placed below the current market price. A trigger price is also specified to allow the system to activate the stop-loss order once the last traded price breaches the trigger price. Stop-loss orders are kept by the system in suspended or abeyance mode and are activated only on the trigger of a price as defined by the member. Once the trigger price is reached, stop order becomes a market order; the price at which one sells may be much different from the stop price. This is especially true in a fast-moving market where prices can change rapidly.

ii) **Time-Related Condition Orders**

- a) **Day Orders (or End-of-Session Orders)** are available for execution during the current trading session. They remain in the system until executed or cancelled. All day orders will get cancelled at the end of the trading session during which such orders were submitted.
- b) **Immediate or Cancel (IOC)** is an order requiring all or part of the order to be executed immediately after it has been placed. Any portion not executed immediately is automatically cancelled. This is used for large orders where filling quickly can be difficult. Such orders will not remain in the order book.

Modification and Cancellation of Orders

A Member is permitted to modify or cancel his orders. The order can be modified by effecting changes in the order input parameters. Time priority for an order modification will not change due to decrease in its quantity or decrease in disclosed quantity. In other circumstances, the time priority of the order will change. An unexecuted pending order can be cancelled.

Clearing process

The clearing house acts as the central counterparty to all trades and provides notation. The clearing house facilitates processing of MTM (Mark to Market) settlement for all trades on the exchange, tracks the deposits for margin exposure, and communicates clearing settlement instructions to the clearing banks for pay-in / pay-out of funds. The clearing house appoints a clearing bank for funds settlement (pay-in / pay-out), collection of deposit for margin exposure, and other fund management activities of the exchange. Every clearing member should have settlement accounts with the designated clearing bank. Clearing members can operate the settlement accounts only for the purpose of settlement of deals entered through the clearing house for payment of margin money or for any other purpose as may be specified by the relevant authority from time to time. The clearing member cannot operate the settlement account for any other purpose. Clearing members and clearing banks are the entities that help clearing house of the exchange in carrying out the activities of clearing and settlement. There are two types of clearing members viz, Trading-cum clearing member and professional clearing member. Trading cum clearing members (TCM) TCM clear and settle their own trades as well as the trades of other trading members (TM). Professional clearing members (PCM) - PCM clear the trades executed by trading members. Both TCM and PCM have to pay deposit to undertake clearing and settlement of trades of every TM. TCM and PCM have to open a separate bank account with the designated bank for settlement of trades. The entire process of clearing and mechanism comprises of three components - clearing, settlement and risk management. Open positions and obligations of clearing members (TCM and PCM) are worked out at the end of every business day. Daily exposure limits and margin obligations are derived based on net open positions. Net open contracts (Buy - Sell) multiplied by 1000 gives the net open positions in USD terms.

Settlement process in the currency exchanges

Settlement is done in cash mode payable in INR (Daily Marking to Market (MTM) settlement takes place based on Daily settlement price (DSP) which is calculated by taking the weighted average of last half an hour's trades. Exchanges daily disseminate DSP on its website. Daily MTM or profit and loss are calculated by taking the difference of trade price and DSP. If a client has carried forward the position from previous day then MTM is calculated as the difference between previous day's DSP and current day's DSP. Clearing members with net loss in daily MTM have to pay the amount in cash. Clearing members with net profit will receive the amount in cash. Payment and receipts are to be settled on the basis of T+1 day. Clearing members are responsible for collection/payment of daily MTM from/to the trading members, who in turn are responsible for the client's liabilities. At the end of the day all the net positions are carried forward to next day after resetting with respect to the current day's DSP. Final settlement is also done in cash mode in terms of INR. Final settlement price is the RBI reference rate on the last trading day of the expiry contract. Final profit and loss or MTM of all the net open positions of the clearing members will be on the basis of final settlement price. Settlement takes place on the basis of T+2 days.

Determination of daily prices

During a trading session, the Currency Exchange continuously disseminates open, high, low, and last-traded prices through its trading system on real time basis. At the end of the day's trading session, the system of the currency exchange calculates the closing price of each and every contract traded on the system. The logic for calculation of the closing price is as follows: Closing price is equal to the weighted average price of all the trades done during the last 30 minutes of a trading session. If the numbers of trades during the last 30 minutes are less than 5, then the closing price is based on the weighted average price of the last 5 trades executed during the day. If the numbers of trades during the day are less than 5, then the closing price is taken as the weighted average of all trades executed during the day. If no trades have been executed in a contract for the entire day, then the official closing price of the last session is taken as the official closing price. In such cases, if there is high volatility of spot prices of the underlying, the Exchange will have the right to modify the closing price for the purpose of marking to market and making the open positions closer to the market.

Determination of settlement price

Closing price or the daily settlement price of a futures contract is the weighted average price of all trades executed for that futures contract during the last half an hour of the trading session. The final settlement price for the currency futures contract is the RBI reference rate on the last trading day of the futures contract. Trading is allowed in the expiring contract only up to 12:00 p.m., since the RBI reference rate is released everyday between 12:00 p.m. and 12:30 p.m.

Delivery process

All currency futures contracts are cash settled on the maturity date. Under cash settlement system, a cash payment is made to the investor or collected from the investor for the difference between contract price and closing price on the maturity date.

7.11 PRICING CURRENCY FUTURES CONTRACTS

Interest rate parity is an important fundamental relationship between the spot and forward exchange rates and the interest rates in two countries. It is the foreign currency market's version of the cost-of-carry forward and futures pricing model. A helpful way to

understand interest rate parity is to consider the position of someone who believes that a higher risk-free return can be earned by converting to a currency that pays a higher interest rate. For example, if an Indian corporate treasurer wants to earn more than the Indian interest rate and believes that he can convert INR to USD and earn the higher US rate and if the treasurer does so but fails to arrange a forward or futures contract to guarantee the rate at which the dollars will be converted back to INR, he runs the risk, not only of not earning the US rate, but of earning less than the INR rate. If the dollar weakens while he is holding dollars, the conversion back to INR will be costly. This type of transaction is similar to going to a foreign country but whatever rates and conditions exist at the time, the return ticket is purchased. Buying a round-trip ticket locks in the return price and conditions. Hence, the corporate treasurer might wish to lock in the rate at which the dollars can be converted back to INR by selling a futures contract on the dollar. But futures prices will adjust so that the overall transaction will earn no more in Euros than the euro interest rate. The cost of the return ticket will offset any interest rate gains while in the foreign currency. Consider the following situation involving INR and USD, observed from the perspective of an Indian.

The spot exchange rate is S_0 . This quote is in USD per INR. The US risk-free interest rate is r , and the holding period is T . You take $S_0(1+P)^T$ INR and buy $(1+P)^T$ dollars. Simultaneously, you sell one future contract expiring at time T . The future exchange rate is F_0 , which is also in INR per dollar. You take your $(1+P)^T$ dollars and invest them in US T-bills that have a return of P .

When the forward contract expires, you will have 1 dollar. This is because your $(1+P)^T$ dollars will have grown by the factor $(1+P)^T$ so $(1+P)^T(1+P)^T = 1$. Your forward contract obligates you to deliver the dollar, for which you receive $F(0,T)$ INR. In effect, you have invested $S_0(1+P)^T$ and received $F(0,T)$ INR. Since, the transaction is riskless, your return should be the INR rate, r ; i.e.,:

$$F(0, T) = S_0(1+r)^T / (1+p)^T$$

Consider the following example from an Indian perspective. On January 31 of a particular year, the spot USD/INR rate was 43.50. The US interest rate was 9 per cent, while the Indian interest rate was 6 per cent. The time to expiration was $90/365 = 0.2466$. Thus,

$$F(0, T) = (43.50 * (1.060)^{0.2466}) / ((1.090)^{0.2466}) = \text{INR } 43.2016$$

Thus, the forward rate should be about INR 43.2016. Suppose that the forward rate is 44.0000. Then an arbitrage opportunity is available. An arbitrager buys $(1.0900) - 0.2466 = 0.9789$ dollars for $0.9789 (44.0000) = \text{INR } 43.0716$ and sells one future contract at a future rate of INR 44.0000. The 0.9789 USD are invested at the US risk-free rate. When contracts expire, the arbitrager will have 1 USD; which is delivered on the futures contract for which the agreed price of 44.0000 is received. Thus, the arbitrager has invested INR 43.0716 and received INR 44.0000 in 90 days. The annualized return is $((44.0000/43.0716) 365/90 - 1) \times 100 = 9.03\%$, which exceeds the INR interest risk-free rate of 6.00%. This transaction is called covered interest arbitrage. The combined effects of numerous arbitragers would push the spot rate up and/or forward rate down until the spot and forward rates are properly aligned with the relative interest rates in the two countries.

Note 1: Arbitrage could also put pressure on interest rates in the two countries. The US rate would decrease, while the INR rate could increase.

Note 2 In case of continuous compounding one will use the equation $F(0, T) = S_0 e^{(r-p)T}$

7.12 HEDGING STRATEGIES

Hedging involves taking an opposite position in the futures market to offset any potential price risk in the cash segment. The objective behind this mechanism is to offset loss in

one market with gain in the other. For example, if an exporter is likely to receive USD after three months, there is a risk of USD depreciation. To offset this risk, the exporter can hedge the USD receivables by selling USD in the forward or futures market. Alternatively, an importer who has risk of USD appreciation can take a long USD position in the forward or futures market.

Example: Risk mitigation by an importer

An edible oil refiner wants to import soya beans worth USD 100,000. The importer is exposed to risk of INR depreciation against USD. This could potentially increase his import bill. The importer places an order on July 15, 20X, with delivery and payment dates being three months ahead, in October 200X. The spot rate at the time of booking the import in July is USD/INR 43.50. If INR depreciates by October, this can result in loss for the importer. On the other hand, if the INR appreciates, this is favourable for the importer. The uncertainty of the movement of the USD/INR is the extent of risk for the importer. The importer decides to hedge against USD/INR volatility using exchange traded currency futures. On July 15, 20X

- a) Spot rate of USD/INR is 43.50
- b) MCX-SX Oct USD/INR futures is trading at 44.00
- c) Hedge Strategy: Buy 100 lots of MCX-SX Oct USD/INR futures contracts on July 15, 20X, @ 44

On October 29, 20X

<i>Spot rate</i>	<i>P/L on Exchange-Traded Currency Futures</i>	<i>P/L in Cash Market for Purchase of USD</i>	<i>Net Profit / Loss</i>
48	(48 - 44) x 100 lots x \$1000 = Profit of INR 4,00,000	(43.50 - 48) x 100 lots x \$1000 = Loss of INR 4,50,000	Net Loss of INR 50,000
40	(40 - 44) x 100 lots x \$1000 = Loss of INR 4,00,000	(43.50 - 40) x 100 lots x \$1000 = Profit of INR 3,50,000	Net Loss of INR 50,000

If the importer had not hedged, his maximum loss (when INR depreciates to 48 against USD), could have been as high as INR 4,50,000. However, the importer has managed to reduce his risk by locking in the USD/INR purchase price of 44 by hedging on exchange-traded currency futures.

Example: Risk mitigation by an exporter

A diamond jeweller exporter has obtained an export order worth USD 250,000 on August 20, 20X, for the delivery of jeweller against payment in December 20X. The exporter is exposed to risk of INR appreciation against USD. This could potentially decrease his revenues from export. The spot rate at the time of booking the export in August is USD/INR 45.50. If INR appreciates by December, this can result in loss for the exporter. On the other hand, if INR depreciates, this is favorable for the exporter. The uncertainty of the movement of the USD/INR is the extent of risk for the exporter. The exporter decides to hedge against USD/INR volatility using exchange-traded currency futures.

On August 20, 20X

- a) Spot rate of USD/INR is 45.50
- b) MCX-SX Dec USD/INR futures is trading at 46.
- c) Hedge Strategy: Sell 250 lots of MCX SX Dec USDINR futures contracts on July 15, 200X, @ 46

<i>Spot rate</i>	<i>P/L on Exchange Traded Currency Futures</i>	<i>P/L in Cash Market for Purchase of USD</i>	<i>Net Profit / Loss</i>
43	$(46 - 43) \times 250 \text{ lots} \times \1000 = Profit of INR 7,50,000	$(43 - 45.50) \times 250 \text{ lots} \times \1000 Loss of INR 6,25,000	Net Profit of INR 1,25,000
49	$(46 - 49) \times 250 \text{ lots} \times \1000 = Loss of INR 7,50,000	$(49 - 45.50) \times 250 \text{ lots} \times \$1000 =$ Profit of INR 8,75,000	Net Profit of INR 1,25,000

Had the exporter not hedged his position, his loss (when INR appreciates to 43 against USD) could have been as high as INR 6, 25,000. But the exporter has managed to reduce his risk by locking in the USD/INR selling price of 46 by hedging on exchange-traded currency futures.

7.13 INVESTMENT STRATEGIES IN FUTURES MARKETS

Speculators play a vital role in the futures markets. Futures are designed primarily to assist hedgers in managing their exposure to price risk; however, this would not be possible without the participation of speculators. Speculators, or traders, assume the price risk that hedgers attempt to lay off in the markets. In other words, hedgers often depend on speculators to take the other side of their trades and to add depth and liquidity to the markets that is vital for the functioning of a futures market.

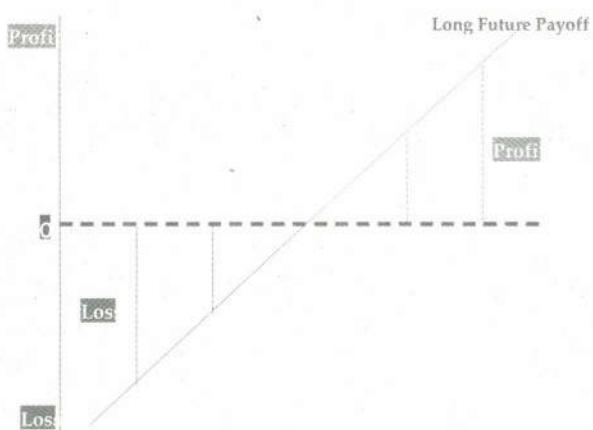
Speculation is also not similar to manipulation. A manipulator tries to push prices in the reverse direction of the market equilibrium while the speculator forecasts the movement in prices and this effort eventually brings the prices closer to the market equilibrium. If the speculator does not adhere to the relevant fundamental factors of the spot market, they would not survive since their correlation with the underlying spot market would be non-existent.

Speculators can also be classified into two categories: *long* and *short* speculators. Long speculators are those who expect the exchange rate to rise above the current level and assume risks by buying futures contracts whereas short speculators are those who expect the exchange rate to fall and consequently sell futures contracts. In futures market, the total short selling position, made up of short hedgers and short speculators, and the total long buying position, made up of long hedgers and long speculators, must always be equal.

(Note: Exchange rate strengthening and weakening have to be considered from the point of view of the base currency.)

1) Long Position in Futures

Long position in a currency futures contract without any exposure in the cash market is called a speculative transaction. Long position in futures for speculative purpose means buying futures contract in anticipation of strengthening of the exchange rate (which actually means buy the base currency and sell the quote currency and you want the base currency to increase in value and then you would sell it back at a higher price). If the exchange rate strengthens before the expiry of the contract, the trader makes a profit on squaring off the position, and if the exchange rate weakens, the trader makes loss.



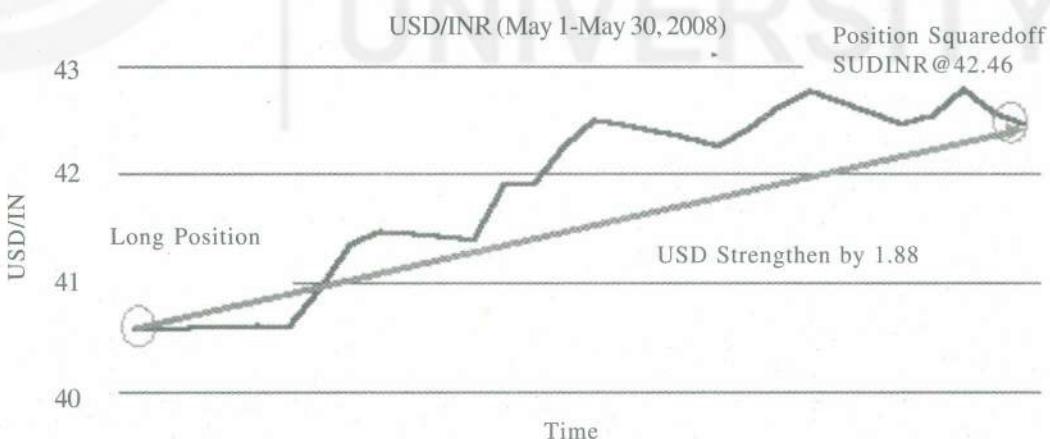
The graph above depicts the pay-off of a long position in a futures contract, which demonstrates that the pay-off of a short trader is linear derivative, that is, he makes unlimited profit if the market moves as per his directional view, and if the market goes against, he has equal risk of making unlimited loss if he doesn't choose to stop out his position.

Example

On May 1, 2009, an active trader in the currency futures market expects INR will depreciate against USD caused by India's sharply rising import bill and poor FII equity flows. On the basis of his view about the USD/INR movement, he buys 1 USD/INR August contract at the prevailing RBI reference rate of Rs 40.5800.

He decides to hold the contract till expiry and during the holding period USD/INR futures actually moves as per his anticipation and the RBI reference rate increases to USD/INR 42.46 on May 30, 2008. He squares off his position and books a profit of Rs 1,880 ($42.4600 \times 1000 - 40.5800 \times 1000$) on 1 contract of USD/INR futures contract.

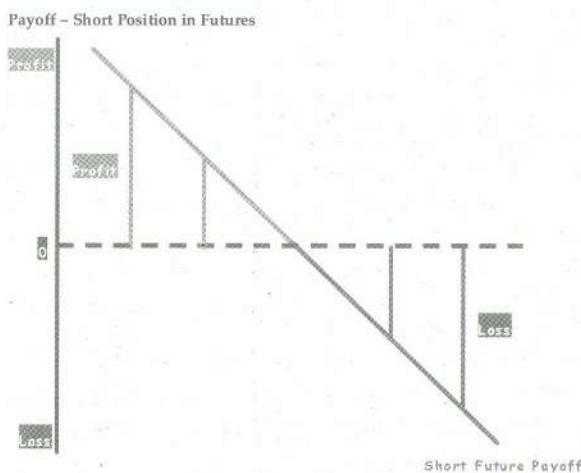
Observation: The trader has effectively analysed the market conditions and has taken a right call by going long on futures and thus has made a decent gain of Rs 1,880.



2) Short Position in Futures

Short position in a currency futures contract without any exposure in the cash market is called a speculative transaction. Short position in futures for speculative purposes means selling a futures contract in anticipation of decline in the exchange rate (which actually means sell the base currency (USD) and buy the quote currency (INR) and you want

the base currency to fall in value and then you would buy it back at a lower price). If the exchange rate weakens before the expiry of the contract, the trader makes a profit on squaring off the position, and if the exchange rate strengthens, the trader makes loss.



The graph above depicts the pay-off of a short position in a future contract which does exhibit that the pay-off of a short trader is a linear derivative, that is, he makes unlimited profit if the market moves as per his directional view (goes down) and if the market goes against his view he has equal risk of making unlimited loss if he doesn't choose to stop out his position.

Example

On August 1, 2009, an active trader in the currency futures market expects INR will appreciate against USD, caused by softening of crude oil prices in the international market and hence helping India's trade balance. On the basis of his view about the USD/INR movement, he sells 1 USD/INR August contract at the prevailing RBI reference rate of Rs 42.3600.

On August 6, 2009, USD/INR October futures contract actually moves as per his anticipation and declines to 41.9999. He decides to square off his position and earns a profit of Rs 360.10000 ($42.3600 \times 1000 - 41.9999 \times 1000$) on squaring off the short position of 1 USD/INR August futures contract.

Observation: The trader has effectively analysed the market conditions and has taken a right call by going short on futures and thus has made a decent gain of Rs. 360 per contract with small investment of, say, a margin of 3%, which comes to Rs. 1,270.8 in a span of six days.

7.14 SPREAD TRADING

Spread refers to the difference between two currency futures contracts with either the same underlying currency pair but with different expiry months, or with different underlying currency pair with same expiry months.

Spread movement is based on following factors:

- Interest Rate Differentials
- Liquidity in Banking System
- Monetary Policy Decision (Change in Repo, Reverse Repo, and CRR rates)
- Inflation

Intra-Currency Pair Spread: An intra-currency pair spread consists of one long future and one short future. Both have the same underlying but different maturities.

Inter-Currency Pair Spread: An inter-currency pair spread is a long-short position in futures on different underlying currency pairs. Both typically have the same maturity.

Example: Mr. Mehta is an active trader in the currency futures market. In Sep 2009, Mr. Mehta gets an opportunity for spread trading in currency futures. He is of the view that in the current environment of high inflation and high interest rate, the premium will move higher and hence USD will appreciate far more than the indication in the current quotes, i.e. spread will widen. On the basis of his views, he decides to buy December currency futures at 47.00 and at the same time sell October futures contract at 46.80; the spread between the two contracts is 0.20.

Suppose after 30 days the spread widens actually as per his expectation and the October futures contract is trading at 46.90 and December futures contract is trading at 47.25, the spread stands at 0.35. He decides to square off his position making a gain of Rs 150 ($0.35 - 0.20 = 0.15 \times \1000) per contract.

Traders can take opposite positions in futures contracts with same underlying currency pair but different expiry months, with the expectation that the spread either increases or decreases. In a contango market, if the trader expects the spread differential to increase between the January and February MCX-SX USD/INR futures, it would be prudent to take short position in the January contract and simultaneously take long position in the February contract. On the other hand, if the spread differential is expected to decrease, then the trader takes the reverse positions i.e., long January and short February contracts. After the increase or decrease in spread, the trader can unwind the outstanding positions in both contracts.

Those who may not have immediate access to the OTC markets for arbitrage can explore spread trading opportunities. Spread trading is also a relatively a less risky proposition as compared to outright speculative (naked) open positions. The risk is minimized to the extent of the relative futures contracts price differential. Professional spread traders in international Forex markets analyze historical movement of spreads and statistically analyze volatility and spread range at different points of time before taking positions. Also, the margin requirement for calendar spread positions is much lower (Rs 250 per lot) than outright speculative position (approx. Rs. 1500 per lot). This provides much better opportunity to leverage existing funds.

7.15 SUMMARY

- Futures contracts are essentially traded through an exchange and are very liquid.
- The size and maturities of a futures contract are standardized.
- Marking to market of outstanding positions at the end of each trading day is a special feature of futures markets.
- Initial and Variable margins are to be maintained with the exchange by participants of futures market.
- The futures exchange guarantees the settlement between various parties to the market and hence counter party risk is absent.
- Futures are available on currencies, bonds, interest rates, stock indices, commodities etc.

7.16 SELF ASSESSMENT QUESTIONS

- 1) What is meant by “Marked to market “?
- 2) What is the difference between spread and basis?
- 3) What is calendar spread?
- 4) What is Position limit?
- 5) What is extreme loss margin?
- 6) What is stop loss order?
- 7) State True or False (Answer in bracket)
 - 1) In a forward contract an initial margin has to be deposited. (F)
 - 2) Currency Futures contracts are cash settled. (T)
 - 3) Forward contracts are tailored to suit the needs of the parties to the agreement.(T)
 - 4) Futures and forwards are not derivatives. (F)
 - 5) Hedging is a risk mitigation tool. (T)
 - 6) An arbitrageur does not look for risk less profit. (F)
 - 7) Futures contracts, unlike forward contracts, are standardized. (T)
 - 8) The presence of an organized exchange for futures eliminates counterparty risk. (T)
 - 9) NSE and MCX-SX are commodity futures exchanges in India (F).

7.17 FURTHER READINGS

- 1) Chance, D. *An Introduction to Derivatives*.
- 2) Report on Currency Futures-RBI.
- 3) Schwager J.D., *A Complete Guide to the Futures Market*.
- 4) Chitale, Rajendra P., *Use of Derivatives by India's Institutional Investors: Issues and Impediments*.
- 5) *A Primer on Currency Futures - Published by MCX-SX*.

UNIT 8 CURRENCY OPTIONS

Objectives

After studying this unit, you should be able to:

- understand the Basics of options;
- distinguish between different types of option;
- explain pricing mechanism of Options;
- discuss option Greeks; and
- design option trading strategies.

Structure

- 8.1 Introduction
- 8.2 Types of Options
- 8.3 Option Terminology
- 8.4 FEMA Guidelines on Option Contract
- 8.5 Hedging through Option
- 8.6 Pricing an Option Contract
- 8.7 Option Valuation Black-Scholes Model
- 8.8 Put-Call Parity
- 8.9 Option Greeks
- 8.10 Delta Hedging
- 8.11 Factors Impacting Option Pricing
- 8.12 Option trading Strategies
- 8.13 Spreads
- 8.14 Exotic Options
- 8.15 Summary
- 8.16 Self Assessment Questions
- 8.17 Further Readings

8.1 INTRODUCTION

Unlike forward contracts and financial futures, options give the buyer opportunity but not the obligation to buy or sell a financial instrument at a pre-agreed price in the future. As the name suggests, an option contract allows the buyer who purchases it, the option or right either to trade at the rate or price stated in the contract if this is to the option buyer's advantage or let the option expire if that would be advantageous for the option buyer.

An option contract is the right to buy or sell a specific quantity of a given asset at a specific price on or before a specific date in the future. An option confers upon the buyer a right not an obligation. Since, it can be abandoned without further penalty the maximum loss that the buyer faces is the original cost of the option (premium). However, if the buyer chooses to exercise his right to buy or sell the asset, the seller has an

obligation to deliver or take delivery of the underlying asset, his potential loss is therefore limited.

Currency Options

There are two types of plain vanilla options, namely, call option and put option. A call option is a contract that gives the owner of the right but not obligation to buy the underlying asset by a specified date and at a specified price. A put option is a contract that gives the owner of the right but not obligation to sell the underlying asset by a specified date and at a specified price. The underlying asset may be spot currency rate, currency futures, commodity futures, equity, index, etc. The buyer (option holder) of the option needs to pay a premium to the counterparty that is, selling (option writing) the option. Option contracts can be traded either in an exchange or over-the-counter. Over-the-counter option contracts are tailor-made contracts matching the specific needs of investors. The initial cash transfer (premium) is to be paid by the buyer of the option to the seller (option writer). The purchase of an option limits the maximum loss and at the same time allows the buyer to take advantage of favorable price movements.

Foreign Currency Options

Foreign currency options are commonly used to hedge foreign exchange risk for a future date.

- Buyers of foreign currency options commonly use foreign currency options:
 - To protect (insure) their foreign currency exposures against adverse currency movements.
 - To set a known worst case exchange rate.
 - To protect against uncertain or contingent foreign exchange exposures.
 - To reduce usage of credit facilities.
 - As part of their foreign exchange risk management exposure tools strategy.
- Sellers of foreign currency options commonly use foreign currency options:
 - To speculate on future currency movements.
 - To generate cash flow through premiums.
 - As a foreign exchange risk management technique to offset costs and exposures of bought options.
 - To offset existing foreign currency positions.

8.2 TYPES OF OPTIONS

An option is, for its owner, the right (but not the obligation) to buy or sell at a specific price at a certain future date and time. An option is similar to a forward deal, with the difference that they can subsequently decide whether or not to fulfill the deal. The Buyer of the Option pays a “premium” upfront to the Seller in order to retain his right but not the obligation. The seller (or “writer”) has the obligation to buy or sell the asset if the owner of the option exercises it. The contract will only be fulfilled if it is advantageous to the Buyer (Owner/Holder) of the Option and consequently disadvantageous to the Seller (Writer) of the Option. Buyers and sellers have asymmetric payout profiles. Given below are the different types of options that are in use:

Calls/Puts

- An FX Option is the right to exchange two currencies and is therefore the right to buy and the right to sell at the same time.
- A USD call gives the right to BUY USD/SELL GBP.

- A GBP put gives the right to SELL GBP/BUY USD.
- For simplicity we will refer to CALL/PUT on the underlying currency e.g. GBP for GBP/USD.

European/American

- A European option can be exercised only at expiry.
- An American option can be exercised at any time before or at expiry.

In the money & Out of the Money

- A European style 3 month USD call/JPY put with strike 105.00, gives the purchaser the right, in three months, to buy US Dollars for 105.00 yen per US Dollar.
- To buy this option, the option buyer has to pay a price, known as the premium, to the option seller.
- If the spot exchange rate at expiry is higher than 105.00, the option is '**in-the-money**', and the purchaser should exercise.
- If the spot exchange rate at expiry is lower than 105.00; i.e., the option is '**out-of-the-money**', then the purchaser should not exercise.

8.3 OPTION TERMINOLOGY

Holder and writer

The purchaser of the option is known as the option holder and the seller i.e., the party receiving the premium is the writer of the option.

Strike Price

The price agreed in the transaction is the strike price. This is not necessarily the same as the forward rate for the same future date but is chosen to suit the option buyer. If it is more advantageous than the forward rate for the option buyer, the option is referred to as "in the money". If it is less advantageous, it is referred to as "out of the money". If it is at the same price as the forward rate, it is called as "at the money".

Value

The difference between strike price and current market price is known as the "intrinsic value" of an option. The intrinsic value of a deep out of the money option is zero rather than negative. The remaining part of the premium paid for the option above the intrinsic value is known as the "time value" of the option.

8.4 FEMA GUIDELINES ON OPTION CONTRACTS

A person resident in India may enter into a cross currency option contract (not involving the rupee) with an authorised dealer in India to hedge foreign exchange exposure arising out of his trade provided that in respect of cost-effective risk reduction strategies like range forwards, ratio-range forwards or any other variable by whatever name called there shall not be any net inflow of premium. These transactions may be freely booked and/or cancelled. Cross currency options should be written on a fully covered back-to-back basis. The cover transaction may be undertaken with a bank outside India, an off-shore banking unit situated in a Special Economic Zone or an internationally recognized option exchange or another authorised dealer in India. Authorised Dealers desirous of writing options, should obtain a one-time approval, before undertaking the business, from The Reserve Bank of India.

Authorised Dealers may purchase call or put options to hedge their cross currency proprietary trading position and use of these instruments is subject to certain conditions which have been stipulated by Reserve Bank of India.

Banks authorised by Reserve Bank of India to operate the Gold Deposit Scheme may use exchange-traded and over-the-counter hedging products available overseas to manage the price risk. However, while using products involving options, it may be ensured that there is no net receipt of premium, either direct or implied. Banks, which are allowed to enter into forward gold contracts in India in terms of the guidelines issued by the Department of Banking Operations and Development of Reserve Bank of India (including the positions arising out of inter-bank gold deals), are also allowed to cover their price risk by hedging abroad.

8.5 HEDGING THROUGH OPTION

Since, the holder of a Currency Option has the right but not the obligation to trade currency, it is beneficial to use options to hedge potential transactions. Currency options in India can only be booked or cancelled for genuine or contingent exposures. Banks in India are not allowed to offer option products with no underlying exposures and only European options are allowed. This restriction discourages applicability of various options combinations. The expiry date of option should not exceed the maturity of the underlying exposure. Corporate have to sign ISDA agreement with banks before undertaking option deals.

Hedging through purchase of options

XYZ Company, an importer of raw cashew nuts, buys a call option for USD 1000000 today (1st August 20X) for Delivery December 20X at a premium of Rs.0.05 to protect against adverse movement in rates

Example of hedging by importer – Call Option for USD 100,000

Spot rate today = Rs 45 per dollar

Strike price (1st August 20X) = Rs.45; premium – Re.0.05

On maturity in Dec 20X

If spot price is Rs.45.20, option will be exercised and savings would be Rs.15, 000

8.6 PRICING AN OPTION CONTRACT

The pricing of an option depends upon probability. In principle, ignoring bid-offer spreads, the premium paid to the writer should represent the buyer's expected profit on the option. The profit arises from the fact that the option buyer is always entitled to exercise an option which expires in-the-money and simultaneously cover the position in the market at a better price. The buyer will never be obliged to exercise the option at a loss. As with insurance premia, assuming that the option seller can accurately assess the probability of each possible outcome, the writers total payout on expiry of a portfolio of options sold, should approximate the premia received. Option pricing theory therefore depends on assessing these probabilities and deriving from them an expected outcome, and hence a fair value for the premium.

The factors on which these probabilities depend are as follows:

- 1) **The strike price:** The more advantageous the strike is to the buyer at the time of pricing, the greater the probability of the option being exercised, at a loss to the writer, and hence the greater the option premium.
- 2) **Volatility:** Volatility is a measure of how much the price fluctuates. The more volatile the price, the greater the probability that the option will become of value to

the buyer at some time. This measurement is formalized in option pricing theory as the annualized standard deviation of the logarithm of relative price movements.

- 3) **The maturity:** The longer the maturity of the option, the greater the probability that it will have value to the buyer at some time since the price has a longer time in which to fluctuate.
- 4) **Interest rates:** The premium represents the buyer's expected profits when the option is exercised, but is payable up front – and is therefore discounted to present value. The rate of discount therefore affects the premium to some extent. The forward price – and hence the relationship between the strike and the forward – is also affected by interest rate movements. Further, in the case of an option on a bond or other interest rate instrument, the rate of interest also directly affects the underlying price.

8.7 OPTION VALUATION – BLACK SCHOLES MODEL

Professors Myron Scholes and Fischer Black derived a method to calculate the fair price or premium to be paid for European-style options on non-dividend paying stocks. The option-pricing model soon came to be known as the Black-Scholes model and was first published in the *Journal of Political Economy* in 1972.

Consider an options trader who is about to sell an option. The trader intends to dynamically hedge the exposure until the option expires. What price should the trader charge for the option? Black and Scholes proposed that the trader charge the cost of dynamically hedging the short option. Significantly, given certain simplifying assumptions, they proposed that this cost could be known in advance.

Today, the Black-Scholes model is widely used for pricing options and other derivative instruments. They have spawned the field of financial engineering, which is dedicated to designing and implementing such derivatives pricing models.

The Black-Scholes model to price call option and put option is as follows:

$$C = SN(d_1) - Ee^{-rt} N(d_2) \quad P = Ee^{-rt} N(-d_2) - SN(-d_1)$$

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

Where:

S = spot price

N(d) = probability that a deviation less than 'd' will occur in a normal distribution with a mean of zero and standard deviation of 1

E = Exercise Price or Strike Price

e = 2.71828

r = risk-free rate of interest

t = time to expiry date

Ln = natural logarithm

σ = standard deviation of continuously compounded annual returns of the underlying commodity

8.8 PUT-CALL PARITY

The relationship between call options and put options or the put-call parity was first identified by Stoll to the prices of European call options and put options that have the

same underlying strike price and expiry date. The relationship is derived by using arbitrage arguments.

Consider two portfolios that consist of:

- A call option and an amount of cash equal to the present value of the option's strike price,
- A put option and the underlying asset.

In the case of European options, early exercise is not possible. If the values on the expiry dates of the two portfolios are the same, then their present values must also be the same. This equivalence is put-call parity. If the present value of the two portfolios is not the same, an investor could make an arbitrage profit by purchasing the less expensive portfolio, selling the more expensive one and holding the long-short position to the expiry date.

The formula to calculate put-call parity is given as

$$C + PV(x) = P + S$$

where:

C = present value of the call option

P = present value of the put option

S = present value of the underlying asset

PV(x) = present value of the strike price discounted from the expiry date at a suitable risk free rate.

The put-call parity is not based on any option-pricing model. It is derived purely by using arbitrage arguments. It applies only to European options, since a possibility of early exercise could cause a divergence in the present values of the two portfolios.

The put-call parity offers a simple test of option-pricing models. Any option-pricing model that produces put price and call price that do not satisfy the put-call parity must be rejected as unsound. Such a model will suggest trading opportunities where none existed.

8.9 OPTION GREEKS

An option writer can write options without hedging his position i.e., his position would be similar to that of an insurance company which opts not to reinsure the business it has underwritten. Now, in order to manage his portfolio, he needs to know how the value of the options he has written will vary with changes in the different factors which affect the price. These factors are referred to by different Greek letters.

Delta : An option delta measures how the options value varies with changes in the underlying price.

$$\Delta = \frac{\text{Change in option's value}}{\text{Change in underlying value}}$$

This may also be expressed as the partial derivative of the option premium with respect to the underlying.

$\frac{C}{S}$ or $\frac{P}{S}$	Where	C = call premium P = put premium S = price of underlying
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The value of the delta is used in hedging an option.

Delta hedging can be done by buying or selling the correct amount of the underlying so that any change in the options P & L is offset by the change in the underlying positions P & L.

Gamma: Since, the delta changes as the underlying price changes, delta hedging needs to be done continuously. In order to do this the change in delta with change in price is measured. This is known as gamma (γ) and is expressed as:

$$\gamma = \frac{\text{Change in delta}}{\text{Change in price}}$$

This is the second partial derivative of the premium with respect to underlying price and can be expressed as

$$\frac{P}{S} \quad \text{or} \quad \frac{C}{S}$$

Therefore, where a trader wants his position to be fully hedged, he needs to be gamma neutral i.e., the portfolio of options should be such that delta does not change at all.

Vega: An option's Vega measures how much an option's value changes with changes in the volatility in the underlying.

$$\text{Vega} = \frac{\text{Change in option's value}}{\text{Change in volatility}}$$

Vega is the highest when the option is in the money and falls when the market and strike price diverge.

Theta : An option's theta measures how much an option's value changes with changes in the time to maturity.

$$\text{Theta} = \frac{\text{Change in option's value}}{\text{Change in time}}$$

$$\text{or } \frac{C}{T} \quad \text{or} \quad \frac{P}{T}$$

Theta is -ve for a long option position and +ve for a short option position. Positive is generally associated with -ve gamma and *vice versa*.

Rho: An option's Rho (ρ) measures how much an option's value changes with changes in interest rates.

$$\text{Rho (}\rho\text{)} = \frac{\text{Change in option's value}}{\text{Change in interest rate}}$$

$$\frac{P}{R} \quad \text{or} \quad \frac{C}{R}$$

Rho tends to increase with maturity. The 'Delta' of the option Market makers would be allowed to hedge the 'Delta' of their option portfolio by accessing the spot markets. Other 'Greeks' may be hedged by entering into option transactions contract would form part of the overnight open position. As regards inclusion of option contracts for the purpose of 'AGL', the "delta equivalent" as at the end of each maturity shall be taken into account. The residual maturity (life) of each outstanding option contracts can be taken as the basis for the purpose of grouping under various maturity buckets.

8.10 DELTA HEDGING

In designing more sophisticated hedging schemes, traders attempt to make their positions immune to small changes in the price of the underlying asset in a short time interval. This can be realized by applying a delta hedge.

Delta indicates the change in the benefit (read option value) relative to a change in the price of the underlying.

Currency Options

$$\text{Delta} = \frac{\text{Change in "benefit" (option premium value)}}{\text{Unit change in underlying asset price}}$$

The delta of a single futures contract is plus or minus 1, the delta of options lies between minus and plus 1. The deltas of individual positions/contracts can be added up to arrive at a total “delta” for a certain exposure. If an option portfolio’s delta is 6, then a change in the price of the underlying portfolio securities, results in a change of six times that amount in the benefits.

Knowing the delta of the “initial position” and the deltas of possible risk management transactions allow the development of an effective risk management strategy, with futures, options, or eventually physical transactions.

Executing a hedging strategy ideally results in a total delta value tending to zero or a **Delta neutral position**.

With a delta of zero, (small) changes in the price of the underlying asset have no impact on expected benefits.

For options, the same goal of obtaining a Delta neutral position can be pursued to obtain full protection for one’s position.

Options have a delta ranging from 0 to +1 in case of a call option and from 0 to -1 in case of a put option. A call option with a delta of +1 and a put option having a delta of -1 are deep-in-the-money: the options behave like the underlying futures contract, US\$ 1 price change resulting in a change of US\$ 1 in the contract’s benefit.

A trader can trade in three types of options to hedge his physical position:

- An out-of-the-money put option which has a delta of 0
- A deep-in-the-money put option which has a delta of -1
- An at-the-money put option which has a delta of -½

While the delta of being long one futures contract is always +1, and the delta of being short one physical contract is always -1, the delta of an option changes. For a put option with a given strike price, the delta comes closer to 0, the more the option becomes out-of-the-money. Options only keep their delta when price changes are very small; normally a change in the price of the underlying asset causes a shift in the option’s delta distribution.

Knowing the delta of an option allows participants on the futures markets to know how many options they need to protect their positions, and participants on the options markets to know how many futures they need to protect their positions. Knowing the deltas of options also allows arbitrage between options with different strike prices and between put option and call option. However, this type of arbitrage is in practice only feasible to those directly active on the options and futures exchanges.

As has been already mentioned, the delta of an option changes when the underlying market price changes.

If an option portfolio delta is zero, then the portfolio is hedged. So, hedgers should look for a combination of options that give a zero delta. It is irrelevant whether this is realized by using in-the-money option, out-of-the-money option, or at-the-money option.

It is important to realize that a certain position only remains delta-hedged for a relatively short time (price change) interval. This is because delta changes with both moves—in the futures price and the passing of time. In practice, delta positions have to be monitored continuously and the hedge has to be adjusted regularly. This adjusting of the delta hedge is known as **rebalancing**.

Gamma Hedging and Rebalancing

Gamma measures the change in delta relative to the change in the price of the underlying asset. This is a second-order derivative.

In a formula: $\text{Gamma} = \frac{\text{Change in delta}}{\text{Unit change in underlying asset price}}$

As we have seen, if prices move, the delta of an option changes. The gamma indicates the speed of a change in delta as compared to a change in the price of the underlying asset. A low gamma means that delta changes only slowly, and adjustments to keep a position delta-hedged need to be made only once in a while. If a position's gamma is relatively high, however, it is very risky to leave an initial Delta neutral position unchanged over time, and the hedge will need continuous monitoring and frequent rebalancing.

Therefore, a party who uses Delta-hedges to cover its risks (and this can have considerable economic benefits as compared to the more traditional hedging with futures contracts), does best to try to keep the total gamma close to zero: this reduces the risk of exposure to a rapidly changing delta and makes the position relatively insensitive to larger changes in the price of the underlying asset.

8.11 FACTORS THAT IMPACT OPTION VALUATION

There are many factors which impact the pricing of an option. Some of these factors are discussed below:

The strike price

As described above, the difference between the strike price and the price of the underlying commodity corresponds to the intrinsic value of the option. The call with the lowest strike price is the most expensive because it has the greatest intrinsic value. The put with the lowest strike price is the cheapest because it has the lowest intrinsic value. So, the lower the strike price relative to the price of the underlying futures contract, the more expensive the call option will be. A put option is more expensive when its strike price is higher.

The price of the underlying asset

Each change in the price of the underlying asset produces a change in the price of the option (assuming that all other factors of influence on the option's premium remain the same). When the price of the underlying futures contract falls, the premium of a call option will decline too, since the chance that the call option will be worthwhile to exercise is getting smaller. Following the same reasoning, the put option's price goes up when the price of the underlying futures contract declines. Similarly, a rise in the price of the underlying asset will make call options more valuable, while the reverse is true for put options. So, a relatively high futures price compared to the strike price of a call option implies a high premium; and when the price of the underlying futures contract is relatively low, the premium of a put option on this contract will be high. The absolute change in the price of an option is, of course, smaller than the change in the price of the underlying commodity.

The more an option is in at-the-money, the more is the influence on premium by a price movement in the underlying asset. The size of this change depends not only on the relationship between the premium and the underlying asset but also on the time remaining until the expiry date.

The longer the time to the expiry date, the greater the time value. Hence the premium is also high. The decrease in time value is quicker towards the end of the option's life. At the expiry date, the option maintains only its intrinsic value.

Volatility of the price of the underlying asset

Volatility is a measure that reflects the size of the price fluctuations during a specific period of time. Volatility does not indicate the trend, but the size of price fluctuations around the average.

Historical volatility is calculated on the basis of the historical prices of the underlying asset. The result obtained is therefore influenced by the frequency and duration of the measurements. However, it is the future that is the determining factor for the calculation of an option's theoretical value. The calculation of the implied volatility gives an indication of the volatility of the underlying asset anticipated by the traders. For each quotation on the expiry dates of different options, the premium reflects certain volatility.

High volatility means that the price of the underlying asset is subject to strong fluctuations. The higher the expected market volatility (implied volatility), the higher the value of the option will be.

The fluctuations of volatility

The options price fluctuates if the volatility of the underlying asset anticipated by the market (implied volatility) fluctuates. It is therefore possible that the price of a call option will remain stable or fall, even though the price of the underlying asset has risen, if volatility diminishes. If volatility is close to zero, the option's premium corresponds to the intrinsic value.

Other factors

The premium is also affected by short-term interest rates (corresponding to the life of the option). If short-term interest rates rise, the price of call options increases and that of put options falls. As shown in the Table given below how different factors can impact the call and put options premiums.

Determining factors	Impact on the call option premium	Impact on the put option premium
Rise in the spot price of the underlying futures	rises	falls
Strike price above the underlying asset's spot price	falls	rises
Longer remaining life until the expiry date	rises	rises
Higher volatility of the underlying asset price	rises	rises
Rise in short-term interest rates	rises	falls

Option pricing models calculate the theoretical value of an option. The theoretical value is the mathematical expectation of profit for the option's buyer (and hence of loss for its seller), which must be compensated by the option's premium. This remains an approximation, because it is not possible to take all relevant factors into account. The parameters described are used to estimate the fair value on the basis of a model. Among these factors, the future volatility of the price of the underlying futures contract is unknown. The fair value is calculated either from the underlying asset's historical volatility or from the volatility expected by market participants, i.e., the implied volatility.

Investigately, option-pricing models are used to calculate implied volatility (not to be confused with historical volatility). Thanks to these models, the current expected volatility can be calculated from the prevailing prices of an options series. So, implied volatility is, to a certain extent, a common denominator for the various options series.

Activity 1

- 1) List five factors that impact option premium.

.....
.....
.....

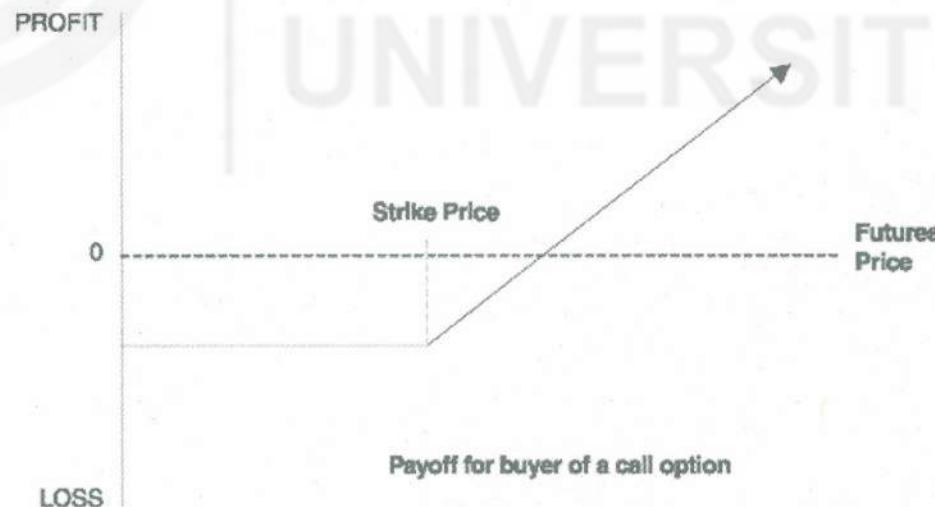
- 2) Explain the main difference between European type and American type option.

.....
.....
.....

8.12 OPTION TRADING STRATEGIES

Long Position in a Call Option

In a call option, long position means buying the call option. It gives the buyer the right but not the obligation to buy the underlying commodity futures contract by a specified date and at a specified price. The buyer pays the option premium to the seller for buying the call option. The buyer makes a profit if the price of the underlying commodity futures contract exceeds the exercise price of the option on expiry of the contract, and the buyer makes a loss if the price of the underlying commodity futures contract is below the exercise price of the option on expiry of the contract. Buyer can incur a maximum loss to the extent of premium paid for buying the option contract.

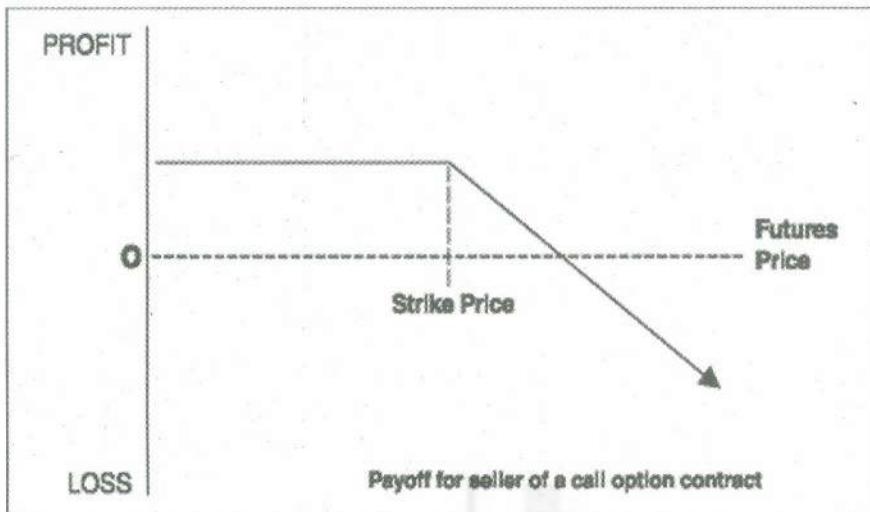


Short Position in a Call Option

In a call option, short position means selling/writing the call option. The seller/writer receives the option premium from the buyer of the call option for selling/writing the option. The seller makes a profit if the price of the underlying commodity futures contract

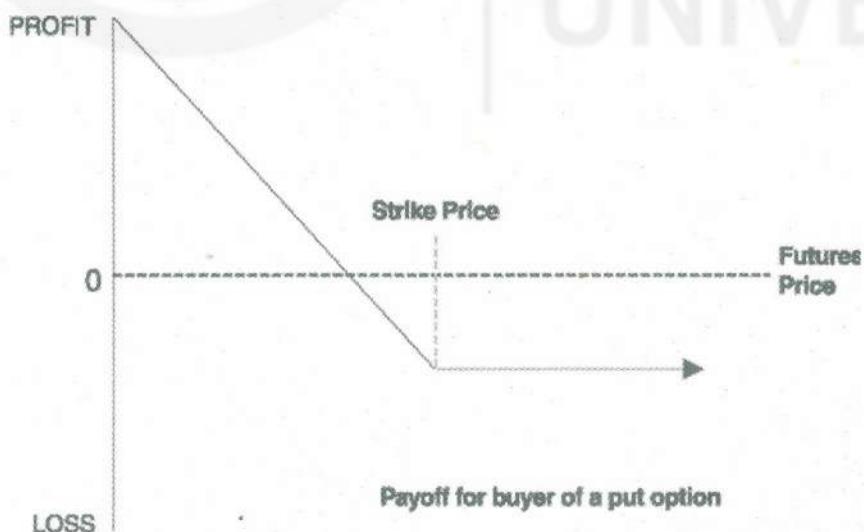
is below the exercise price of the option on expiry of the contract, and the seller makes a loss if the price of the underlying commodity futures contract exceeds the exercise price of the option on expiry of the contract.

The seller can earn maximum profits to the extent of premium received for writing the option contract.



Long Position in a Put Option

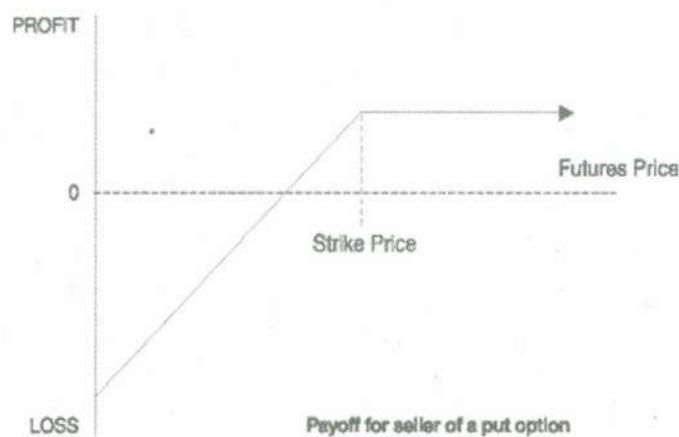
In a put option, long position means buying the put option. It gives the buyer the right but not the obligation to sell the underlying commodity futures contract by a specified date and at a specified price. The buyer pays the option premium to the seller for buying the put option. The buyer makes a profit if the price of the underlying commodity futures contract is below the exercise price of the option on expiry of the contract and the buyer makes a loss if the price of the underlying commodity futures contract exceeds the exercise price of the option on expiry of the contract. The buyer can incur a maximum loss to the extent of premium paid for buying the option contract.



Short Position in a Put Option

In a put option, short position means selling/writing the put option. The seller/writer receives the option premium from the buyer of the put option for selling/writing the option. The seller makes a profit if the price of the underlying commodity futures contract

exceeds the exercise price of the option on expiry of the contract and makes a loss if the price of the underlying commodity futures contract is below the exercise of the option on expiry of the contract. The seller can earn a maximum profit to the extent of premium received for writing the option contract.



8.13 SPREADS

Vertical Bull Call Spreads

A vertical bull call spread involves buying a call option on a commodity at a lower strike price and selling a call option on the same commodity at a higher strike price. Both the options have the same expiry dates.

This strategy is best implemented in a moderately bullish market to provide high leverage over a limited price range of the commodity. This strategy has both limited profit potential and limited downside risk.

Vertical Bull Put Spreads

A vertical bull put spread is a spread created by purchasing a lower strike put option and selling a higher strike put option with the same expiry dates. This strategy is best implemented in a moderately bullish market to provide high leverage over a limited range of commodity prices. This strategy has both limited profit potential and limited downside risk.

Vertical Bear Call Spreads

A vertical bear call spread is a spread created by purchasing a higher strike call option and selling a lower strike call option with the same expiry dates. This strategy is best implemented in a moderately bearish or stable market to provide high leverage over a limited range of commodity futures prices. This strategy has both limited profit potential and limited downside risk.

Vertical Bear Put Spreads

A vertical bear put spread is a spread created by purchasing a higher strike put option and selling a lower strike put option with the same expiry dates. This strategy is best implemented in a moderately bearish market. It provides high leverage over a limited range of commodity futures prices. The strategy has both limited profit potential and limited downside risk.

A butterfly spread consists of a combination of a bull spread and a bear spread by using either call options or put options. It involves positions in options at three different strike prices.

Long-Butterfly Spread

A long-butterfly spread is created with four similar types of options that have the same expiry dates. The strategy consists of a combination of two short identical options (either a call option or a put option at the same strike price), one long option with an immediate lower strike price, and one long option with a higher strike price. The maximum profit for a long-butterfly spread occurs when the underlying futures price of the commodity trades close to the middle strike price at expiry. The maximum loss is equal to the premium paid.

Short-Butterfly Spread

A short-butterfly spread is created with four similar types of options that have the same expiry dates. The strategy consists of a combination of two long identical options (either a call option or a put option at the same strike price), one short option with a lower strike price, and one short option with a higher strike price. This strategy is used when the market is expected to be trading in narrow price ranges and no major variations in prices are expected.

This strategy is used when the market is expected to be relatively volatile. The maximum profit for a short-butterfly spread is the premium received and occurs when the underlying futures price of the commodity trades outside the extreme strike prices on expiry. The maximum loss occurs when the underlying futures price of the commodity reaches the level of the middle strike price on expiry.

Calendar Spreads

Unlike the earlier spread strategies, where the options used to create these spreads expire at the same time, calendar spreads have different expiry dates.

A calendar spread is a combination of two similar types of options (either call options or put options) that have the same strike price but different expiry dates.

Calendar Spread Involving Call Options

A calendar spread on an underlying commodity futures can be created by selling a call option at a certain strike price and buying a call option of the underlying commodity futures with a longer maturity at the same strike price. Profits from calendar spreads are taken when the shorter-maturity option expires and assuming that the position of the longer-maturity option is squared off at the same time.

The investor makes a profit when the underlying futures price of the commodity is close to the strike price on expiry of the shorter-maturity option. Losses are incurred when the underlying prices of the commodity futures are significantly higher or lower to the strike price.

Calendar Spread Involving Put Options

A calendar spread on an underlying commodity futures can be created by selling a put option at a certain strike price and buying a put option of the underlying commodity futures with a longer maturity at the same strike price. Profits from calendar spreads are taken when the shorter-maturity option expires and assuming that the position of the longer-maturity option is squared off at the same time. Profits are similar as in the case of calendar spreads involving call options.

Combination Spreads

Straddles

A straddle involves buying a call option and a put option of a commodity at the same strike price and the same expiry dates. A straddle is traded when an investor is expecting the markets to be very volatile but is not certain of the direction. By employing this strategy, a trader is not concerned if the prices of the commodity go up or down but is only concerned with the degree of the move. Decreasing volatility and time decay could affect the option premium significantly.

Strangles

A strangle involves buying a call option and a put option of a commodity at different strike prices but having the same expiry dates. The strike price of the call option is higher than that of the put option. Generally, both the call option and the put options are out-of-the-money. The initial outflow and the maximum potential loss that a trader incurs in a strangle are less than that of a straddle. Similarly, for the trader to profit, the prices of the underlying commodity futures should move much farther when compared to that of a straddle.

8.14 EXOTIC OPTIONS

Exotic option is a derivative that has features making it more complex than commonly traded products (vanilla options). These products are usually traded over-the-counter (OTC). An exotic derivative product could have one or more of the following features:

- The payoff at maturity depends not just on the value of the underlying asset at maturity, but on its value at several times during the contract's life (it could be an Asian option depending on some average, a lookback option depending on the maximum or minimum, a barrier option which ceases to exist if a certain level is reached or not reached by the underlying asset, a digital option, range options, etc.).
- It could depend on more than one index (as in a basket option).
- There could be "callability" and "puttability" rights.
- Exotic options can pose challenging problems in valuation and hedging. The following "exotic options" are still options, but have payoffs calculated quite differently from those above. Although these instruments are far more unusual they can also vary in exercise style between European and American style options.
- A lookback option is a path dependent option where the option owner has the right to buy (sell) the underlying instrument at its lowest (highest) price over some preceding period.
- An Asian option is an option where the payoff is not determined by the underlying price at maturity but by the average underlying price over some pre-set period of time.
- A Russian option is a lookback option, which runs for perpetuity. That is, there is no end to the period into which the owner can look back.
- A game option or Israeli option is an option where the writer has the opportunity to cancel the option he has offered, but must pay the payoff at that point, plus a penalty fee.
- The payoff of a Parisian option is dependent on the amount of time the option has spent above or below a strike price.

- A barrier option involves a mechanism where, if a price is crossed by the underlying futures contract, the option either can be exercised or can no longer be exercised. Knock-ins and Knock-outs are examples of barrier options.
- A binary option (also known as a digital option) pays a fixed amount or nothing at all, depending on the price of the underlying instrument at maturity.
- A chooser option gives the purchaser a fixed period of time to decide whether the derivative will be a vanilla call option or put option.

8.15 SUMMARY

- **Underlying:** The specific security/asset on which an options contract is based.
- **Option Premium:** Premium is the price paid by the buyer to the seller to acquire the right to buy or sell
- **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.
- **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.
- **Exercise Date:** is the date on which the option is actually exercised. In case of European Options the exercise date is same as the expiration date while in case of American Options, the options contract may be exercised any day between the purchase of the contract & its expiration date (see European/ American Option)
- **Open Interest:** The total number of options contracts outstanding in the market at any given point of time.
- **Option Holder:** is the one who buys an option which can be a call or a put option. He enjoys the right to buy or sell the underlying asset at a specified price on or before specified time. His upside potential is unlimited while losses are limited to the Premium paid by him to the option writer.
- **Option seller/writer:** One who is obligated 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. His profits are limited to the premium received from the buyer while his downside is unlimited.

8.16 SELF ASSESSMENT QUESTIONS

- 1) What is a call option?
- 2) What is meant by straddle?
- 3) What is exotic option?
- 4) What is the difference between American and European option?
- 5) What is meant by ‘in the money’?
- 1) The underlying for a Option can be.....
 - 1) Interest rate
 - 2) Equity
 - 3) Commodities
 - 4) Any of the above

A: The correct answer is number 4 _ _

- 2) Currency Derivatives are used mainly for
1) Risk taking
2) Hedging
3) Managing volatility
4) Speculative trading
A: The correct answer is number 2
- 3) Who are the participants in the derivatives market?
1) Arbitrageurs
2) Hedgers
3) Speculators
4) All of the above
A: The correct answer is number 4
- 4) An in-the-money option contract would generate upon exercise for the buyers.....
1) Negative cash flow
2) Pre-determined amount of cash flow
3) No cash flow
4) Positive cash flow
A: The correct answer is number 4.
- 5) In a currency option contract
1) the option buyer has the right to buy the underlying but not sell
2) the option buyer has the obligation to buy the underlying but no obligation to sell
3) the option seller has the right but not the obligation to sell the underlying
4) the buyer has the right but not the obligation to buy or sell the underlying depending on whether it is a call or put option.
A: The correct answer is number 4.
- 6) Buying a call option on currency Y against currency X is same as
1) Buying a put on currency X against Y
2) Selling a put on X against Y
3) Either A or B
4) Neither A nor B
A: The correct answer is number .4

8.17 FURTHER READINGS

- 1) John Hull, *Option ,Futures and Other Derivatives.*
- 2) Francesca Taylor, *Mastering Derivatives Market.*
- 3) Robert McDonald, *Derivative Markets.*
- 4) Chance, D., *An Introduction to Derivatives.*
- 5) Kolb R. Futures, *Options and Swaps.*



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