FOREIGN EXCHANGE EXPOSURE AND RISK MANAGEMENT

LEARNING OUTCOMES

After going through the chapter student shall be able to understand

- Exchange rate determination
- Foreign currency market
- Management of transaction, translation and economic exposures
- Hedging currency risk
- Foreign exchange derivatives – Forward, futures, options and swaps

1. INTRODUCTION

Coupled with globalisation of business, the raising of capital from the international capital markets has assumed significant proportion during the recent years. The volume of finance raised from international capital market is steadily increasing over a period of years, across the national boundaries. Every day new institutions are emerging on the international financial scenario and introducing new derivative financial instruments (products) to cater to the requirements of multinational organisations and the foreign investors.

To accommodate the underlying demands of investors and capital raisers, financial institutions and instruments have also changed dramatically. Financial deregulation, first in the United States and then in Europe and Asia, has prompted increased integration of world financial markets. As a result of the rapidly changing scenario, the finance manager today has to be global in his approach.
In consonance with these remarkable changes, the Government of India has also opened Indian economy to foreign investments and has taken a number of bold and drastic measures to globalise the Indian economy. Various fiscal, trade and industrial policy decisions have been taken and new avenues provided to foreign investors like Foreign Institutional Investors (FII's) and NRI's etc., for investment especially in infrastructural sectors like power and telecommunication etc.

The basic principles of financial management i.e., efficient allocation of resources and raising of funds on most favourable terms and conditions etc. are the same, both for domestic and international enterprises. However the difference lies in the environment in which these multinational organisations function. The environment relates to political risks, Government's tax and investment policies, foreign exchange risks and sources of finance etc. These are some of the crucial issues which need to be considered in the effective management of international financial transactions and investment decisions.

Under the changing circumstances as outlined above, a finance manager, naturally cannot just be a silent spectator and wait and watch the developments. He has to search for "best price" in a global market place (environment) through various tools and techniques. Sometimes he uses currency and other hedges to optimise the utilisation of financial resources at his command.

However, the problems to be faced by him in the perspective of financial management of the multinational organisations are slightly more complex than those of domestic organisations. While the concepts developed earlier in the previous chapters are also applicable here, the environment in which decisions are made in respect of international financial management is different and it forms the subject matter of this chapter for discussion. In this chapter we shall describe how a finance manager can protect his organisation from the vagaries of international financial transactions.

2. NOSTRO, VOSTRO AND LORO ACCOUNTS

In interbank transactions, foreign exchange is transferred from one account to another account and from one centre to another centre. Therefore, the banks maintain three types of current accounts in order to facilitate quick transfer of funds in different currencies. These accounts are Nostro, Vostro and Loro accounts meaning “our”, “your” and “their”. A bank’s foreign currency account maintained by the bank in a foreign country and in the home currency of that country is known as Nostro Account or “our account with you”. For example, An Indian bank’s Swiss franc account with a bank in Switzerland. Vostro account is the local currency account maintained by a foreign bank/branch. It is also called “your account with us”. For example, Indian rupee account maintained by a bank in Switzerland with a bank in India. The Loro account is an account wherein a bank remits funds in foreign currency to another bank for credit to an account of a third bank.


2.1 Exchange Position

It is referred to total of purchases or sale of commitment of a bank to purchase or sale foreign exchange whether actual delivery has taken place or not. In other words all transactions for which bank has agreed with counter party are entered into exchange position on the date of the contract.

2.2 Cash Position

It is outstanding balance (debit or credit) in bank’s nostro account. Since all foreign exchange dealings of bank are routed through nostro account it is credited for all purchases and debited for sale by bank.

It should however be noted that all dealings whether delivery has taken place or not effects the Exchange Position but Cash Position is effected only when actual delivery has taken place.

Therefore, all transactions effecting Cash position will affect Exchange Position not vice versa.

Illustration 1

Suppose you are a dealer of ABC Bank and on 20.10.2014 you found that balance in your Nostro account with XYZ Bank in London is £65000 and you had overbought £65000. During the day following transaction have taken place:

<table>
<thead>
<tr>
<th>Description</th>
<th>£</th>
</tr>
</thead>
<tbody>
<tr>
<td>DD purchased</td>
<td>12,500</td>
</tr>
<tr>
<td>Purchased a Bill on London</td>
<td>40,000</td>
</tr>
<tr>
<td>Sold forward TT</td>
<td>30,000</td>
</tr>
<tr>
<td>Forward purchase contract cancelled</td>
<td>15,000</td>
</tr>
<tr>
<td>Remitted by TT</td>
<td>37,500</td>
</tr>
<tr>
<td>Draft on London cancelled</td>
<td>15,000</td>
</tr>
</tbody>
</table>

What steps would you take, if you are required to maintain a credit Balance of £15000 in the Nosto A/c and keep as overbought position on £7,500?

Solution

Exchange Position:

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Purchase £</th>
<th>Sale £</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opening Balance Overbought</td>
<td>35,000</td>
<td>—</td>
</tr>
<tr>
<td>DD Purchased</td>
<td>12,500</td>
<td>—</td>
</tr>
<tr>
<td>Purchased a Bill on London</td>
<td>40,000</td>
<td>—</td>
</tr>
</tbody>
</table>
10.4 STRATEGIC FINANCIAL MANAGEMENT

<table>
<thead>
<tr>
<th></th>
<th>Credit£</th>
<th>Debit£</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sold forward TT</td>
<td>—</td>
<td>30,000</td>
</tr>
<tr>
<td>Forward purchase contract cancelled</td>
<td>—</td>
<td>15,000</td>
</tr>
<tr>
<td>TT Remittance</td>
<td>37,500</td>
<td>—</td>
</tr>
<tr>
<td>Draft on London cancelled</td>
<td>15,000</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>1,02,500</td>
<td>82,500</td>
</tr>
<tr>
<td>Closing Balance Overbought</td>
<td>—</td>
<td>20,000</td>
</tr>
<tr>
<td></td>
<td>1,02,500</td>
<td>1,02,500</td>
</tr>
</tbody>
</table>

Cash Position (Nostro A/c)

<table>
<thead>
<tr>
<th></th>
<th>Credit£</th>
<th>Debit£</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opening balance credit</td>
<td>65,000</td>
<td>—</td>
</tr>
<tr>
<td>TT Remittance</td>
<td>—</td>
<td>37,500</td>
</tr>
<tr>
<td></td>
<td>65,000</td>
<td>37,500</td>
</tr>
<tr>
<td>Closing balance (credit)</td>
<td>—</td>
<td>27,500</td>
</tr>
<tr>
<td></td>
<td>65,000</td>
<td>65,000</td>
</tr>
</tbody>
</table>

To maintain Cash Balance in Nostro Account at £7500 you have to sell £20000 in Spot which will bring Overbought exchange position to Nil. Since bank require Overbought position of £7500 it has to buy the same in forward market.

3. EXCHANGE RATE QUOTATION

3.1 American Term and European Term

Quotes in American terms are the rates quoted in amounts of U.S. dollar per unit of foreign currency. While rates quoted in amounts of foreign currency per U.S. dollar are known as quotes in European terms.

For example, U.S. dollar 0.2 per unit of Indian rupee is an American quote while INR 44.92 per unit of U.S. dollar is a European quote.

Most foreign currencies in the world are quoted in terms of the number of units of foreign currency needed to buy one U.S. dollar i.e. the European term.

3.2 Direct and Indirect Quote

As indicated earlier, a currency quotation is the price of a currency in terms of another currency. For example, $1 = ₹48.00, means that one dollar can be exchanged for ₹48.00. Alternatively; we
may pay ₹48.00 to buy one dollar. A foreign exchange quotation can be either a direct quotation and or an indirect quotation, depending upon the home currency of the person concerned.

A direct quote is the home currency price of one unit foreign currency. Thus, in the aforesaid example, the quote $1 =₹48.00 is a direct-quote for an Indian.

An indirect quote is the foreign currency price of one unit of the home currency. The quote Re.1 =$0.0208 is an indirect quote for an Indian. ($1/₹ 48.00 =$0.0208 approximately)

Direct and indirect quotes are reciprocals of each other, which can be mathematically expressed as follows.

Direct quote = 1/indirect quote and vice versa

The following table is an extract from the Bloomberg website showing the Foreign Exchange Cross rates prevailing on 14/09/2012.

<table>
<thead>
<tr>
<th></th>
<th>USD</th>
<th>CNY</th>
<th>JPY</th>
<th>HKD</th>
<th>INR</th>
<th>KRW</th>
<th>SGD</th>
<th>EUR</th>
</tr>
</thead>
<tbody>
<tr>
<td>USD</td>
<td>0.1583</td>
<td>0.0128</td>
<td>0.129</td>
<td>0.0184</td>
<td>0.0009</td>
<td>0.8197</td>
<td>1.3089</td>
<td></td>
</tr>
<tr>
<td>CNY</td>
<td>6.3162</td>
<td>0.0809</td>
<td>0.8147</td>
<td>0.1161</td>
<td>0.0057</td>
<td>5.177</td>
<td>8.2667</td>
<td></td>
</tr>
<tr>
<td>JPY</td>
<td>78.08</td>
<td>12.362</td>
<td>10.072</td>
<td>1.435</td>
<td>0.0701</td>
<td>64</td>
<td>102.17</td>
<td></td>
</tr>
<tr>
<td>HKD</td>
<td>7.7526</td>
<td>1.2274</td>
<td>0.0993</td>
<td>0.143</td>
<td>0.0069</td>
<td>6.3546</td>
<td>10.148</td>
<td></td>
</tr>
<tr>
<td>INR</td>
<td>54.405</td>
<td>8.613</td>
<td>0.6955</td>
<td>7.005</td>
<td>0.0488</td>
<td>44.505</td>
<td>71.067</td>
<td></td>
</tr>
<tr>
<td>KRW</td>
<td>1,114.65</td>
<td>176.5476</td>
<td>14.2965</td>
<td>143.9908</td>
<td>20.4965</td>
<td>914.8582</td>
<td>1,459.05</td>
<td></td>
</tr>
<tr>
<td>SGD</td>
<td>1.2202</td>
<td>0.1932</td>
<td>0.0156</td>
<td>0.0024</td>
<td>0.0011</td>
<td>0.0007</td>
<td>0.6263</td>
<td></td>
</tr>
<tr>
<td>EUR</td>
<td>0.7642</td>
<td>0.121</td>
<td>0.0098</td>
<td>0.0086</td>
<td>0.014</td>
<td>0.0007</td>
<td>0.6263</td>
<td></td>
</tr>
</tbody>
</table>


Students will notice that the rates given in the rows are direct quotes for each of the currencies listed in the first column and the rates given in the columns are the indirect quotes for the currencies listed in the first row. Students can also verify that in every case above

### 3.3 Bid, Offer and Spread

A foreign exchange quotes are two-way quotes, expressed as a 'bid' and an offer' (or ask) price. Bid is the price at which the dealer is willing to buy another currency. The offer is the rate at which he is willing to sell another currency. Thus a bid in one currency is simultaneously an offer in another currency. For example, a dealer may quote Indian rupees as ₹48.80 - 48.90 vis-a-vis dollar. That means that he is willing to buy dollars at ₹48.80/$ (sell rupees and buy dollars), while he will sell dollar at ₹ 48.90/$ (buy rupees and sell dollars). The difference between the bid and the offer is called the spread. The offer is always higher than the bid as inter-bank dealers make money by buying at the bid and selling at the offer.
% Spread = \frac{\text{Bid - Offer}}{\text{Bid}} \times 100

It must be clearly understood that while a dealer buys a currency, he at the same time is selling another currency. When a dealer wants to buy a currency, he/she will ask the other dealer a quote for say a million dollars. The second dealer does not know whether the first dealer is interested in buying or selling one million dollars. The second dealer would then give a two way quote (a bid/offer quote). When the first dealer is happy with the ‘ask’ price given by the second dealer, he/she would convey “ONE MINE”, which means “I am buying one million dollars from you”. If the first dealer had actually wanted to sell one million dollars and had asked a quote, and he is happy with the ‘bid’ price given by the second dealer, he/she would convey “ONE YOURS”, which means “I am selling one million dollars to you”.

3.4 Cross Rates

It is the exchange rate which is expressed by a pair of currency in which none of the currencies is the official currency of the country in which it is quoted. For example, if the currency exchange rate between a Canadian dollar and a British pound is quoted in Indian newspapers, then this would be called a cross rate since none of the currencies of this pair is of Indian rupee.

Broadly, it can be stated that the exchange rates expressed by any currency pair that does not involve the U.S. dollar are called cross rates. This means that the exchange rate of the currency pair of Canadian dollar and British pound will be called a cross rate irrespective of the country in which it is being quoted as it does not have U.S. dollar as one of the currencies.

3.5 Pips

This is another technical term used in the market. PIP is the Price Interest Point. It is the smallest unit by which a currency quotation can change. E.g., USD/INR quoted to a customer is INR 61.75. The minimum value this rate can change is either INR 61.74 or INR 61.76. In other words, for USD/INR quote, the pip value is 0.01. Pip in foreign currency quotation is similar to the tick size in share quotations. However, in Indian interbank market, USD-INR rate is quoted upto 4 decimal point. Hence minimum value change will be to the tune of 0.0001. Spot EUR/USD is quoted at a bid price of 1.0213 and an ask price of 1.0219. The difference is USD 0.0006 equal to 6 “pips”.

3.6 Forward exchange rate quotation

Forward contract or outright forward contractor merely outright is an agreement between two counterparts to exchange currencies on a future date at a rate fixed in the contract. Ideally, the way in which exchange rate for a forward date [forward exchange rate] is quoted should be the same as that for spot date e.g. if the spot rate is 61.53/54, then the [say six months] forward rate quoting should look like say 61.93/98. However, the market convention is different. Forward rate is not quoted as so and so exchange rate like this but always quoted with spot rate and the forward margin separately. In other words, forward quote is not a foreign exchange rate quotation but is quoted as a difference between spot & forward rates.
The reader or user has to calculate the forward applicable rate by loading the forward margin into the spot rate. Thus e.g. in the above case, the foreign exchange dealer will quote the six month forward rate as 40/44. He will even presume that the ongoing spot rate is known to the counterparty and may not even mention. Even if he were to mention, he will mention only 53/54, because the ‘big figure’ [in this case, “61”] is supposed to be known to the counterparty without ambiguity. Since the rate fluctuation is very high, the dealer has no time to quote rates in very detailed English sentences and these conventions have come into practice! The numbers 40 & 44 are arrived at as the differential between 61.93 – 61.53 and 61.98 – 62.54 respectively. These numbers 40 & 44 are called forward margins representing the factor by which the forward rate is different from the spot rate i.e. the margin to be ‘loaded’ onto the spot rate. Though looks silly, it is worth reiterating that this margin is not the profit margin of the trader!

If the price on a future date is higher, then the currency is said to be at forward premium and then the number represents the forward premium for that forward period. If the price on a future date is lower, then the currency is said to be at forward discount and then the number represents the forward discount for that forward period. In the above example, US dollar is at a premium and the forward premium of USD for six months is 40/44 paise for buying and selling rate respectively in the interbank market. Generally, the margin is quoted in annualized percentage terms. E.g. in this case, extrapolating the premium of six months to twelve months, it can be said that US dollar is likely to have a premium of 80 paise per year [40 paise per six months X 2] which means on a base rate of 61.53, the annualized premium \[=0.8^*2*100/61.53\] is 2.60% p.a. In market parlance, forward premium is quoted in percentage terms and this is the basis of calculation. Actually, the forward market in foreign exchange is an interest rate market and is not a foreign exchange market. Because it compares interest rate of one currency with that of another over a period of time. In fact some banks include FX forward traders under their interest rate segment rather than FX segment.

### 3.7 Forward point determination

The number of ‘basis points’ from the spot rate to arrive at the forward rate in the above discussions is also referred to as forward points. The points are added to the spot rate when the [foreign] currency is at a premium and deducted from the spot rate when the [foreign] currency is at a discount, to arrive at the forward rate. This is when the rates are quoted in direct method. In case of indirect rate quotations, the process will be exactly the opposite. The forward point may be positive or negative and marked accordingly or specifically mentioned so. The forward points represent the interest rate differential between the two currencies. E.g. if the spot exchange rate is GBP 1 = 1.6000 - 1.6010 USD and if the outright forward points are 5-8, then the outright forward exchange rate quote is GBP 1 = $ 1.6005 - 1.6018. The number of forward points between the spot and forward is influenced by the present and forward interest rates, the ‘length’ of the forward and other market factors. Forward point is not a rate but a difference in the rate! Between two currencies, the currency which carries lower interest rate is always at a premium versus the other currency. This is the same as stating that if a currency has a relatively higher ‘yield’, then it will cost
less in the forward market and a currency having lower yield will cost more in the forward market. If there is an aberration to this, arbitration opportunity arises, which itself will push the prices to equilibrium. If the forward points are mentioned simply as 5/8, then a doubt arises as to whether it is at premium, and hence has to be added or at discount and hence to be deducted. The spot market always has the lowest bid-ask spread and the spread will steadily widen as the duration lengthens.

This is because the uncertainty and the liquidity concerns increase as we go forward in time. If we add 5/8 to the left and right side, the spread will widen and hence fits into the argument.

Hence a quote such as 5/8 or 43/45 with increasing numbers from left to right means the foreign currency is at premium. This looks like a workaround to calculate but the reader can visualize the logic.

Forward points are equivalent to pips in the spot market which we discussed earlier. They are quoted to an accuracy of 1/100th of one point. E.g. if EUR/USD rates for spot and forward are 1.1323 & 1.1328, then the forward point is 5 because one pip or point is worth 0.0001 in EUR/USD.

3.8 Broken period forward rate

Interbank exchange rates are wholesale rates which are applicable to transaction among banks and in the interbank market. They are for large standard amounts with standardized due dates i.e. end of January, end of February and so on. However, in customer transactions, the amounts are not only smaller & for odd amounts, but the due date could be also a nonstandardized one. There could be an export bill for euro 12,345.67 getting realized on 10th January or 23rd February and so on. Thus the forward rate that is available in the interbank market [in the form of forward points for February, for March and so on] cannot be applied as such for customer transactions. The broken period concept becomes relevant in such situations.

On 1st January, if the spot rate for US Dollar is 62 and if the forward margin for two months is 10 paise [premium], then the forward rate can be calculated as ₹ 62.10 per USD and any customer transaction exchange rate can be calculated using this as the base rate. Thus if the bank wishes to keep a margin of say 3 paise, it will quote a rate of ₹ 62.13 for an importer and quote a rate of ₹ 62.07 for an exporter for an end February realizing bill. However, this logic is valid only for a bill to be realized [for an exporter] or a bill to be paid [for an importer] on 28th February because the underlying forward rate was for two months on 1st January i.e. the date of 28th February. However, in customer transactions, the event [of converting FC into INR or vice versa] does not always happen on the exact standard dates. Thus if the bill is getting paid or is to be retired on 23rd February, then the forward points are to be calculated for such odd number of days starting from 1st January. It will be presumed [though there is no logical answer, in practice, it turns out to be adequately accurate], that the forward points ‘grow’ uniformly throughout and arithmetical proportionate for the applicable date is arrived at. E.g. in the above instance, on 1st January, the premium for a customer transaction expected to happen on 23rd February is calculated as
=10*53/59 = 8.98 paise [53 & 59 are broken & full periods] and hence the exchange rate will be 62.0898. As market convention, this will be rounded off to 62.09. The merchant forward rate for a customer transaction expected to happen on 23rd February will be this margin loaded onto spot rate. Thus if the margin is 3 paise, the rate for an exporter will be 62.06 & for an importer, the rate will be 62.12. This logic will be applied even while calculating exchange rate for a third currency though the calculation will be a bit lengthier.

3.9 Merchant Rates

It is always interesting to know who ‘fixes’ the exchange rates as quoted to customers and to realize that nobody fixes but the market decides the exchange rate based on demand and supply and other relevant factors. RBI often clarifies that it does not fix the exchange rates, though in the same breath, RBI also clarifies that it monitors the ‘volatility’ of Indian rupee exchange rate. In other words, RBI does not control the exchange rates but it controls the volatile movement of INR exchange rate by intervention i.e. by deliberately altering the demand and supply of the foreign currency say USD. It does it by either buying USD from the interbank market or pumping in USD into the market. This wholesale interbank market rate is the basis for banks’ exchange rates quoted to customers.

In foreign exchange market, banks consider customers as ‘merchants’ for historical reasons. It may look ridiculous to call an NRI who has remitted dollars to India as a merchant but exchange rates applied to all types of customers including that for converting inward remittance in USD to INR are called merchant rates as against the rates quoted to each other by banks in the interbank market, which are called interbank rates. Why this term is important here is because there are guidelines issued by FEDAI [Foreign Exchange Dealers Association of India] to banks on these merchant rates as there is customer service element involved in these.

Till 1998, FEDAI prescribed what ‘margins’ are to be loaded by banks onto the ongoing interbank exchange rate for quoting to customers i.e. to arrive at the merchant rates. This was because, most customer affecting costs like interest rates were then controlled by regulators.

As a part of liberalization, banks got the freedom to quote their own rates. Since then, banks decide themselves what should be the margin depending on the bank’s ‘position’. The only rule that is still existing in the FEDAI rule book is rule 5A.8 which states that “Settlement of all merchant transactions shall be effected on the principle of rounding off the Rupee amounts to the nearest whole Rupee i.e., without paise”. This means if an exporter or an individual has received USD 1234 and if the applicable exchange rate is 61.32, then the amount to be credited to customer’s account is ₹ 75669 and not ₹ 75668.88, less charges if any. This rule will be similarly applicable for import or outward remittance transactions also. This rule is more a matter of common sense and does not have any meaningful impact on customer transactions. In fact in some of the banking software, amount is always rounded off.

After the discontinuation of gold standard in 1971 by USA, the foreign exchange market was in turmoil. Initially, RBI had kept sterling as the intervention currency pegging the rupee exchange
rate for historical reasons and due to political legacy. Effective 1975, rupee was delinked from sterling and was linked to a basket of currencies. It should be noted that the concept of RBI/FEDAI advising the fixed exchange rate was discontinued long ago. The sterling schedule was abolished from the beginning of 1984. FEDAI issued detailed guidelines to banks on how to calculate exchange rates under the new freedom, the minimum & maximum profit margin and the maximum spread between the buying and selling rates. All these are now redundant now. There were arguments for and against giving freedom to banks for loading margins by banks themselves on the ongoing interbank rate. However the liberalization wave overruled the skeptics.

The International Division of any bank calculates the merchant rates for variety of transactions like import bill, export bill, inward & outward remittance etc and advises the same in the morning with standard spread loaded to all branches. It is called card rate. For a walk-in customer, for transactions of small value [what is small varies with the bank], this is applied.

However, for regular customers and for transactions of high value, always a better rate is sought from the dealing room. Card rates advised in the margin are generally not changed unless there is too much volatility.

4. EXCHANGE RATE FORECASTING

The foreign exchange market has changed dramatically over the past few years. The amounts traded each day in the foreign exchange market are now huge. In this increasingly challenging and competitive market, investors and traders need tools to select and analyze the right data from the vast amounts of data available to them to help them make good decisions. Corporates need to do the exchange rate forecasting for taking decisions regarding hedging, short-term financing, short-term investment, capital budgeting, earnings assessments and long-term financing.

**Techniques of Exchange Rate Forecasting:** There are numerous methods available for forecasting exchange rates. They can be categorized into four general groups- technical, fundamental, market-based, and mixed.

(a) **Technical Forecasting:** It involves the use of historical data to predict future values. For example time series models. Speculators may find the models useful for predicting day-to-day movements. However, since the models typically focus on the near future and rarely provide point or range estimates, they are of limited use to MNCs.

(b) **Fundamental Forecasting:** It is based on the fundamental relationships between economic variables and exchange rates. For example subjective assessments, quantitative measurements based on regression models and sensitivity analyses.

In general, fundamental forecasting is limited by:

- the uncertain timing of the impact of the factors,
- the need to forecast factors that have an immediate impact on exchange rates,
the omission of factors that are not easily quantifiable, and
changes in the sensitivity of currency movements to each factor over time.

(c) Market-Based Forecasting: It uses market indicators to develop forecasts. The current spot/forward rates are often used, since speculators will ensure that the current rates reflect the market expectation of the future exchange rate.

(d) Mixed Forecasting: It refers to the use of a combination of forecasting techniques. The actual forecast is a weighted average of the various forecasts developed.

5. EXCHANGE RATE DETERMINATION

An exchange rate is, simply, the price of one nation’s currency in terms of another currency, often termed the reference currency. For example, the rupee/dollar exchange rate is just the number of rupee that one dollar will buy. If a dollar will buy 100 rupee, the exchange rate would be expressed as Rs 100/$ and the rupee would be the reference currency.

Equivalently, the dollar/rupee exchange rate is the number of dollars one rupee will buy. Continuing the previous example, the exchange rate would be $0.01/Rs (1/100) and the dollar would now be the reference currency. Exchange rates can be for spot or forward delivery.

The foreign exchange market includes both the spot and forward exchange rates. The spot rate is the rate paid for delivery within two business days after the day the transaction takes place. If the rate is quoted for delivery of foreign currency at some future date, it is called the forward rate. In the forward rate, the exchange rate is established at the time of the contract, though payment and delivery are not required until maturity. Forward rates are usually quoted for fixed periods of 30, 60, 90 or 180 days from the day of the contract.

(a) The Spot Market: The most common way of stating a foreign exchange quotation is in terms of the number of units of foreign currency needed to buy one unit of home currency. Thus, India quotes its exchange rates in terms of the amount of rupees that can be exchanged for one unit of foreign currency.

Illustration 2

If the Indian rupee is the home currency and the foreign currency is the US Dollar then what is the exchange rate between the rupee and the US dollar?

Solution

US$ 0.0217/₹1 reads "0.0217 US dollar per rupee." This means that for one Indian rupee one can buy 0.0217 US dollar.

In this method, known as the European terms, the rate is quoted in terms of the number of units of the foreign currency for one unit of the domestic currency. This is called an indirect quote.

The alternative method, called the American terms, expresses the home currency price of one unit
of the foreign currency. This is called a direct quote.

This means the exchange rate between the US dollar and rupee can be expressed as:

₹ 46.08/US$ reads "₹ 46.08 per US dollar."

Hence, a relationship between US dollar and rupee can be expressed in two different ways which have the same meaning:

- One can buy 0.0217 US dollars for one Indian rupee.
- ₹ 46.08 Indian rupees are needed to buy one US dollar.

(b) The Forward Market: A forward exchange rate occurs when buyers and sellers of currencies agree to deliver the currency at some future date. They agree to transact a specific amount of currency at a specific rate at a specified future date. The forward exchange rate is set and agreed by the parties and remains fixed for the contract period regardless of the fluctuations in the spot exchange rates in future. The forward exchange transactions can be understood by an example.

A US exporter of computer peripherals might sell computer peripherals to a German importer with immediate delivery but not require payment for 60 days. The German importer has an obligation to pay the required dollars in 60 days, so he may enter into a contract with a trader (typically a local banker) to deliver Euros for dollars in 60 days at a forward rate – the rate today for future delivery.

So, a forward exchange contract implies a forward delivery at specified future date of one currency for a specified amount of another currency. The exchange rate is agreed today, though the actual transactions of buying and selling will take place on the specified date only. The forward rate is not the same as the spot exchange rate that will prevail in future. The actual spot rate that may prevail on the specified date is not known today and only the forward rate for that day is known. The actual spot rate on that day will depend upon the supply and demand forces on that day. The actual spot rate on that day may be lower or higher than the forward rate agreed today.

An Indian exporter of goods to London could enter into a forward contract with his banker to sell pound sterling 90 days from now. This contract can also be described as a contract to purchase Indian Rupees in exchange for delivery of pound sterling. In other words, foreign exchange markets are the only markets where barter happens – i.e., money is delivered in exchange for money!

6. EXCHANGE RATE THEORIES

There are three theories of exchange rate determination- Interest rate parity, Purchasing power parity and International Fisher effect.

6.1 Interest Rate Parity (IRP)

Interest rate parity is a theory which states that ‘the size of the forward premium (or discount) should be equal to the interest rate differential between the two countries of concern”. When interest rate parity exists, covered interest arbitrage (means foreign exchange risk is covered) is
not feasible, because any interest rate advantage in the foreign country will be offset by the discount on the forward rate. Thus, the act of covered interest arbitrage would generate a return that is no higher than what would be generated by a domestic investment.

The Covered Interest Rate Parity equation is given by:

\[
(1 + r_D) = \frac{F}{S} (1 + r_F)
\]

Where,

\( (1 + r_D) \) = Amount that an investor would get after a unit period by investing a rupee in the domestic market at \( r_D \) rate of interest and \( \frac{F}{S} (1 + r_F) \) is the amount that an investor by investing in the foreign market at \( r_F \) that the investment of one rupee yield same return in the domestic as well as in the foreign market.

The Uncovered Interest Rate Parity equation is given by:

\[
r + r_D = \frac{S_1}{S} (1 + r_F)
\]

Where,

\( S_1 \) = Expected future spot rate when the receipts denominated in foreign currency is converted into domestic currency.

Thus, it can be said that Covered Interest Arbitrage has an advantage as there is an incentive to invest in the higher-interest currency to the point where the discount of that currency in the forward market is less than the interest differentials. If the discount on the forward market of the currency with the higher interest rate becomes larger than the interest differential, then it pays to invest in the lower-interest currency and take advantage of the excessive forward premium on this currency.

### 6.2 Purchasing Power Parity (PPP)

Why is a dollar worth ₹ 48.80, JPY 122.18, etc. at some point in time? One possible answer is that these exchange rates reflect the relative purchasing powers of the currencies, i.e. the basket of goods that can be purchased with a dollar in the US will cost ₹ 48.80 in India and ¥ 122.18 in Japan.

Purchasing Power Parity theory focuses on the ‘inflation – exchange rate’ relationship. There are two forms of PPP theory:

The ABSOLUTE FORM, also called the ‘Law of One Price’ suggests that “prices of similar products of two different countries should be equal when measured in a common currency”. If a discrepancy in prices as measured by a common currency exists, the demand should shift so that these prices should converge.
An alternative version of the absolute form that accounts for the possibility of market imperfections such as transportation costs, tariffs, and quotas embeds the sectoral constant. It suggests that ‘because of these market imperfections, prices of similar products of different countries will not necessarily be the same when measured in a common currency.’ However, it states that the rate of change in the prices of products should be somewhat similar when measured in a common currency, as long as the transportation costs and trade barriers are unchanged.

In Equilibrium Form:

\[
S = \alpha \frac{P_D}{P_F}
\]

Where,

- \(S(\text{\₹}/\$)\) = spot rate
- \(P_D\) = is the price level in India, the domestic market.
- \(P_F\) = is the price level in the foreign market, the US in this case.
- \(\alpha\) = Sectoral price and sectoral shares constant.

For example, a cricket bat sells for \(\text{\₹} 1000\) in India. The transportation cost of one bat from Ludhiana to New York costs \(\text{\₹} 100\) and the import duty levied by the US on cricket bats is \(\text{\₹} 200\) per bat. Then the sectoral constant for adjustment would be \(1000/1300 = 0.7692\).

It becomes extremely messy if one were to deal with millions of products and millions of constants. One way to overcome this is to use a weighted basket of goods in the two countries represented by an index such as Consumer Price Index. However, even this could break down because the basket of goods consumed in a country like Finland would vary with the consumption pattern in a country such as Malaysia making the aggregation an extremely complicated exercise.

The RELATIVE FORM of the Purchasing Power Parity tries to overcome the problems of market imperfections and consumption patterns between different countries. A simple explanation of the Relative Purchase Power Parity is given below:

Assume the current exchange rate between INR and USD is \(\text{\₹} 50 / \$1\). The inflation rates are 12% in India and 4% in the US. Therefore, a basket of goods in India, let us say costing now \(\text{\₹} 50\) will cost one year hence \(\text{\₹} 50 \times 1.12 = \text{\₹} 56.00\). A similar basket of goods in the US will cost USD 1.04 one year from now. If PPP holds, the exchange rate between USD and INR, one year hence, would be \(\text{\₹} 56.00 = \$1.04\). This means, the exchange rate would be \(\text{\₹} 53.8462 / \$1\), one year from now. This can also be worked backwards to say what should have been the exchange rate one year before, taking into account the inflation rates during last year and the current spot rate.

Expected spot rate = Current Spot Rate x expected difference in inflation rates
FOREIGN EXCHANGE EXPOSURE AND RISK MANAGEMENT

\[ E(S_1) = S_0 \times \frac{(1 + I_d)}{(1 + I_f)} \]

Where

- \( E(S_1) \) is the expected Spot rate in time period 1
- \( S_0 \) is the current spot rate (Direct Quote)
- \( I_d \) is the inflation in the domestic country (home country)
- \( I_f \) is the inflation in the foreign country

According to Relative PPP, any differential exchange rate to the one propounded by the theory is the ‘real appreciation’ or ‘real depreciation’ of one currency over the other. For example, if the exchange rate between INR and USD one year ago was ₹ 45.00. If the rates of inflation in India and USA during the last one year were 10% and 2% respectively, the spot exchange rate between the two currencies today should be

\[ S_0 = 45.00 \times \frac{(1+10\%)/(1+2\%)}{ } = ₹ 48.53 \]

However, if the actual exchange rate today is ₹ 50.00, then the real appreciation of the USD against INR is ₹ 1.47, which is 1.47/45.00 = 3.27%. And this appreciation of the USD against INR is explained by factors other than inflation.

PPP is more closely approximated in the long run than in the short run, and when disturbances are purely monetary in character.

6.3 International Fisher Effect (IFE)

International Fisher Effect theory uses interest rate rather than inflation rate differentials to explain why exchange rates change over time, but it is closely related to the Purchasing Power Parity (PPP) theory because interest rates are often highly correlated with inflation rates.

According to the International Fisher Effect, ‘nominal risk-free interest rates contain a real rate of return and anticipated inflation’. This means if investors of all countries require the same real return, interest rate differentials between countries may be the result of differential in expected inflation.

The IFE theory suggests that foreign currencies with relatively high interest rates will depreciate because the high nominal interest rates reflect expected inflation. The nominal interest rate would also incorporate the default risk of an investment.

The IFE equation can be given by:

\[ r_D - P_D = r_F - \Delta P_F \]

or

\[ P_D - P_F = \Delta S = r_D - r_F \]
The above equation states that if there are no barriers to capital flows the investment will flow in such a manner that the real rate of return on investment will equalize. In fact, the equation represents the interaction between real sector, monetary sector and foreign exchange market.

If the IFE holds, then a strategy of borrowing in one country and investing the funds in another country should not provide a positive return on average. The reason is that exchange rates should adjust to offset interest rate differentials on the average. As we know that purchasing power has not held over certain periods, and since the International Fisher Effect is based on Purchasing Power Parity (PPP). It does not consistently hold either, because there are factors other than inflation that affect exchange rates, the exchange rates do not adjust in accordance with the inflation differential.

6.4 Comparison of PPP, IRP and IFE Theories

All the above theories relate to the determination of exchange rates. Yet, they differ in their implications.

The theory of IRP focuses on why the forward rate differs from the spot rate and on the degree of difference that should exist. This relates to a specific point in time.

Conversely, PPP theory and IFE theory focuses on how a currency’s spot rate will change over time. While PPP theory suggests that the spot rate will change in accordance with inflation differentials, IFE theory suggests that it will change in accordance with interest rate differentials. PPP is nevertheless related to IFE because inflation differentials influence the nominal interest rate differentials between two countries.

<table>
<thead>
<tr>
<th>Theory</th>
<th>Key Variables</th>
<th>Basis</th>
<th>Summary</th>
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<tr>
<td>Interest Rate Parity (IRP)</td>
<td>Forward rate premium (or discount)</td>
<td>Interest rate differential</td>
<td>The forward rate of one currency will contain a premium (or discount) that is determined by the differential in interest rates between the two countries. As a result, covered interest arbitrage will provide a return that is no higher than a domestic return.</td>
</tr>
<tr>
<td>Purchasing Power Parity (PPP)</td>
<td>Percentage change in spot exchange rate.</td>
<td>Inflation rate differential.</td>
<td>The spot rate of one currency w.r.t. another will change in reaction to the differential in inflation rates between two countries. Consequently, the</td>
</tr>
</tbody>
</table>
purchasing power for consumers when purchasing goods in their own country will be similar to their purchasing power when importing goods from foreign country.

| International Fisher Effect (IFE) | Percentage change in spot exchange rate | Interest rate differential | The spot rate of one currency w.r.t. another will change in accordance with the differential in interest rates between the two countries. Consequently, the return on uncovered foreign money market securities will on average be no higher than the return on domestic money market securities from the perspective of investors in the home country. |

7. FOREIGN EXCHANGE MARKET

The foreign exchange market is the market in which individuals, firms and banks buy and sell foreign currencies or foreign exchange. The purpose of the foreign exchange market is to permit transfers of purchasing power denominated in one currency to another i.e. to trade one currency for another. For example, a Japanese exporter sells automobiles to a U.S. dealer for dollars, and a U.S. manufacturer sells machine tools to Japanese company for yen. Ultimately, however, the U.S. company will be interested in receiving dollars, whereas the Japanese exporter will want yen. Because it would be inconvenient for the individual buyers and sellers of foreign exchange to seek out one another, a foreign exchange market has developed to act as an intermediary.

Transfer of purchasing power is necessary because international trade and capital transactions usually involve parties living in countries with different national currencies. Each party wants to trade and deal in his own currency but since the trade can be invoiced only in a single currency, the parties mutually agree on a currency beforehand. The currency agreed could also be any convenient third country currency such as the US dollar. For, if an Indian exporter sells machinery to a UK importer, the exporter could invoice in pound, rupees or any other convenient currency like the US dollar.

But why do individuals, firms and banks want to exchange one national currency for another? The demand for foreign currencies arises when tourists visit another country and need to exchange their national currency for the currency of the country they are visiting or when a domestic firm
wants to import from other nations or when an individual wants to invest abroad and so on. On the other hand, a nation's supply of foreign currencies arises from foreign tourist expenditures in the nation, from export earnings, from receiving foreign investments, and so on. For example, suppose a US firm exporting to the UK is paid in pounds sterling (the UK currency). The US exporter will exchange the pounds for dollars at a commercial bank. The commercial bank will then sell these pounds for dollars to a US resident who is going to visit the UK or to a United States firm that wants to import from the UK and pay in pounds, or to a US investor who wants to invest in the UK and needs the pounds to make the investment.

Thus, a nation's commercial banks operate as clearing houses for the foreign exchange demanded and supplied in the course of foreign transactions by the nation's residents. Hence, four levels of transactor or participants can be identified in foreign exchange markets. At the first level, are tourists, importers, exporters, investors, etc. These are the immediate users and suppliers of foreign currencies. At the next or second level are the commercial banks which act as clearing houses between users and earners of foreign exchange. At the third level are foreign exchange brokers through whom the nation's commercial banks even out their foreign exchange inflows and outflows among themselves. Finally, at the fourth and highest level is the nation's central bank which acts as the lender or buyer of last resort when the nation's total foreign exchange earnings and expenditures are unequal. The central bank then either draws down its foreign exchange reserves or adds to them.

Market Participants

The participants in the foreign exchange market can be categorized as follows:

(i) **Non-bank Entities**: Many multinational companies exchange currencies to meet their import or export commitments or hedge their transactions against fluctuations in exchange rate. Even at the individual level, there is an exchange of currency as per the needs of the individual.

(ii) **Banks**: Banks also exchange currencies as per the requirements of their clients.

(iii) **Speculators**: This category includes commercial and investment banks, multinational companies and hedge funds that buy and sell currencies with a view to earn profit due to fluctuations in the exchange rates.

(iv) **Arbitrageurs**: This category includes those investors who make profit from price differential existing in two markets by simultaneously operating in two different markets.

(v) **Governments**: The governments participate in the foreign exchange market through the central banks. They constantly monitor the market and help in stabilizing the exchange rates.

8. FOREIGN EXCHANGE EXPOSURE

“An Exposure can be defined as a Contracted, Projected or Contingent Cash Flow whose magnitude is not certain at the moment. The magnitude depends on the value of variables such as Foreign Exchange rates and Interest rates.”
In other words, exposure refers to those parts of a company’s business that would be affected if exchange rate changes. Foreign exchange exposures arise from many different activities.

For example, travellers going to visit another country have the risk that if that country's currency appreciates against their own, their trip will be more expensive.

An exporter who sells his product in foreign currency has the risk that if the value of that foreign currency falls, then the revenues in the exporter's home currency will be lower.

An importer who buys goods priced in foreign currency has the risk that the foreign currency will appreciate thereby making the local currency cost greater than expected.

Fund Managers and companies who own foreign assets are exposed to fall in the currencies where they own the assets. This is because if they were to sell those assets, their exchange rate would have a negative effect on the home currency value.

Other foreign exchange exposures are less obvious and relate to the exporting and importing in one's local currency but where exchange rate movements are affecting the negotiated price.

8.1. Types of Exposures

The foreign exchange exposure may be classified under three broad categories:

**Moment in time when exchange rate changes**

<table>
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<th>Translation exposure</th>
<th>Operating exposure</th>
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<tbody>
<tr>
<td>Accounting-based changes in consolidated financial statements caused by a change in exchange rates</td>
<td>Change in expected cash flows arising because of an unexpected change in exchange rates</td>
</tr>
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</table>

**Transaction exposure**

Impact of setting outstanding obligations entered into before change in exchange rates but to be settled after the change in exchange rates

8.1.1 Transaction Exposure

It measures the effect of an exchange rate change on outstanding obligations that existed before exchange rates changed but were settled after the exchange rate changes. Thus, it deals with cash flows that result from existing contractual obligations.

**Example**: If an Indian exporter has a receivable of $100,000 due in six months hence and if the dollar depreciates relative to the rupee, a cash loss occurs. Conversely, if the dollar appreciates...
relative to the rupee, a cash gain occurs.

The above example illustrates that whenever a firm has foreign currency denominated receivables or payables, it is subject to transaction exposure and their settlements will affect the firm’s cash flow position.

It measures the changes in the value of outstanding financial obligation incurred prior to a change in exchange rates but not due to be settled until after the exchange rates change.

Thus, it deals with the changes in the cashflow which arise from existing contractual obligation.

In fact, the transaction exposures are the most common ones amongst all the exposures. Let’s take an example of a company which exports to US, and the export receivables are also denominated in USD. While doing budgeting the company had assumed USDINR rate of 62 per USD. By the time the exchange inward remittance arrives. USDINR could move down to 57 leading to wiping off of commercial profit for exporter. Such transaction exposures arise whenever a business has foreign currency denominated receipts or payments. The risk is an adverse movement of the exchange rate from the time the transaction is budgeted till the time the exposure is extinguished by sale or purchase of the foreign currency against the domestic currency.

8.1.2 Translation Exposure

Also known as accounting exposure, it refers to gains or losses caused by the translation of foreign currency assets and liabilities into the currency of the parent company for consolidation purposes.

Translation exposure, also called as accounting exposure, is the potential for accounting derived changes in owner’s equity to occur because of the need to “translate” foreign currency financial statements of foreign subsidiaries into a single reporting currency to prepare worldwide consolidated financial statements.

Translation exposures arise due to the need to “translate” foreign currency assets and liabilities into the home currency for the purpose of finalizing the accounts for any given period. A typical example of translation exposure is the treatment of foreign currency loans.

Consider that a company has taken a medium term loan to finance the import of capital goods worth dollars 1 million. When the import materialized, the exchange rate was, say, USD/INR-55. The imported fixed asset was, therefore, capitalized in the books of the company at ₹ 550 lacs through the following accounting entry:

Debit fixed assets ₹ 550 lacs
Credit dollar loan ₹ 550 lacs

In the ordinary course, and assuming no change in the exchange rate, the company would have provided depreciation on the asset valued at ₹ 550 lacs, for finalizing its account for the year in which the asset was purchased.
However, what happens if at the time of finalization of the accounts the exchange rate has moved to say USD/INR-58. Now the dollar loan will have to be “translated” at ₹ 58, involving a “translation loss” of a ₹ 30 lacs. It shall have to be capitalized by increasing the book value of the asset, thus making the figure ₹ 380 lacs and consequently higher depreciation will have to be provided, thus reducing the net profit.

It will be readily seen that both transaction and translation exposures affect the bottom line of a company. The effect could be positive as well if the movement is favourable – i.e., in the cited examples, in case the USD would have appreciated in case of Transaction Exposure example, or the USD would have depreciated in case of Translation Exposure, for example, against the rupee.

An important observation is that the translation exposure, of course, becomes a transaction exposure at some stage: the dollar loan has to be repaid by undertaking the transaction of purchasing dollars.

### 8.1.3 Economic Exposure

It refers to the extent to which the economic value of a company can decline due to changes in exchange rate. It is the overall impact of exchange rate changes on the value of the firm. The essence of economic exposure is that exchange rate changes significantly alter the cost of a firm’s inputs and the prices of its outputs and thereby influence its competitive position substantially.

#### Effects of Local Currency Fluctuations on Company’s Economic Exposure (Cash inflow)

<table>
<thead>
<tr>
<th>Variables influencing the inflow of cash in Local currency</th>
<th>Revaluation impact</th>
<th>Devaluation impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local sale, relative to foreign competition in local currency</td>
<td>Decrease</td>
<td>Increase</td>
</tr>
<tr>
<td>Company’s export in local currency</td>
<td>Decrease</td>
<td>Increase</td>
</tr>
<tr>
<td>Company’s export in foreign currency</td>
<td>Decrease</td>
<td>Increase</td>
</tr>
<tr>
<td>Interest payments from foreign investments</td>
<td>Decrease</td>
<td>Increase</td>
</tr>
</tbody>
</table>

#### Effects of Local Currency Fluctuations on Company’s Economic Exposure (Cash outflow)

<table>
<thead>
<tr>
<th>Variables influencing the outflow of cash in local currency</th>
<th>Revaluation impact</th>
<th>Devaluation impact</th>
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<tbody>
<tr>
<td>Company’s import of material the same denoted in local currency</td>
<td>Remain the same</td>
<td>Remain the same</td>
</tr>
<tr>
<td>Company’s import of material denoted in foreign currency</td>
<td>Decrease</td>
<td>Increase</td>
</tr>
<tr>
<td>Interest on foreign debt</td>
<td>Decrease</td>
<td>Increase</td>
</tr>
</tbody>
</table>
9. HEDGING CURRENCY RISK

There are a range of hedging instruments that can be used to reduce risk. Broadly these techniques can be divided into

(A) *Internal Techniques*: These techniques explicitly do not involve transaction costs and can be used to completely or partially offset the exposure. These techniques can be further classified as follows:

(i) Invoicing in Domestic Currency: Companies engaged in exporting and importing, whether of goods or services, are concerned with decisions relating to the currency in which goods and services are invoiced. Trading in a foreign currency gives rise to transaction exposure. Although trading purely in a company’s home currency has the advantage of simplicity, it fails to take account of the fact that the currency in which goods are invoiced has become an essential aspect of the overall marketing package given to the customer. Sellers will usually wish to sell in their own currency or the currency in which they incur cost. This avoids foreign exchange exposure. But buyers’ preferences may be for other currencies. Many markets, such as oil or aluminum, in effect require that sales be made in the same currency as that quoted by major competitors, which may not be the seller’s own currency. In a buyer’s market, sellers tend increasingly to invoice in the buyer’s ideal currency. The closer the seller can approximate the buyer’s aims, the greater chance he or she has to make the sale.

Should the seller elect to invoice in foreign currency, perhaps because the prospective customer prefers it that way or because sellers tend to follow market leader, then the seller should choose only a major currency in which there is an active forward market for maturities at least as long as the payment period. Currencies, which are of limited convertibility, chronically weak, or with only a limited forward market, should not be considered.

The seller’s ideal currency is either his own, or one which is stable relative to it. But often the seller is forced to choose the market leader’s currency. Whatever the chosen currency, it should certainly be one with a deep forward market. For the buyer, the ideal currency is usually its own or one that is stable relative to it, or it may be a currency of which the purchaser has reserves.

(ii) Leading and Lagging: Leading and Lagging refer to adjustments in the times of payments in foreign currencies. Leading is the payment before due date while lagging is delaying payment past the due date. These techniques are aimed at taking advantage of expected devaluation and/or revaluation of relevant currencies. Lead and lag payments are of special importance in the event that forward contracts remain inconclusive. For example, Subsidiary b in B country owes money to subsidiary a in country A with payment due in three months’ time, and with the debt denominated in US dollar. On the other side, country B’s currency is expected to devalue within three months against US dollar, vis-à-vis country A’s currency. Under these circumstances, if company b leads -
pays early - it will have to part with less of country B’s currency to buy US dollars to make payment to company A. Therefore, lead is attractive for the company. When we take reverse the example-revaluation expectation- it could be attractive for lagging.

(iii) Netting: Netting involves associated companies, which trade with each other. The technique is simple. Group companies merely settle inter affiliate indebtedness for the net amount owing. Gross intra-group trade, receivables and payables are netted out. The simplest scheme is known as bilateral netting and involves pairs of companies. Each pair of associates nets out their own individual positions with each other and cash flows are reduced by the lower of each company’s purchases from or sales to its netting partner. Bilateral netting involves no attempt to bring in the net positions of other group companies.

Netting basically reduces the number of inter company payments and receipts which pass over the foreign exchanges. Fairly straightforward to operate, the main practical problem in bilateral netting is usually the decision about which currency to use for settlement.

Netting reduces banking costs and increases central control of inter company settlements. The reduced number and amount of payments yield savings in terms of buy/sell spreads in the spot and forward markets and reduced bank charges.

(iv) Matching: Although netting and matching are terms, which are frequently used interchangeably, there are distinctions. Netting is a term applied to potential flows within a group of companies whereas matching can be applied to both intra-group 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 approximate timing. Receipts in a particular currency are used to make payments in that currency thereby reducing the need for a group of companies to go through the foreign exchange markets to the unmatched portion of foreign currency cash flows.

The prerequisite for a matching operation is a two-way cash flow in the same foreign currency within a group of companies; this gives rise to a potential for natural matching. This should be distinguished from parallel matching, in which the matching is achieved with receipt and payment in different currencies but these currencies are expected to move closely together, near enough in parallel.

Both Netting and Matching presuppose that there are enabling Exchange Control regulations. For example, an MNC subsidiary in India cannot net its receivable(s) and payable(s) from/to its associated entities. Receivables have to be received separately and payables have to be paid separately.

(v) Price Variation: Price variation involves increasing selling prices to counter the adverse effects of exchange rate change. This tactic raises the question as to why the company has not already raised prices if it is able to do so. In some countries, price increases are the only legally available tactic of exposure management.
Let us now concentrate to price variation on inter company trade. Transfer pricing is the term used to refer to the pricing of goods and services, which change hands within a group of companies. As an exposure management technique, transfer price variation refers to the arbitrary pricing of inter company sales of goods and services at a higher or lower price than the fair price, arm’s length price. This fair price will be the market price if there is an existing market or, if there is not, the price which would be charged to a third party customer. Taxation authorities, customs and excise departments and exchange control regulations in most countries require that the arm’s length pricing be used.

(vi) **Asset and Liability Management**: This technique can be used to manage balance sheet, income statement or cash flow exposures. Concentration on cash flow exposure makes economic sense but emphasis on pure translation exposure is misplaced. Hence our focus here is on asset liability management as a cash flow exposure management technique.

In essence, asset and liability management can involve aggressive or defensive postures. In the aggressive attitude, the firm simply increases exposed cash inflows denominated in currencies expected to be strong or increases exposed cash outflows denominated in weak currencies. By contrast, the defensive approach involves matching cash inflows and outflows according to their currency of denomination, irrespective of whether they are in strong or weak currencies.

**(B) External Techniques**:
Under this category range of various financial products are used which can be categorized as follows:

(i) **Money Market Hedging**: At its simplest, a money market hedge is an agreement to exchange a certain amount of one currency for a fixed amount of another currency, at a particular date. For example, suppose a business owner in India expects to receive 1 Million USD in six months. This Owner could create an agreement now (today) to exchange 1Million USD for INR at roughly the current exchange rate. Thus, if the USD dropped in value by the time the business owner got the payment, he would still be able to exchange the payment for the original quantity of U.S. dollars specified.

Advantages and Disadvantages of Money Market Hedge: Following are the advantages and disadvantages of this technique of hedging.

Advantages

(a) Fixes the future rate, thus eliminating downside risk exposure

(b) Flexibility with regard to the amount to be covered

(c) Money market hedges may be feasible as a way of hedging for currencies where forward contracts are not available.

Disadvantages include:

(a) More complicated to organise than a forward contract
(b) Fixes the future rate - no opportunity to benefit from favourable movements in exchange rates.

(ii) Derivative Instruments: A derivatives transaction is a bilateral contract or payment exchange agreement whose value depends on - derives from - the value of an underlying asset, reference rate or index. Today, derivatives transactions cover a broad range of underlying - interest rates, exchange rates, commodities, equities and other indices.

In addition to privately negotiated, global transactions, derivatives also include standardized futures and options on futures that are actively traded on organized exchanges and securities such as call warrants.

The term derivative is also used to refer to a wide variety of other instruments. These have payoff characteristics, which reflect the fact that they include derivatives products as part of their make-up.

Transaction risk can also be hedged using a range of financial derivatives products which include: Forwards, futures, options, swaps, etc. These instruments are discussed in detailed manner in following pages.

10. FORWARD CONTRACT

The simplest form of derivatives is the forward contract. It obliges one party to buy, and the other to sell, a specified quantity of a nominated underlying financial instrument at a specific price, on a specified date in the future. There are markets for a multitude of underlyings. Among these are the traditional agricultural or physical commodities, currencies (foreign exchange forwards) and interest rates (forward rate agreements - FRAs). The volume of trade in forward contracts is massive.

10.1 Forward Rate – Premium and Discount

The change in value in a forward contract is broadly equal to the change in value in the underlying. Forwards differ from options in that options carry a different payoff profile. Forward contracts are unique to every trade. They are customized to meet the specific requirements of each end-user. The characteristics of each transaction include the particular business, financial or risk-management targets of the counterparties. Forwards are not standardized. The terms in relation to contract size, delivery grade, location, delivery date and credit period are always negotiated.

In a forward contract, the buyer of the contract draws its value at maturity from its delivery terms or a cash settlement. On maturity, if the price of the underlying is higher than the contract price the buyer makes a profit. If the price is lower, the buyer suffers a loss. The gain to the buyer is a loss to the seller.

- **Forwards Rates**: The forward rate is different from the spot rate. Depending upon whether the forward rate is greater than the spot rate, given the currency in consideration, the forward may either be at a 'discount' or at a 'premium'. Forward premiums and discounts are usually expressed...
as an annual percentages of the difference between the spot and the forward rates.

- **Premium**: When a currency is costlier in forward or say, for a future value date, it is said to be at a premium. In the case of direct method of quotation, the premium is added to both the selling and buying rates.

- **Discount**: If the currency is cheaper in forward or for a future value date, it is said to be at a discount. In case of direct quotation the discount is deducted from both the selling and buying rate. The following example explains how to calculate Premium / Discount both under Indirect/Direct quotes.

To calculate the Premium or Discount of a currency vis-à-vis another, we need to find out how much each unit of the first currency can buy units of the second currency. For instance, if the Spot rate between INR and USD is ₹ 55 to a dollar and the six months forward rate is ₹ 60 to a dollar, it is clear the USD is strengthening against the Rupee and hence is at a premium. Which also means that Rupee is at discount.

The premium of USD against INR is ₹ 5 for six months in absolute terms. However, forward premium is always expressed as an annual percentage. Therefore, this premium is calculated as

\[
\frac{(\text{Forward Rate} - \text{Spot rate})}{\text{Spot rate}} \times \frac{12}{6} = \frac{(60 - 55)}{55} \times \frac{12}{6} = 18.18\%
\]

Rupee is at discount and to calculate the discount, we need to find out how many dollars each Rupee can buy today and six months from now. Therefore, the Spot rate of USD in terms of INR today is USD 1/55 = $ 0.01818 and six months from now is USD 1/60 = $ 0.01667. The discount is calculated as:

\[
\frac{(\text{Forward Rate} - \text{Spot rate})}{\text{Spot rate}} \times \frac{12}{6} = \frac{(0.01667 - 0.01818)}{0.01818} \times \frac{12}{6} = - 16.61\%
\]

The minus sign implies that the Rupee is at discount.

Another important point to be noted in the above example, is that the forward premiums do not equal forward discount always. In the aforesaid example, for instance, the rupee is trading at a discount of 16.67% while the dollar is trading at a premium of 18.18%.

### 10.2 Fate of Forward Contracts

Whenever any forward contract is entered, normally it meets any of the following three fates.

- **(A) Delivery under the Contract**
- **(B) Cancellation of the Contract**
- **(C) Extension of the Contract**
Further above of fates of forward contract can further classified into following sub-categories.

(A) Delivery under the Contract
   (i) Delivery on Due Date
   (ii) Early Delivery
   (iii) Late Delivery

(B) Cancellation of the Contract
   (i) Cancellation on Due Date
   (ii) Early Cancellation
   (iii) Late Cancellation

(C) Extension of the Contract
   (i) Extension on Due Date
   (ii) Early Extension
   (iii) Late Extension

Let us discuss each of above executions one by one.

**Delivery on Due Date**

This situation does not pose any problem as rate applied for the transaction would be rate originally agreed upon. Exchange shall take place at this rate irrespective of the spot rate prevailing.

**Illustration 3**

On 1st June 2015 the bank enters into a forward contract for 2 months for selling US$ 1,00,000 at ₹ 65.5000. On 1st July 2015 the spot rate was ₹ 65.7500/65.2500. Calculate the amount to be debited in the customer’s account.

**Answer**

The bank will apply rate originally agreed upon i.e. ₹ 65.5000 and will debit the account of the customer with ₹ 65,50,000.

**Early Delivery**

The bank may accept the request of customer of delivery at the before due date of forward contract provided the customer is ready to bear the loss if any that may accrue to the bank as a result of this. In addition to some prescribed fixed charges bank may also charge additional charges comprising of:
(a) **Swap Difference**: This difference can be loss/gain to the bank. This arises on account of offsetting its position earlier created by early delivery as bank normally covers itself against the position taken in the original forward contract.

(b) **Interest on Outlay of Funds**: It might be possible early delivery request of a customer may result in outlay of funds. In such bank shall charge from the customer at a rate not less than prime lending rate for the period of early delivery to the original due date. However, if there is an inflow of funds the bank at its discretion may pass on interest to the customer at the rate applicable to term deposits for the same period.

**Illustration 4**

On 1 October 2015 Mr. X an exporter enters into a forward contract with a BNP Bank to sell US$ 1,00,000 on 31 December 2015 at ₹ 65.40/$. However, due to the request of the importer, Mr. X received amount on 28 November 2015. Mr. X requested the bank the take delivery of the remittance on 30 November 2015 i.e. before due date. The inter-banking rates on 28 November 2015 was as follows:

| Spot |
| ₹ 65.22/65.27 |
| One Month Premium |
| 10/15 |

If bank agrees to take early delivery then what will be net inflow to Mr. X assuming that the prevailing prime lending rate is 18%.

**Answer**

Bank will buy from customer at the agreed rate of ₹ 65.40. In addition to the same if bank will charge/pay swap difference and interest on outlay funds.

(a) **Swap Difference**

- Bank Sells at Spot Rate on 28 November 2015
  - ₹ 65.22
- Bank Buys at Forward Rate of 31 December 2015 (65.27 + 0.15)
  - ₹ 65.42
- Swap Loss per US$
  - ₹ 0.20
- Swap loss for US$ 1,00,000
  - ₹ 20,000

(b) **Interest on Outlay Funds**

- On 28th November Bank sells at
  - ₹ 65.22
- It buys from customer at
  - ₹ 65.40
- Outlay of Funds per US$
  - ₹ 0.18
- Interest on Outlay fund for US$ 1,00,000 for 31 days
  - ₹ 275.00
  (US$100000 x 0.18 x 31/365 x 18%)
(c) Charges for early delivery

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Swap loss</td>
<td>₹ 20,000.00</td>
</tr>
<tr>
<td>Interest on Outlay fund for US$ 1,00,000 for 31 days</td>
<td>₹ 275.00</td>
</tr>
<tr>
<td></td>
<td>₹ 20,275.00</td>
</tr>
</tbody>
</table>

(d) Net Inflow to Mr. X

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amount received on sale (₹ 65.40 x 1,00,000)</td>
<td>₹ 65,40,000</td>
</tr>
<tr>
<td>Less: Charges for early delivery payable to bank</td>
<td>(₹ 20,275)</td>
</tr>
<tr>
<td></td>
<td>₹ 65,19,725</td>
</tr>
</tbody>
</table>

**Late Delivery**

In case of late delivery current rate prevailing on such date of delivery shall be applied. However, before this delivery (execution) takes place the provisions of Automatic Cancellation (discussed later on) shall be applied.

**Cancellation on Due Date**

In case of cancellation on due date in addition of flat charges (if any) the difference between contracted rate and the cancellation rate (reverse action of original contract) is charged from/ paid to the customer.

**Illustration 5**

On 15th January 2015 you as a banker booked a forward contract for US$ 250000 for your import customer deliverable on 15th March 2015 at ₹ 65.3450. On due date customer request you to cancel the contract. On this date quotation for US$ in the inter-bank market is as follows:

<table>
<thead>
<tr>
<th>Rate</th>
<th>Exchange Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spot</td>
<td>₹ 65.2900/2975 per US$</td>
</tr>
<tr>
<td>Spot/ April</td>
<td>3000/ 3100</td>
</tr>
<tr>
<td>Spot/ May</td>
<td>6000/ 6100</td>
</tr>
</tbody>
</table>

Assuming that the flat charges for the cancellation is ₹ 100 and exchange margin is 0.10%, then determine the cancellation charges payable by the customer.

**Answer**

Bank will buy from customer at the agreed rate of ₹ 65.40.

Since this is sale contract the contract shall be cancelled at ready buying rate on the date of cancellation as follows:

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spot Buying Rate on 15 March 2015</td>
<td>₹ 65.2900</td>
</tr>
<tr>
<td>Less: Exchange Margin</td>
<td>₹ 0.0653</td>
</tr>
<tr>
<td></td>
<td>₹ 65.2247</td>
</tr>
</tbody>
</table>
Rounded to ₹65.2250
Dollar sold to customer at ₹65.3450
Dollar bought from customer ₹65.2250
Net amount payable by the customer per US$ ₹0.1200
Amount payable by the customer
Flat Charges ₹100.00
Cancellation Charges (₹0.12 x 250000) ₹30,000.00
 ₹30,100.00

Early Cancellation
If a forward is required to be cancelled earlier than the due date of forward contract same shall be cancelled at opposite rate of original contract of the date that synchronises with the date of original forward contract.

Illustration 6
You as a banker has entered into a 3 month’s forward contract with your customer to purchase AUD 1,00,000 at the rate of ₹47.2500. However after 2 months your customer comes to you and requests cancellation of the contract. On this date quotation for AUD in the market is as follows:
Spot ₹47.3000/3500 per AUD
1 month forward ₹47.4500/5200 per AUD
Determine the cancellation charges payable by the customer.

Answer
The contract shall be cancelled at the 1 month forward sale rate of ₹47.5200 as follows:
AUD bought from customer under original forward contract at ₹47.2500
On cancellation it is sold to him at ₹47.5200
Net amount payable by customer per AUD ₹00.2700
Thus total cancellation charges payable by the customer ₹27,000

Late Cancellation
In case of late cancellation of Forward Contract the provisions of Automatic Cancellation (discussed later on) shall be applied.

Extension on Due Date
It might also be possible that an exporter may not be able to export goods on the due date. Similarly it might also be possible that an importer may not to pay on due date. In both of these situations an
extension of contract for selling and buying contract is warranted. Accordingly, if earlier contract is extended first it shall be cancelled and rebooked for the new delivery period. In case extension is on due date it shall be cancelled at spot rate as like cancellation on due date (discussed earlier) and new contract shall be rebooked at the forward rate for the new delivery period.

**Illustration 7**

Suppose you are a banker and one of your export customer has booked a US$ 1,00,000 forward sale contract for 2 months with you at the rate of ₹ 62.5200 and simultaneously you covered yourself in the interbank market at 62.5900. However on due date, after 2 months your customer comes to you and requests for cancellation of the contract and also requests for extension of the contract by one month. On this date quotation for US$ in the market was as follows:

<table>
<thead>
<tr>
<th></th>
<th>₹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spot</td>
<td>62.7200/62.6800</td>
</tr>
<tr>
<td>1 month forward</td>
<td>62.6400/62.7400</td>
</tr>
</tbody>
</table>

Determine the extension charges payable by the customer assuming exchange margin of 0.10% on buying as well as selling.

**Answer**

**Cancellation**

First the original contract shall be cancelled as follows:

<table>
<thead>
<tr>
<th></th>
<th>₹</th>
</tr>
</thead>
<tbody>
<tr>
<td>US$/₹ Spot Selling Rate</td>
<td>62.7200</td>
</tr>
<tr>
<td>Add: Margin @ 0.10%</td>
<td>0.06272</td>
</tr>
<tr>
<td>Net amount payable by customer per US$</td>
<td>62.78272</td>
</tr>
<tr>
<td>Rounded off</td>
<td>62.7825</td>
</tr>
<tr>
<td>Bank buys US$ under original contract at</td>
<td>62.5200</td>
</tr>
<tr>
<td>Bank Sells at</td>
<td>62.7825</td>
</tr>
</tbody>
</table>

Thus total cancellation charges payable by the customer for US$ 1,00,000 is ₹ 26,750.

**Rebooking**

<table>
<thead>
<tr>
<th></th>
<th>₹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forward US$/₹ Buying Rate</td>
<td>62.6400</td>
</tr>
<tr>
<td>Less: Margin @ 0.10%</td>
<td>0.06264</td>
</tr>
<tr>
<td>Net amount payable by customer per US$</td>
<td>62.57736</td>
</tr>
<tr>
<td>Rounded off</td>
<td>62.5775</td>
</tr>
</tbody>
</table>
Extension before Due Date

In case any request to extend the contract is received before due date of maturity of forward contract, first the original contract would be cancelled at the relevant forward rate as in case of cancellation of contract before due date and shall be rebooked at the current forward rate of the forward period.

Illustration 8

Suppose you as a banker entered into a forward purchase contract for US$ 50,000 on 5th March with an export customer for 3 months at the rate of 59.6000. On the same day you also covered yourself in the market at 60.6025. However on 5th May your customer comes to you and requests extension of the contract to 5th July. On this date (5th May) quotation for US$ in the market is as follows:

<table>
<thead>
<tr>
<th></th>
<th>Spot</th>
<th>Spot/ 5th June</th>
<th>Spot/ 5th July</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rate</strong></td>
<td>59.1300/1400</td>
<td>59.2300/2425</td>
<td>59.6300/6425</td>
</tr>
</tbody>
</table>

Assuming a margin 0.10% on buying and selling, determine the extension charges payable by the customer and the new rate quoted to the customer.

Answer

(a) Cancellation of Original Contract

The forward purchase contract shall be cancelled at the for the forward sale rate for delivery June.

Interbank forward selling rate: 59.2425

Add: Exchange Margin: 0.0592

Net amount payable by customer per US$: 59.3017

Rounded off, the rate applicable is 59.3000

Buying US$ under original contract at original rate: 59.6000

Selling rate to cancel the contract: 59.3000

Difference per US$: 0.3000

Exchange difference for US$ 50,000 payable to the customer is 15,000.

(b) Rate for booking new contract

The forward contract shall be rebooked with the delivery 15th July as follows:

Forward buying rate (5th July): 59.6300

Less: Exchange Margin: 0.0596

Net amount payable by customer per US$: 59.5704

Rounded off to 59.5700
Late Extension

In case of late extension current rate prevailing on such date of delivery shall be applied. However, before this delivery the provisions of Automatic Cancellation (discussed later on) shall be applied.

Automatic Cancellation

As per FEDAI Rule 8 a forward contract which remains overdue without any instructions from the customers on or before due date shall stand automatically cancelled on 15th day from the date of maturity. Though customer is liable to pay the exchange difference arising there from but not entitled for the profit resulting from this cancellation.

For late delivery and extension after due date as mentioned above the contract shall be treated as fresh contract and appropriate rates prevailing on such date shall be applicable as mentioned below:

1. Late Delivery: In this case the relevant spot rate prevailing on the such date shall be applicable.
2. Extension after Due Date: In this case relevant forward rate for the period desired shall be applicable.

As mentioned earlier in both of above case cancellation charges shall be payable consisting of following:

(i) **Exchange Difference**: The difference between Spot Rate of offsetting position (cancellation rate) on the date of cancellation of contract after due date or 15 days (whichever is earlier) and original rate contracted for.

(ii) **Swap Loss**: The loss arises on account of offsetting its position created by early delivery as bank normally covers itself against the position taken in the original forward contract. This position is taken at the spot rate on the date of cancellation earliest forward rate of offsetting position.

(iii) **Interest on Outlay of Funds**: Interest on the difference between the rate entered by the bank in the interbank market and actual spot rate on the due date of contract of the opposite position multiplied by the amount of foreign currency amount involved. This interest shall be calculated for the period from the due date of maturity of the contract and the actual date of cancellation of the contract or 15 days whichever is later.

Please note in above in any case there is profit by the bank on any course of action same shall not be passed on the customer as normally passed cancellation and extension on or before due dates.

**Illustration 9**

An importer booked a forward contract with his bank on 10th April for USD 2,00,000 due on 10th June @ ₹ 64.4000. The bank covered its position in the market at ₹ 64.2800.

The exchange rates for dollar in the interbank market on 10th June and 20th June were:
Exchange Margin 0.10% and interest on outlay of funds @ 12%. The importer requested on 20th June for extension of contract with due date on 10th August.

Rates rounded to 4 decimal in multiples of 0.0025.

On 10th June, Bank Swaps by selling spot and buying one month forward.

Calculate:
(i) Cancellation rate
(ii) Amount payable on $ 2,00,000
(iii) Swap loss
(iv) Interest on outlay of funds, if any
(v) New contract rate
(vi) Total Cost

Answer

(i) Cancellation Rate:
The forward sale contract shall be cancelled at Spot TT Purchase for $ prevailing on the date of cancellation as follows:

<table>
<thead>
<tr>
<th>$/ ₹ Market Buying Rate</th>
<th>₹ 63.6800</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less: Exchange Margin @ 0.10%</td>
<td>₹ 0.0636</td>
</tr>
<tr>
<td>₹ 63.6163</td>
<td></td>
</tr>
</tbody>
</table>

Rounded off to ₹ 63.6175

(ii) Amount payable on $ 2,00,000

| Bank sells $2,00,000 @ ₹ 64.4000 | ₹ 1,28,80,000 |
| Bank buys $2,00,000 @ ₹ 63.6163 | ₹ 1,27,23,260 |
| Amount payable by customer | ₹ 1,56,740 |
(iii) **Swap Loss**

On 10th June the bank does a swap sale of $ at market buying rate of ₹ 63.8300 and forward purchase for June at market selling rate of ₹ 63.9500.

<table>
<thead>
<tr>
<th>Bank buys at</th>
<th>₹ 63.9500</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bank sells at</td>
<td>₹ 63.8000</td>
</tr>
<tr>
<td>Amount payable by customer</td>
<td>₹ 0.1500</td>
</tr>
</tbody>
</table>

Swap Loss for $2,00,000 in ₹ = ₹ 30,000

(iv) **Interest on Outlay of Funds**

On 10th April, the bank receives delivery under cover contract at ₹ 64.2800 and sell spot at ₹ 63.8000.

<table>
<thead>
<tr>
<th>Bank buys at</th>
<th>₹ 64.2800</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bank sells at</td>
<td>₹ 63.8000</td>
</tr>
<tr>
<td>Amount payable by customer</td>
<td>₹ 0.4800</td>
</tr>
</tbody>
</table>

Outlay for $2,00,000 in ₹ 96,000

Interest on ₹ 96,000 @ 12% for 10 days = ₹ 320

(v) **New Contract Rate**

The contract will be extended at current rate

| ₹/ ₹ Market forward selling Rate for August | ₹ 64.2500 |
| Add: Exchange Margin @ 0.10%              | ₹ 0.0643 |
|                                          | ₹ 64.3143 |

Rounded off to ₹ 64.3150

(vi) **Total Cost**

<table>
<thead>
<tr>
<th>Cancellation Charges</th>
<th>₹ 1,56,740.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Swap Loss</td>
<td>₹ 30,000.00</td>
</tr>
<tr>
<td>Interest</td>
<td>₹ 320.00</td>
</tr>
<tr>
<td></td>
<td>₹ 1,87,060.00</td>
</tr>
</tbody>
</table>
10.3 Non-deliverable Forward Contract

A cash-settled, short-term forward contract on a thinly traded or non-convertible foreign currency, where the profit or loss at the time at the settlement date is calculated by taking the difference between the agreed upon exchange rate and the sport rate at the time of settlement, for an agreed upon notional amount of funds.

All NDFs have a fixing date and a settlement date. The fixing date is the date at which the difference between the prevailing market exchange rate and the agreed upon exchange rate is calculated. The settlement date is the date by which the payment of the difference is due to the party receiving payment.

NDFs are commonly quoted for time periods of one month up to one year, and are normally quoted and settled in U.S. dollars. They have become a popular instrument for corporations seeking to hedge exposure to foreign currencies that are not internationally traded.

10.4 Rollover of Deliverable Forward Contract

Rollover of Deliverable Forward Contract is a Contract wherein, as an Exporter, you have no Foreign Currency to Deliver at maturity and as an Importer you have no Local Currency to deliver at maturity. As an Exporter or Importer you would like to rollover the contract which effectively means spot cancellation and booking of new contract for later date.

The rationale behind the rollover is:

- Non receipt of Foreign Currency from client (export perspective),
- Shortage of local currencies (Import perspective),
- Non-agreement of payment with clients,
- Non availability of longer period forward contracts as normally forward contracts are available maximum for one year and to hedge the exposure for the period more than one roll over contract shall be used.

11. Futures Contracts

A basic futures contract is very similar to the forward contract in its obligation and payoff profile. There are some important distinctions between futures and forwards and swaps.

- The contract terms of futures are standardized. These encompass:
  - Quantity and quality of the underlying;
  - Time and place of delivery;
  - Method of payment.
- Credit risk is standardized as this is greatly reduced by marking the contract to market on a
daily basis with daily checking of position.

- Futures are smaller in contract size than forwards and swaps, which means that they are available to a wider business market.

A financial futures contract is purchased or sold through a broker. It is a commitment to make or take delivery of a specified financial instrument, or perform a particular service, at predetermined date in the future. The price of the contract is established at the outset.

**Distinction between Futures and Forward Contracts**

There are major differences between the traditional forward contract and a futures contract. These are tabulated below:

<table>
<thead>
<tr>
<th>Feature</th>
<th>Forward Contract</th>
<th>Futures Contract</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Amount</strong></td>
<td>Flexible</td>
<td>Standard amount</td>
</tr>
<tr>
<td><strong>Maturity</strong></td>
<td>Any valid business date agreed to by the two parties</td>
<td>Standard date. Usually one delivery date such as the second Tuesday of every month</td>
</tr>
<tr>
<td><strong>Furthest maturity date</strong></td>
<td>Open</td>
<td>12 months forward</td>
</tr>
<tr>
<td><strong>Currencies traded</strong></td>
<td>All currencies</td>
<td>Majors</td>
</tr>
<tr>
<td><strong>Cross rates</strong></td>
<td>Available in one contract; Multiple contracts avoided</td>
<td>Usually requires two contracts</td>
</tr>
<tr>
<td><strong>Market-place</strong></td>
<td>Global network</td>
<td>Regular markets — futures market and exchanges</td>
</tr>
<tr>
<td><strong>Price fluctuations</strong></td>
<td>No daily limit in many currencies</td>
<td>Daily price limit set by exchange</td>
</tr>
<tr>
<td><strong>Risk</strong></td>
<td>Depends on counter party</td>
<td>Minimal due to margin requirements</td>
</tr>
<tr>
<td><strong>Honouring of contract</strong></td>
<td>By taking and giving delivery</td>
<td>Mostly by a reverse transaction</td>
</tr>
<tr>
<td><strong>Cash flow</strong></td>
<td>None until maturity date</td>
<td>Initial margin plus ongoing variation margin because of market to market rate and final payment on maturity date</td>
</tr>
<tr>
<td><strong>Trading hours</strong></td>
<td>24 hours a day</td>
<td>4 – 8 hours trading sessions</td>
</tr>
</tbody>
</table>
12. OPTION CONTRACTS

An option is a contract which has one or other of two key attributes:

- to buy (call option);
- or to sell (put option).

The purchaser is called the buyer or holder; the seller is called the writer or grantor. The premium may be expressed as a percentage of the price per unit of the underlying.

The holder of an American option has the right to exercise the contract at any stage during the period of the option, whereas the holder of a European option can exercise his right only at the end of the period.

During or at the end of the contract period (depending on the type of the option) the holder can do as he pleases. He can buy or sell (as the case may be) the underlying, let the contract expire or sell the option contract itself in the market.

**Call Option**: It is a contract that gives the buyer the right, but not the obligation, to buy a specified number of units of commodity or a foreign currency from the seller of option at a fixed price on or up to a specific date.

**Put Option**: It is a contract that gives the buyer the right, but not the obligation, to sell a specified number of units of commodity or a foreign currency to a seller of option at a fixed price on or up to a specific date.

**Distinction between Options and Futures**

There are certain fundamental differences between a futures and an option contract. Let us look at the main comparative features given below:

<table>
<thead>
<tr>
<th>Options</th>
<th>Futures</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Only the seller (writer) is obliged to perform</td>
<td>Both the parties are obligated to perform.</td>
</tr>
<tr>
<td>(b) Premium is paid by the buyer to the seller at the inception of the contract</td>
<td>No premium is paid by any party.</td>
</tr>
<tr>
<td>(c) Loss is restricted while there is unlimited gain potential for the option buyer.</td>
<td>There is potential/risk for unlimited gain/loss for the futures buyer.</td>
</tr>
<tr>
<td>(d) An American option contract can be exercised any time during its period by the buyer.</td>
<td>A futures contract has to be honoured by both the parties only on the date specified.</td>
</tr>
</tbody>
</table>
Options Vs Futures: Gain and Losses in Different Circumstances

<table>
<thead>
<tr>
<th>Price Movement</th>
<th>Call buyer</th>
<th>Long Futures Position</th>
<th>Call Seller</th>
<th>Put Buyer</th>
<th>Short Futures Position</th>
<th>Put Seller</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price rises</td>
<td>Unlimited gain</td>
<td>Unlimited gain</td>
<td>Unlimited loss</td>
<td>Limited loss</td>
<td>Unlimited loss</td>
<td>Limited loss</td>
</tr>
<tr>
<td>Price falls</td>
<td>Limited loss</td>
<td>Unlimited loss*</td>
<td>Limited gain</td>
<td>Unlimited gain*</td>
<td>Unlimited gain*</td>
<td>Unlimited loss*</td>
</tr>
<tr>
<td>Price unchanged</td>
<td>Limited loss</td>
<td>No gain or loss</td>
<td>Limited gain</td>
<td>Limited loss</td>
<td>No Gain or loss</td>
<td>Limited gain</td>
</tr>
</tbody>
</table>

**Note:** Transaction Costs are ignored.

*Since the price of any commodity; share are financial instrument cannot go below zero, there is technically a ‘limit’ to the gain/loss when the price falls. For practical purposes, this is largely irrelevant.

**13. SWAP CONTRACTS**

Swaps are infinitely flexible. In technical terms they are a method of exchanging the underlying economic basis of a debt or asset without affecting the underlying principal obligation on the debt or asset.

A swap transaction commits the participants to exchange cash flows at specified intervals, which are called payment or settlement dates. Cash flows are either fixed or calculated for specific dates by multiplying the quantity of the underlying by specified reference rates or prices.

The vast majority of swaps are classified into the following groups:

- Interest rate;
- Currency;
- Commodity;
- Equity.

The notional principal (i.e. the face value of a security) on all these, except currency swaps, is used to calculate the payment stream but not exchanged. Interim payments are usually netted - the difference is paid by one party to the other.
Like forwards, the main users of swaps are large multinational banks or corporations. Swaps create credit exposures and are individually designed to meet the risk-management objectives of the participants.

13.1 Interest Rate Swaps

Interest Rate Swap has been covered in greater details in the Chapter 12 of this Study Material. Please refer the same from there.

13.2 Currency Swaps

It involves an exchange of liabilities between currencies. A currency swap can consist of three stages:

- A spot exchange of principal - this forms part of the swap agreement as a similar effect can be obtained by using the spot foreign exchange market.
- Continuing exchange of interest payments during the term of the swap - this represents a series of forward foreign exchange contracts during the term of the swap contract. The contract is typically fixed at the same exchange rate as the spot rate used at the outset of the swap.
- Re-exchange of principal on maturity.

A currency swap has the following benefits:

- Treasurers can hedge currency risk.
- It can provide considerable cost savings. A strong borrower in the Japanese Yen market may be interested in borrowing in the American USD markets where his credit rating may not be as good as it is in Tokyo. Such a borrower could get a better US dollar rate by raising funds first in the Tokyo market and then swapping Yen for US dollars.
- The swap market permits funds to be accessed in currencies, which may otherwise command a high premium.
- It offers diversification of borrowings.

A more complex version of a currency swap is a currency coupon swap, which swaps a fixed-or-floating rate interest payment in one currency fora floating rate payment in another. These are also known as Circus Swaps.

In a currency swap the principal sum is usually exchanged:

- At the start;
- At the end;
- At a combination of both; or
- Neither.
Many swaps are linked to the issue of a Eurobond. An issuer offers a bond in a currency and instrument where it has the greatest competitive advantage. It then asks the underwriter of the bond to provide it with a swap to convert funds into the required type.

### 13.3 Equity Swaps

An equity swap is an arrangement in which total return on equity or equity index in the form of dividend and capital is exchanged with either a fixed or floating rate of interest.

### 14. STRATEGIES FOR EXPOSURE MANAGEMENT

A company’s attitude towards risk, financial strength, nature of business, vulnerability to adverse movements, etc shapes its exposure management strategies. There can be no single strategy which is appropriate to all businesses. Four separate strategy options are feasible for exposure management.

#### Exposure Management Strategies

**14.1 Low Risk: Low Reward**

This option involves automatic hedging of exposures in the forward market as soon as they arise, irrespective of the attractiveness or otherwise of the forward rate. The merits of this approach are that yields and costs of the transaction are known and there is little risk of cash flow destabilization. Again, this option doesn't require any investment of management time or effort. The negative side is
that automatic hedging at whatever rates are available is hardly likely to result into optimum costs. At least some management seems to prefer this strategy on the grounds that an active management of exposures is not really their business. In the floating rate era, currencies outside their home countries, in terms of their exchange rate, have assumed the characteristics of commodities. And business whose costs depend significantly on commodity prices can hardly afford not to take views on the price of the commodity. Hence this does not seem to be an optimum strategy.

14.2 Low Risk: Reasonable Reward
This strategy requires selective hedging of exposures whenever forward rates are attractive but keeping exposures open whenever they are not. Successful pursuit of this strategy requires quantification of expectations about the future and the rewards would depend upon the accuracy of the prediction. This option is similar to an investment strategy of a combination of bonds and equities with the proportion of the two components depending on the attractiveness of prices. In foreign exchange exposure terms, hedged positions are similar to bonds (known costs or yields) and unhedged ones to equities (uncertain returns).

14.3 High Risk: Low Reward
Perhaps the worst strategy is to leave all exposures unhedged. The risk of destabilization of cash flows is very high. The merit is zero investment of managerial time or effort.

14.4 High Risk: High Reward
This strategy involves active trading in the currency market through continuous cancellations and re-bookings of forward contracts. With exchange controls relaxed in India in recent times, a few of the larger companies are adopting this strategy. In effect, this requires the trading function to become a profit centre. This strategy, if it has to be adopted, should be done in full consciousness of the risks.

15. CONCLUSION
Thus, on account of increased globalization of financial markets, risk management has gained more importance. The benefits of the increased flow of capital between nations include a better international allocation of capital and greater opportunities to diversify risk. However, globalization of investment has meant new risks from exchange rates, political actions and increased interdependence on financial conditions of different countries.

All these factors- increase in exchange rate risk, growth in international trade, globalization of financial markets, increase in the volatility of exchange rates and growth of multinational and transnational corporations- combine to make it imperative for today’s financial managers to study the factors behind the risks of international trade and investment, and the methods of reducing these risks.
Test Your Knowledge

Theoretical Questions

1. “Operations in foreign exchange market are exposed to a number of risks.” Discuss.

2. What do you mean by Nostro, Vostro and Loro Accounts?

Practical Questions

1. The price of a bond just before a year of maturity is $5,000. Its redemption value is $5,250 at the end of the said period. Interest is $350 p.a. The Dollar appreciates by 2% during the said period. Calculate the rate of return.

2. ABC Ltd. of UK has exported goods worth Can $5,00,000 receivable in 6 months. The exporter wants to hedge the receipt in the forward market. The following information is available:

<table>
<thead>
<tr>
<th>Spot Exchange Rate</th>
<th>Can $ 2.5/£</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interest Rate in UK</td>
<td>12%</td>
</tr>
<tr>
<td>Interest Rate In Canada</td>
<td>15%</td>
</tr>
</tbody>
</table>

   The forward rates truly reflect the interest rates differential. Find out the gain/loss to UK exporter if Can $ spot rates (i) declines 2%, (ii) gains 4% or (iii) remains unchanged over next 6 months.

3. On January 28, 2013 an importer customer requested a Bank to remit Singapore Dollar (SGD) 2,500,000 under an irrevocable Letter of Credit (LC). However, due to unavoidable factors, the Bank could effect the remittances only on February 4, 2013. The inter-bank market rates were as follows:

<table>
<thead>
<tr>
<th>Exchange Rate</th>
<th>January 28, 2013</th>
<th>February 4, 2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>US$ 1=</td>
<td>₹ 45.85/45.90</td>
<td>₹ 45.91/45.97</td>
</tr>
<tr>
<td>GBP £ 1=</td>
<td>US$ 1.7840/1.7850</td>
<td>US$ 1.7765/1.7775</td>
</tr>
<tr>
<td>GBP £ 1=</td>
<td>SGD 3.1575/3.1590</td>
<td>SGD 3.1380/3.1390</td>
</tr>
</tbody>
</table>

   The Bank wishes to retain an exchange margin of 0.125%

   Required:

   How much does the customer stand to gain or lose due to the delay? (Note: Calculate the rate in multiples of 0.0001)

4. In March, 2009, the Multinational Industries make the following assessment of dollar rates per British pound to prevail as on 1.9.2009:
### Question 10.44

#### Strategic Financial Management

<table>
<thead>
<tr>
<th>$/Pound</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.60</td>
<td>0.15</td>
</tr>
<tr>
<td>1.70</td>
<td>0.20</td>
</tr>
<tr>
<td>1.80</td>
<td>0.25</td>
</tr>
<tr>
<td>1.90</td>
<td>0.20</td>
</tr>
<tr>
<td>2.00</td>
<td>0.20</td>
</tr>
</tbody>
</table>

(i) What is the expected spot rate for 1.9.2009?

(ii) If, as of March, 2009, the 6-month forward rate is $ 1.80, should the firm sell forward its pound receivables due in September, 2009?

5. An Indian exporting firm, Rohit and Bros., would be cover itself against a likely depreciation of pound sterling. The following data is given:

- Receivables of Rohit and Bros : £500,000
- Spot rate : ₹ 56.00/£
- Payment date : 3-months
- 3 months interest rate :
  - India : 12 per cent per annum
  - UK : 5 per cent per annum

What should the exporter do?

6. The rate of inflation in India is 8% per annum and in the U.S.A. it is 4%. The current spot rate for USD in India is ₹ 46. What will be the expected rate after 1 year and after 4 years applying the Purchasing Power Parity Theory?

7. On April 1, 3 months interest rate in the UK £ and US $ are 7.5% and 3.5% per annum respectively. The UK £/US $ spot rate is 0.7570. What would be the forward rate for US $ for delivery on 30th June?

8. ABC Technologic is expecting to receive a sum of US$ 4,00,000 after 3 months. The company decided to go for future contract to hedge against the risk. The standard size of future contract available in the market is $1000. As on date spot and futures $ contract are quoting at ₹ 44.00 &₹ 45.00 respectively. Suppose after 3 months the company closes out its position futures are quoting at ₹ 44.50 and spot rate is also quoting at ₹ 44.50. You are required to calculate effective realization for the company while selling the receivable. Also calculate how company has been benefitted by using the future option.

9. XYZ Ltd. a US firm will need £ 3,00,000 in 180 days. In this connection, the following information is available:
Spot rate 1 £ = $2.00
180 days forward rate of £ as of today = $1.96

Interest rates are as follows:

<table>
<thead>
<tr>
<th></th>
<th>U.K.</th>
<th>US</th>
</tr>
</thead>
<tbody>
<tr>
<td>180 days deposit rate</td>
<td>4.5%</td>
<td>5%</td>
</tr>
<tr>
<td>180 days borrowing rate</td>
<td>5%</td>
<td>5.5%</td>
</tr>
</tbody>
</table>

A call option on £ that expires in 180 days has an exercise price of $1.97 and a premium of $0.04.

XYZ Ltd. has forecasted the spot rates 180 days hence as below:

<table>
<thead>
<tr>
<th>Future rate</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>$1.91</td>
<td>25%</td>
</tr>
<tr>
<td>$1.95</td>
<td>60%</td>
</tr>
<tr>
<td>$2.05</td>
<td>15%</td>
</tr>
</tbody>
</table>

Which of the following strategies would be most preferable to XYZ Ltd.?
(a) A forward contract;
(b) A money market hedge;
(c) An option contract;
(d) No hedging.

Show calculations in each case

10. A Ltd. of U.K. has imported some chemical worth of USD 3,64,897 from one of the U.S. suppliers. The amount is payable in six months time. The relevant spot and forward rates are:

<table>
<thead>
<tr>
<th>Spot rate</th>
<th>USD 1.5617-1.5673</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 months’ forward rate</td>
<td>USD 1.5455 –1.5609</td>
</tr>
</tbody>
</table>

The borrowing rates in U.K. and U.S. are 7% and 6% respectively and the deposit rates are 5.5% and 4.5% respectively.

Currency options are available under which one option contract is for GBP 12,500. The option premium for GBP at a strike price of USD 1.70/GBP is USD 0.037 (call option) and USD 0.096 (put option) for 6 months period.

The company has 3 choices:
(i) Forward cover
(ii) Money market cover, and
(iii) Currency option

Which of the alternatives is preferable by the company?

ANSWERS/ SOLUTIONS

Answers to Theoretical Questions

1. Please refer paragraph 8.1
2. Please refer paragraph 2.

Answers to the Practical Questions

1.

Here we can assume two cases (i) If investor is US investor then there will be no impact of appreciation in $. (ii) If investor is from any other nation other than US say Indian then there will be impact of $ appreciation on his returns.

First we shall compute return on bond which will be common for both investors.

\[
\text{Return} = \frac{(\text{Price at end} - \text{Price at beginning}) + \text{Interest}}{\text{Price at beginning}}
\]

\[
= \frac{(5250 - 5000) + 350}{5000}
\]

\[
= \frac{250 + 350}{5000} = 0.12 \text{ say } 12\%
\]

(i) For US investor the return shall be 12% and there will be no impact of appreciation in $.

(ii) If $ appreciate by 2% then return for non-US investor shall be:

\[
\text{Return} \times 1.02 = 0.12 \times 1.02 = 0.1224 \text{ i.e. } 12.24\%
\]

Alternatively it can also be considered that $ appreciation will be applicable to the amount of principal as well. The answer therefore could also be

\[
(1+0.12)(1+0.02) - 1 = 1.12 \times 1.02 - 1 = 0.1424 \text{ i.e. } 14.24\%
\]

2.

Forward Rate = \[
\frac{2.50 \times (1+0.075)}{1+0.060} = \text{Can$ } 2.535/\text{£}
\]

(i) If spot rate decline by 2%

Spot Rate = Can$ 2.50 \times 1.02 = Can$ 2.55/\text{£}
<table>
<thead>
<tr>
<th></th>
<th>£</th>
</tr>
</thead>
<tbody>
<tr>
<td>£ receipt as per Forward Rate (Can $ 5,00,000/ Can$ 2.535)</td>
<td>1,97,239</td>
</tr>
<tr>
<td>£ receipt as per Spot Rate (Can $ 5,00,000/ Can$ 2.55)</td>
<td>1,96,078</td>
</tr>
<tr>
<td>Gain due to forward contract</td>
<td>1,161</td>
</tr>
</tbody>
</table>

(ii) If spot rate gains by 4%

\[
\text{Spot Rate} = \text{Can$ 2.50} \times 0.96 = \text{Can$ 2.40/£}
\]

<table>
<thead>
<tr>
<th></th>
<th>£</th>
</tr>
</thead>
<tbody>
<tr>
<td>£ receipt as per Forward Rate (Can $ 5,00,000/ Can$ 2.535)</td>
<td>1,97,239</td>
</tr>
<tr>
<td>£ receipt as per Spot Rate (Can $ 5,00,000/ Can$ 2.40)</td>
<td>2,08,333</td>
</tr>
<tr>
<td>Loss due to forward contract</td>
<td>11,094</td>
</tr>
</tbody>
</table>

(iii) If spot rate remains unchanged

<table>
<thead>
<tr>
<th></th>
<th>£</th>
</tr>
</thead>
<tbody>
<tr>
<td>£ receipt as per Forward Rate (Can $ 5,00,000/ Can$ 2.535)</td>
<td>1,97,239</td>
</tr>
<tr>
<td>£ receipt as per Spot Rate (Can $ 5,00,000/ Can$ 2.50)</td>
<td>2,00,000</td>
</tr>
<tr>
<td>Loss due to forward contract</td>
<td>2,761</td>
</tr>
</tbody>
</table>

3.

On January 28, 2013 the importer customer requested to remit SGD 25 lakhs.

To consider sell rate for the bank:

\[
\text{US $} = \text{₹45.90}
\]

\[
\text{Pound 1} = \text{US$ 1.7850}
\]

\[
\text{Pound 1} = \text{SGD 3.1575}
\]

\[
\text{Therefore, SGD 1} = \frac{\text{₹ 45.90} \times 1.7850}{\text{SGD 3.1575}}
\]

\[
\text{SGD 1} = \text{₹25.9482}
\]

Add: Exchange margin (0.125%)

\[
\text{₹0.0324}
\]

\[
\text{₹25.9806}
\]

On February 4, 2013 the rates are

\[
\text{US $} = \text{₹45.97}
\]
Pound 1 = US$ 1.7775
Pound 1 = SGD 3.1380
Therefore, SGD 1 = \( \frac{\text{₹} 45.97 \times 1.7775}{\text{SGD} \ 3.1380} \)
SGD 1 = ₹ 26.0394
Add: Exchange margin (0.125%)
       ₹ 0.0325
       ₹ 26.0719

Hence, loss to the importer

= SGD 25,00,000 (₹26.0719 – ₹25.9806) = ₹2,28,250

4. (i) Calculation of expected spot rate for September, 2009:

<table>
<thead>
<tr>
<th>$ for £ (1)</th>
<th>Probability (2)</th>
<th>Expected $/£ ( (1) \times (2) = (3) )</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.60</td>
<td>0.15</td>
<td>0.24</td>
</tr>
<tr>
<td>1.70</td>
<td>0.20</td>
<td>0.34</td>
</tr>
<tr>
<td>1.80</td>
<td>0.25</td>
<td>0.45</td>
</tr>
<tr>
<td>1.90</td>
<td>0.20</td>
<td>0.38</td>
</tr>
<tr>
<td>2.00</td>
<td>0.20</td>
<td>0.40</td>
</tr>
<tr>
<td></td>
<td>1.00</td>
<td>EV = 1.81</td>
</tr>
</tbody>
</table>

Therefore, the expected spot value of $ for £ for September, 2009 would be $ 1.81.

(ii) If the six-month forward rate is $ 1.80, the expected profits of the firm can be maximised by retaining its pounds receivable.

5.

The only thing lefts Rohit and Bros to cover the risk in the money market. The following steps are required to be taken:

(i) Borrow pound sterling for 3- months. The borrowing has to be such that at the end of three months, the amount becomes £ 500,000. Say, the amount borrowed is £ x. Therefore

\[
x \left[1 + 0.05 \times \frac{3}{12}\right] = 500,000 \text{ or } x = £493,827\]
(ii) Convert the borrowed sum into rupees at the spot rate. This gives: £493,827 × ₹ 56 = ₹ 27,654,312

(iii) The sum thus obtained is placed in the money market at 12 per cent to obtain at the end of 3-months:

\[
S = ₹ 27,654,312 \times \left[1 + 0.12 \times \frac{3}{12}\right] = ₹ 28,483,941
\]

(iv) The sum of ₹500,000 received from the client at the end of 3-months is used to refund the loan taken earlier.

From the calculations, it is clear that the money market operation has resulted into a net gain of ₹483,941 (₹28,483,941 – ₹500,000 × 56).

If pound sterling has depreciated in the meantime. The gain would be even bigger.

<table>
<thead>
<tr>
<th>End of Year</th>
<th>₹</th>
<th>₹/USD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>₹46.00 × (\frac{1 + 0.08}{1 + 0.04})</td>
<td>47.77</td>
</tr>
<tr>
<td>2</td>
<td>₹47.77 × (\frac{1 + 0.08}{1 + 0.04})</td>
<td>49.61</td>
</tr>
<tr>
<td>3</td>
<td>₹49.61 × (\frac{1 + 0.08}{1 + 0.04})</td>
<td>51.52</td>
</tr>
<tr>
<td>4</td>
<td>₹51.52 × (\frac{1 + 0.08}{1 + 0.04})</td>
<td>53.50</td>
</tr>
</tbody>
</table>

7.

As per interest rate parity

\[
S_1 = S_0 \left[1 + \frac{A}{B}\right]
\]

\[
S_1 = £0.7570 \left[\frac{1 + (0.075) \times \frac{3}{12}}{1 + (0.035) \times \frac{3}{12}}\right]
\]

\[
= £0.7570 \left[\frac{1.01875}{1.00875}\right]
\]
10.50 STRATEGIC FINANCIAL MANAGEMENT

= £0.7570 \times 1.0099 = £0.7645
= UK £0.7645 / US$

8.

The company can hedge position by selling future contracts as it will receive amount from outside.

Number of Contracts = \frac{4,00,000}{1,000} = 400 contracts

Gain by trading in futures = (45 - 44.50) \times 4,00,000 = 2,00,000

Net Inflow after 3 months = 44.50 \times 4,00,000 + 2,00,000 = 1,80,00,000

Effective Price realization = \frac{1,80,00,000}{4,00,000} = 45 Per US$

9.

(a) Forward contract: Dollar needed in 180 days = \£3,00,000 \times 1.96 = $5,88,000/-

(b) Money market hedge: Borrow $, convert to £, invest £, repay $ loan in 180 days

Amount in £ to be invested = \£3,00,000 / 1.045 = \£2,87,081

Amount of $ needed to convert into £ = 2,87,081 \times 2 = $5,74,162

Interest and principal on $ loan after 180 days = 5,74,162 \times 1.055 = $6,05,741

(c) Call option:

<table>
<thead>
<tr>
<th>Expected Spot rate in 180 days</th>
<th>Prem./unit</th>
<th>Exercise Option</th>
<th>Total price per unit</th>
<th>Total price for £3,00,000x_i</th>
<th>Prob. P_i</th>
<th>pixi</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.91</td>
<td>0.04</td>
<td>No</td>
<td>1.95</td>
<td>5,85,000</td>
<td>0.25</td>
<td>1,46,250</td>
</tr>
<tr>
<td>1.95</td>
<td>0.04</td>
<td>No</td>
<td>1.99</td>
<td>5,97,000</td>
<td>0.60</td>
<td>3,58,200</td>
</tr>
<tr>
<td>2.05</td>
<td>0.04</td>
<td>Yes</td>
<td>2.01*</td>
<td>6,03,000</td>
<td>0.15</td>
<td>90,450</td>
</tr>
</tbody>
</table>

Add: Interest on Premium @ 5.5% (12,000 \times 5.5%) 660

5,95,560

*(1.97 + 0.04)*

(d) No hedge option:
FOREIGN EXCHANGE EXPOSURE AND RISK MANAGEMENT

<table>
<thead>
<tr>
<th>Expected Future spot rate</th>
<th>Dollar needed Xi</th>
<th>Prob. Pi</th>
<th>Pi xi</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.91</td>
<td>5,73,000</td>
<td>0.25</td>
<td>1,43,250</td>
</tr>
<tr>
<td>1.95</td>
<td>5,85,000</td>
<td>0.60</td>
<td>3,51,000</td>
</tr>
<tr>
<td>2.05</td>
<td>6,15,000</td>
<td>0.15</td>
<td>92,250</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5,86,500</td>
</tr>
</tbody>
</table>

The probability distribution of outcomes for no hedge strategy appears to be most preferable because least number of $ are needed under this option to arrange £3,00,000.

10.

In the given case, the exchange rates are indirect. These can be converted into direct rates as follows:

Spot rate

\[
\text{GBP} = \frac{1}{\text{USD 1.5617}} \quad \text{to} \quad \frac{1}{\text{USD 1.5673}}
\]

\[
\text{USD} = \text{GBP 0.64033} \quad - \quad \text{GBP 0.63804}
\]

6 months’ forward rate

\[
\text{GBP} = \frac{1}{\text{USD 1.5455}} \quad \text{to} \quad \frac{1}{\text{USD 1.5609}}
\]

\[
\text{USD} = \text{GBP 0.64704} \quad - \quad \text{GBP 0.64066}
\]

Payoff in 3 alternatives

i. Forward Cover

Amount payable USD 3,64,897
Forward rate GBP 0.64704
Payable in GBP GBP 2,36,103

ii. Money market Cover

Amount payable USD 3,64,897
PV @ 4.5% for 6 months i.e. \( \frac{1}{1.0225} = 0.9779951 \) USD 3,56,867
Spot rate purchase GBP 0.64033
Borrow GBP 3,56,867 x 0.64033  
GBP 2,28,512
Interest for 6 months @ 7%  
7,998
Payable after 6 months  
GBP 2,36,510

iii. Currency options

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amount payable</td>
<td>USD 3,64,897</td>
</tr>
<tr>
<td>Unit in Options contract</td>
<td>GBP 12,500</td>
</tr>
<tr>
<td>Value in USD at strike rate of 1.70 (GBP 12,500 x 1.70)</td>
<td>USD 21,250</td>
</tr>
<tr>
<td>Number of contracts USD 3,64,897/ USD 21,250</td>
<td>17.17</td>
</tr>
<tr>
<td>Exposure covered USD 21,250 x 17</td>
<td>USD 3,61,250</td>
</tr>
<tr>
<td>Exposure to be covered by Forward (USD 3,64,897 – USD 3,61,250)</td>
<td>USD 3,647</td>
</tr>
<tr>
<td>Options premium 17 x GBP 12,500 x 0.096</td>
<td>USD 20,400</td>
</tr>
<tr>
<td>Premium in GBP (USD 20,400 x 0.64033)</td>
<td>GBP 13,063</td>
</tr>
<tr>
<td>Total payment in currency option</td>
<td></td>
</tr>
<tr>
<td>Payment under option (17 x 12,500)</td>
<td>GBP 2,12,500</td>
</tr>
<tr>
<td>Premium payable</td>
<td>GBP 13,063</td>
</tr>
<tr>
<td>Payment for forward cover (USD 3,647 x 0.64704)</td>
<td>GBP 2,360</td>
</tr>
<tr>
<td></td>
<td>GBP 2,27,923</td>
</tr>
</tbody>
</table>

Thus total payment in:

(i) Forward Cover  
2,36,103 GBP
(ii) Money Market  
2,36,510 GBP
(iii) Currency Option  
2,27,923 GBP

The company should take currency option for hedging the risk.

Note: Even interest on Option Premium can also be considered in the above solution.