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FOREX

By GAURAV JAINN

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Shailee Chaudhary

Roll No. 130814

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Al 2nd Highest
Roll No. 125761

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Foreign Exchange Exposure & Risk Management

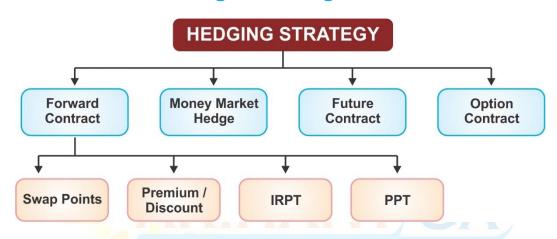
Study Session 8

LOS 1: Introduction

Three types of transactions associated with foreign exchange risk:

- 1. Loans(ECB)
- 2. Investments (Bonds & Equity)
- 3. Export & Import

Foreign Exchange Risk



Foreign Exchange Market (3 Tier Market)



Note:

In India, Foreign Exchange Market is regulated by RBI.

What is Exchange Rate?

- The rate of conversion is the Exchange Rate.
- An exchange rate is the price of one country's currency expressed in terms of the currency of another country. E.g. A rate of ₹ 50 per US \$ implies that one US \$ costs ₹ 50.

Rule 1: in an exchange rate two currencies are involved.

<u>Rule 2:</u> in any transaction involving Foreign Currency, you are selling one currency and buying another.



LOS 2: Home Currency & Foreign Currency

Home Currency: Country's own currency.

Example:

For India '₹'/INR is home currency For USA 'US \$' or 'Dollar' is a home currency For UK '£' or 'Pound' or 'GBP' is home currency

Foreign Currency: Any currency other than home currency will be a Foreign Currency

Example:

For India, \$, \pounds , etc. will be a foreign currency. For US * , \pounds will be foreign currency.

LOS 3: Bid & Ask Rate

Bid Rate: Rate at which bank BUYS left hand side currency.

Ask Rate: Rate at which bank SELLS left hand side currency.

One-way Quote: [when Bid and Ask Rate are same]

Example:

1\$ = ₹ 65

Explanation:

Bank buys 1\$ at ₹ 65. Bank sells 1\$ at ₹ 65.

Two-way Quote: [when Bid and Ask Rate are separately given]

Example:

Note:

- Difference between Bid & Ask rate represents Profit Margin for the bank.
- Quotation/ Bid & Ask rate or Exchange Rate is always quoted from the point of view of bank.
- Bid Rate must always be less than Ask Rate.

Or

Ask Rate must always be greater than Bid Rate.

- ❖ Always solve question from the point of view of investor/ Customer unless otherwise stated.
- ❖ The difference between the Ask & Bid rates is called *Spread*, representing the profit margin of dealer.

Spread = Ask Rate - Bid Rate





LOS 4: Direct Quote & Indirect Quote

<u>Direct Quote:</u> Home Currency Price for 1 unit of foreign currency.

Example: 1\$ = ₹ 50 is DQ for Rupee.

Indirect Quote: Foreign Currency Price for 1 unit of Home Currency.

Example: 1Re = 0.0200\$ is IDQ for Rupee.

Note:

- If a given quotation is direct for one country, then the same quotation will be indirect for another country and vice-versa.
- The concept of DQ and IDQ is only theoretical and don't have any practical relevance.

LOS 5: Conversion of Direct Quote into Indirect Quote and vice-versa

Case 1: One-way Quote [When bid & ask rates are same]

Direct Quote can be converted into indirect quote by taking the reciprocal of direct quote.

$$IDQ = \frac{1}{DQ}$$

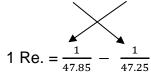
<u>Case 2</u>: Two-way Quote [When bid & ask rates are separately given]

❖ Direct Quote (DQ) can be converted into Indirect Quote (IDQ) by taking the reciprocal of direct quote and switching the position.

Convert DQ into the IDQ.

Solution:

IDQ => 1 Re. =
$$\frac{1}{47.25} - \frac{1}{47.85}$$



OR 1 Re. = 0.02090 --- 0.02116 (2nd Quote)

Conversion Rules:

- Which currency is given in the question, we need that currency in the LHS of the quote.
- Decide whether to Buy that currency or Sell.
- ❖ If you Buy
 Bank Sells
 Use Ask Rate
 If you Sell
 Bank Buys
 Use Bid Rate
- Always Solve question from the point of view of Customer.



LOS 6: Spot Rate & Forward Rate

Spot Rate: Rate used for buying & selling of foreign currency at 'As on Today or Immediately'

<u>Forward rate</u>: Rate used for buying & selling of foreign currency at <u>some future Date</u> i.e. Forward rate is the rate contracted today for exchange of currencies at a specified future date.

LOS 7: Premium or Discount

<u>Premium:</u> If the currency is costly or Expensive in future as compared to spot it is said to be at a premium.

In the above quote \$ is at Premium.

Discount: If the currency is Cheaper in future as compared to spot it is said to be at a discount.

SR => 1Re. =
$$\frac{1}{45}$$
 \$ = 0.0222
FR => 1Re. = $\frac{1}{50}$ \$ = 0.02

We can say that rupee is at discount.

Calculation of Premium or Discount

$$\left[\frac{FR - SR}{SR}\right] \times \frac{12}{\text{Forward Period}} \times 100$$

Note: This formula is applicable only for left hand currency

Conclusion:

- If one currency is at a premium, then another currency must be at a discount. However, the rate of premium may not be equal to the rate of discount.
- On account of base effect, premium is slightly higher than the discount.

LOS 8 : Calculation of Forward Rate when Spot Rate & Premium or Discount is given

Example 1:

Solution:

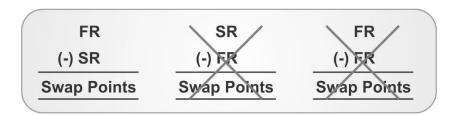
FR
$$\rightarrow$$
 1\$ = ₹ 48.50 (1 + 0.05)
1\$ = ₹ 50.925

LOS 9 : SWAP POINTS/ Forward Margin/ Forward-Spot Differential

Difference between Forward Rate and Spot Rate is known as **Swap Points**.



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How to ADD or DEDUCT Swap Points

- Swap Point should be Added or Deducted from the last decimal point in the Reverse Order.
- ❖ Premium → Add Swap Points
- ❖ Discount → Less Swap Points

If Premium / Discount is not mentioned, we observe the following rules:

Case 1: When Swap Points are in increasing order:

- It indicates premium on left hand currency.
- ❖ In this case, we will add swap points with spot rates to calculate forward rates.

Case 2: When Swap Points are in decreasing order:

- It indicates discount on left hand currency.
- ❖ In this case, we will deduct swap points from Spot Rate to calculate forward rates.

Note: Don't apply the rule if Premium or Discount is used in the question.

LOS 10: Cross Rate

<u>Cross Rate</u> between ant two currencies is derived with the help of quotations between these currencies & third currency.

- Cross Rate is normally used in finding out any missing exchange rate.
- The calculation of cross rate simply requires you to focus on cancellation of common currencies, to do so you have to multiply with DQ & IDQ.
- Always check ASK Rate > BID Rate.

LOS 11 : Squaring-up the position or Covering the Position or Closing-out the Position under FOREX

Covering the Position means taking an opposite or reverse position to calculate profit and loss i.e. we cover our position to book Profit or Loss.



LOS 12 : Exchange Margin

<u>Exchange Margin</u> is the extra amount or percentage charged by the bank over and above the rate quoted by it. Eq. Commission, transaction charges, etc.





Actual Selling Rate of Bank: (Add Exchange Margin)

= Ask Rate (1+ Exchange Margin)

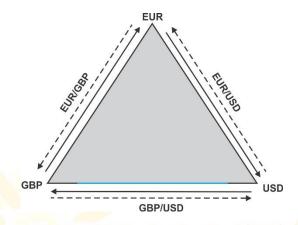
Actual Buying Rate of Bank: (Deduct Exchange Margin)

= Bid Rate (1 – Exchange Margin)

LOS 13: Triangular Arbitrage

It involves 3 currencies represented by 3 corner points of triangle. We will be starting with one currency, pass through the other two currencies and come back to the original currency. There are two paths \rightarrow clockwise and Anticlockwise.

One path will result in profit while the other path will result in Loss.



LOS 14: Purchasing Power Parity Theory (PPPT)

Calculation of Spot Rate

- ❖ PPPT is based on the concept of 'Law of One Price'.
- PPPT is based on the fact that price of a commodity in two different market will always be same.
- If Price of a commodity in two different market are not same, there will be an arbitrage opportunity exists in the market.
- Suppose Price of a Commodity in India is ₹ X & In USA is \$Y. Spot Rate is 1\$ = ₹ SR
 Then X = Y x SR

$$SR = \frac{X}{Y}$$

Spot Rate (₹ / \$) =
$$\frac{\text{Current Price (Rs.)}}{\text{Current Price ($)}}$$

Exchange Rate = Price Ratio

Calculation of Forward Rate

PPPT is also applicable in case of inflation. Suppose Inflation Rate of India is I_{Rs} and in US is I_{\$} Forward Rate 1\$ = ₹ F. Now as per PPPT, we have after 1 year:

$$X (1+ I_{\bar{e}}) = y (1+ I_{\bar{e}}) \times FR$$

$$FR = \frac{X (1 + I_{RS})}{Y (1 + I_{\$})}$$





$$FR = SR \times \frac{1 + I_{RS}}{1 + I_{\$}}$$

$$\frac{FR (Rs./\$)}{SR (Rs./\$)} = \frac{1 + Rupee Inflation}{1 + Dollar (\$) Inflation}$$

Note:

- The above equation is applicable for any two given currency.
- Determination of Premium or Discount with the help of Inflation Rate: If Inflation Rate of a country is higher, then the currency of that Country will be at a discount in future and Vice- Versa.

Inflation rate in above equation must be adjusted according to forward period.

Case1: When Period is less than 1 Year.	Case2: When Period is more than 1 Year.
FR (Rs./\$) _ 1+Periodic Inflation Rate (Rs.)	FR (Rs./\$) (1+ Inflation Rate (Rs.)) ⁿ
SR (Rs./\$) 1+Periodic Inflation Rate (\$)	$\frac{1}{SR (Rs./\$)} = \frac{1}{(1 + Inflation Rate (\$))^n}$

LOS 15: Interest Rate Parity Theory (IRPT)

- ❖ IRPT states that exchange rate between currencies are directly affected by their Interest Rate.
- ❖ Assumption: Investment opportunity in any two different market will always be same.

$$\frac{FR (Rs./\$)}{SR (Rs./\$)} = \frac{1 + Interest Rate (Rs.)}{1 + Interest Rate (\$)}$$

Note:

- The above equation is applicable for any two given currency.
- ❖ Interest Rate should be adjusted according to forward period. □ with you

Case1: When Period is le	es <mark>s than 1 Year.</mark>	Case2: When Period is more than 1 Year.
FR (Rs./\$) _ 1+Periodic II	nterest Rate (Rs.)	FR (Rs./\$) (1+ Interrest Rate (Rs.)) ⁿ
${SR (Rs./\$)} - {1 + Periodic I}$	nterest Rate (\$)	$\frac{1}{SR (Rs./\$)} = \frac{1}{(1 + Interest Rate (\$))^n}$

Note:

- ❖ Determination of Premium or Discount with the help of Interest Rate: If Interest rate of a country is higher, than the currency of that country will be at a discount in future and vice-versa.
- If IRPT holds, arbitrage is not possible. In that case, it doesn't matter whether you invest in domestic country or foreign country, your rate of return will be same.

LOS 16: Covered Interest Arbitrage (CIA)

Type 1	Type 2
When Bid and Ask rates are same.	If Bid & Ask rates are given separately.
When Investment & Borrowing rates are same	Investment & Borrowing rate of a given currency
in one country.	is separately given.
# (Short – cut is available)	# (Hit & Trial method is used)

- When Investment opportunity in any two given countries are different, covered Interest Arbitrage is possible.
- When IRPT is not applicable, then covered interest arbitrage will be applicable.



8.8 FOREIGN EXCHANGE EXPOSURE & RISK MANAGEMENT

- ❖ The rule is to "Borrow from one country & Invest in another Country ".
- Suppose Interest Rate of India is INT₹ And USA is INT\$. Spot Rate is 1\$ = ₹ SR, Forward Rate => 1\$ = ₹ FR

Let assume Investor is having ₹ A for investment

Option 1: When investor invest ₹ A in India:

Amount of ₹ Received after one year

Option 2: When investor invest ₹ A in USA:

Amount of Equivalent ₹ Received after one year

$$A2 = [\frac{A}{SR} \$ (1 + INT\$)] \times FR$$

IF A1 = A2	IF A1 > A2	IF A1 < A2
No arbitrage opportunity.	Arbitrage Opportunity is Possible. Arbitrager should invest in India (Home Country) & borrow from USA (Foreign Country)	possible.

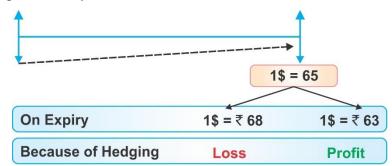
Note:

If in 1st try we have arbitrage profit, then no need to solve 2nd case.

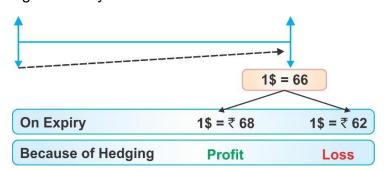
If in 1st try we have arbitrage loss, then 2nd case must be solved.

LOS 17: Forward Contract

- Transaction exposure arises when a firm has a known amount of foreign currency payable or receivable but home currency equivalent of which is unknown.
- Hedging is defined as an activity converted uncertainty into certainty. The simplest hedging strategy is hedging through forward contract.
- In case of foreign currency is to be received in future



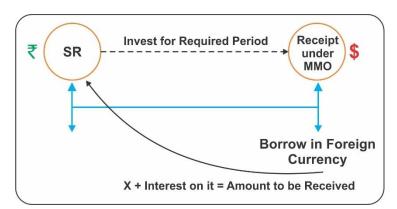
In case of foreign currency is to be Paid in future





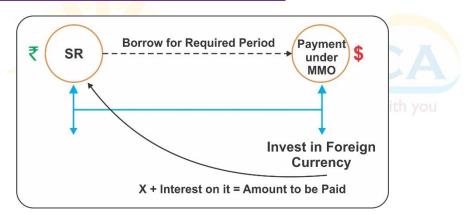
LOS 18: Money Market Operations

Case 1: If Foreign Currency is to be received in future:



- **Step 1**: Borrow in Foreign Currency: Amount of borrowing should be such that Amount Borrowed +Interest on it becomes equal to the amount to be received.
- Step 2: Convert the borrowed foreign currency into home currency by using spot Rate.
- **Step 3:** Invest this home currency amount for the required period.
- **Step 4:** Pay the borrowed amount of foreign currency with interest using the amount to be received in foreign currency. [May be Ignored]

Case 2: When foreign currency is to be paid in future



- <u>Step 1:</u> Invest in Foreign currency. Amount of investment should be such that, "Amount Invested + Interest on it" becomes equal to amount to be paid
- <u>Step 2:</u> Borrow in Home Currency, equivalent amount which is to be invested in foreign currency using Spot rate.
- **Step 3:** Pay the borrowed amount with interest in Home Currency on Maturity.
- **Step 4:** Pay the outstanding amount with the amount received from investment. [May be ignored]

LOS 19 : Adjusting Exchange rate quotation when exchange margin is attached to it

Example:

 $1 \text{ Euro} = £ 1.7846 \pm 0.0004$

Solution:

1 Euro = £ 1.7842 ---- 1.7850





LOS 20 : Foreign Capital Budgeting

Two approaches are followed in case investment is undertaken in foreign country:

- Home Currency Approach
- Foreign Currency Approach

Home Currency Approach:

- **Step 1:** Compute all cash inflows & outflows arising in foreign currency.
- <u>Step 2:</u> Convert these cash Inflows & outflows into home currency by using appropriate exchange rates (i.e. Forward Rate) (Calculate through Swap Point or IRPT)
- **Step 3:** Compute a suitable discount rate.
- Step 4: Compute Home Currency (NPV)

Foreign Currency Approach:

- **Step 1:** Compute all cash inflows & outflows arising in foreign currency.
- Step 2: Compute a suitable discount rate (RADR).
- **Step 3:** Compute Foreign Currency (NPV)
- **Step 4:** Convert foreign currency NPV into Home currency by using Spot Rate

Note:

- Answer by both approach will be same.
- Discount Rate to be used should be risk-adjusted discount rate (RADR), Since foreign project involves risk.

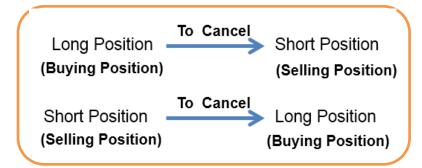
- Discount Rate or RADR of both the country are different.
- Risk Premium of both home country and foreign country are assumed to be same.

LOS 21: Cancellation/Modification under Forward Contract

Forward Contract are legal binding contracts, which must be fulfilled by each and every party. In case of cancellation of Forward Contracts, following rules must be followed:

How to cancel Forward Contract

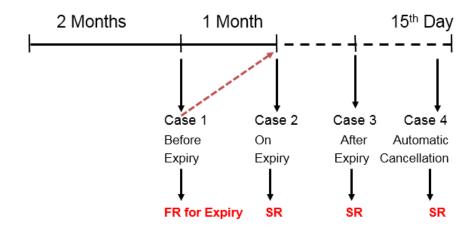
Forward Contracts must be cancelled by entering into a reverse contract.



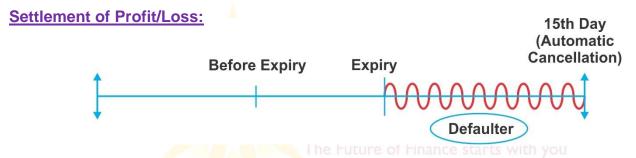




Rate at which contract needs to be Cancelled



Case 1	Cancelled before expiry	Forward Rate prevailing as on today for expiry
Case 2	Cancelled on expiry	Spot Rate of expiry
Case 3	Cancelled after expiry	Spot Rate of the date when customer contracted with the bank.
Case 4	Automatic Cancellation	Spot Rate prevailing on 15 th day i.e. when grace period ends.



Case 1	Cancelled on or before expiry	Customer will be eligible for both profit/Loss.
Case 2	Cancelled after expiry or automatic cancellation	Customer will be eligible only for Loss

LOS 22: Extension of Forward Contract

Step 1: Cancellation of original Contract

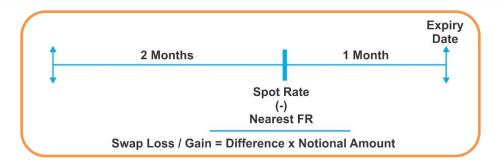
Step 2: Entering into a new forward contract for the extended period.

LOS 23 : Early Delivery

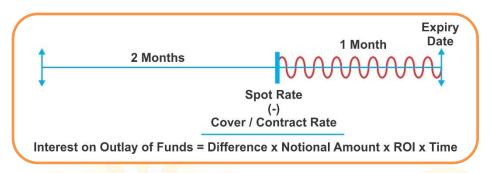
The bank may accept the request of customer of delivery at the before due date of forward contract provided the customer is ready to bear the loss if any that may accrue to the bank as a result of this. In addition to some prescribed fixed charges bank may also charge additional charges comprising of:

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.





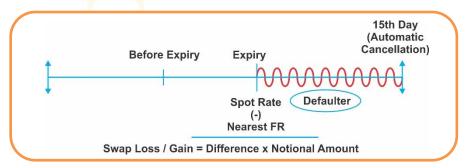
b) Interest on Outlay of Funds: It might be possible early delivery request of a customer may result in outlay of funds. In such bank shall charge from the customer at a rate not less than prime lending rate for the period of early delivery to the original due date. However, if there is an inflow of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



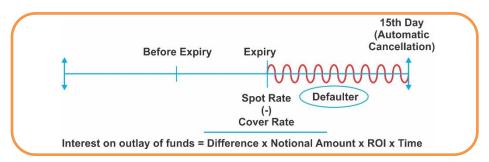
LOS 24 : Cancellation after Due Date/ Automatic Cancellation Late Delivery / Extension after due date

In these cases the following cancellation charges may be payable:

- 1. Exchange Difference
- 2. Swap Loss



3. Interest on outlay of funds





LOS 25 : Centralized Cash Management & Decentralized Cash Management System

- Under Decentralized Cash Management, every branch is viewed as separate undertaking. Cash Surplus and Cash Deficit of each branch should not be adjusted.
- Under Centralized Cash Management, every branch cash position is managed by single centralized authority. Hence, Cash Surplus and Cash Deficit of each branch with each other is accordingly adjusted

LOS 26: Contribution to Sales Ratio based decision under FOREX

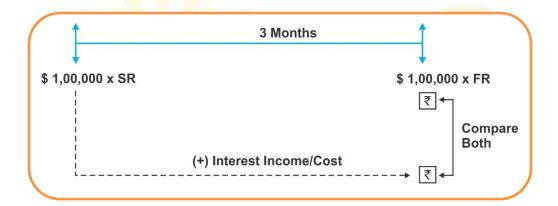
Contribution to Sales Ratio =
$$\frac{\text{Contribution (Sales-VC)}}{\text{Sales}} \times 100$$

Decision:

Higher the C/S Ratio, Better the position.

LOS 27: Leading & Lagging

- Leading means advancing the timing of payments and receipts.
- Lagging means postponing or delaying the timing of payments and receipts.



LOS 28: Exposure Netting

Netting means adjusting receivable and payables (or inflows & Outflows)



Two conditions must be fulfilled:

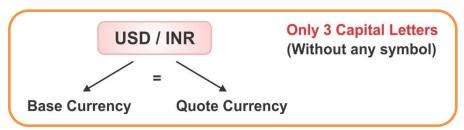
- 1. Netting can be done for same currency.
- 2. Netting can be done for same period.

Note: In case of Netting, No. of forward contracts can be reduced.



LOS 29 : Currency Pairs

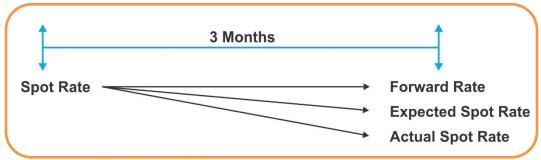
Currency Pairs are written by ISO Currency codes of the base currency and the counter currency, separating them with a slash character.



Example:

A price quote of EUR/USD at 1.30851 means 1 Euro = 1.30851 \$

LOS 30: Gain/Loss under FOREX



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LOS 31: Evaluation of Quotation from two Banks

When quotations are received from two banks, customer should select that quotation which is more beneficial to him.

Example:

LOS 32: Expected Spot Rate

Expected Spot Rate = ∑ Spot Rates × Probability

LOS 33: Currency Futures

Steps Involved:





Step1: Decide Position

- Long Position
- Short Position

<u>Note:</u> First we will decide which currency will buy or which currency we will sell then check the currency on the LHS of the quotation & then accordingly decide Long Position & Short Position



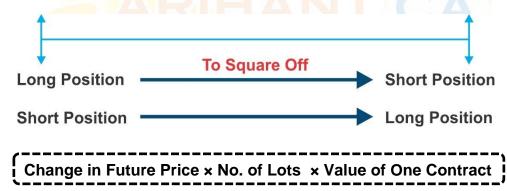
Step 2: Calculation of Number of contracts/Lots

No. of Lots =
$$\frac{\text{Value of Position}}{\text{Value of one Contract}} = \frac{\pounds}{\pounds} = \frac{\$}{\pounds}$$

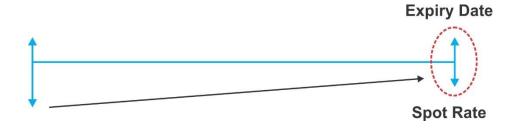
<u>Note:</u> Convert exposure amount in the same currency as of Lot Size/Contract Size & it will be converted at CONTRACT RATE.

Step 3: Calculate Settlement Amount/ Total Outflow/Inflow under Future Contract

1. Calculate Profit and Loss under Future Contract



2. Calculate Total Receipt/Total Payment using SR on Expiry



3. Calculation of opportunity cost of initial margin if Given

Total Outflow / Inflow under Future Hedging



LOS 34 : Currency Options

Steps Involved:

Step1: Decide Position

<u>Note:</u> First we will decide which currency will buy or which currency we will sell then check the currency on the LHS of the quotation & then accordingly decide Long Call & Long Put



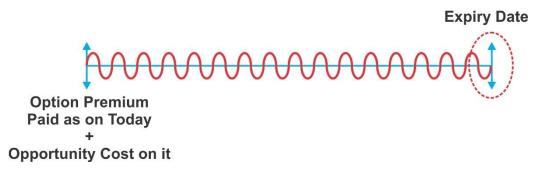
Step2: Calculation of Number of contracts/Lots

No. of Lots =
$$\frac{\text{Value of Position}}{\text{Value of one Contract}} = \frac{\$}{\$} = 17.35 \text{ or } 17 \text{ lots}$$

Note: Convert exposure amount in the same currency as of Lot Size/Contract Size & it will be converted at CONTRACT RATE.

<u>Step 3:</u> Now the UNHEDGE POSITION should be hedge through forward market as there is no lot size requirement under forward market.

Step 4: Calculation of Option Premium paid as on today with opportunity cost on it.



<u>Step 5:</u> Calculate / Total Outflow/Inflow under Option Contract

- (i) Option Premium paid as on today with opportunity cost on it.
- (ii) Unhedged Position under forward contract
- (iii) Under Option Contract using Exercise Price

Total Outflow / Inflow under Option Hedging



LOS 35: Calculation of Return under FOREX

Return (In terms of Home Currency) =
$$\left[1 + \frac{P_1 - P_0 + I}{P_0}\right]$$
 (1+ C) – 1

 P_0 = Price at the beginning

P₁ = Price at the End

I = Income from Interest/Dividend

C = Change in exchange rate.

LOS 36: Broken Date Contracts

A Broken Date Contract is a forward contract for which quotation is not readily available.

Example: If quotes are available for 1 month and 3 months but a customer wants a quote for 2 months, it will be a Broken Date Contract. It can be calculated by interpolating between the available quotes for the preceding and succeeding maturities.

LOS 37: Implied Differential in Interest Rate

Interest rate is just another name of premium or discount of one country currency in relation to another country currency (As per IRPT).

Premium or Discount = Difference in Interest Rate

Equation:

$$\frac{FR (Rs./\$) - SR(Rs./\$)}{SR}$$
 × $\frac{12}{Forward Period}$ × 100 = Interest Rate (₹) – Interest Rate(\$)

LOS 38: Savings due to Time Value (Discount) & Currency Fluctuation

If the firm decides to pay today rather than in future he may get two types of benefits:

- Benefit on account of discount for pre-payment.
- Benefit on account of currency fluctuation.

LOS 39: Nostro Account, Vostro Account and LORO Account

Nostro Account [Ours account with you]

This is a current account maintained by a domestic bank/dealer with a foreign bank in foreign currency.

Example: Current account of SBI bank (an Indian Bank) with swizz bank in Swizz Franc. (CHF) is a Nostro account.



Nostro Account of Indian Bank

Vostro Account [Yours account with us]

This is a current account maintained by a foreign bank with a domestic bank/dealer in Rupee currency.



8.18 FOREIGN EXCHANGE EXPOSURE & RISK MANAGEMENT

Example: Current account of Swizz bank in India with SBI bank in Rupee (₹) currency

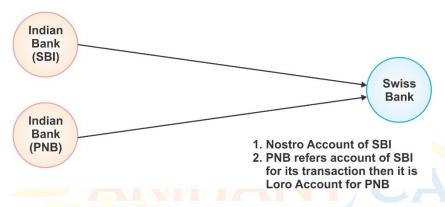


Loro Account [Our account of their Money with you]

This is a current account maintained by one domestic bank on behalf of other domestic bank in foreign bank in a foreign currency.

In other words, Loro account is a Nostro account for one bank who opened the bank and Loro account for other bank who refers first one account.

Example: SBI opened Current account with swizz bank. If PNB refers that account of SBI for its correspondence, then it is called Loro account for PNB and it is Nostro account for SBI.



Note:

- SPOT purchase/sale of CHF affects both exchange position as well as Nostro account.
- However, forward purchase/sale affects only the exchange position.

1. Nostro A/c (Cash A/c) in Foreign Currency

Particulars	Dr. [Debit] outflow	Cr. [Credit] Inflow
	of Dollars (FC)	of Dollars (FC)

2. Exchange Position A/c/

