

Foreign Exchange Exposure & Risk Management

Study Session 8

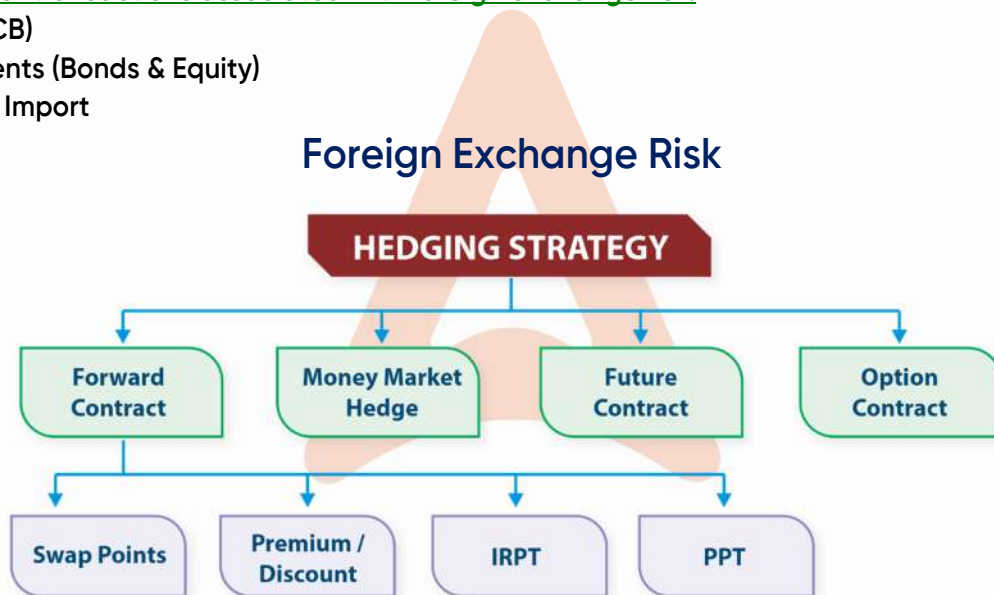
LOS 1 : Introduction

Globalization of Business

- ✚ Raising of Capital from International Capital Markets or easy excess to External Commercial Borrowings for companies.
- ✚ Open Economy to Foreign Investments, Exports, Imports and making investments in Indian Economy like Infrastructure sector, medical science, etc.
- ✚ Participations of FII's in Indian capital markets.
- ✚ Trade tie-ups between countries.
- ✚ Different countries have different currencies and the different currencies have different values, so there is a need of the rule for currency conversions for Global Business and Investments.

Three types of transactions associated with foreign exchange risk:

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



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.**Rule 2:** 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 CurrencyExample:

For India, \$, £, etc. will be a foreign currency.

For US '₹', £ will be foreign currency.

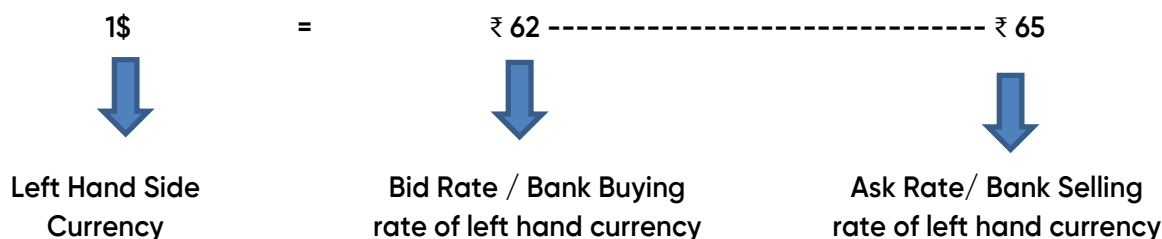
LOS 3 : Bid & Ask RateBid Rate: Rate at which bank BUYS left hand side currency.Ask Rate: Rate at which bank SELLS left hand side currency.One-way Quote: [when Bid and Ask Rate are same]Example:

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.

$$\text{Spread} = \text{Ask Rate} - \text{Bid Rate}$$

LOS 4 : Direct Quote & Indirect Quote

Direct Quote: 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.

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

Case 2: 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.

Example: \$1 = ₹ 47.25 --- ₹ 47.85 (1st Quote)

Convert DQ into the IDQ.

Solution:

DQ => \$1 = ₹ 47.25 --- ₹ 47.85

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

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

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.

QUESTION NO. 1B

The following two way quotes appear in the Foreign Exchange Market:

	Spot	2-Months Forward
₹ / US\$	₹ 46.00 / ₹ 46.25	₹ 47.00 / ₹ 47.50

Required:

- How many US dollars should a firm sell to get ₹25 lacs after 2 months?
- How many Rupees is the firm required to pay to obtain US\$ 2,00,000 in the Spot Market?
- Assume the firm has US \$ 69,000 in current Account earning no interest. ROI on Rupee Investment is 10% p.a. should the firm encash the US \$ now or two months later?

Solution :

Q.1B (4) (5 marks)
(3-timer)

(i) 2 months FR :-

1\$ = ₹ 47.00 — ₹ 47.50

we buy $\frac{1}{47.50}$ \$ — $\frac{1}{47.00}$ \$

Bank sell \$

Transaction

\$ → Sell
₹ → Buy

No. of US \$ sell to get ₹ 25 lacs after 2 months:-

$$\Rightarrow ₹ 25,00,000 \times \frac{1}{47.00} \$$$

$$\Rightarrow \$ 53191.49$$

(ii) S/R 1\$ = ₹ 46.00 — ₹ 46.25

we buy

Bank sell \$

Transaction

\$ → Buy
₹ → Sell

$$\Rightarrow \$ 2,00,000 \times ₹ 46.25$$

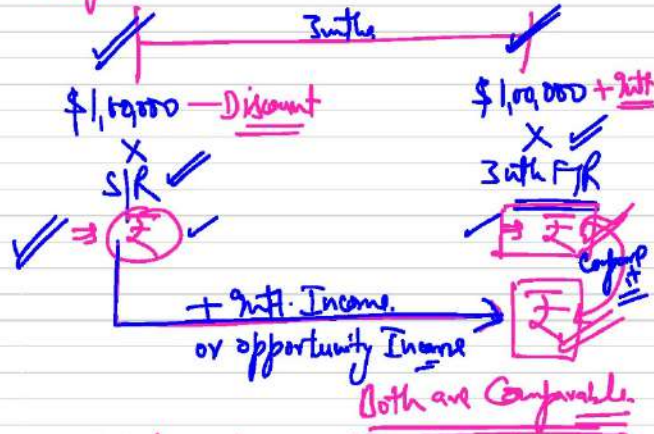
$$\Rightarrow ₹ 92,50,000$$

we need ₹ 92,50,000 to obtain \$ 2,00,000

Concept:- Leading & lagging:-
 ↓ ↓
 Advancing. Delaying.

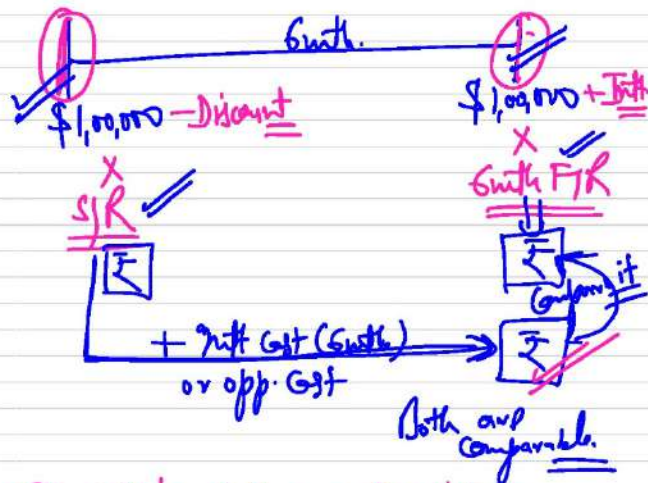
Case I:- Receipt:-

Example

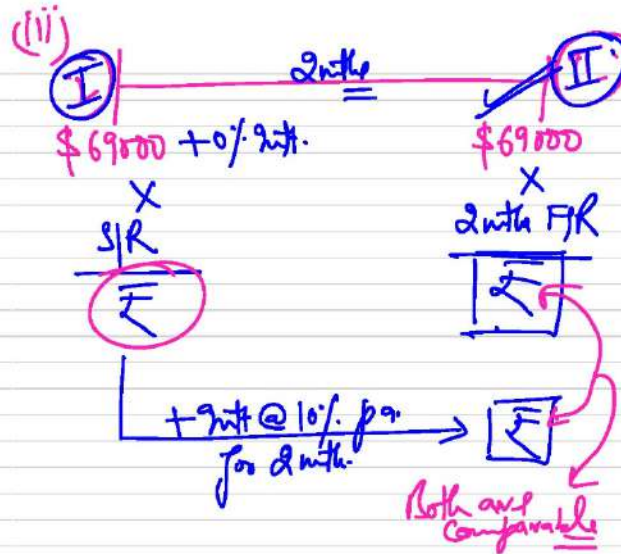


Select which one is maximum.

Case II: Payment:-



Select which one is minimum.



(a) If Enough as on today:-

$$\$69,000 \times ₹46.00 = ₹31,74,000$$

S/R $1\$ = ₹46.00 - 46.25$

\$ $\rightarrow$ Sell
₹ $\rightarrow$ Buy.

Add: opportunity Income @ 10% p.a. ₹52,900 for 2 months

$$\left[31,74,000 \times 10\% \times \frac{2}{12} \right]$$

Total inflow after 2 months ₹ 32,26,900

(b) If Enough after 2 months:-

$$\$69,000 \times ₹47.00 = ₹32,43,000$$

2mth F/R

$$1\text{₹} = \text{₹} 47.00 - \text{₹} 47.50$$

\$ → Sell
₹ → Buy

Decision:- We should Encash \$69000 after 2 months because receipt is maximum in this case.

LOS 6 : Spot Rate & Forward Rate

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

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

LOS 7 : Premium or Discount

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

$$SR \Rightarrow 1\$ = ₹ 45$$

$$FR \Rightarrow 1\$ = ₹ 50$$

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.

$$SR \Rightarrow 1\text{Re.} = \frac{1}{45} \$ = 0.0222$$

$$FR \Rightarrow 1\text{Re.} = \frac{1}{50} \$ = 0.02$$

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:**

SR → 1\$ = ₹ 48.50

\$ is at premium = 5%

Calculate FR?

Solution:

FR → 1\$ = ₹ 48.50 (1 + 0.05)

1\$ = ₹ 50.925

LOS 9 : SWAP POINTS/ Forward Margin/ Forward-Spot DifferentialDifference between Forward Rate and Spot Rate is known as **Swap Points**.

FR (-) SR	SR (-) FR	FR (-) FR
Swap Points	Swap Points	Swap Points

Example:

SR → 1£ = \$ 0.02594 --- \$ 0.02599

FR → 1£ = \$ 0.02598 --- \$ 0.02608

Calculate Swap points?

Solution:

FR →	1£	= \$ 0.02598	---	\$ 0.02608
SR →	1£	= \$ 0.02594	---	\$ 0.02599
		<u>0.00004</u>		<u>0.00009</u>

So, Swap Point = 4/9

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.**Example:**

SR → 1\$ = 45.4500 ----- 45.4580

2 months Swap Point = 30/42

Calculate Forward Rate?

Solution:

1\$ = 45.4500 ----- 45.4580

+ 00.0030 ----- 00.0042

FR 1\$ = 45.4530 ----- 45.4622

Example:

SR → 1£ = \$ 1.4510 ----- 1.4620

1 months Swap Point = 55/44

Calculate Forward Rate?

Solution:

1£ = \$ 1.4510 ----- 1.4620

(-) 0.0055 ----- 0.0044

FR 1£ = \$ 1.4455 ----- 1.4576

LOS 10 : Cross Rate

Cross Rate between any 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.



QUESTION NO. 6A

You sold Hong Kong Dollar 1,00,00,000 value spot to your customer at ₹ 5.70 & covered yourself in London market on the same day, when the exchange rate were as under :

	US\$ 1 = H.K.\$ 7.5880 - 7.5920
Local interbank market rates for US\$ were Spot	US\$1 = ₹ 42.70 - 42.85

Calculate cover rate & ascertain the profit or loss in the transaction ignore brokerage.

Solution :

Q.6A

To Cover

Bank Short Position
HK\$ 100,00,000
@ ₹ 5.70 / HK\$

Long Position
@ ?
[Cover Rate]

W.No. / Cal. of Cover Rate / Cross Rate:-

1 US\$ = HK\$ 7.5880 - 7.5920

1 US\$ = ₹ 42.70 - ₹ 42.85

1 HK\$ = ----- ₹

₹ / HK\$

$$\frac{\text{₹}}{\text{HK\$}} \Rightarrow \frac{\text{₹}}{\text{₹}} \times \frac{\text{₹}}{\text{HK\$}}$$

$$\begin{array}{l} \text{1 HK\$} = \frac{1}{7.5720} \text{ ₹} - \frac{1}{7.5800} \text{ ₹} \\ \text{100 ₹} = \text{₹ } 42.70 - \text{₹ } 42.85 \end{array}$$

Cross Rate:

$$\begin{array}{l} \text{1 HK\$} = \text{₹ } \frac{1}{7.5720} \times 42.70 \\ \text{₹ } \frac{1}{7.5800} \times 42.85 \end{array}$$

Cross Rate

$$\text{1 HK\$} = \text{₹ } 5.6243 - \text{₹ } 5.6471$$

Main Soln:-Bank → Short Position

Sell HK\$ 100,00,000 @ ₹ 570,00,000

To CoverLong PositionBuy HK\$ 100,00,000 @ ₹ 564,71,000
⇒ ₹ 564,71,000

$$\text{1 HK\$} = \text{₹ } 5.6243 - \text{₹ } 5.6471$$

Transaction Gain

$$\text{₹ } 5,29,000$$

LOS 12 : Exchange Margin

Exchange Margin is the extra amount or percentage charged by the bank over and above the rate quoted by it. Eg. 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)

QUESTION NO. 7B

On Jan 28, 2005 an importer customer requested a bank to remit Singapore Dollar SGD 25,00,000 under an irrevocable LC. However due to bank strikes, the bank could affect the remittance only on February 4, 2005. The interbank market rates were as follows:

	28th January	4th February
Bombay US 1	INR 45.85/45.90	45.91/45.97
London Pound 1	USD 1.7840/1.7850	1.7765/1.7775
London Pound 1	SGD 3.1575/3.1590	3.1380/3.1390

The bank wishes to retain an exchange margin of 0.125%. How much does the customer stand to gain or lose due to the delay? (Calculate rate in multiples of 0.0001)

Solution :

Q.7B

(#) If HC is missing, always assume to be rupee is our home currency.

W.N.:- Cal. of Cross Rate

28th Jan, 2005

1\$ = ₹ 45.85 — ₹ 45.90 ✓

1£ = \$ 1.7840 — \$ 1.7850 ✓

1£ = SGD 3.1575 — SGD 3.1590

1SGD = ————— ₹

(#) HC = ₹
FC = SGD

$\frac{₹}{SGD} \Rightarrow \frac{₹}{\$} \times \frac{\$}{£} \times \frac{£}{SGD}$

1\$ = ₹ 45.85 — ₹ 45.90

1£ = \$ 1.7840 — \$ 1.7850

1SGD = £ $\frac{1}{3.1590}$ — £ $\frac{1}{3.1575}$

$$USD = ₹ 45.85 \times 1.7840 \times \frac{1}{3.1590} (1 - 0.0125)$$

$$₹ 45.90 \times 1.7850 \times \frac{1}{3.1575} (1 + 0.0125)$$

$$USD = ₹ 25.8608 - ₹ 25.9807$$

4th Feb.

$$USD = ₹ 45.91 \times 1.7765 \times \frac{1}{3.1390} (1 - 0.0125)$$

$$₹ 45.97 \times 1.7775 \times \frac{1}{3.1580} (1 + 0.0125)$$

$$USD = ₹ 25.9500 - ₹ 26.0720$$

Final Answer:

loss due to delay:-

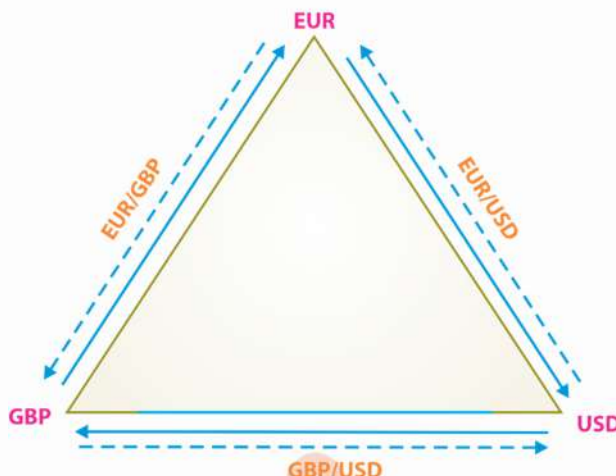
$$USD 25,00,000 [₹ 26.0720 - ₹ 25.9807]$$

$$\Rightarrow ₹ \underline{2,28,250}$$

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 → clockwise and Anticlockwise.

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



QUESTION NO. 8C

The following quotes are available from your dealer:

1 AUD	USD 0.6000 – 0.6015
1 MXN	USD 0.0933 – 0.0935

Compute the implied 1 AUD = ___ MXN cross rate?

If your dealer also quotes 1 AUD = MXN 6.3000 – 6.3025, is an arbitrage profit possible? If so, compute the arbitrage profit in USD if you start with USD 1 Million.

Solution :

(i) Q8C

$$1 \text{ AUD} = \text{USD } 0.6000 - 0.6015 \quad \frac{\text{USD}}{\text{AUD}}$$

$$1 \text{ MXN} = \text{USD } 0.0933 - \text{USD } 0.0935 \quad \frac{\text{USD}}{\text{MXN}}$$

$$1 \text{ AUD} = \text{-----} \text{ MXN} \quad \frac{\text{MXN}}{\text{AUD}}$$

$$\frac{\text{MXN}}{\text{AUD}} \Rightarrow \frac{\text{MXN}}{\text{USD}} \times \frac{\text{USD}}{\text{AUD}}$$

$$1 \text{ USD} = \text{MXN } \frac{1}{0.0935} - \text{MXN } \frac{1}{0.0933}$$

$$1 \text{ AUD} = \text{USD } 0.6000 - \text{USD } 0.6015$$

Cal. of Cross Rate:-

$$1 \text{ AUD} = \text{MXN } \frac{1}{0.0935} \times 0.6000$$

$$\text{MXN } \frac{1}{0.0733} \times 0.6015$$

$$1 \text{ AUD} = \text{MXN } 6.4171 - 6.4469$$

Short Cut:-

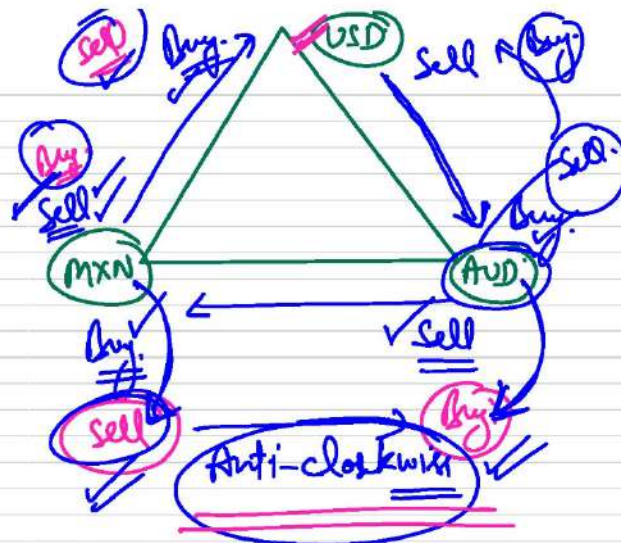
Valuation $\longrightarrow$ Actual

$$1 \text{ AUD} = \text{MXN } 6.4171 - 6.4469$$

$$1 \text{ AUD} = \frac{6.3000}{\text{MXN}} - \frac{6.3025}{\text{MXN}}$$

AUD is Under Val.

AUD is Under-Valued
MXN is Over-valued



Anti-clockwise:-

1st Convert USD into MXN

$$\Rightarrow \text{USD } 10,00,000 \times \frac{1}{0.0925} \text{ MXN}$$

$$\Rightarrow \text{MXN } 10695187.17 \checkmark$$

$$1 \text{ MXN} = \text{USD } 0.0933 - 0.0935$$

$$1 \text{ USD} = \frac{1 \text{ MXN}}{0.0935} - \frac{1 \text{ MXN}}{0.0933}$$

IInd: Convert MXN into AUD:-

$$\Rightarrow \text{MXN } 10695187.17 \times \frac{1 \text{ AUD}}{6.3025}$$

$$\Rightarrow \text{AUD } 1696975.35$$

$$1 \text{ AUD} = \text{MXN } 6.3000 - 6.3025$$

$$1 \text{ MXN} = \frac{1 \text{ AUD}}{6.3025} - \frac{1 \text{ AUD}}{6.3000}$$

IIIrd:- Convert AUD into USD

$$\Rightarrow \text{AUD } 1696975.35 \times 0.6000 \text{ USD}$$

$$\Rightarrow \text{USD } 10,18,185.21$$

$$1 \text{ AUD} = \text{USD } 0.6000 - 0.6015$$

Arbitrage Profit:-

$$\text{USD } 10,18,185.21 - \text{USD } 19,00,000$$

$$\Rightarrow \text{USD } 18,185.21$$

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

$$\text{Then } X = Y \times \text{SR}$$

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

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

✚ Exchange Rate = Price Ratio

Calculation of Forward Rate

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

$$X (1 + I_{\text{₹}}) = Y (1 + I_{\$}) \times \text{FR}$$

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

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

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

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.

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

Case2: When Period is more than 1 Year.

$$\frac{\text{FR (Rs./\$)}}{\text{SR (Rs./\$)}} = \frac{(1 + \text{Inflation Rate (Rs.)})^n}{(1 + \text{Inflation Rate (\$)})^n}$$

QUESTION NO. 9A

The rate of inflation in USA is likely to be 3% per annum and in India it is likely to be 6.5%. The current spot rate of US \$ in India is ₹ 43.40. Find the expected rate of US \$ in India after one year and 3 years from now using purchasing power parity theory.

Solution :

Q 9A

SR $1\$ = ₹ 43.40$ (₹/\$)

Inflation (₹) = 6.5% p.a.
\$ = 3% p.a.

As per PPPT:-

$$\frac{\text{FR (₹/\$)}}{\text{SR (₹/\$)}} = \frac{(1 + \text{Inflation}_{\text{₹}})}{(1 + \text{Inflation}_{\$})}$$

For 1 year FR:-

$$\frac{\text{FR}}{43.40} = \frac{(1 + 0.065)^1}{(1 + 0.03)^1}$$

1 year FR $1\$ = ₹ 44.8748$

For 3 year F/R

$$\frac{FR}{43.40} = \frac{(1+0.065)^3}{(1+0.03)^3}$$

$$\boxed{3 \text{ year F/R } 1\$ = ₹ 47.9763}$$

Extra part:-

For 3 months F/R:-

$$\frac{FR}{43.40} = \frac{(1+0.065 \times \frac{3}{12})^{1.01625}}{(1+0.03 \times \frac{3}{12})}$$

$$\boxed{3 \text{ month F/R } 1\$ = ₹ 43.7769}$$

Extra part:-

Cal. 3 months F/R if inflation is compounded quarterly:-

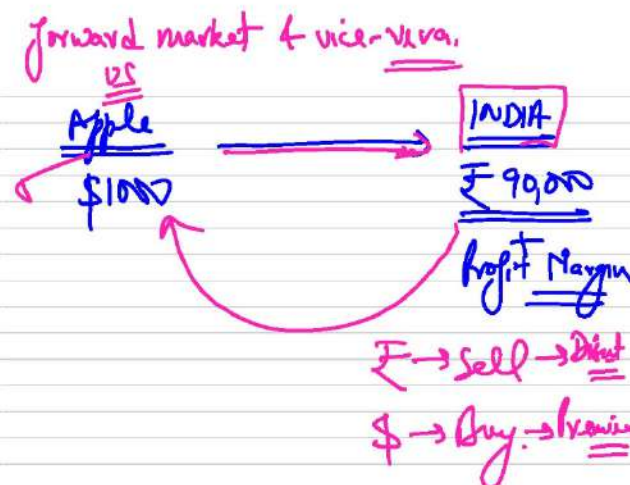
$$\frac{FR}{43.40} = \frac{(1 + \frac{0.065}{4})^{4 \times \frac{3}{12} \times 1.01625}}{(1 + \frac{0.03}{4})^{4 \times \frac{3}{12}}}$$

3 month F/R

$$\boxed{1\$ = ₹ 43.7769}$$

Determination of Premium/Discant with the help of inflation rate:-

If the inflation rate of a country is higher than the currency of that country will be at Discount in the

**QUESTION NO. 9D**

A US investor chose to invest in Sensex for a period of one year. The relevant information is given below.

Size of investment (\$)	20,00,000
Spot rate 1 year ago (₹/\$)	42.50/60
Spot rate now (₹/\$)	43.85/90
Sensex 1 year ago	3,256
Sensex now	3,765
Inflation in US	5%
Inflation in India	9%

- Compute the nominal rate of return to the US investor.
- Compute the real depreciation / appreciation of Rupee.
- What should be the exchange rate if relevant purchasing power parity holds good?
- What will be the real return to an Indian investor in Sensex?

Solution :

Q.9D (MCA)

(i) Nominal rate of return for US Investor.

Size of Investment = \$ 20,00,000

Size of Investment in ₹

$$\text{\$ } 20,00,000 \times \text{₹ } 42.50 = \text{₹ } 851,00,000$$

1\$ = ₹ 42.50 - 42.60

Sensex at To

No. of units of Sensex

$$\frac{\text{₹ } 851,00,000}{3256} \Rightarrow 26125.65$$

Samex at T₁

3765

Value at the end

$$\left[26105.65 \times 3765 \right] \text{ ₹ } 982,87,772$$

Equivalent (\$)

⇒ \$22,38,901

$$\text{₹ } 982,87,772 \times \frac{1}{43.90} \$$$

$$1\$ = \text{₹ } 43.85 - 43.90$$

$$1\$ \Rightarrow \frac{1}{43.90} \$ - \frac{1}{43.85} \$$$

Gain in US \$

\$2,38,901

$$\text{\$ } 22,38,901 - \text{\$ } 20,00,000$$

$$\% \text{ gain} \Rightarrow \frac{\text{\$ } 2,38,901}{\text{\$ } 20,00,000} \times 100$$

$$\Rightarrow 11.95\% \text{ p.a.}$$

Nominal rate of return to US Investor

ii) Nominal Rate

$$1\$ = \text{₹ } 43.85 - 43.90$$

↓
Bid

↓
Ask

Bid Rate:-

$$\boxed{1\$ = \frac{\text{₹ } 43.85}{(1+0.05)} \quad \frac{\text{₹ } 43.90}{(1+0.09)}}$$

Hint:

Exmple: $\text{₹}100 (1+0.10) \Rightarrow \text{₹}110$

Real Value $\rightarrow$ Nominal CF

Nominal $\leftarrow 110 \Rightarrow \text{₹}100 \rightarrow$ Real

$(1+0.10)^{-1}$

Real Exchange Rate:-

$$\frac{1\$}{(1+0.05)} = \frac{\text{₹}43.85}{(1+0.09)}$$

Real Exchange Rate

$$1\$ \Rightarrow \frac{43.85}{(1+0.09)} \times (1.05)$$

$$1\$ = \text{₹}42.24$$

Real Exchange Rate

$1\$ = \text{₹}42.50$

$\Rightarrow 1\$ = \text{₹}42.24$

Real Appreciation of ₹

$$\frac{42.50 - 42.24}{42.50} \times 100$$

$$\Rightarrow 0.61\% \text{ p.a.}$$

(ii) As per PPPT:-

$$\frac{FR(\text{₹}/\$)}{SR(\text{₹}/\$)} = \frac{C(1+\text{inflation } \text{₹})}{C(1+\text{inflation } \$)}$$

Price Ratio

$$\frac{FR}{42.50} = \frac{(1+0.09)}{(1+0.05)}$$

$$FR \Rightarrow 1\$ = ₹ 44.12 \rightarrow \text{Bid Rate}$$

Ask Rate:

$$\frac{FR}{42.60} = \frac{(1+0.09)}{(1+0.05)}$$

$$1\$ = ₹ 44.22 \rightarrow \text{Ask Rate}$$

$$FR \quad 1\$ = ₹ 44.12 - 44.22$$

(iv) Real Rate of Return to Indian Investor for Sensex:-

Nominal Return:-

$$\frac{3765 - 3256}{3256} \times 100$$

$$\Rightarrow \underline{15.63\% \text{ p.a.}}$$

Relationship:-

$$(1 + \text{Nominal Rate}) = (1 + \text{Real Rate}) (1 + \text{inflation rate})$$

$$(1 + 0.1563) = (1 + RR) (1 + 0.09)$$

$$(1 + RR) = \frac{(1 + 0.1563)}{(1 + 0.09)}$$

$$RR = \left[\frac{1 + 0.1563}{1 + 0.09} \right] - 1$$

$$\text{Real Rate of Return} \Rightarrow \underline{6.08\% \text{ p.a.}}$$

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.

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

Note:

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

Case1: When Period is less than 1 Year.

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

Case2: When Period is more than 1 Year.

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

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.

QUESTION NO. 10C

The US Dollar is selling in India at ₹ 72.50. If the interest rate for a 3 months borrowing in India is 6% per annum and the corresponding rate in USA is 2.75%.

- Do you expect that US dollar will be at a premium or at discount in the Indian Forex Market?
- What will be the expected 3-months forward rate for US dollar in India?
- What will be the rate of forward premium or discount?

Solution :

Q.10C

SR 1\$ = ₹ 72.50

Interest rates → ₹ → 6% p.a.
\$ → 2.75% p.a.

(i) Under the given situation, the USD is expected to quote at a premium in India as the interest rate is higher in India.

As we know as per IRPT, country with higher interest rates will be at Discount in future & country with lower rate will be at premium in future.

Since interest rate in USA is.

2.75% is lower than India is 6%,
US Dollar will be at a premium.

(ii) Cal. 3 months Forward Rate:-

As per IRPT:-

$$\frac{FR(\text{₹/₹})}{SR(\text{₹/₹})} = \frac{(1 + \text{Interest ₹})}{(1 + \text{Interest \$})}$$

$$\frac{FR}{72.50} = \frac{(1 + 0.06 \times \frac{3}{12})^{1.015}}{(1 + 0.0275 \times \frac{3}{12})}$$

$$\boxed{\text{3 months FR } 1\$ = ₹ 73.0850}$$

(iii) Rate of Premium for US Dollar:-

$$SR \ 1\$ = ₹ 72.50$$

$$\text{3 months FR } 1\$ = ₹ 73.0850$$

% Premium for Dollar:-

$$\Rightarrow \frac{FR - SR}{SR} \times \frac{12}{\text{Forward period}} \times 100$$

$$\Rightarrow \frac{73.0850 - 72.50}{72.50} \times \frac{12}{3} \times 100$$

$$\Rightarrow \underline{\underline{3.23\% \text{ p.a. (Premium for \$)}}}$$

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 in one country.	Investment & Borrowing rate of a given currency 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.
- The rule is to "Borrow from one country & Invest in another Country".

Suppose Interest Rate of India is $INT₹$ And USA is $INT₈$. Spot Rate is $1\$ = ₹ SR$, Forward Rate $\Rightarrow 1\$ = ₹ FR$

Let assume Investor is having ₹ A for investment

Option 1: When investor invest ₹ A in India:

Amount of ₹ Received after one year

$$A_1 = A (1 + INT₹)$$

Option 2: When investor invest ₹ A in USA:

Amount of Equivalent ₹ Received after one year

$$A_2 = \left[\frac{A}{SR} \$ (1 + INT\$) \right] \times FR$$

IF $A_1 = A_2$	IF $A_1 > A_2$	IF $A_1 < A_2$
No arbitrage opportunity.	Arbitrage Opportunity is Possible. Arbitrager should invest in India (Home Country) & borrow from USA (Foreign Country)	Arbitrage opportunity is possible. Arbitrager should invest in USA (Foreign Country) & borrow from India (Home Country)

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.

QUESTION NO. 11A

Given the following information:

Exchange Rates	Canadian Dollar 0.665 per DM (spot)
	Canadian Dollar 0.670 per DM (3 months)
Interest rates	DM 7% p.a.
	Canadian Dollar 9% p.a.

What operations would be carried out to take the possible arbitrage gains?

Solution :

Q. 11A

S/R $1 DM = Can \$ 0.665$

3mth F/R $1 DM = Can \$ 0.670$

Intt. Rates:- DM = 7% p.a.
Can \$ = 9% p.a.

Short-Cut :-

W.No. Add.1 As per IRPT:- (As per val.)

$$\frac{FR (Can \$ / DM)}{SR (Can \$ / DM)} = \frac{CF + Intt. Can \$}{CF + Intt. DM}$$

$$\frac{0.670}{0.665} = \frac{(1 + 9\% \times \frac{3}{12})}{(1 + 7\% \times \frac{3}{12})}$$

$$1.0252 \Rightarrow (1 + r \times \frac{3}{12})$$

$$r = .1008 \text{ or } 10.08\% \text{ p.a.}$$

As per our Val.

Can & Int. Rates

$$10.08\% \text{ p.a.}$$

Actual Rate

Can & Int. Rate

$$9\% \text{ p.a.}$$

Under-valued

Buy $\rightarrow$ Borrow

Action: Borrow from Canada & invest in Germany.

Q1:2

$$\frac{FR(\text{Can/DM})}{SR(\text{Can/DM})} = \frac{(1 + r_{\text{int Can}})}{(1 + r_{\text{int DM}})}$$

$$\Rightarrow \frac{.670}{.615} = \frac{(1 + .09 \times \frac{3}{12})}{(1 + r \times \frac{3}{12})}$$

$$1.0149 = (1 + r \times \frac{3}{12})$$

$$r \Rightarrow 5.95\% \text{ p.a.}$$

Valuation

$$DM = 5.95\% \text{ p.a.}$$

Actual

$$DM = 7\% \text{ p.a.}$$

Over-valued

Sell $\rightarrow$ Invest

Action: Invest in Germany & Borrow from Canada.

Alt 3

$$FR = \frac{(1 + 0.09 \times \frac{2}{12})}{(1 + 0.07 \times \frac{2}{12})} \times 1.0225$$

3 months FR

$$1 \text{ DM} = \text{Can \$ } 0.6683 \Rightarrow \text{Valuation}$$

<u>Valuation</u>	<u>Actual</u>
1 DM = Can \$ 0.6683	1 DM = Can \$ 0.670
	Overvalued $\rightarrow$ DM
	DM $\rightarrow$ Sell

Action: Borrow in Can \$ $\rightarrow$ Invest in DM / Germany.

Arbitrage Process:-

Notional Amount = Can \$ 1,00,000

Borrow Can \$ 1,00,000 & Invest in Germany.
@9% $t = 3 \text{ months}$ @7%

Step 1:- Amount repaid after 3 months with interest:-

$$\Rightarrow \text{Can \$ } 1,00,000 (1 + 0.09 \times \frac{2}{12})$$

$$\Rightarrow \text{Can \$ } 102,250$$

Step 2:- Invest in Germany:- First convert Can \$ into DM using SR & then invest in DM) - U

$$\text{₹ } 1,00,000 \times \frac{1}{0.665} \text{ DM}$$

$$\Rightarrow \text{DM } 150375.94$$

$$\text{S/R } 1 \text{ DM} = 0.665 \text{ ₹}$$

$$1 \text{ ₹} = \frac{1}{0.665} \text{ DM}$$

Step 3:- Amount received after 3 months with interest:-

$$\Rightarrow \text{DM } 150375.94 \left(1 + 0.07 \times \frac{3}{12}\right)$$

$$\Rightarrow \text{DM } 153007.52$$

Step 4:- Convert DM into ₹ using 3 months FR:-

$$\Rightarrow \text{DM } 153007.52 \times 0.670 \text{ ₹}$$

$$\text{3 months FR} = 1 \text{ DM} = 0.670 \text{ ₹} \Rightarrow \text{₹ } 102515.04$$

Arbitrage Profit:-

$$\Rightarrow \text{₹ } 102515.04 - \text{₹ } 102250$$

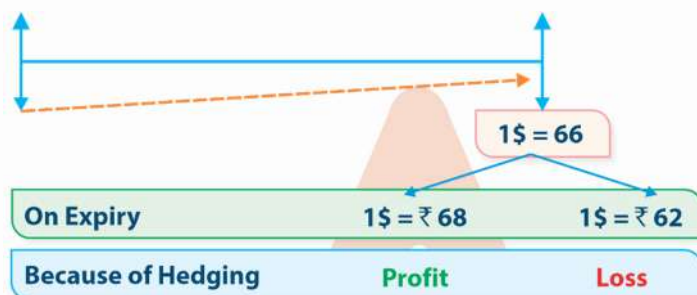
$$\Rightarrow \text{₹ } 265.04$$

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



QUESTION NO. 12B

ABC Exporters Company, a UK company, is due to receive 500000 Northland dollars in 6 months' time for goods supplied. The company decides to hedge its currency exposure by using forward market. The short-time interest rate in the UK is 12% per annum and the equivalent rate in Northland is 15%. Spot rate of exchange is 2.5 Northland dollars to the UKP.

You are required: To calculate how much Exporters Company actually gains or losses as a result of the hedging transaction if, at the end of six months, the UKP in relation to Northland dollar, had

- gained 4%,
- lost 2% or
- Remained stable.

You may assume that forward rate of exchange simply reflects interest differential in the two countries (i.e. it reflects the interest rate parity analysis of forward rates).

Solution :

Q.12B (4) 3-4 times
(8 marks)

W.No. Cal. of FR using IRT :-

$$S/R \text{ 1 UKL} \Rightarrow 2.5 \text{ ND} \quad (\text{ND/UKL})$$

Int. Rates $\rightarrow$ UKL 12% p.a.
ND 15% p.a.

As per IRT :-

$$\frac{FR(\text{ND/UKL})}{SR(\text{ND/UKL})} = \frac{(1 + \text{Int. ND})}{(1 + \text{Int. UKL})}$$

$$\Rightarrow \frac{FR}{2.5} = \frac{(1 + 15\% \times \frac{6}{12})}{(1 + 12\% \times \frac{6}{12})}$$

$$\boxed{\text{6 months FIR 1 UKL} \Rightarrow 2.5354 \text{ ND}} \quad \checkmark$$

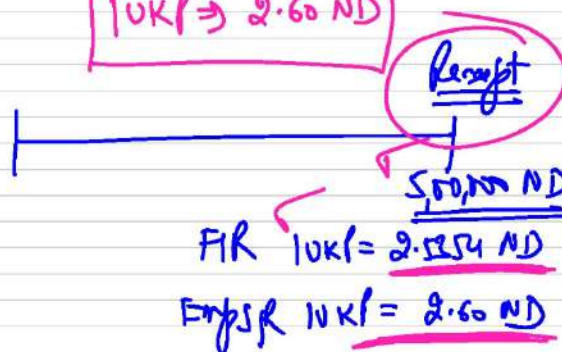
Ques I: If UKL gains by 4% at the end of 6 months in relation to ND:-

Cal. of Expected S/R after 6 months

$$S/R \text{ 1 UKL} = 2.5 \text{ ND} [1 + 0.04]$$

Exp. S/R on Expiry:- (i.e. after 6 months)

$$\boxed{1 \text{ UKL} \Rightarrow 2.60 \text{ ND}}$$



Amount received using FR (with hedging)

$$\text{ND } 500,000 \times \frac{1}{2.5354} \text{ UK£} = \text{UK£ } 197,207.54$$

$$\text{FR } 1 \text{ UK£} = 2.5354 \text{ ND}$$

$$1 \text{ ND} = \frac{1}{2.5354} \text{ UK£}$$

Amount received using Exp. S/R

(without hedging)

$$500,000 \text{ ND} \times \frac{1}{2.6} \text{ UK£} = \text{UK£ } 192,307.69$$

Exp. S/R

$$1 \text{ UK£} = 2.6 \text{ ND}$$

$$1 \text{ ND} = \frac{1}{2.6} \text{ UK£}$$

Because of hedging. UK£ 4899.85
(Profit due to hedging)

Case II: if UK£ drops by 2%W.No: Cal. of Expected S/R after 6 months

$$\text{S/R } 1 \text{ UK£} = 2.5 \text{ ND} (1 - 0.02)$$

$$\boxed{\text{Exp. S/R } 1 \text{ UK£} = 2.45 \text{ ND}}$$

Amount received using FR

(with hedging)

$$500,000 \text{ ND} \times \frac{1}{2.5354} \text{ UK£} = \text{UK£ } 197,207.54$$

Am. received using Exp. S/R

$$5,00,000 \text{ ND} \times \frac{1}{2.45} \text{ UKP} \Rightarrow \text{UKP } 204081.63$$

loss due to hedging UKP 6874.09

Case III:- If UKP remains stable:-

Exp. S/R on Expiry

$$1 \text{ UKP} = 2.5 \text{ ND} \checkmark$$

Amt. received using FK

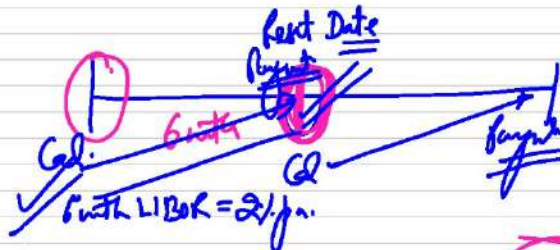
$$5,00,000 \text{ ND} \times \frac{1}{2.5354} \text{ UKP} \Rightarrow \text{UKP } 197207.59$$

Amt. received using Exp. S/R

$$5,00,000 \text{ ND} \times \frac{1}{2.5} \text{ UKP} \Rightarrow \text{UKP } 2,00,000$$

2.5

loss due to hedging UKP 2792.46



Current 6 months LIBOR is 2% p.a.

6 months contract rate

1 with LIBOR $\Rightarrow$ 5% p.a. ✓
2 with LIBOR $\Rightarrow$ 5.5% p.a. ✓

QUESTION NO. 12D

Excel Exporters are holding an Export bill in United States Dollar (USD) 1,00,000 due 60 days hence. They are worried about the falling USD value which is currently at ₹ 45.60 per USD. The concerned Export Consignment has been priced on an Exchange rate of ₹ 45.50 per USD. The Firm's Bankers have quoted a 60-day forward rate of ₹ 45.20.

Calculate:

- Rate of discount quoted by the Bank
- The probable loss of operating profit if the forward sale is agreed to.

Solution :

Q.12D

S/R $1\$ = ₹ 45.60$ ✓
 60 Days F/R $1\$ = ₹ 45.20$ ✓

Price of Export Bill $1\$ = ₹ 45.50$

(i) Rate of Discount quoted by the Bank:-

Discount on Dollar:-

$$\frac{FR - SR}{SR} \times \frac{365}{\text{Forward Period}} \times 100$$

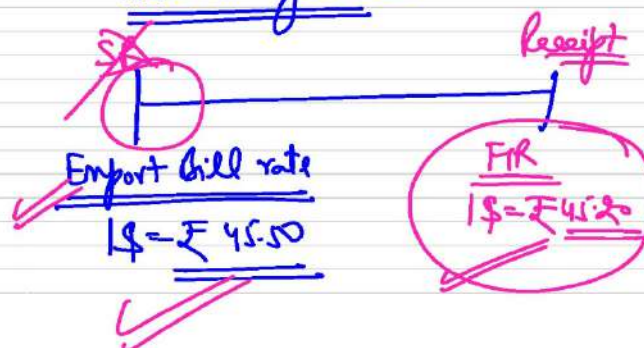
1 year = 365 Days

$$\Rightarrow \frac{45.20 - 45.60}{45.60} \times \frac{365}{60} \times 100$$

$$\Rightarrow 5.336\% \text{ p.a.}$$

Discount on \$'

(ii) Expected operating loss if forward sale is agreed:-



Operating Loss:-

$$\Rightarrow [₹45.50 - ₹45.20] \times ₹1,00,000$$

$$\Rightarrow ₹30,000 \checkmark$$

QUESTION NO. 12F

XYZ has taken a six-month loan from its foreign collaborator for USD 2 millions. Interest is payable on maturity @ LIBOR plus 1%. The following information is available:

Spot Rate	INR/USD	68.5275
6 months Forward rate	INR/USD	68.4575
6 months LIBOR for USD	2%	
6 months LIBOR for INR	6%	
You are required to :		

- Calculate Rupee requirements if forward cover is taken.
- Advise the company on the forward cover.

What will be your opinion if spot rate of INR/USD is 68.4275 ?

Solution :

Q.12F

6 mths F/R

INR/USD

68.4575

$$\boxed{1 \text{ USD} = \text{INR } 68.4575}$$

Total Commitment in Dollars:-

Principal Amount

USD 20,00,000

+ int. on it

$$\left[20,00,000 \times 3\% \times \frac{6}{12} \right] \text{ USD } 30,000$$

[2% + 1%]

Total Commitment in ₹ 20,30,000 ✓

Rupee requirement using 6 mths F/R

$$(\text{USD } 20,20,000 \times ₹ 68.4575) \\ \Rightarrow ₹ 13,89,687.25$$

(ii) Forward Rate as per IRPT:-

$$\frac{FR ₹/\$}{SR ₹/\$} = \frac{C(1+2\text{mt}\% \cdot \frac{F}{S})}{C(1+2\text{mt}\% \cdot \frac{F}{S})}$$

$$\frac{FR}{68.5275} = \frac{C(1+0.06 \times \frac{6}{12})}{C(1+0.02 \times \frac{6}{12})}$$

$$\text{6mths FR } \boxed{1 \text{ USD} = \text{INR } 69.8845}$$

The Co. should take forward cover because as per IRPT, the rate offer

6mths is expected to be higher than actual forward rate.

However, if spot rate is ₹ 68.4575/\$
The expected rate as per IRPT shall be:-

As per IRPT:-

$$\frac{FR (₹/\$)}{SR (₹/\$)} = \frac{C(1+2\text{mt}\% \cdot \frac{F}{S})}{C(1+2\text{mt}\% \cdot \frac{F}{S})}$$

$$\frac{FR}{68.4575} = \frac{C(1+0.06 \times \frac{6}{12})}{C(1+0.02 \times \frac{6}{12})}$$

6mths FR

$$\boxed{1 \text{ USD} = \text{INR } 69.7825}$$

Thus, still the company should take forward cover.

QUESTION NO. 12G

On 1st February 2020, XYZ Ltd. a laptop manufacturer imported a particular type of Memory Chips from SKH Semiconductor of South Korea. The payment is due in one month from the date of Invoice, amounting to 1190 Million South Korean Won (SKW). Following Spot Exchange Rates (1st February) are quoted in two different markets:

USD/ INR	75.00/ 75.50	in Mumbai
USD/ SKW	1190.00/ 1190.75	in New York

Since hedging of Foreign Exchange Risk was part of company's strategic policy and no contract for hedging in SKW was available at any in-shore market, it approached an off-shore Non- Deliverable Forward (NDF) Market for hedging the same risk.

In NDF Market a dealer quoted one-month USD/ SKW at 1190.00/1190.50 for notional amount of USD 100,000 to be settled at reference rate declared by Bank of Korea.

After 1 month (1st March 2020) the dealer agreed for SKW 1185/ USD as rate for settlement and on the same day the Spot Rates in the above markets were as follows:

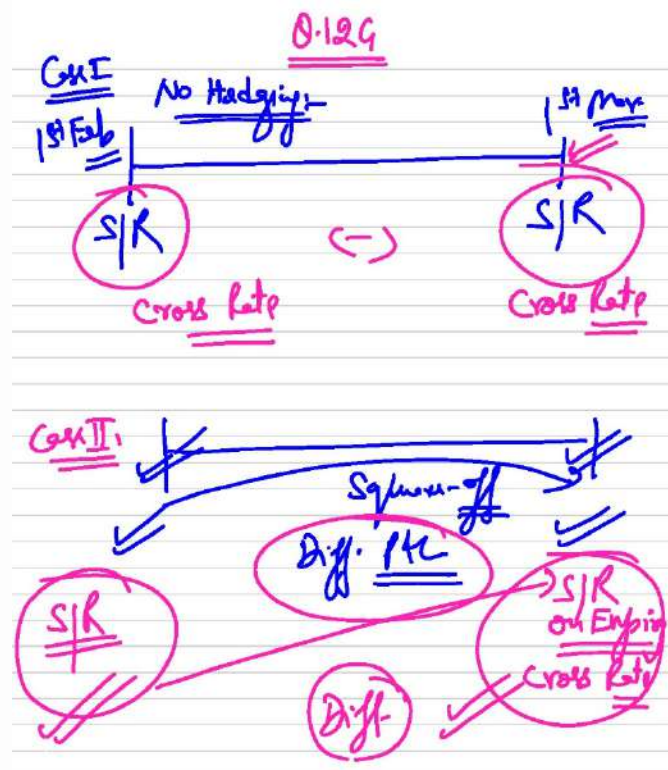
USD/ INR	75.50/ 75.75	in Mumbai
USD/ SKW	1188.00/ 1188.50	in New York

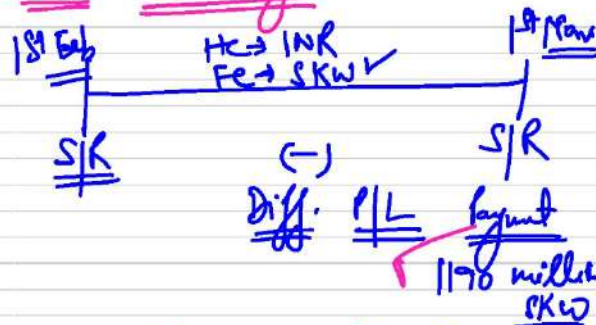
Analyze the position of company under each of the following cases, comparing with Spot Position of 1st February:

- Do Nothing.
- Opting for NDF Contract.

Note: Both ₹/ SKW Rate and final payment (to be computed in ₹ Lakh) to be rounded off upto 4 decimal points.

Solution :



Concl: Do Nothing:-W No 1 Cal. of Cross Rate:- (S/R on 1st Feb)

$$1 \text{ USD} = \text{INR } 75.00 - 75.50 \quad \frac{\text{INR}}{\text{USD}}$$

$$1 \text{ USD} \Rightarrow \text{SKW } 1190.00 - 1190.75 \quad \frac{\text{SKW}}{\text{USD}}$$

$$1 \text{ SKW} = \text{INR } \frac{75.50}{1190.75} - \frac{75.00}{1190.00}$$

$$\frac{\text{INR}}{\text{SKW}} = \frac{\text{INR}}{\text{USD}} \times \frac{\text{USD}}{\text{SKW}}$$

$$1 \text{ SKW} \Rightarrow \frac{1}{1190.75} - \frac{1}{1190} \text{ USD}$$

$$1 \text{ USD} = \text{INR } 75.00 - 75.50$$

$$1 \text{ SKW} = \text{INR } 75 \times \frac{1}{1190.75} - 75.50 \times \frac{1}{1190}$$

$$1 \text{ SKW} \Rightarrow \text{INR } 0.0630 - 0.0634$$

1st March:-

$$1 \text{ SKW} \Rightarrow 75.50 \times \frac{1}{1188.50} - 75.75 \times \frac{1}{1188}$$

S/R on 1st March.

$$1 \text{ SKW} = 0.0635 - 0.0638 \text{ INR}$$

✓✓ SR SR
 $1 \text{ SKW} = 1 \text{ INR } 0.0634$ $1 \text{ SKW} = 0.0638$

Amount payable to Manufacturer:-

(On 1st Feb)

$(1190 \text{ million SKW} \times 0.0634 \text{ INR})$

$\Rightarrow \text{₹ } 754.4600$
₹ 754.4600
₹ 754.4600

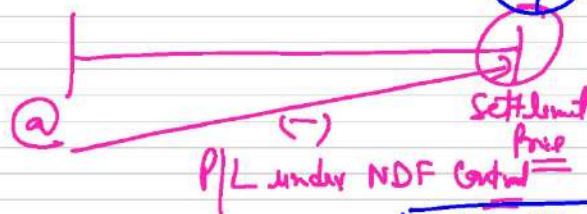
Amount payable to Manufacturer on
1st March

$1190 \text{ million SKW} \times 0.0638 \text{ INR}$

$\Rightarrow \text{₹ } 759.2200$
₹ 759.2200
₹ 759.2200

Exchange Rate loss / Exp loss ₹ 4.7600

(ii) Hedging in NDF Market:-



1190 SKW
 million
Payment

- 1) SKW Buy $\rightarrow$ USD Sell $\rightarrow$ Available
- 2) SKW Sell $\rightarrow$ USD Buy $\rightarrow$ Available
Settlement Price

⇒ Co. needs SKW after 1 month, it will take long position in SKW & after 1 month it will reverse its position at Settlement rate.

Cal. of Profit/Loss under NDF Contract:

Buy SKW & Sell USD

⇒ USD 10,00,000

$$1190 \text{ million SKW} \times \frac{1}{1190} \text{ USD}$$

$$1 \text{ USD} = \text{SKW } 1190.00 - 1190.50$$

$$1 \text{ SKW} = \frac{1}{1190.50} - \frac{1}{1190.00} \text{ USD}$$

To Square-off:

Sell SKW & Buy USD

⇒ USD 1004219

$$1190 \text{ million SKW} \times \frac{1}{1185} \text{ USD}$$

$$1 \text{ USD} = 1185 \text{ SKW}$$

$$1 \text{ SKW} = \frac{1}{1185} \text{ USD}$$

Profit under the
NDF Contract

USD 4219 ✓

Final Position:-

Amount payable in Spot MKT. → ₹ 757.2200
on 1st March Debit

less: Profit from NDF MKT. → ₹ 3.1853

$$USD 4219 \times ₹ 75.50$$

Debit

$$S/R \text{ 10SD} = \text{INR } 75.50 - 75.75$$

Net payout $\text{₹ } 756.0347$
Jah

Cal. of Enchange loss / Expected loss:-

S/R	Total payout under CNDF
$\text{₹ } 754.4600$ Jah	$\text{₹ } 756.0347$ Jah
(-)	

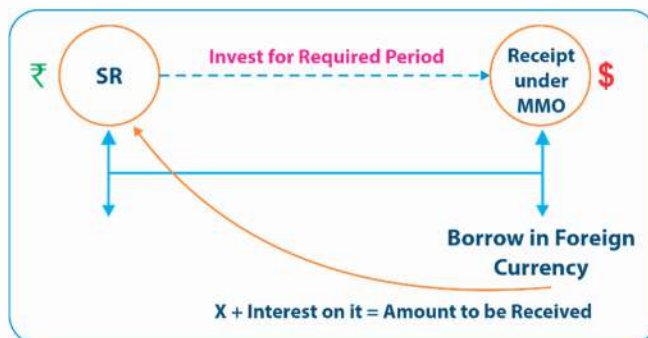
Expected loss / Enchange loss
 $\Rightarrow \text{₹ } 1.5747$ Jah

Decision:

Since, Enchange loss / Expected loss in case of NDF hedging is less so we opted for NDF hedging (Option 2)

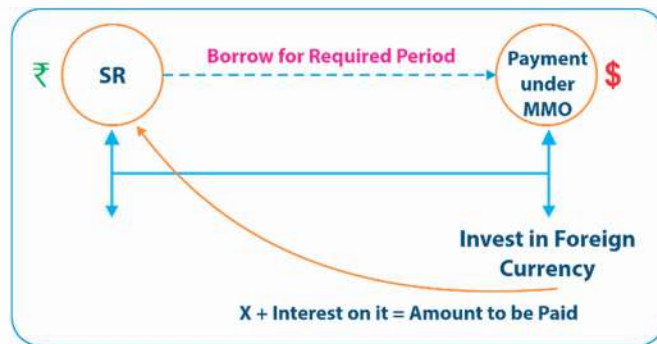
LOS 18 : Money Market Operations

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



- Step 1:** Invest in Foreign currency. Amount of investment should be such that, "Amount Invested + Interest on it" becomes equal to amount to be paid
- Step 2:** 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]

QUESTION NO. 13D

H Ltd. is an Indian firm exporting handicrafts to North America. All the exports are invoiced in US\$. The firm is considering the use of money market or forward market to cover the receivable of \$50,000 expected to be realized in 3 months' time and has the following information from its banker:

	Exchange Rates
Spot	₹ / \$ 72.65/73
3-m forward	₹ / \$ 72.95/73.40

The borrowing rates in US and India are 6 % and 12% p.a. and the deposit rates are 4% and 9% p.a. respectively.

- Which option is better for H Ltd. ?
- Assume that H Ltd. anticipates the spot exchange rate in 3-months time to be equal to the current 3-months forward rate. After 3-months the spot exchange rate turned out to be ₹/\$: 73/73.42. What is the foreign exchange exposure and risk of H Ltd.?

Solution :

Q.13D

INDIA 3mth USA

\$50,000
Receipt

(i) (a) Money Mkt. Hedge:-

Step 1:- Borrow in \$' & Amount of Borrowing should be such that:-

$$X + X \times \text{int.} = \text{Amt to be received}$$

$$\Rightarrow X + X \times 6\% \times \frac{3}{12} = \$50,000$$

$$\Rightarrow X = \$49261.08 \checkmark$$

Step 2:- Convert Borrowed Amount into ₹ using Current Spot Rate:-

$$\begin{aligned} \$ 49281.08 \times ₹ 72.65 \\ \Rightarrow ₹ 3578817.46 \end{aligned}$$

SR $1\$ = ₹ 72.65 - ₹ 73.00$

Step 3:- Invest in ₹

Amount received after 3 months:-

$$₹ 3578817.46 \left(1 + 0.09 \times \frac{3}{12} \right)$$

$$\Rightarrow ₹ 3659340.85$$

(Receipt under MM Hedge)

⑤ Receipt under Forward Hedging:-

$$\Rightarrow \$ 50,000 \times ₹ 72.95$$

$$\Rightarrow ₹ 36,47,500$$

3 months F/R

$1\$ = ₹ 72.95 - ₹ 73.40$

Decision: In this case, more ₹ will be received under the MM Hedge.
Hence, it is better option.

(ii) Foreign Exchange Exposure to HED:-

Expected Realization as per Forward rate:-

$$\$50,000 \times ₹72.95 \Rightarrow ₹36,47,500$$

Actual Realization as
per Actual Rate
(No Hedging)

$$\$50,000 \times ₹72.00 \Rightarrow ₹36,00,000$$

Gain / Risk

₹2,50,000 ✓

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

Example:

1 Euro = £ 1.7846 ± 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.
- Step 2:** 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.

$$(1 + \text{RADR}) = (1 + \text{Risk-free rate}) (1 + \text{Risk Premium})$$

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

QUESTION NO. 15A

Ram Pharma Ltd. an Indian based MNC, is evaluating an overseas investment proposal. Ram Pharma's exports of automobiles products have increased to such an extent that it is considering a project to build a

plant in the U.S. The project will entail an initial outlay of \$100 million and is expected to generate the following cash flows over its four year life.

Year	1	2	3	4
Cash Flows (in \$ in millions)	30	40	50	60

The current exchange rate is ₹ 45 per US \$, the risk free rate in India 11% and the risk free rate in US is 6%. Ram Pharma's rupee return on a project of this kind is 15%. Should Ram Pharma undertake this project?

Solution :

0.15A

1) Home Currency Approach:-

W.No:- Cal. of FR:-

Using IRPT:-

$$\frac{FR(\text{₹}/\$)}{SR(\text{₹}/\$)} = \frac{(1 + \text{Interest } \text{₹})}{(1 + \text{Interest } \$)}$$

1 year FR $\frac{FR}{45} = \frac{(1 + 11\%)^{4 \times 1/3/4}}{(1 + 6\%)^{4 \times 1/3/4}}$

1 year FR $1\$ = ₹ 47.12$

2 year FR $1\$ = ₹ 49.35$

3 year FR $1\$ = ₹ 51.67$

4 year FR $1\$ = ₹ 54.11$

Cal. of NPV

Year	CF (\$ millions)	Ex. Rate	CF (₹ millions)	DR @ 15%	PV (₹ millions)
0	-100	45	-4500	1	-4500
1	30	47.12	1413.60	0.8696	1229.27
2	40	49.35	1974	0.7561	1492.54
3	50	51.67	2583.50	0.6575	1698.65
4	60	54.11	3246.60	0.5718	1856.41

NPV = 1229.27 + 1492.54 + 1698.65 + 1856.41 - 4500 = 3776.87

Since NPV is positive, the project should be undertaken.

$$NPV \downarrow \text{Hc} \quad \text{₹ 1776.87 million}$$

Since, NPV is positive, Ram Pharma should undertake the project.

2) Foreign Currency Approach:-

W.No. 2 Calculation of Foreign Currency Discount Rate is. RADR

$$(1 + RADR) = (1 + RFR) (1 + \text{Risk Premium})$$

$$(1 + RADR) = (1 + 0.06) (1 + 0.036)$$

$$\text{RADR} \Rightarrow 9.82\% \text{ p.a.}$$

Fe → DR

W.No. 3:- Cal. of Risk Premium:-

$$(1 + RADR) = (1 + RFR) (1 + RP)$$

$$(1 + 15) = (1 + 11) (1 + RP)$$

$$\text{Risk Premium} \Rightarrow 3.60\% \text{ p.a.}$$

Final Answer:- Cal. of NPV:- (FCF)

<u>Year</u>	<u>CF (₹ million)</u>	<u>DR = 9.82%</u>	<u>PV (₹ million)</u>
0	-100	1	-100
1	30	.9106	27.318
2	40	.8292	33.168
3	50	.7550	37.75
4	60	.6875	41.25
NPV ⇒ ₹			<u>37.486 million</u>

NPV in ₹

$$\Rightarrow \$ 39.486 \text{ million} \times ₹45$$

$\Rightarrow ₹ 1776.87 \text{ million}$

Hence Proved

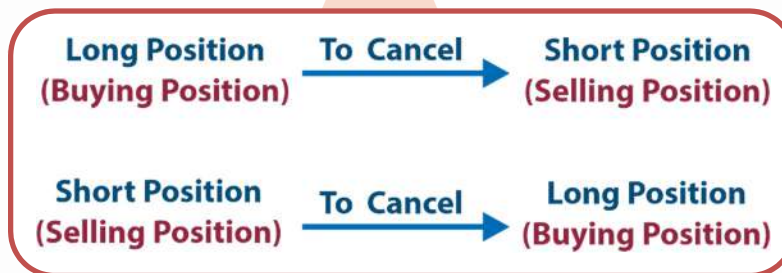
Since, NPV is positive, Ram Sharma should accept the project.

LOS 21 : Cancellation/Modification under Forward Contract

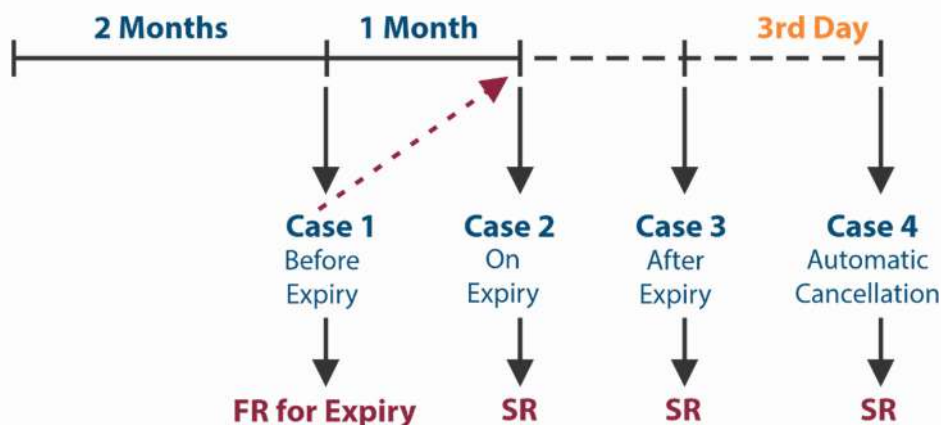
Forward Contract are legal binding contracts, which must be fulfilled by each and every party. In case of cancellation of Forward Contracts, following rules must be followed:

How to cancel Forward Contract

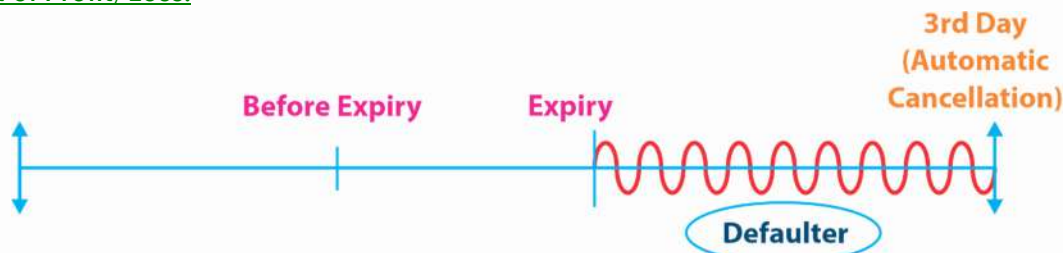
Forward Contracts must be cancelled by entering into a reverse contract.



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.

Settlement of Profit/Loss:

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

QUESTION NO. 16B

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:

Spot	₹ 65.2900/2975 per US\$
Spot/ April	3000/ 3100
Spot/ May	6000/ 6100

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.

Solution :

0.16%

From the point of view of Bank:-

Bank → Sale Contract of US\$ 2,50,000
@ ₹ 65.3450 ⇒ ₹ 16,33,625

To Cancel

purchase Contract of US\$ 2,50,000
@ ₹ 65.2247 ⇒ ₹ 16,30,617.50

⇒ ₹ 30,018.50

Profit to Bank/ Loss to Customer

+ Flat charges

W.No:- Amt payable by Customer

S/R on 15th March:-

£ = ₹ 65.2900 — ₹ 65.2975

Exchge Marg. 10% (-) (+)

0.0653 0.0653

TT Rate £ = ₹ 65.2247 — 65.3628

LOS 22 : Extension of Forward Contract

Step 1: Cancellation of original Contract

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

QUESTION NO. 17B

An importer requests his bank to extend the forward contract of US\$ 20,000 which is due for maturity on 30th October, 2010, for a further period of 3 months. He agrees to pay the required margin money for such extension of the contract.

Contracted Rate-US\$ 1	₹ 42.32
The US Dollar quoted on	30-10-2010
Spot	41.5000 / 41.5200
3 month's Premium	0.87% / 0.93%

Margin money for buying and selling rate is 0.075% and 0.20% respectively.

Compute:

- The cost to the importer in respect of the extension of the forward contract, and
- The rate of new forward contract.

Solution :

Q.17B

From Customer point-of-view:-

Customer:-

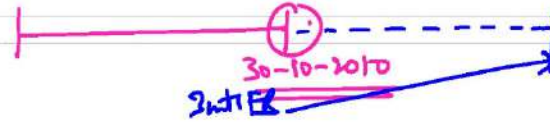
Buy Contract of US\$ 20,000 = ₹ 846400

@ ₹ 42.32

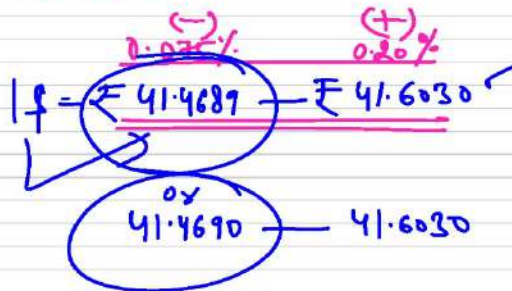
To Cancel:-

Sell Contract of US\$ 20,000 $\Rightarrow$ ₹ 829,380
 @ ₹ 41.4690

Loss to Customer / Profit to Bank
 Cost to Importer for $\rightarrow$ ₹ 17,020
 Extension

W.No:-S/R

S/R 1\$ = ₹ 41.5000 — 41.5200



(b) Rate at which new contract will be entered:-

Cal. of 3mth F/R:-

S/R 1\$ = ₹ 41.5000 — 41.5200

S/R (+) 00.3611 00.3861

0.97% / 0.93%

3mth F/R 1\$ = ₹ 41.8611 — 41.9061
 (1 - 0.00075) (1 + 0.002)

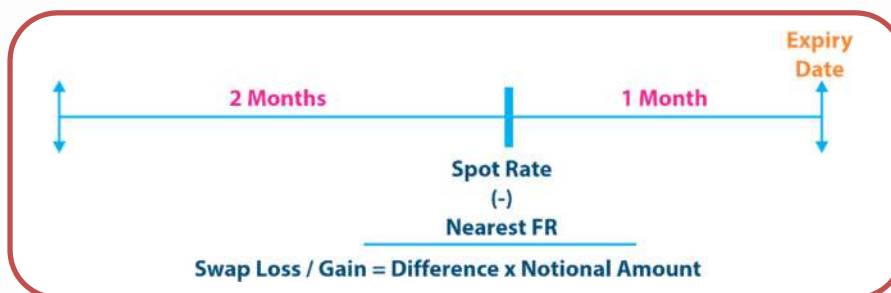
3mth F/R 1\$ = ₹ 41.8297 — 41.7899

Importer / Customer will enter into the purchase contract of US\$ 20,000 after 3mths @ ₹ 41.7899 ✓

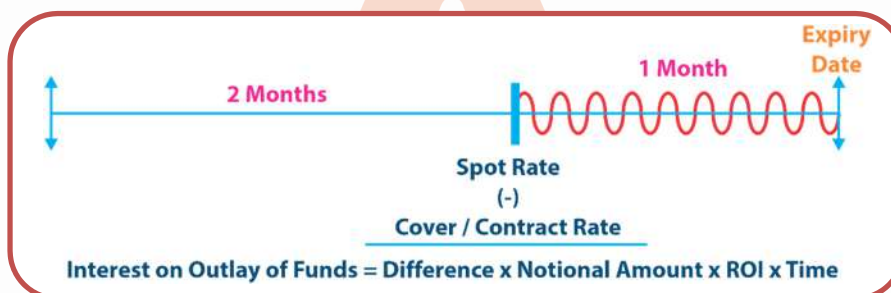
LOS 23 : Early Delivery

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.



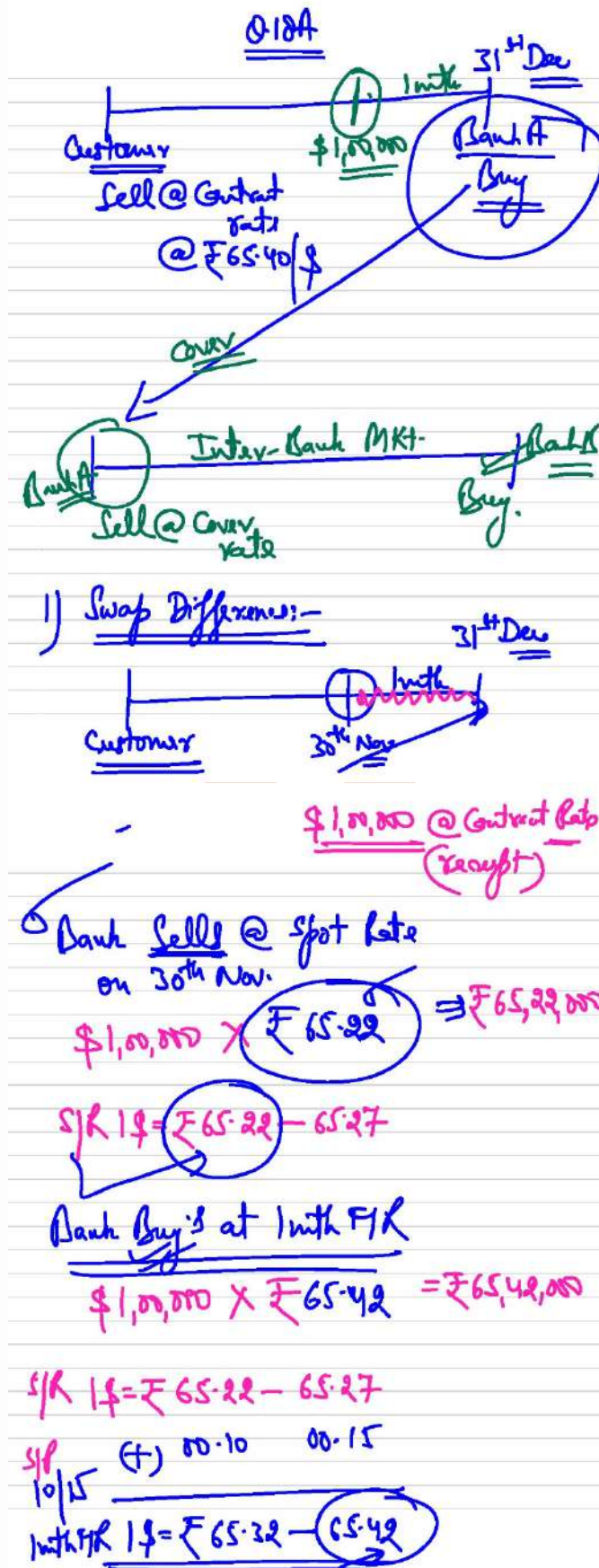
QUESTION NO. 18A

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 30 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%.

Solution :



✓ Swap loss $\Rightarrow \underline{\underline{₹ 20,000}}$

W.No.: 2 Interest on Outlay of funds:-

Bank Buy's [On Delivery Date]

@ Contract rate

$$₹ 1,00,000 \times ₹ 65.40 \Rightarrow ₹ 65,40,000$$

Bank sell's

@ S/R

$$₹ 1,00,000 \times ₹ 65.22 \Rightarrow ₹ 65,22,000$$

Outlay of funds $\underline{\underline{₹ 18000}}$

Interest on Outlay of funds:-

$$\Rightarrow ₹ 18000 \times 18\% \times \frac{1}{12} \Rightarrow \underline{\underline{₹ 270}}$$

Main Soln:-

Charges for Early Delivery:-

$$\text{Swap loss} \Rightarrow ₹ 20,000$$

$$\text{Intt. on outlay of funds} \Rightarrow ₹ 270$$

$$\underline{\underline{₹ 20,270}}$$

Net Inflow to Mr. X

Amount received on sale of
\$1,00,000 @ Contract rate

$$\text{i.e. } \$1,00,000 \times ₹ 65.40 \Rightarrow ₹ 65,40,000$$

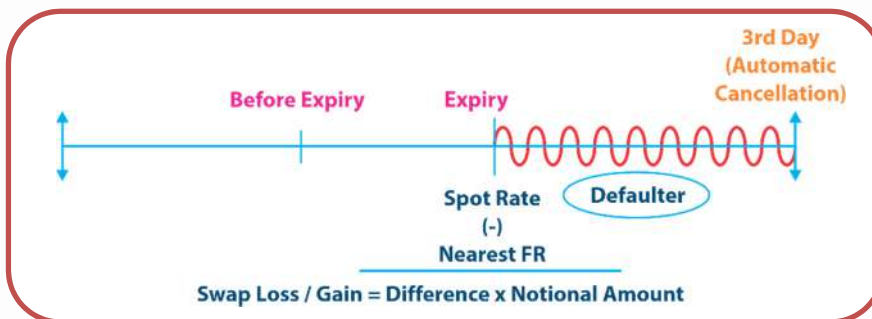
less: Charges for Early Delivery $\Rightarrow ₹ 20,270$

$$\text{Net Inflow to Mr. X} \quad \underline{\underline{₹ 65,19,730}}$$

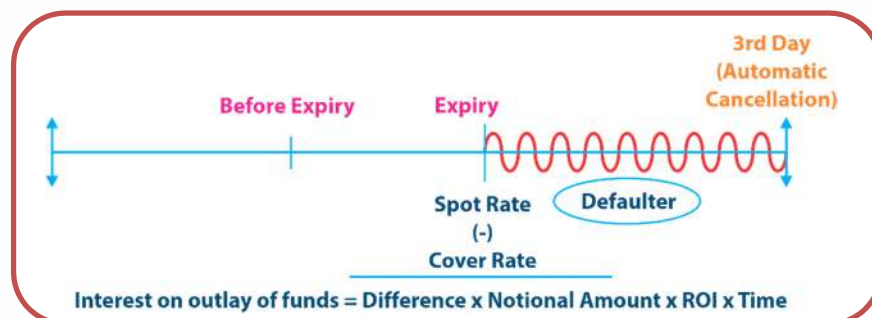
LOS 24 : Cancellation after Due Date / Automatic Cancellation Late Delivery / Extension after due date

In these cases the following cancellation charges may be payable:

1. Exchange Difference
2. Swap Loss



3. Interest on outlay of funds


QUESTION NO. 19A

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:

	10th June	20th June
Spot USD 1=	₹ 63.8000/8200	₹ 63.6800/7200
Sport/ June	₹ 63.9200/9500	₹ 63.8000/8500
July	₹ 64.0500/0900	₹ 63.9300/9900
August	₹ 64.3000/3500	₹ 64.1800/2500
September	₹ 64.6000/6600	₹ 64.4800/5600

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

Solution:

Q.19A V.V. Imp. (2 marks)
(2 times)

W.No1 Cal. of Exchange Differences:-
(From the point of view of Bank)

Bank sells \$ 2,00,000 $\Rightarrow$ ₹ 128,80,000
@ ₹ 64.4000 ✓

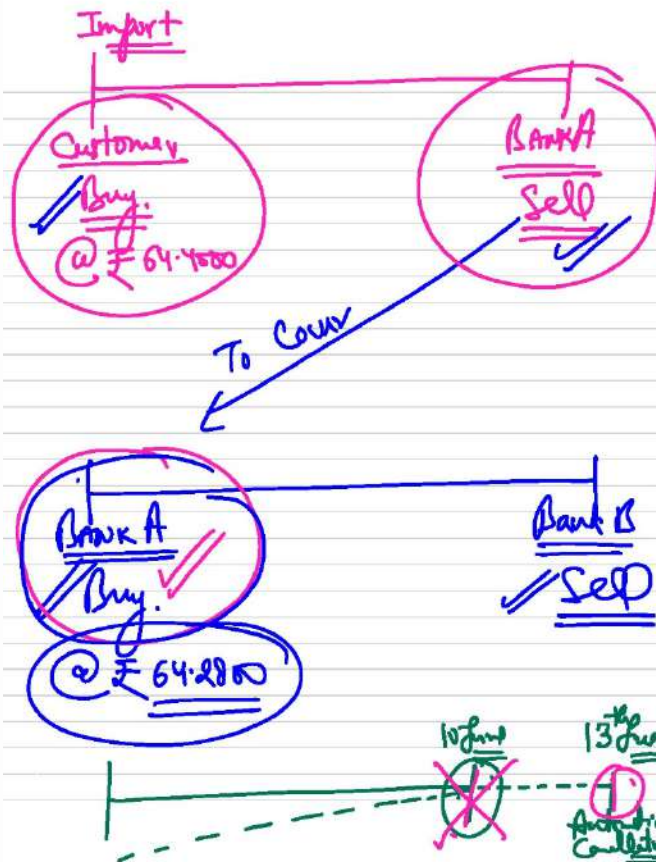
To Cancel

Bank buy \$ 2,00,000 $\Rightarrow$ ₹ 127,23,500
@ ₹ 63.6175 ✓

Exchange Difference.

Profit to Bank / loss to customer
Amt. payable by Customer

₹ 1,56,500 ✓

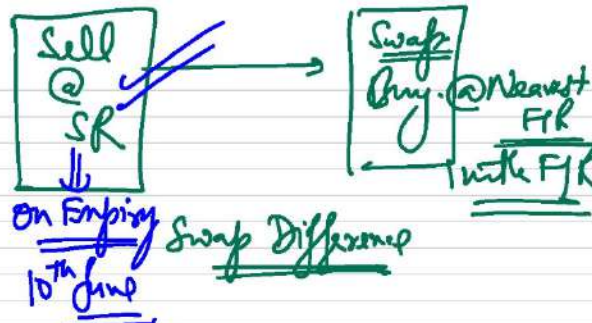


S/RS/R on 13th June:-

$$1\$ = ₹ \frac{63.6800}{(1-0.001)} - ₹ \frac{63.7800}{(1+0.001)}$$

$$1\$ = ₹ 63.6163 - ₹ 63.7817$$

round off or $1\$ = ₹ 63.6175$

W.No: 2 Cal. of Swap Difference:-Sell → Buy. Swap

\$2,00,000
Bank Sells @ Spot Rate on 10th June ⇒ ₹ 127,60,000
 $1\$ = ₹ 63.8000$

S/R on 10th June

$$1\$ = ₹ 63.8000 - 63.8200$$

To Swap-

Bank Buys @ Nearest F/R ⇒ ₹ 127,90,000
 @ 1 with F/R

$$\$2,00,000 \times ₹ 63.9500$$

Spot/June (Nearest FR)

$$1 ₹ = ₹ 63.9200 - 63.9500$$

Swap loss

$$₹ 30,000$$

W.No.3:- Interest on Outlay of funds:-
On Expiry.

Bank buys @ Cover Rate:- $\Rightarrow 128,56,000$

$$\$2,00,000 \times ₹ 64.2800$$

Bank sells @ S/R on 15th June $\Rightarrow 127,60,000$

$$\$2,00,000 \times ₹ 63.8000$$

Outflow of funds

$$₹ 96000$$

Interest on outlay of funds:-



$$₹ 96000 \times 12\% \times \frac{3}{360} \Rightarrow ₹ 96$$

$$1 \text{ year} = 360 \text{ Days}$$

Main Solution:-

1) Cancellation rate:- (W.No.1)

Bank cancels by buying \$2,00,000

② ₹ 63.6175

2) Amount payable by Customer on
\$2,00,000 (W.No.1) (Cancellation
Loss)

⇒ ₹ 156,500

3) Swap loss (W.No.2)

⇒ ₹ 30,000 ✓

4) Interest on outlay of funds:-

⇒ ₹ 96 (W.No.3)

5) New Contract rate:-

Bank sells \$2,00,000 @ ₹ 64.3150
13th June:-

Spot/Buy.

1\$ = ₹ $\frac{64.1800}{(1-001)} - \frac{64.2500}{(1+001)}$

1\$ = ₹ 64.1158 - ₹ 64.3143

or
1\$ = ₹ 64.3150

6) Total Cost:-

Cancellation charges ₹ 156,500

Swap loss ₹ 30,000

Interest on outlay of funds ₹ 96

Total cost of Extension ₹ 186,596 ✓

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

QUESTION NO. 20A

AMK Ltd. an Indian based company has subsidiaries in U.S. and U.K. Forecasts of surplus funds from two subsidiaries are as below:

U.S.	\$ 12.5 million
U.K.	£ 6 million

Following exchange rate information are obtained:	\$/₹	£/₹
Spot	0.0215	0.0149
30 days forward	0.0217	0.0150

Annual borrowing/deposits rates (Simple) are available.

₹	6.4%/6.21%
\$	1.6%/1.5%
£	3.9%/3.7%

The Indian operations are forecasting a cash deficit of ₹ 500 million. It is assumed that rates are based on a year of 360 days.

- Calculate the cash balance at the end of 30 days period in ₹ for each company under each of the following scenarios ignoring transaction costs and taxes:
 - Each company invests / finances its own cash balances / deficits in local currency independently.
 - Cash balances are pooled immediately in India and the net balances are invested/ borrowed for the 30 days period.
- Which method do you think is preferable from the parent company's point of view?

Solution :

Q-20A

(a) Calculation of Cash Balance after 30 Days, if each co. invest/borrow in its own country independently:-

30 Days

Cash Balance after 30 Days

₹ → Deficit → borrow

\$ → Surplus → invest

£ → Surplus → invest

30 Days FR

Cash Balance at the end of 30 Days

US Sub: (Surplus)
(Invest)₹ millions

\$ 12.5 millions

$$\left(1 + 0.015 \times \frac{30}{360}\right)$$

$$\Rightarrow \$ 12.5156 \times \frac{1}{0.0217} \text{ million } ₹ \Rightarrow ₹ 576.76$$

30 Days FR

$$1 ₹ \Rightarrow \$ 0.0217$$

$$1 \$ = \frac{1}{0.0217} ₹$$

UK Sub: (Surplus)
(Invest)£ 6 million $\left(1 + 0.037 \times \frac{30}{360}\right)$

$$\Rightarrow £ 6.0185 \times \frac{1}{0.0150} \text{ million } ₹ \Rightarrow ₹ 401.23$$

30 Days FR

$$1 ₹ \Rightarrow £ 0.0150$$

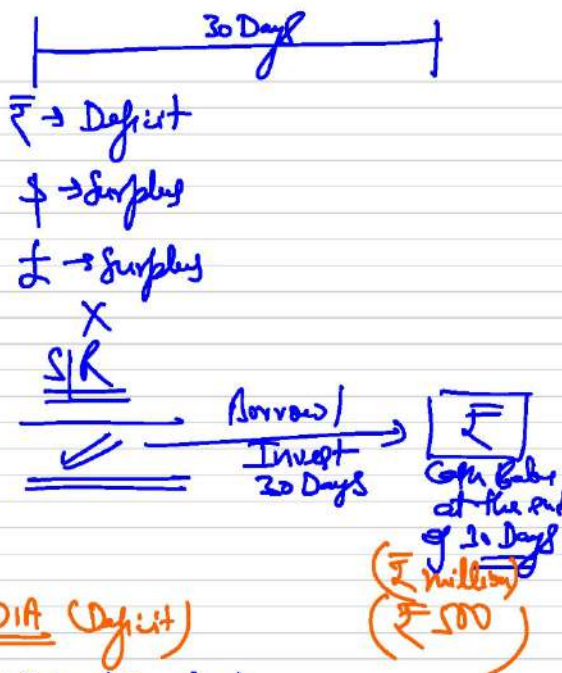
$$1 £ = \frac{1}{0.0150} ₹$$

INDIA (Deficit)
(Borrow)

$$₹ 500 \text{ million } \left(1 + 0.064 \times \frac{30}{360}\right) (₹ 502.67)$$

Net Cash Balance at the
end of 30 Days₹ 475.32
millions

- ⑥ Calculation of Cash Balance after
30 Days if each co. pool
immediately in India:-



INDIA (Deficit)

US Sub: - (Surplus)

$$\$12.5 \text{ million} \times \frac{1}{0.0215} \text{ ₹} = ₹581.40$$

UK Sub: (Surplus)

$$£6 \text{ million} \times \frac{1}{0.0149} \text{ ₹} = ₹402.68$$

Net Balance in ₹ as on today $\Rightarrow ₹484.08$
million (Surplus)

Now invest ₹484.08 million for 30 Days

So, Amount received after 30 Days:-

$$₹484.08 \left(1 + 0.0621 \times \frac{30}{360}\right)$$

$$\Rightarrow ₹486.59 \text{ million}$$

(ii) Immediate cash pooling is preferable as it maximize the

Cash Balance at the end of 30 Days for AMK Ltd.

LOS 26 : Contribution to Sales Ratio based decision under FOREX

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

Decision:

Higher the C/S Ratio, Better the position.

QUESTION NO. 21

Following information relates to AKC Ltd. which manufactures some parts of an electronics device which are exported to USA, Japan and Europe on 90 days credit terms.

Cost and Sales information:	Japan	USA	Europe
Variable cost per unit	₹ 225	₹ 395	₹ 510
Export sale price per unit	Yen 650	US\$10.23	Euro 11.99
Receipts from sale due in 90 days	Yen 78,00,000	US\$1,02,300	Euro 95,920
Foreign Exchange Rate Information:	Yen/₹	US\$/₹	Euro/₹
Spot market	2.417-2.437	0.0214-0.021	0.0177-0.0180
3 months forward	2.397-2.427	0.0213-0.0216	0.0176-0.0178
3 months spot	2.423-2.459	0.02144-0.02156	0.0177-0.0179

Advice AKC Ltd. by calculating average contribution to sales ratio whether it should hedge it's foreign currency risk or not.

Solution :

Q.21 (2+times)
(8 marks)

C/S Ratio:-

$$\Rightarrow \frac{C}{\text{Sales}} \times 100$$

$$C = \text{Sales} - V/C$$

W.No.1 Cal. of No. of units:-

	<u>Japan</u>	<u>USA</u>	<u>Europe</u>
Sales	₹ 78,00,000	\$ 1,02,300	€ 95,920
Sales Price / Unit	₹ 650	\$ 10.23	€ 11.99
<u>No. of units sold</u>	12,000 units	10,100 units	8,000 units

Case I: If Foreign Exchange Risk is to be
hedge using forward market/
Contract:-

	<u>Japan</u>	<u>USA</u>	<u>Europe</u>
Sales (₹)	¥ 78,00,000	\$ 10,23,000	€ 9,59,200
	X	X	X
3mth F/R	$\frac{1}{2.427}$	$\frac{1}{0.0216}$	$\frac{1}{0.0178}$
IF =	2.397 - 2.427		
	$\frac{1}{2.397} - \frac{1}{2.427}$		
Sales (₹)	₹ 32,13,844	₹ 47,36,111	₹ 53,88,764
U/C (₹)	₹ (1200 x 225)	₹ 10,000	₹ 8000
	375	510	510
	₹ 27,10,000	₹ 39,50,000	₹ 49,80,000

C	<u>513844</u>	<u>786111</u>	<u>1308764</u>
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$$C/S \text{ Ratio} \Rightarrow \frac{C}{\text{Sales}} \times 100$$

$$\Rightarrow \frac{2608719}{133,38,719} \times 100$$

$$C/S \text{ Ratio} \Rightarrow \underline{\underline{19.56\%}}$$

Case II: If Foreign Currency risk is
not to be hedge (i.e. forward
cover is not taken)

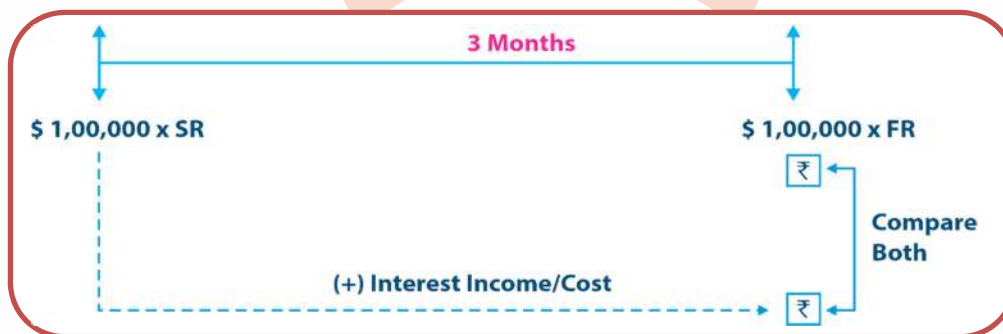
	<u>Japan</u>	<u>USA</u>	<u>Europe</u>
Sales (₹)	¥ 78,00,000	\$ 10,23,000	€ 9,59,200
	X	X	X
3mth F/R			

$$\begin{array}{ccc}
 \frac{1}{2.459} & \frac{1}{0.02156} & \frac{1}{0.0179} \\
 \text{Sales (₹)} & ₹3172021 & ₹4444898 & ₹558659 \\
 \text{(-) V/C} & ₹2700,000 & ₹3950,000 & ₹40,80,000 \\
 \text{C} & ₹472021 & ₹494898 & ₹1278659 \\
 \\
 \text{c/s Retro} & & & \\
 \Rightarrow & \frac{25,95,578}{138,75,578} \times 100 & & \\
 \Rightarrow & \underline{\underline{19.17\%}} & &
 \end{array}$$

Decision:
 AKE Ltd. is advisable to hedge its foreign exchange risk through forward contract / market.

LOS 27 : Leading & Lagging

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

**QUESTION NO. 22A**

A firm is contemplating import of a consignment from the USA for a value of US \$ 10,000. The firm requires 90 days to make payment. The supplier has offered 60 days interest free credit and is willing to offer additional 30 days credit at an interest rate of 6% p.a. the bankers of the firm offer a short loan for 30 days at 9% p.a. The banker's quotations for exchange rate is:

Spot 1 USD	₹ 46
60 day Forward 1 USD	₹ 46.20
90 day Forward 1 USD	₹ 46.35

You are required to advise the firm as to whether it should:

- a) Pay the supplier in 60 days, or
b) Avail the supplier's offer of 90 days credit. Show your calculations.

Solution :

Q.22A

Case I: Pay the Supplier in 60 Days:-

Total Payment in '\$' = \$10,000

Equivalent ₹

$$\$10,000 \times ₹46.20 \Rightarrow ₹462,000$$

60 Days FR

1\$ = ₹46.20

Add: Interest Cost @ 9% p.a. 3465

for 30 Days

[1 year = 360 Days]

$$\left[₹462,000 \times 9\% \times \frac{30}{360} \right]$$

Total Cost in 90 Days ₹465,465

Case II: Pay the Supplier in 90 Days:-

Total payment in ₹ ⇒ \$10,000

Add: Intt Cost @ 6% p.a. ⇒ ₹ 50
for 30 Days

$$\left[\$10,000 \times 6\% \times \frac{30}{360} \right]$$

Total payment in \$ 10,050

Equivalent ₹

$$\$10,050 \times ₹ 46.35 = ₹ 465817.50$$

90 Days FR
1 \$ = ₹ 46.35

Decision: -

It is advisable to pay the supplier
in 60 Days as Total Outflow is minimum
in this case.

QUESTION NO. 22D

XYZ Ltd. has imported goods to the extent of US\$ 8 Million. The payment terms are as under:

- (a) 1% discount if full amount is paid immediately; or
- (b) 60 days interest free credit. However, in case of a further delay up to 30 days, interest at the rate of 8% p.a. will be charged for additional days after 60 days. M/s XYZ Ltd. Has ₹25 Lakh available and for remaining it has an offer from bank for a loan up to 90 days @ 9.0% p.a.

The quotes for foreign exchange are as follows:

Spot Rate INR/ US\$ (buying)	₹ 66.98
60 days Forward Rate INR/ US\$ (buying)	₹ 67.16
90 days Forward Rate INR/ US\$ (buying)	₹ 68.03

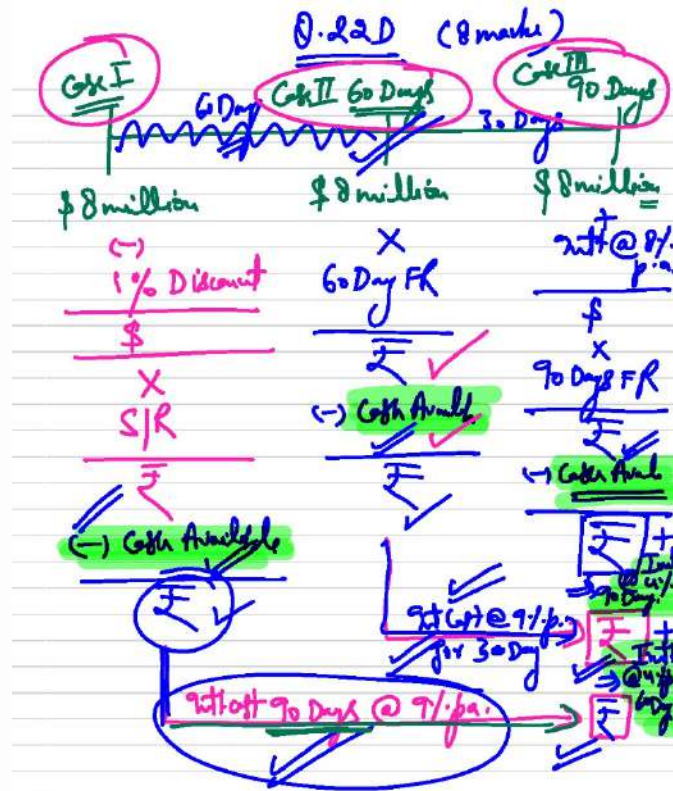
Advise which one of the following options would be better for XYZ Ltd.

- (i) Pay immediately after utilizing cash available and for balance amount take 90 days loan from bank.
- (ii) Pay the supplier on 60th day and avail bank's loan (after utilizing cash) for 30 days.
- (iii) Avail supplier offer of 90 days credit and utilize cash available.

Further presume that the cash available with XYZ Ltd. will fetch a return of 4% p.a. in India till it is utilized. Assume year has 360 days. Ignore Taxation.

Compute your working upto four decimals and cash flows in Crore.

Solution:



Case I:- Pay Immediately availing Discount:-

$$S/R \quad 1\$ = ₹66.98$$

$$\text{Amount required in '$'} \Rightarrow \$7.92 \text{ million}$$

$$(\$8 \text{ million} - 1\%)$$

Equivalent (₹)

$$\$7.92 \text{ million} \times ₹66.98 = ₹53.0482 \text{ Cr.}$$

$$\text{less: Cash Available} \Rightarrow 0.2500 \text{ Cr.}$$

$$\text{Total outflow as on today } ₹52.7982 \text{ Cr.}$$

$$\text{Add:- Interest Cost for 90 Days } ₹1.1880 \text{ Cr.}$$

$$@ 7\% \text{ p.a.}$$

$$52.7982 \text{ Cr} \times 7\% \times \frac{90}{360}$$

Total Outflow at 90 Days ₹ 53.9862 cr

Case II: Pay the Supplier on 60th Day:-

60 Days FR 1\$ = ₹ 67.16

Am't. required in \$ → US \$ 8 million
Equivalent (₹)

US \$ 8 million × ₹ 67.16 → ₹ 53.7280 cr.

less: Cash Available = ₹ 0.2500 cr.

Total Outflow ₹ 53.4780 cr

Add:- opp cost for 30 Days @ 9% pa. 0.9011 cr.

Total Outflow at 90 Days ₹ 53.8791 cr

less: Opportunity Income 0.5017 cr.
for 60 Days @ 4% pa.
 $0.2500 \text{ cr.} \times 4\% \times \frac{60}{360}$
(Inflow) ✓

Net Outflow @ 90 Days ₹ 53.8774 cr

Case III: Avail Supplier offer of 90 Days
Credits

90 Days FR 1\$ = ₹ 68.03

Am't payable in '\$' → \$ 8.0523 million

\$ 8 million + Intt @ 8% pa. for 30 Days

\$ 8 million $(1 + 0.08 \times \frac{30}{360})$

Equivalent (₹)

$$₹ 8.0533 \text{ million} \times ₹ 68.03 = ₹ 54.7866 \text{ cr.}$$

less: Cash Available = 0.250 cr

Total Outflow ₹ 54.5366 cr

less:- Int'l. Income @ 4% p.a. 0.0025 cr.
for 90 Days
 $0.250 \times 4\% \times \frac{90}{360}$

Total Outflow at 90 Days ₹ 54.5341 cr

Decision:-

Cash Outflow is least in case of option II i.e. pay the supplier on

60th Day & same should be opted for.

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.

QUESTION NO. 23B

NP and Co. has imported goods for US \$ 7,00,000. The amount is payable after three months. The company has also exported goods for US \$ 4,50,000 and this amount is receivable in two months. For receivables amount a forward contract is already taken at ₹ 48.90.

The market rates for ₹ and Dollar are as under:

Spot	₹ 48.50/70
Two months	25/30 points
Three months	40/45 points

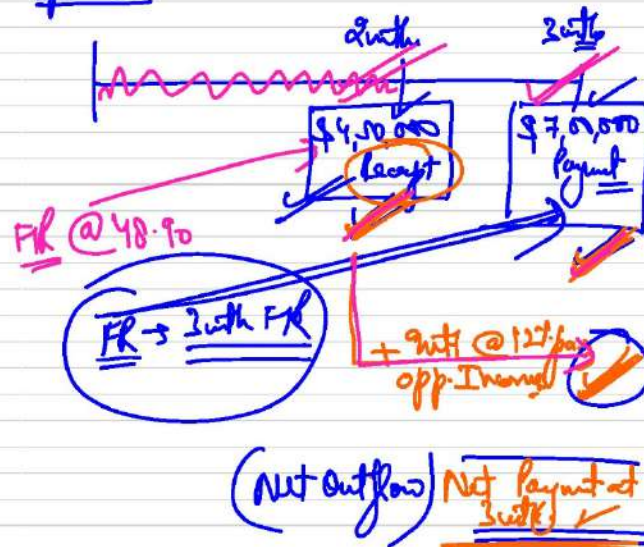
The company wants to cover the risk and it has two options as under:

- To cover payables in the forward market and
- To lag the receivables by one month and cover the risk only for the net amount. No interest for delaying the receivables is earned. Evaluate both the options if the cost of Rupee Funds is 12%. Which option is preferable?

Solution :

Q.23B V. Imp (8 marks)

Option 1:-



W.No:- Cal. of Forward Rate:-

$$S/R \text{ is } ₹ 48.50 \text{ — } 48.70$$

$$\begin{array}{r} 40/45 \quad (+) \quad 00.40 \quad 00.45 \\ \hline \text{3with Fx} \quad 1\text{¢} = \text{₹} 48.90 - \text{₹} 49.15 \end{array}$$

At 2with

$$\text{\$} 4,00,000 \text{ Receipt @ ₹} 48.90 \Rightarrow \text{₹} 220,05,000$$

Add: opportunity Income @ 12% p.a.
for 1with

$$\text{₹} 220,05,000 \times 12\% \times \frac{1}{12} \Rightarrow \text{₹} 2,20,050$$

$$\text{Total Inflow at 3with (A)} \quad \underline{\underline{\text{₹} 222,25,050}}$$

At 2with

Total payout in ₹

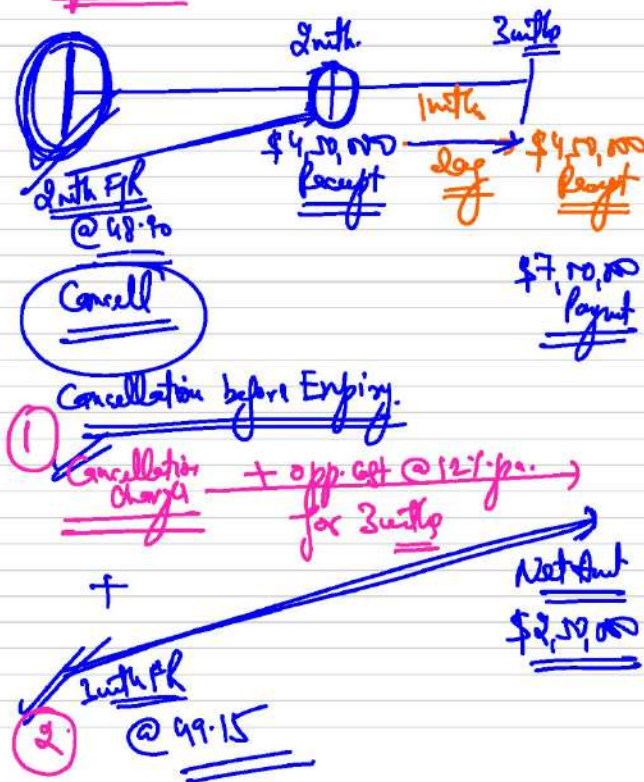
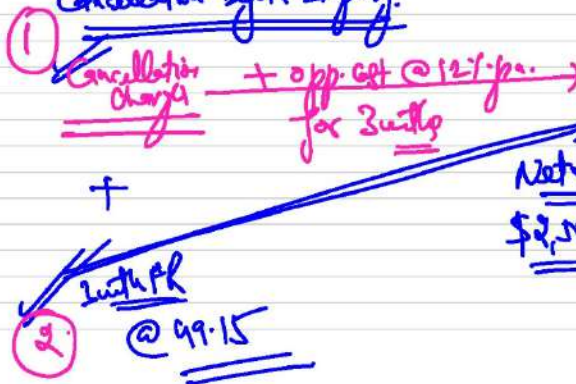
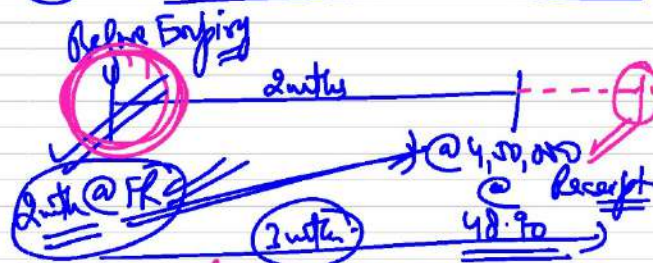
$$\text{Total Outflow at 3with} \Rightarrow \text{₹} 344,05,000$$

$$\text{\$} 7,00,000 \text{ @ ₹} 49.15 \quad (\text{3with Fx})$$

Net Outflow at 3with: - (Option L)
(A-A)

$$\Rightarrow \text{₹} 344,05,000 - \text{₹} 222,25,050$$

$$\Rightarrow \underline{\underline{\text{₹} 121,79,950}}$$

Option 2:-Cancellation before Expiry.Step 1:- Cancellation of Original Forward ContractStep 2. Look forward for Net Amt. at 3 months1 Cancellation Under Forward Contract:-Customer lost of view:-Customer sell's \$4,50,000 @ 48.90 $\Rightarrow$ ₹20,05,000To Cancell Customer buy's \$4,50,000 $\Rightarrow$ ₹20,50,000

₹ 49.00 ✓

1st F/R

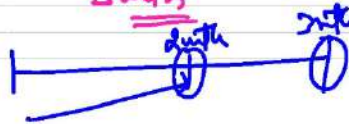
$$S/R \text{ 1\$} = ₹ 48.50 - 48.70$$

$$\text{25/30 (+) } 00.25 \quad 00.30$$

$$\text{2nd F/R 1\$} = ₹ 48.75 - 49.00$$

Exchange Difference /
Loss to Customer ₹ 45,000 ✓

+ opp cost @ 12% for 3 months ₹ 1350



$$\text{Ex. Diff} \xrightarrow{\text{3 months}} + \text{opp cost}$$

$$45000 \times 12\% \times \frac{3}{12}$$

Net loss to Customer / Net outflow at 3 months ₹ 46,350 ✓

2) Outflow at 3 months

$$\text{2nd } \$7,00,000 - \$4,50,000$$

Payment Receipt

$$\Rightarrow \$ 2,50,000$$

Equivalent (₹) ₹ 122,87,500

$$\$ 2,50,000 \times ₹ 49.15$$

Option 2:

Net Outflow at 3 months

$$\Rightarrow ₹122,87,500 + ₹46,350$$

$$\Rightarrow ₹123,33,850$$

Decision:

Net Outflow under option '1' is lower than option '2'

Hence, option 1 is preferable to cover the risk i.e. to cover the payable in the forward market.

QUESTION NO. 23C

XP Pharma Ltd., has acquired an export order for ₹ 10 million for formulations to a European company. The Company has also planned to import bulk drugs worth ₹ 5 million from a company in UK. The proceeds of exports will be realized in 3 months from now and the payments for imports will be due after 6 months from now. The invoicing of these exports and imports can be done in any currency i.e. Dollar, Euro or Pounds sterling at company's choice. The following market quotes are available.

	Spot Rate	Annualised Premium
₹/\$	67.10/67.20	\$ - 7%
₹ /Euro	63.15/63.20	Euro - 6%
₹ /Pound	88.65/88.75	Pound - 5%

Advice XP Pharma Ltd. about invoicing in which currency.
(Calculation should be upto three decimal places).

Solution :

Q.23C

(i) Proceeds of Exports in INR = ₹10 million

Position of inflow under 3 currencies:-

Currency '\$'
Step 1:-

Invoice in '\$' at Spot Rate

$$\Rightarrow ₹100,00,000 \times \frac{1\$}{67.10} = \$147031.29$$

S/R

$$1\$ = ₹67.10 - ₹67.20$$

$$1₹ \Rightarrow \frac{1\$}{67.20} - \frac{1\$}{67.10}$$

Step 2: Cal. Forward Rate:-

$$S/R \text{ 19} = \text{₹ } 67.10 - \text{₹ } 67.20$$

$$(1 + 0.07 \times \frac{3}{12})$$

$$\text{with F/R 19} = \text{₹ } 68.27$$

Step 3:- Conversion into INR after 3 months

$$\$ 49031.297 \times \text{₹ } 68.27$$

$$\Rightarrow \text{₹ } 101,74,367$$

Case II: Invoicing in '£' using S/R

$$\textcircled{1} \text{₹ } 100,00,000 \times \frac{1}{63.15} \text{ £}$$

$$\Rightarrow \text{£ } 158353.127$$

② Cal. F/R

$$63.15 (1 + 0.06 \times \frac{3}{12}) \Rightarrow \text{₹ } 64.10$$

③ Convert into INR:- (after 3 months)

$$\text{£ } 158353.127 \times \text{₹ } 64.10$$

$$\Rightarrow \text{₹ } 101,50,435$$

Case III: ① Invoicing in '£' using S/R

$$\Rightarrow \text{₹ } 100,00,000 \times \frac{1}{88.65} \text{ £}$$

$$\Rightarrow \text{£ } 112803.158$$

② Cal. of F/R

$$88.65 (1 + 0.05 \times \frac{3}{12}) \Rightarrow \text{₹ } 89.76$$

② Convert into the INR

$$\Rightarrow \text{₹ } 112803.158 \times \text{₹ } 89.76$$

$$\Rightarrow \text{₹ } 10125211$$

(ii) Payment of Import in INR = ₹ 5 million

Position of outflow:-

Case I: Invoicing in '\$'

$$\Rightarrow \text{₹ } 50,00,000 \times \frac{1}{67.20} \text{ ₹}$$

$$\Rightarrow \text{\$ } 74404.762$$

$$\text{S/R } 1\text{₹} = \text{₹ } 67.10 - \text{₹ } 67.20$$

$$1\text{₹} \Rightarrow \left(\frac{1}{67.20} \text{ ₹} \right) - \frac{1}{67.10} \text{ ₹}$$

② Cal. of FR

$$67.20 (1 + 0.07 \times \frac{6}{12}) \Rightarrow 69.55$$

③ Convert into INR

$$\text{\$ } 74404.762 \times \text{₹ } 69.55$$

$$\Rightarrow \text{₹ } 51,74,851$$

Case II: Invoicing in '€'

$$\text{① } \text{₹ } 50,00,000 \times \frac{1}{63.20} \text{ €}$$

$$\Rightarrow \text{€ } 79113.924$$

② Cal. of FR

$$63.20 \left(1 + 0.06 \times \frac{6}{12}\right) \Rightarrow \underline{65.10}$$

③ Convert into INR

$$₹ 71113.924 \times ₹ 65.10$$

$$\Rightarrow ₹ \underline{51,50,316}$$

Cash III: ① Invoicing in £'

$$\Rightarrow ₹ 50,00,000 \times \frac{1}{88.75} £$$

$$\Rightarrow £ \underline{56338.028}$$

② Cal. of FR

$$88.75 \left(1 + 0.05 \times \frac{6}{12}\right) \Rightarrow \underline{90.97}$$

③ Convert in INR

$$£ 56338.028 \times ₹ 90.97$$

$$\Rightarrow ₹ \underline{51,25,070}$$

Advice:-

Since Cash inflow is highest
₹ 10174367 in case of \$' invoicing hence,
invoicing for Export should be in \$'.

However, Cash outflow is least
₹ 51,25,070 in case of £' invoicing, hence,
invoicing for import should be in £'.

LOS 29 : Forward Premium Paid or Additional cost while taking Forward Contracts**QUESTION NO. 24B**

A company is considering hedging its foreign exchange risk. It has made a purchase on 1st July, 2016 for which it has to make a payment of US\$ 60,000 on December 31, 2016. The present exchange rate is 1 US \$ = ₹ 65. It can purchase forward 1 \$ at ₹ 64. The company will have to make an upfront premium @ 2% of the forward amount purchased. The cost of funds to the company is 12% per annum.

In the following situations, compute the profit/loss the company will make if it hedges its foreign exchange risk with the exchange rate on 31st December, 2016 as :

- ₹ 68 per US \$.
- ₹ 62 per US \$.
- ₹ 70 per US \$.
- ₹ 65 per US \$.

Solution :

Q.24B

W No.1 Calculation of Total Hedging Cost:-

Forward Premium

$$\$60,000 \times ₹64 \times 2\% = ₹76,800$$

~~Minimum~~ ^{6 mths}

(+) Opportunity Cost of Interest @ 12% p.a. $\Rightarrow ₹4608$

$$₹76,800 \times 12\% \times \frac{6}{12}$$

Total Hedging Cost ₹81408

Cal. of Profit / Loss if Price becomes after 6 mths:-

Case I: If Price on Expiry comes out to be ₹68/\$:-

Profit due to hedging:-

$$\Rightarrow \$60,000 [₹68 - ₹64] \Rightarrow ₹2,40,000$$

less: Hedging Cost $\Rightarrow ₹81408$

Net Profit ₹ 1,58,592 ✓

Case II: If price on Expiry comes out to be ₹ 62/\$:-

Loss due to hedging :- ₹ 12/\$

⇒ ₹ 60,000 [₹ 64 - ₹ 62] ⇒ ₹ 1,20,000

Add: Hedging Cost ⇒ ₹ 81,408

Net loss ₹ 2,01,408 ✓

Case III: ₹ 70 per US\$:-

Profit due to hedging :-

₹ 60,000 [₹ 70 - ₹ 64] ⇒ ₹ 3,60,000

Less: Hedging Cost ⇒ ₹ 81,408

Net Profit ₹ 2,78,592 ✓

Case IV: ₹ 65/US\$:-

Profit due to hedging :-

₹ 60,000 [₹ 65 - ₹ 64] ⇒ ₹ 60,000

Less: Hedging Cost ⇒ ₹ 81,408

Net loss ₹ 21,408 ✓

LOS 30 : Letter of Credit

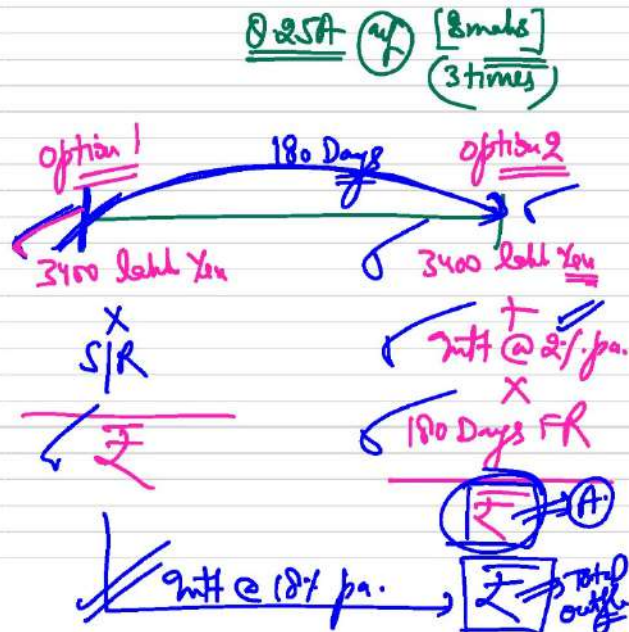
QUESTION NO. 25A

Alert Ltd. is planning to import a multi-purpose machine from Japan at a cost 3,400 lacs yen. The company can avail loans at 18% interest per annum with quarterly rests with which it can import the machine. However, there is an offer from Tokyo branch of an India based bank extending credit of 180 days at 2% p.a. against opening of an irrevocable letter of credit. Other Information:

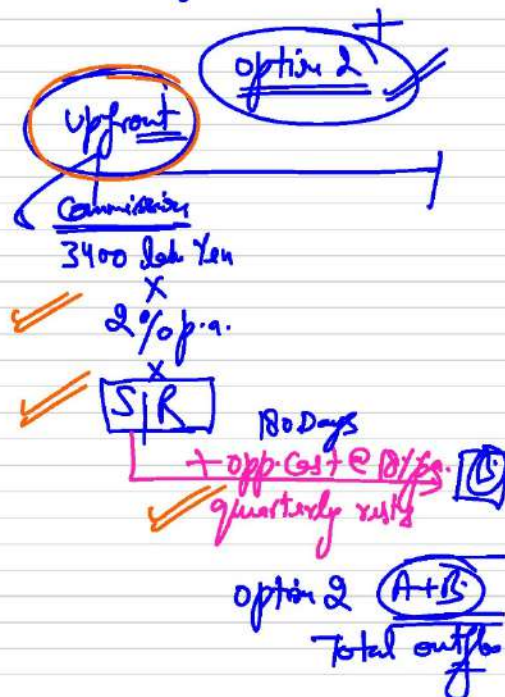
Present exchange rate	₹ 100 = 340 yen.
180 day's forward rate	₹ 100 = 345 yen.

A commission charge for letter of credit is 2% per 12 months. Advise whether the offer from the foreign branch should be accepted?

Solution :



quarterly rates



Option 1:- To finance the purchase by
availing loan @ 18% per. quarterly
rate:-

Cost of Machine

₹ 1000

in Yen:- 3400 lakhs Yen

Equivalent '₹'

$$3400 \text{ lakhs Yen} \times \frac{₹ 100}{340}$$

$$S/R ₹ 100 = 340 \text{ Yen}$$

$$1 \text{ Yen} = \frac{₹ 100}{340}$$

Add:- Opp. Cost | Int. Cost

1st Quarter

₹ 45

$$₹ 1000 \text{ lakhs} \times 18\% \times \frac{90}{360}$$

1 year = 360 Days

IInd quarter:-

⇒ ₹ 47.025

$$₹ 1045 \times 18\% \times \frac{90}{360}$$

Ans. 1

Total Outflow in
180 Days

₹ 1092.025
Lakhs

Ans. 2

or

$$FV = PV \left[1 + \frac{r}{m} \right]^{m \times n}$$

$$\Rightarrow 1000 \left[1 + \frac{18}{4} \right]^{4 \times \frac{180}{360}}$$

$$\Rightarrow 1000 [1 + 0.045]^2$$

$$\Rightarrow \underline{\underline{₹ 1092.025 \text{ Lakh}}}$$

option 2:- To avail the offer from the foreign branch of Indian Based Bank:-

Total payment in Yen:-

$$₹ 3400 \text{ Lakh} + \text{Intt @ } 2\% \text{ p.a.}$$

$$₹ 3400 \text{ Lakh} \left(1 + 0.02 \times \frac{180}{360} \right)$$

$$\Rightarrow \underline{\underline{₹ 3434 \text{ Lakh}}}$$

Equivalent (₹)

$$₹ 3434 \text{ Lakh} \times \frac{100}{345} ₹$$

$$₹ 995.36 \text{ Lakh}$$

180 Days F/R

$$₹ 100 = 345 \text{ Yen}$$

$$1 \text{ Yen} = \frac{100}{345} ₹$$

Add: Commission @ 2% p.a.

(S/R)

$$₹ 3400 \text{ Lakh Yen}$$

$$\times 2\% \text{ p.a.}$$

$$+ \text{Intt. Cost @ } 18\% \text{ p.a.}$$

Quarterly rests

$$₹ 3400 \text{ Lakh} \times 2\% \times \frac{180}{360}$$

$$\Rightarrow \underline{\underline{₹ 34 \text{ Lakh}}}$$

Equivalent (₹)

$$₹ 10 \text{ Lakh}$$

$$\begin{aligned}
 & \text{₹ } 34 \text{ Lakh} \times \frac{100}{340} \text{ ₹} \\
 & \text{Add: Opp. Cost / Intl. Cost} \\
 & \quad @ 18\% \text{ p.a. quarterly rate} \\
 & \text{I}^{\text{st}} \text{ quarter} \\
 & \quad 10 \text{ Lakh} \times 18\% \times \frac{90}{360} \Rightarrow \text{₹ } 0.45 \text{ Lakh} \\
 & \text{II}^{\text{nd}} \text{ quarter} \\
 & \quad \text{₹ } 10.45 \text{ Lakh} \times 18\% \times \frac{90}{360} \Rightarrow \text{₹ } 0.47025 \text{ Lakh} \\
 & \text{Total Outflow in 180 Days} \quad \text{₹ } 1006.28025 \text{ Lakh} \\
 & \text{Decision:-} \\
 & \quad \text{option 2 is preferred because total outflow is least in this case.} \\
 & \quad \text{Hence, the offer from foreign branch of Indian based bank should be accepted.}
 \end{aligned}$$

QUESTION NO. 25C

M/s. Sky products Ltd., of Mumbai, an exporter of sea foods has submitted a 60 days bill for EUR 5,00,000 drawn under an irrevocable Letter of Credit for negotiation. The company has desired to keep 50% of the bill amount under the Exchange Earners Foreign Currency Account (EEFC). The rates for ₹/USD and USD/EUR in inter-bank market are quoted as follows:

	₹/ USD	USD/EUR
Spot	67.8000 - 67.8100	1.0775 - 1.8000
1 month forward	10/11 Paise	0.20/0.25 Cents
2 months forward	21/22 Paise	0.40/0.45 Cents
3 months forward	32/33 Paise	0.70/0.75 Cents

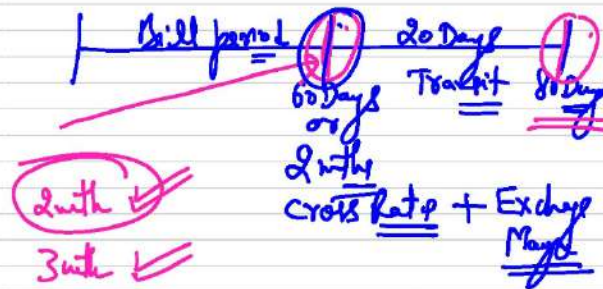
Transit Period is 20 days. Interest on post shipment credit is 8 % p.a. Exchange Margin is 0.1%. Assume 365 days in a year.

You are required to calculate:

- Exchange rate quoted to the company
- Cash inflow to the company
- Interest amount to be paid to bank by the company.

Solution :

0.25 (8 marks) $\frac{2}{4}$



Note: Transit & insurance period is 80 Days

It will be rounded off to the lower of months.

2m the FJK

S/R USD = ₹ 67.8000 - 67.8100

S/P 2/22 (+) 00.2100 00.2200
Pall

2. with FX $1 \text{ USD} = \text{₹ } 68.0100 - \text{₹ } 68.0300$

$$1 \text{ EUR} = \$ 1.0775 - \$ 1.8000$$

$$\begin{array}{r} .40 \overline{) 45} \\ \underline{40} \\ 50 \end{array} \quad \begin{array}{r} (+) .40 \\ \underline{100} \\ 0.0040 \end{array} \quad \begin{array}{r} .45 \\ \underline{100} \\ 0.0045 \end{array}$$

2nd F/R | EUR = \$1.0815 - \$1.8045 (W)

$$|E_{UR} = - \frac{F}{\sum U_R}$$

$$\frac{\text{€}}{\text{€UR}} \Rightarrow \frac{\text{€}}{\text{USD}} \times \frac{\text{USD}}{\text{€UR}}$$

$$1 \text{ EUR} = ₹ 68.0100 \times 1.0815$$

$$(1 - 0.001)$$

$$₹ 68.0300 \times 1.8045$$

$$(1 + 0.001)$$

$$1 \text{ EUR} = ₹ 73.4793 - ₹ 122.8829$$

(i) Exchange rate quoted to the co.

$$1 \text{ EUR} \Rightarrow ₹ 73.4793$$

(ii) Cash inflow to the co. :-

Amount of Export Bill $\Rightarrow$ EUR 2,50,000

WBS: EEFC

$$\Rightarrow \text{EUR } 2,50,000$$

$$\text{EUR } 2,50,000$$

Equivalent '₹'
Cash inflow

$$\times ₹ 73.4793$$

$$₹ 183,69,825$$

(iii) Interest @ 8% pa. for 80 Days

$$\Rightarrow ₹ 183,69,825 \times 8\% \times \frac{80}{365}$$

$$\Rightarrow ₹ 322101$$

LOS 31 : 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 \$

QUESTION NO. 26A

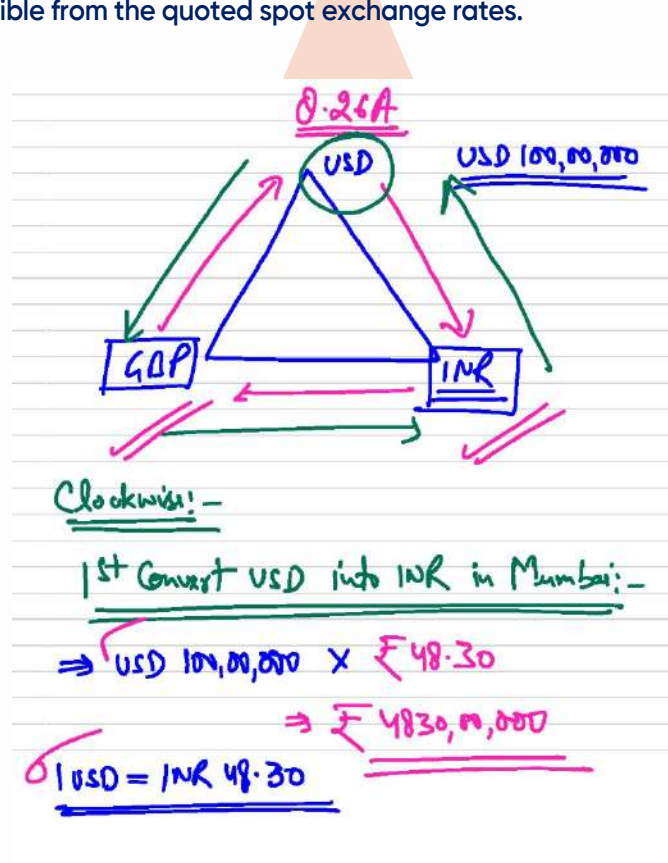
Following are the spot exchange rates quoted at three different forex markets:

USD / INR 48.30 in Mumbai

GBP / INR 77.52 in London

GBP / USD 1.6231 in New York

The arbitrageur has USD 1,00,00,000. Assuming that there are no transaction costs, explain whether there is any arbitrage gain possible from the quoted spot exchange rates.

Solution :

IInd Convert INR into GBP in London:-

$$\Rightarrow \text{₹ } 4830,00,000 \times \frac{1}{77.52} \text{ GBP}$$

$$\Rightarrow \text{GBP } 6230650.15$$

$$\text{GBP} = \text{INR } 77.52$$

$$\text{INR} = \frac{1}{77.52} \text{ GBP}$$

IIIrd:- Convert GBP into USD at NY:-

$$\Rightarrow \text{GBP } 62,30,650.15 \times 1.6231 \text{ USD}$$

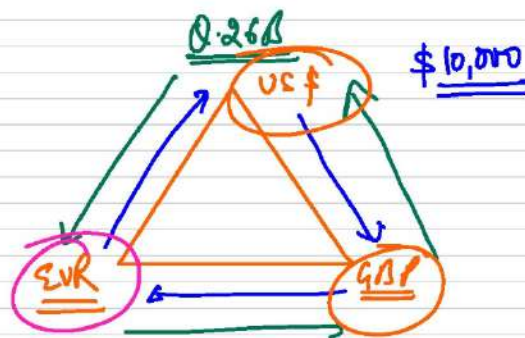
$$\Rightarrow \text{USD } 101,12,968.26$$

$$\text{GBP} = \text{USD } 1.6231$$

Arbitrage Gain:-

$$\Rightarrow \text{USD } 101,12,968.26 - \text{USD } 100,00,000$$

$$\Rightarrow \text{USD } 1,12,968.26$$

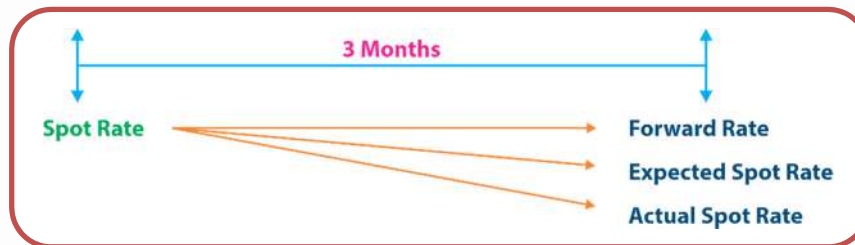


1st Convert \$10,000 into GBP:-

$$\text{\$ } 10,000 \times \frac{1}{1.2752} \text{ GBP} \Rightarrow \text{GBP } 7841.91$$

$$\text{GBP} = \text{USD } 1.2752$$

LOS 32 : Gain/Loss under FOREX

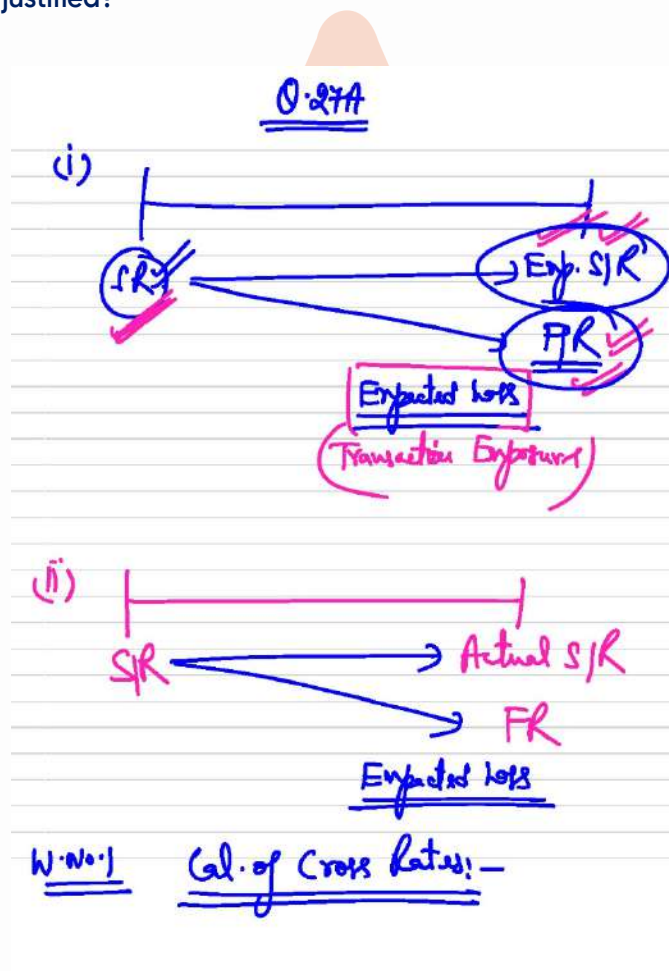


QUESTION NO. 27A

X Ltd. an Indian company has an export exposure of 10 million (100 lacs) yen, value September end. Yen is not directly quoted against Rupee. The current spot rates are USD/INR 41.79 and USD/JPY 129.75. It is estimated that Yen will depreciate to 144 level and Rupee to depreciate against dollar to 43. Forward rate of September 1998: USD/JPY 137.35 and USD/INR 42.89. You are required:

- To calculate the expected loss if hedging is not done. How the position will change with company taking forward cover?
- If the spot rate on 30th September 1998 was eventually USD/JPY 137.85 and USD/INR 42.78, is the decision to take forward cover justified?

Solution :



(i) S/R as on today:-

$$1 \text{ USD} = \text{INR } 41.79 \quad \frac{\text{INR}}{\text{USD}} \checkmark$$

$$1 \text{ USD} = \text{JPY } 129.75 \quad \frac{\text{JPY}}{\text{USD}} \rightarrow 100$$

$$1 \text{ JPY} = \text{--- INR} \quad \frac{\text{INR}}{\text{JPY}}$$

$$\frac{\text{INR}}{\text{JPY}} \Rightarrow \frac{\text{INR}}{\text{USD}} \times \frac{\text{USD}}{\text{JPY}}$$

1st Convert & then use

$$1 \text{ USD} = \text{INR } 41.79$$

$$1 \text{ JPY} = \frac{1}{129.75} \text{ USD}$$

$$\frac{\text{INR}}{\text{JPY}} = \frac{\text{INR}}{\text{USD}} \times \frac{\text{USD}}{\text{JPY}}$$

$$1 \text{ JPY} = 41.79 \times \frac{1}{129.75} \text{ INR}$$

$$\text{S/R as on today} \Rightarrow 1 \text{ JPY} = 0.3221 \text{ INR}$$

(ii) Expected S/R on 30th Sep:-

$$1 \text{ USD} = \text{JPY } 144$$

$$1 \text{ USD} = \text{INR } 43$$

$$1 \text{ JPY} = \text{--- INR}$$

$$1 \text{ JPY} = 43 \times \frac{1}{144} \text{ INR}$$

$$1 \text{ JPY} = 0.2986 \text{ INR}$$

Expected S/R on Exp'g.

(iii) Cal. of F/R

$$1 \text{ USD} = \text{JPY } 127.35$$

$$1 \text{ USD} = 42.89 \text{ INR}$$

$$1 \text{ JPY} = \dots \text{ INR}$$

$$1 \text{ JPY} = 42.89 \times \frac{1}{137.25} \text{ INR}$$

$$1 \text{ JPY} = 0.3123 \text{ INR} \quad \text{FR}$$

(iv) Actual S/R on 30th Sep:-

$$1 \text{ USD} = \text{JPY } 137.85$$

$$1 \text{ USD} = \text{INR } 42.78$$

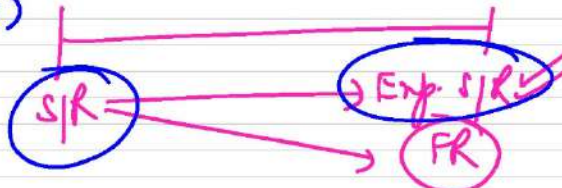
$$1 \text{ JPY} = \dots \text{ INR}$$

$$1 \text{ JPY} = 42.78 \times \frac{1}{137.85} \text{ INR}$$

or Actual S/R on 30th Sep:-

$$1 \text{ JPY} = 0.3103 \text{ INR}$$

(a)



Case I: If Hedging is not done:-

$$\text{Receipt} = \text{₹ } 100 \text{ Lakhs}$$

Total receipts as per S/R as on today:-

$$\text{₹ } 100 \text{ Lakhs} \times 0.3221 = \text{₹ } 32,21,000$$

$$\text{S/R } 1 \text{ ₹} \Rightarrow 0.3221 \text{ INR}$$

Total Receipt as per Exp. S/R $\Rightarrow \text{₹ } 29,86,000$
 $\text{₹ } 100 \text{ Lakhs} \times 0.2986 \text{ ₹}$

Expected loss if hedging
is not done ₹ 235,000

Case II: If Hedging is done:-

Am't. received as per S/R = ₹ 32,21,000
as on today

Am't. received as per F/R $\Rightarrow \text{₹ } 31,23,000$
on 30th Sep:-

$\text{₹ } 100 \text{ Lakhs} \times 0.3123 \text{ ₹}$

Expected loss if hedging ₹ 98,000

is done

Decision:

If Hedging is done, the expected loss is ₹ 98,000 & if hedging is not done, expected loss is ₹ 235,000

Expected loss is reduced if hedging is done through forward contract.

Hence, it is advisable to take the forward cover since losses are minimum in this case.



Am't received as per Current S/R

$$₹ 100 \text{ lakhs} \times 0.3221 ₹ = ₹ 32,21,000$$

Am't received as per S/R on30th Sep:-

$$₹ 100 \text{ lakhs} \times 0.3103 ₹$$

Expected loss if hedging ₹ 1,18,000 ✓
is not done

Decision:-

The expected loss is ₹ 1,18,000
if forward is not taken & Expected
loss is ₹ 98,000 if forward is taken.

So, it is advisable to take
forward cover because the losses are
minimum in this case.

Hence, Forward Cover is justified.

LOS 33 : 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:

	Sell	
HDFC Bank 1£ =	\$ 1.9650	— \$ 1.9670
Axis Bank 1£ =	\$ 1.9550	— \$ 1.9560 Buy
—Buy 1 £ = \$ 1.9560 (HDFC)		
—Sell 1 £ = \$ 1.9650 (ICICI)		

QUESTION NO. 28

You have following quotes from Bank A and Bank B :

	Bank A	Bank B
SPOT	USD/CHF 1.4650/55	USD/CHF 1.4653/60
3 months	5/10	
6 months	10/15	
SPOT	GBP/USD 1.7645/60	GBP/ USD 1.7640/50
3 months	25/20	
6 months	35/25	

Calculate:

- How much minimum CHF amount you have to pay for 1 Million GBP spot ?
- Considering the quotes from Bank A only, for GBP/CHF what are the Implied Swap points for Spot over 3 months?

Solution :

Q.28

BANK A (S/R)

1 USD = CHF 1.4650 — 1.4655 ✓

1 GBP = USD 1.7845 — 1.7860 ✓

BANK B (S/R)

1 USD = CHF 1.4653 — 1.4660 ✓

1 GBP = USD 1.7840 — 1.7850 ✓

(9) Minimum CHF amount to pay for 1 million GBP (Spot):—

CHF → Sell
GBP → Buy.

CHF → Sell → Buy USD ①

Sell → USD → Buy GBP ②

CHF
USD

1 USD = CHF 1.4655 (BANK A)

USD
GBP

1 GBP = USD 1.7850 (BANK B)

1 GBP = ---- CHF

CHF
GBP

$\frac{\text{CHF}}{\text{GBP}} = \frac{\text{CHF}}{\text{USD}} \times \frac{\text{USD}}{\text{GBP}}$

1 GBP = CHF 1.4655 × 1.7850

1 GBP = CHF 2.5866 ✓

Minimum CHF amount pay for 1 million GBP spot:-

$$\text{GBP } 10,00,000 \times 2.5866 \text{ CHF}$$

$$\Rightarrow \boxed{\text{CHF } 25,86,600}$$

(ii) Swap bids:-

FR $\rightarrow$ 3mth GBP/CHF ✓

+ SR GBP/CHF ✓

Swap formula

Spot Rates:-

$$\begin{array}{l} 1 \text{ USD} = \text{CHF } 1.4650 \quad 1.4655 \quad \text{CHF/USD} \\ 1 \text{ GBP} = \text{USD } 1.7845 \quad 1.7860 \quad \text{USD/GBP} \end{array}$$

$$1 \text{ GBP} = \dots \text{ CHF } \frac{\text{CHF}}{\text{GBP}}$$

$$\frac{\text{CHF}}{\text{GBP}} = \frac{\text{CHF}}{\text{USD}} \times \frac{\text{USD}}{\text{GBP}}$$

$$1 \text{ GBP} = \text{CHF } 1.4650 \times 1.7845 \text{ (Bid)}$$

$$\text{Ask} \quad 1.4655 \times 1.7860 \text{ (Ask)}$$

$$\text{SR} \Rightarrow 1 \text{ GBP} = \text{CHF } 2.5850 - 2.5881$$

Cal. of 3mth FR

$$\text{SR } 1 \text{ USD} = \text{CHF } 1.4650 - 1.4655$$

$$\text{S/10} \quad + \quad .0005 \quad .0010$$

$$\text{3mth FR } 1 \text{ USD} = \text{CHF } 1.4655 - 1.4665$$

$$S/R \quad 1 \text{ GBP} = \text{USD } 1.7645 - 1.7660$$

$$\frac{25}{20} \quad (-) \quad .0025 \quad .0020$$

$$3 \text{ month } 1 \text{ GBP} \Rightarrow \text{USD } 1.7620 - 1.7640$$

Cross Rate:-

$$1 \text{ GBP} = \text{CHF } 1.4655 \times 1.7620 \text{ (Bid)}$$

$$\text{CHF } 1.4665 \times 1.7640 \text{ (Ask)}$$

3 month P/R:-

$$1 \text{ GBP} = \text{CHF } 2.5822 - 2.5869$$

Final Answer:- Cal. of Swap points:-

$$3 \text{ month } 1 \text{ GBP} = \text{CHF } 2.5822 - 2.5869$$

$$(-) S/R \quad 1 \text{ GBP} = \text{CHF } 2.5850 - 2.5881$$

$$.0028 - .0012$$

$$\text{Swap points} = 28/12$$

LOS 34 : Borrowing and Investment Strategy

QUESTION NO. 29B

Your bank's London office has surplus funds to the extent of US\$ 500000 for a period of 3 months. The cost of funds to the bank is 4 % p.a. It proposes to invest these funds in London, New York or Frankfurt and obtain the best yield, without any exchange risk to the bank. The following rates of interest are available at the three centres of domestic funds there at for a period of 3 months.

London	5 % p.a.
New York	8 % p.a.
Frankfurt	3% p.a.

The market rates in London for US dollars and EURO are as under:

London on New York

Spot	1.5350/90
1 month	15/18

2 months	30/35
3 months	80/85

London on Frankfurt

Spot	1.8260/90
1 month	60/55
2 months	95/90
3 months	145/140

At which centre, will the investment be made & what will be the net gain (to the nearest pound) to the bank on the invested funds?

Solution :

Q.298 V.Imp.

1) Invest in New York (\$) :-

Amount received after 3 months :-

$$\$5,00,000 \left(1 + 0.08 \times \frac{3}{12}\right) \Rightarrow \$5,10,000$$

less: Amt. repaid after 3 months

$$\$5,00,000 \left(1 + 0.04 \times \frac{3}{12}\right) = \$5,05,000$$

$$\text{Net gain in \$} \quad \underline{\underline{\$5,000}}$$

Net gain in £ :-

$$\Rightarrow \$5,000 \times \frac{1}{1.5475} \text{ £} \Rightarrow \underline{\underline{\text{£} 3231}}$$

3 months F/R

$$\text{S/R } 1 \text{ £} = \$1.5350 - \$1.5390$$

$$\text{3 months S/P (+)} \quad .0080 \quad .0085$$

$$\text{2 months } 1 \text{ £} = \$1.5430 - \$1.5475$$

$$1 \text{ £} = \frac{1}{1.5475} \text{ \$} - \frac{1}{1.5430} \text{ \$}$$

$\boxed{\begin{matrix} \$ \rightarrow \text{sell} \\ \text{£} \rightarrow \text{buy} \end{matrix}}$

2) Invest in London:-

First convert '\$' into '£' using spot rates:-

$$\$5,00,000 \times \frac{1}{1.5390} \text{ £} \Rightarrow \text{£} 3,24,886.29$$

$$\text{S/R } \text{£} = \$ 1.5350 - 1.5390$$

$$1 \$ = \frac{1}{1.5390} \text{ £} - \frac{1}{1.5350} \text{ £}$$

Amount received after 3 months with int:-

$$\text{£} 3,24,886.29 \left(1 + 0.5 \times \frac{3}{12}\right) \Rightarrow \text{£} 3,28,947.37$$

④
Net: Equivalent '£' required

to repay \$5,05,000 after 3 months:-

$$\$5,05,000 \times \frac{1}{1.5430} \text{ £} \Rightarrow \text{£} 3,27,289.51$$

3 with F/R

$$1 \$ = \frac{1}{1.5425} \text{ £} - \frac{1}{1.5430} \text{ £}$$

\$ → Buy.
£ → Sell

Net gain in '£' £ 1,662.86

$$\text{or } \text{£} 1,663$$

3) Invest in Frankfurt:- (€)

1st Convert '\$' into '€' using Spot Rate

$$0 \$ 5,00,000 \times \text{€ } 1.1865 \Rightarrow \text{€ } 593250$$

Cal. of Cross Rate:-

$$1 \text{ £} = \$ 1.5350 - 1.5390 \quad \frac{100}{\text{£}}$$

$$1 \text{ £} = \text{€ } 1.8260 - 1.8290 \quad \frac{\text{€}}{\text{£}}$$

$$1 \$ = \text{€ } \frac{\text{€}}{\text{£}}$$

$$\frac{\text{€}}{\text{£}} = \frac{\text{€}}{\text{£}} \times \frac{\text{£}}{\text{\$}}$$

$$1 \text{ £} = \text{€ } 1.8260 - 1.8290$$

$$1 \$ = \text{£ } \frac{1}{1.5390} - \frac{1}{1.5350} \text{ £}$$

$$1 \$ = \text{€ } 1.8260 \times \frac{1}{1.5390} - 1.8290 \times \frac{1}{1.5350}$$

$$1 \$ = \text{€ } 1.1865 - 1.1915$$

\$ \rightarrow\$ Sell

€ \$\rightarrow\$ Buy.

Am't received after 3 mths! - (with int'l.)

$$\text{€ } 593250 \left(1 + 0.03 \times \frac{3}{12}\right) = \text{€ } 597699.38$$

Equivalent '£'

$$\text{€ } 597699.38 \times \frac{1}{1.8150} \text{ £} \Rightarrow \text{£ } 329310.75$$

3 mths F/R

$$S/R \text{ } f = ₹ 1.8260 - 1.8290$$

$$145/140 (-) 0.0145 \quad 0.0140$$

$$\text{with } F/R \text{ } f = ₹ 1.8115 - ₹ 1.8150$$

$$f = \frac{1}{1.8150} - \frac{1}{1.8115}$$

₹ → Sell

f → Buy.

less: Amt. repaid in f' ✓

$$₹ 5,05,000 \times \frac{1}{1.5430} f \Rightarrow f 327284.51$$

(from Part II)

Net gain in f' f 2026.44

or
f 2026

Decision:-

We will invest at New York because
Net gain is maximum in this case i.e.
of f 3231.

QUESTION NO. 29D

K Ltd. currently operates from 4 different buildings and wants to consolidate its operations into one building which is expected to cost ₹ 90 crores. The Board of K Ltd. had approved the above plan and to fund the above cost, agreed to avail an External Commercial Borrowing (ECB) of GBP 10 m from G Bank Ltd. on the following conditions:

- ✚ The Loan will be availed on 1st April, 2019 with interest payable on half yearly rest.
- ✚ Average Loan Maturity life will be 3.4 years with an overall tenure of 5 years.
- ✚ Upfront Fee of 1.20%.
- ✚ Interest Cost is GBP 6 months LIBOR + Margin of 2.50%.
- ✚ The 6 month LIBOR is expected to be 1.05%.

K Ltd. also entered into a GBP-INR hedge at 1 GBP = INR 90 to cover the exposure on account of the above ECB Loan and the cost of the hedge is coming to 4.00% p.a.

As a Finance Manager, given the above information and taking the 1 GBP = INR 90:

- (i) Calculate the overall cost both in percentage and rupee terms on an annual basis.
- (ii) What is the cost of hedging in rupee terms?

- (iii) If K Ltd. wants to pursue an aggressive approach, what would be the net gain/loss for K Ltd. if the INR depreciates/appreciates against GBP by 10% at the end of the 5 years assuming that the loan is repaid in GBP at the end of 5 years?

Ignore time value and taxes and calculate to two decimals.

Solution :

Q-29D V. Imp.
(8 marks)

(i) Calculation of Overall Cost:-

Interest Cost

6 mths LIBOR + ^{Margin} 2.5% 3.55% p.a.
 $[1.05\% + 2.5\%] \text{ p.a.}$

Hedging Cost

4% p.a.

One-time Upfront fees:-

1.20%

Avg. loan Maturity = 3.4 years 0.35% p.a.

Per annum Cost = $\frac{1.2\%}{3.4}$

Overall Cost (%) per annum 7.9% p.a.

Overall Cost in rupee terms:- (p.a.)

GBP 10 million $\times 7.9\% \text{ p.a.} \times 90$

1 GBP = ₹90

$\Rightarrow ₹71,00,000$

per annum.

(ii) Cost of Hedging in rupee terms:-

GBP 100,00,000 $\times 4\% \text{ p.a.} \times ₹90$

$\Rightarrow ₹360,00,000 \text{ per annum}$

OR

Total Hedging Cost:- ✓

$$\Rightarrow ₹ 36000,000 \times 3.4 \text{ years}$$

$$\Rightarrow ₹ 1224 \text{ lakhs} \text{ or } ₹ 12.24 \text{ cr.}$$

$$\text{or } ₹ 122.40 \text{ million} \checkmark$$

Savings

(ii) If K Ltd. pursues an aggressive approach [Not going to hedge the exposure] then Gain/Loss if INR Depreciate Appreciate by 10% shall be as follows

Case I:- If INR depreciate by 10%:-

$$\text{S/R } 1 \text{ GBP} = ₹ 90$$

$$1 ₹ = \frac{1}{90} \text{ GBP } (1-10\%)$$

$$1 ₹ \Rightarrow 0.01 \text{ GBP}$$

or

$$1 \text{ GBP} = \frac{1}{0.01} ₹ \Rightarrow 100 \text{ INR}$$

Expected S/R on Expiry.

$$1 \text{ GBP} = ₹ 100$$

$$₹ \text{ loss / GBP} \Rightarrow ₹ 100 - 90 = ₹ 10$$

Total loss :-

$$\text{GBP } 10 \text{ million} \times ₹ 10 \Rightarrow ₹ 1000 \text{ lakhs}$$

$$\text{Add:- Savings in Cost of Hedging} \Rightarrow ₹ 1224 \text{ lakhs}$$

Net Gain

$$₹ 224 \text{ lakhs}$$

Qn II:- INR Appreciates by 10%:-

$$\text{SR } 1\text{GBP} = \text{₹ } 90$$

$$L \text{ INR} = \frac{1}{90} \text{GBP} (1 + 10)$$

$$L \text{ INR} = 0.0122\text{GBP}$$

$$1\text{GBP} = \text{₹ } 81.97$$

$$\text{₹ gain / GBP} \Rightarrow \text{₹ } 90 - 81.97 \\ \Rightarrow \text{₹ } 8.03$$

Total gain on Repayment of loan:-

$$\text{GBP } 10 \text{ million} \times \text{₹ } 8.03 \Rightarrow \text{₹ } 803 \text{ lakhs}$$

$$\text{Add: Savings in Cost of Hedging} = \text{₹ } 1224 \text{ lakhs}$$

$$\text{Net gain } \text{₹ } 2027 \text{ lakhs}$$

QUESTION NO. 29F

ICL an Indian MNC is executing a plant in Sri Lanka. It has raised ₹ 400 billion. Half of the amount will be required after six months' time. ICL is looking an opportunity to invest this amount on 1st April, 2020 for a period of six months. It is considering two underlying proposals:

Market	Japan	US
Nature of Investment	Index Fund (JPY)	Treasury Bills (USD)
Dividend (in billions)	25	-
Income from stock lending (in billions)	11.9276	-
Discount on initial investment at the end	2%	-
Interest	-	5 per cent per annum
Exchange Rate (1st April, 2020)	JPY/INR 1.58	USD/INR 0.014
Exchange Rate (30th September, 2020)	JPY/INR 1.57	USD/INR 0.013

You, as an Investment Manager, is required to suggest the best course of option.

Solution:

0.29F (Sum)

(i) Investment in JPY:- (in billions)

⇒ Available Amount ⇒ ₹ 200 × 1.58 JPY

JPY/INR 1.58 ⇒ 316 JPY (billions)

1 INR = 1.58 JPY

⇒ Dividend Income ⇒ 25 JPY (billions)

⇒ Income from stock holding ⇒ 11.9276 JPY (billions)

⇒ Investment Value at the end after 2% Discount ⇒ 309.68 JPY (billions)
(316 × .98)

346.6076 JPY
billions

Conversion on 30th Sep, 2020

346.6076 JPY × $\frac{1}{1.57}$ ₹ ⇒ ₹ 220.77 (billions)

1 INR = 1.57 JPY

1 JPY = $\frac{1}{1.57}$ ₹

Cash:- ₹ 220.77 - ₹ 200 billions

⇒ ₹ 20.77 billions

(ii) Investment in USD:-

Available Amount

₹ 200 billions × 0.014 \$ ⇒ 2.8 billion USD

1 INR = 0.014 USD

= 0.07 billion

Add: intl. @ 5% p.a. for 6 months

2.87 USD

And available at the end. → Dollar

Conversion as on 30th Sep. 2020

$$2.17 \text{ USD Billion} \times \frac{1}{0.013} \text{ ₹} \\ \Rightarrow \text{₹ } 220.77 \text{ Billion}$$

$$\text{Gain} = \text{₹ } 220.77 - \text{₹ } 200$$

$$\Rightarrow \text{₹ } 20.77 \text{ Billion} \checkmark$$

The equivalent amount is same in both the options so ICL is indifferent.

However, USD is more stable & Treasury Bills are risk free, so Investment in Treasury Bills (USD) is suggested.

LOS 35 : Expected Spot Rate

$$\text{Expected Spot Rate} = \sum \text{Spot Rates} \times \text{Probability}$$

QUESTION NO. 30B

ZX Ltd. has made purchases worth USD 80,000 on 1st May 2020 for which it has to make a payment on 1st November 2020. The present exchange rate is INR/USD 75. The company can purchase forward dollars at INR/USD 74. The company will have to make an upfront premium @ 1 per cent of the forward amount purchased. The cost of funds to ZX Ltd. is 10 per cent per annum.

The company can hedge its position with the following expected rate of USD in foreign exchange market on 1st May 2020:

	Exchange Rate	Probability
(i)	INR/USD 77	0.15
(ii)	INR/USD 71	0.25
(iii)	INR/USD 79	0.20
(iv)	INR/USD 74	0.40

You are required to advise the company for a suitable cover for risk.

Solution :

Q.30B

Case I: If ZX Ltd. hedge its position in the forward market:-

FR 1 USD = INR 74

Total Hedging Cost:-

Upfront Premium paid @ 1%.

vs. $80,000 \times ₹ 74 \times 1\% \Rightarrow ₹ 59,200$

Add: Int. @ 10% p.a. for 6 mths $\Rightarrow ₹ 2960$
 $59200 \times 10\% \times \frac{6}{12}$

Total Hedging Cost ₹ 62,160 ✓

Total Outflow:-

$80,000 \times ₹ 74 \Rightarrow ₹ 59,20,000$

Add: Hedging Cost = ₹ 62,160

Total Cost if hedging is done through forward contract. ₹ 59,82,160 ✓

Case II: If ZX Ltd. does not take forward (Unhedged position):-

Cal. of Expected Spot Rate:-

<u>S/R</u> <u>₹/\$</u>	<u>Prob</u>	<u>Exp. S/R</u>
77	.15	$77 \times .15$
71	.25	$71 \times .25$
79	.20	$79 \times .20$
74	.40	$74 \times .40$

Expected Amt. Payable :-

$$\$80,000 \times ₹74.70 = ₹59,76,000$$

Decision:

Since Cash outflow is less in case of unhedged position, company should opt for the same.

LOS 36 : Currency Futures

Steps Involved:

Step 1: Decide Position

- ✚ Long Position
- ✚ Short Position

Note: 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

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

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

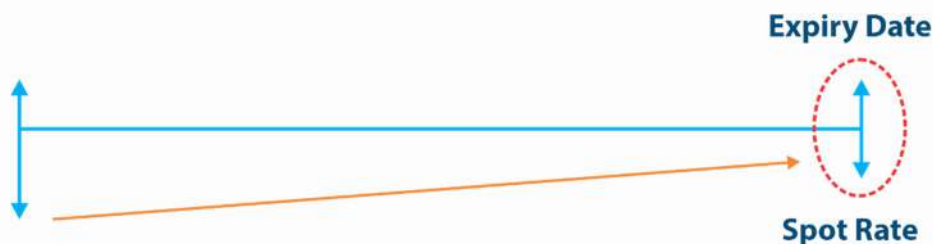
Step 3: Calculate Settlement Amount/ Total Outflow/Inflow under Future Contract

1. Calculate Profit and Loss under Future Contract



Change in Future Price × No. of Lots × Value of One 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

QUESTION NO. 31A

XYZ Ltd. is an export oriented business house based in Mumbai. The Company invoices in customer's currency. Its receipt of US \$ 1,00,000 is due on September 1, 2005. Market information as at June 1, 2005.

Exchange Rates		Currency Futures	
	US\$/ ₹	Contract Size	₹ 4,72,000
Spot	0.02140		US \$/₹
1 month forward	0.02136	June	0.02126
3 month forward	0.02127	September	0.02118

	Initial Margin	Interest Rates in India
June	₹10,000	7.50%
September	₹15,000	8.00%

On September 1st, 2005. The spot rate US \$/₹ is 0.02133 and currency future rate for September contract is 0.02134. Comment which of the following methods would be most advantageous for XYZ Ltd.

- Using Forward Contract
- Using Currency Futures
- Not Hedging Currency Risks.

It may be assumed that variation in margin would be settled on the maturity of the futures contract.

Solution:

Q.31A Imp. [4-5+imp](a) Forward Contract:-Total Receipt using Forward Hedging:-

$$\$1,00,000 \times \frac{1}{0.02127} \text{ ₹} \rightarrow \text{₹} 47,01,957.45$$

3mths F/R

$$1\text{₹} = \$ 0.02127$$

$$1\$ = \frac{1}{0.02127} \text{ ₹}$$

(b) Currency futures:-Step 1:- Decide position :-INDIAN firm $\rightarrow$ \$ Receivables
(₹)

\$	$\rightarrow$ sell
₹	$\rightarrow$ Buy.

Step:- $1\text{₹} \rightarrow \$ 0.02118$ Long positionContract
RateStep 2:- Cal. of No. of Lots: / Contracts:-

$$\Rightarrow \frac{\text{Value of position under future contract}}{\text{Value of one contract}}$$

$$\Rightarrow \frac{\$ 1,00,000}{\text{₹} 472000}$$

$$\Rightarrow \text{₹ } 47,21,435.32$$

$$\text{₹ } 47,20,000$$

$$\Rightarrow 10.003 \text{ or } 10 \text{ lots}$$

long position

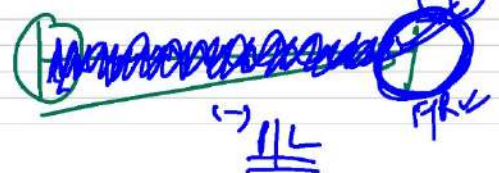
W.No:- Contract Rate:-

$$1 \text{ ₹} \Rightarrow \$ 0.02118$$

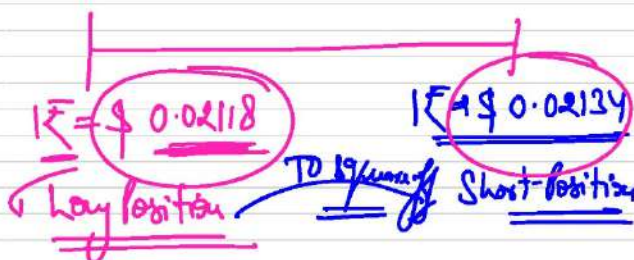
$$\text{Value of position} = \$ 1,00,000 \times \frac{1}{0.02118} \text{ ₹}$$

$$\Rightarrow \text{₹ } 47,21,435.32$$

Step 3:-



Cal. of Profit & Loss under future contract:-



Profit under the future contract:-

$$\Rightarrow \text{₹ } 47,20,000 \times 10 \times [\text{Change in future price}]$$

$$\Rightarrow \text{₹ } 47,20,000 \times [\$ 0.02134 - \$ 0.02118]$$

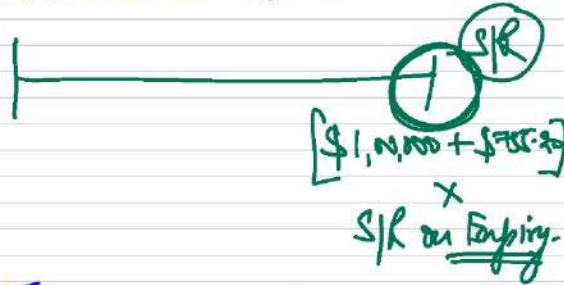
$$\Rightarrow \$ 755.20 \text{ (Profit)}$$

Step 4: Total Receipt in 'f'

$$\Rightarrow \$1,00,000 + \$755.20$$

→ \$ 18755.20

Convert into ₹ early Spot Rate on Expiry.



$$= ₹ 100755.20 \times \frac{1}{0.02133}$$

$$\Rightarrow \sqrt{47,23,638.07}$$

S/R on Empiry:

$$|F| = 0.02133 f$$

Step 5:- Cal. of opportunity Cost of Initial Margins -

$$\Rightarrow \underline{\underline{\text{₹ } 15000 \times 10 \times 8\% \times \frac{3}{12}}}$$

$\Rightarrow \text{Rs } 3000$ ✓

Step 6:- Cal. of Net Receipt under
future hedging:-

Total Receipt $\Rightarrow ₹ 47,23,678.07$

hex. opp. cost $\Rightarrow$ 3,000.00

Net Receipt ₹ 47,20,628.07

under future
hedging.

③ No Hedging:-

Total Receipt under No Hedging:-

$$\Rightarrow \$1,10,000 \times \frac{1}{0.02123} \text{ ₹}$$

$$\text{SL on 1st Sep:-} \Rightarrow \text{₹ } 46,88,232.54$$

$$\text{1 ₹} \Rightarrow \$ 0.02133$$

Decision:-

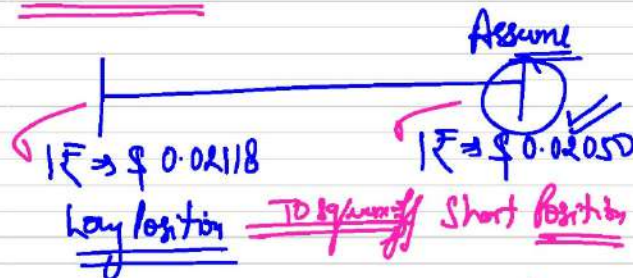
Receipt under forward:- ₹ 47,01,457.45

Receipt under future:- ₹ 47,20,638.07

Receipt under No Hedging:- ₹ 46,88,232.54

The most advantageous strategy for XYZ Ltd. is to hedge through future contract because receipt is maximum in this case.

Extra Part:-



loss under the future contract:-

$$₹ 472000 \times 10 [\$ 0.02118 - \$ 0.02050]$$

$$\Rightarrow \text{Loss } (\$) \underline{\underline{\$ 3209.60}}$$

Loss under the future
Contract.

Total Receipt in '\$'

$$\Rightarrow \$ 1,00,000 - \$ 3209.60$$

$$\Rightarrow \underline{\underline{\$ 96790.40}}$$

$$\text{in } (₹) \Rightarrow \$ 96790.40 \times \frac{1}{0.02050} ₹$$

$$\Rightarrow \underline{\underline{₹ 47,21,482.93}}$$

Net Receipt:-

$$\Rightarrow ₹ 47,21,482.93 - ₹ 3000$$

$$\Rightarrow \underline{\underline{₹ 47,18,482.93}}$$

LOS 37 : Currency Options

Steps Involved:

Step1: Decide Position

Long Call
Long Put

~~Short Call~~
~~Short Put~~

Note: 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



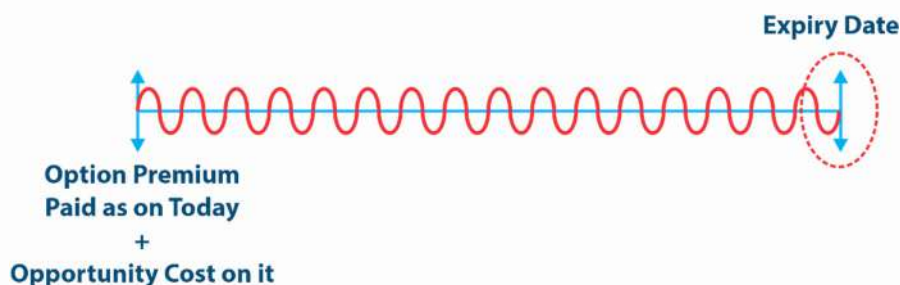
Step2 : Calculation of Number of contracts/Lots

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

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

Step 3: 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.



Step 5: Calculate / Total Outflow/Inflow under Option Contract

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

Total Outflow / Inflow under Option Hedging

QUESTION NO. 32A

Best of Luck Ltd. London will have to make a payment of \$ 3,64,897 in six months' time. The company is considering the various choices it has in order to hedge its transaction exposure.

Exchange rates:

Spot rate	\$1.5617-1.5673
Six month forward rate	\$1.5455-1.5609

Money Market rates:

	Borrow (%)	Invest (%)
US	6	4.5
UK	7	5.5

Foreign currency option prices (1 unit is £12,500):

Exercise price	Call option (March)	Put option (March)
\$ 1.70	\$ 0.037	\$ 0.096

By making the appropriate calculations decide which of the following hedging alternatives is the most attractive to Best of Luck Ltd:

- Forward market
- Money market Cover
- Currency options

Solution:

Q.32A Typical

(i) Forward Hedging:-

Amount paid under forward contract
using 6mth FR:-

$$\$ 364897 \times \frac{1}{1.5455} \text{ £}$$

$$\Rightarrow \text{£ } 236102.88$$

6mth FR

$$1\text{£} = \$ 1.5455 - \$ 1.5609$$

$$1\$ = \frac{1}{1.5609} \text{ £} - \frac{1}{1.5455} \text{ £}$$

(ii) Money Market Cover:-

Step 1:- Invest in '£' & Amount of Investment
should be such that:-

X + interest on it $\Rightarrow$ Amount to be paid

$$X + X \times 4.5\% \times \frac{6}{12} \Rightarrow \$ 364897$$

$$\Rightarrow X \Rightarrow \$ 356867.48$$

Step 2:- Borrow equivalent amount in '£'
using spot rate as on today:-

$$\Rightarrow \$ 356867.48 \times \frac{1}{1.5617} \text{ £}$$

$$\text{S/R} \Rightarrow \text{£ } 228512.19$$

$$1 \text{ £} = \$ 1.5617 - 1.5673$$

$$1 \text{ £} = \frac{1}{1.5673} \text{ \$} - \frac{1}{1.5617} \text{ \$}$$

Step 3:- Amount repaid with interest after 6 months:-

$$\Rightarrow \text{£ } 228512.19 \left(1 + 0.07 \times \frac{6}{12} \right)$$

$$\Rightarrow \text{£ } 2,36,510.12$$

(Payment under MM Hedge)

(ii) Currency Options:-

Step 1:- Decide Position:-

UK firm $\rightarrow$ \$ payable

$\text{\$} \rightarrow \text{Buy.}$
 $\text{£} \rightarrow \text{sell.}$

$$X \Rightarrow 1 \text{ £} = \$ 1.70$$

Outright rate

right to sell

hedge put

or put option:-

$$1 \text{ £} = \$ 0.096$$

Step 2:- Cal. of No. of Lots / Contracts:-

$$\Rightarrow \frac{\text{Value of Position}}{\text{Value of one Contract}}$$

$$\Rightarrow \frac{\$ 364897}{£ 12,500} \Rightarrow \frac{£}{£}$$

$$\Rightarrow \frac{£ 214645.29}{£ 12500}$$

$$\Rightarrow 17.17 \text{ lots or } \underline{\underline{17 \text{ lots}}}$$

W.No:- $X = 1£ = \$1.70$
or $1\$ = \frac{1}{1.70} £$

Value of Position in £'

$$\Rightarrow \$ 364897 \times \frac{1}{1.70} £$$

$$\Rightarrow \underline{\underline{£ 214645.29}}$$

Step 3:- Unhedge position should be hedge through forward market:-

Exposure required to be hedge:- \$364897

Exposure actually hedged:- $\rightarrow \$ 361250$
 $£ 12,500 \times 17 \times \$ 1.70$

$$X = 1£ = \underline{\underline{\$1.70}}$$

Unhedged Position $\underline{\underline{\$ 367}}$

We will take forward contract for \$ 3647 as there is no dot size req.

$$\Rightarrow \$ 3647 \times \frac{1}{1.5455} \text{ £} \Rightarrow \text{£ } 2359.75$$

6mths: - FR: -

$$1 \text{ £} = \$ 1.5455 - 1.5609$$

$$1 \$ = \frac{1}{1.5609} \text{ £} - \frac{1}{1.5455} \text{ £}$$

Step 4: - Cal. of option premium paid as on today & opp. cost on it: -

$$\text{OP Paid: - } 1 \text{ £} = \$ 0.096$$

$$\Rightarrow 17 \text{ lots} \times \text{£ } 12500 \times \$ 0.096$$

$$\Rightarrow \$ 20400 \rightarrow \text{paid as on today}$$

$$\text{£ } 20400 \times \text{S/R}$$

Equivalent (£) using Spot Rate as on today: -

$$\Rightarrow \$ 20400 \times \frac{1}{1.5617} \text{ £} \Rightarrow \text{£ } 13062.67$$

S/R

$$1 \text{ £} = \$ 1.5617 - \$ 1.5673$$

$$1 \$ = \frac{1}{1.5673} \text{ £} - \frac{1}{1.5617} \text{ £}$$

Total of paid + opp. cost on it:-

$$\Rightarrow \text{£ } 13062.69 \left(1 + 0.07 \times \frac{6}{12} \right)$$

$$\Rightarrow \text{£ } 13579.88$$

Step 5:- Total Outflow under Currency options:-

1) Total option premium paid with opp. cost on it:- ✓ $\text{£ } 13579.88$

2) Unhedged position under forward:- ✓ $\text{£ } 2359.75$

3) Under Currency options contract:- ✓ $\Rightarrow \text{£ } 212500$
 $17 \text{ lots} \times \text{£ } 12500$

Total Outflow under options Hedging. ✓ $\text{£ } 228379.63$

Decision:-

1) Payment under forward hedging. $\Rightarrow \text{£ } 236102.88$

2) Payment under MM Hedge $\Rightarrow \text{£ } 236510.12$

3) Payment under options Hedging $\Rightarrow \text{£ } 228379.63$

The most appropriate strategy for best of luck is hedging through options contract/mkt. because outflow is minimum in this case.

QUESTION NO. 32D

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 £ = \$ 1.96	
Interest Rate are as follows	UK	US

180 days deposit rate	4.5%	5%
180 days borrowing rate	5%	5.5%

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:

Future Rates	Probability
\$1.91	25%
\$1.95	60%
\$2.05	15%

Which of the following strategies would be most preferable for XYZ Ltd.?

- Forward Contract.
- A Money Market Hedge
- An Option Contract
- No Hedging

Show calculation in each case

Solution :

0.320 (of) (3 times) (8 marks)

1) Forward Contract:-

Amount paid using Forward Rate:-

$\Rightarrow £ 3,00,000 \times \$ 1.96$

$\Rightarrow \$ 5,88,000$

180 Days FK

$1£ = \$ 1.96$

2) Money MKT. Hedge:-

US \$

180 Days

UK (£)

$£ 3,00,000$ payable

Step 1:- Invest in '£' & Amount of Investment should be such that

$$X + \text{Int. on it} = \text{Amt to be paid}$$

$$X + X \times 4.5\% \Rightarrow £ 3,00,000$$

$$X \Rightarrow \underline{\underline{£ 287,081.34}}$$

Step 2:- Borrow equivalent amount in '\$' using Spot Rate: -

$$\Rightarrow £ 287,081.34 \times \$ 2$$

$$\Rightarrow \underline{\underline{\$ 5,74,162.68}}$$

$$\text{SR } 1£ = \$ 2$$

Step 3:- Amount repaid after 180 Days with Interest: -

$$\Rightarrow \$ 5,74,162.68 (1 + 0.05)$$

$$\Rightarrow \underline{\underline{\$ 6,02,870.91}}$$

(Payment under Money Mkt. Hedge)

3) Option Cover:-

Step 1:- Decide Position: -

US firm $\rightarrow$ £ 300,000 payables

£ $\rightarrow$ Buy ✓
\$ $\rightarrow$ Sell

$$X = 1\text{f} = \$1.97$$

right to buy: i.e. long call

$$\text{of paid } 1\text{f} \Rightarrow \$0.04$$

Cal. of Profit/Loss on option Contract:-

Call option:

$$S - X$$

$$1\text{f} \Rightarrow \$1.91 - \$1.97 < 0 \quad \text{Not Exercise}$$

$$\$1.95 - \$1.97 < 0 \quad \text{Not Exercise}$$

$$\$2.05 - \$1.97 > 0 \quad \text{Exercise}$$

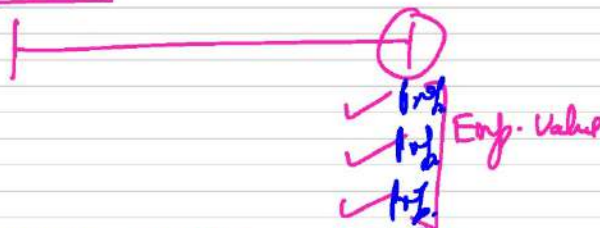
$$\underline{GP} \checkmark \quad NP \Rightarrow \underline{GP - OP} \checkmark$$

$$0 \quad 0 - 0.04 \Rightarrow -10.04 \quad \text{Loss}$$

$$0 \quad 0 - 0.04 \Rightarrow -10.04 \quad \text{Loss}$$

$$0.08 \quad 0.08 - 0.04 \Rightarrow +10.04 \quad \text{Profit}$$

Total Cost



Total Cost

Cost/f

Cost/f

$$1\text{f} \Rightarrow \$$$

$$1\text{f} \Rightarrow \$1.91 \quad 1.91 + 0.04 \quad 1\text{f} \Rightarrow \$1.95$$

$$1\text{f} = \$1.95 \quad 1.95 + 0.04 \quad \$1.99$$

$$1\text{£} = \$2.05 \quad 2.05 - 0.04 \quad \underline{\underline{\$2.01}}$$

$$\underline{\text{Total cost of £3,00,000}} \quad \underline{\underline{102}}$$

$$£3,00,000 \times \$1.25 \Rightarrow \$585,000 \quad .25$$

$$£3,00,000 \times \$1.99 \Rightarrow \$597,000 \quad .60$$

$$£3,00,000 \times \$2.01 \Rightarrow \$603,000 \quad .15$$

Expected Gst

$$\$585,000 \times .25$$

$$\$597,000 \times .60$$

$$\$603,000 \times .15$$

$$\underline{\underline{\$594,900}} \quad \checkmark$$

Total outflow under option Contract:-

$$\text{Expected Gst} \Rightarrow \$594,900 \quad \checkmark$$

(+) opp. Gst of option premium

$$1\text{£} = \$0.04 \quad \checkmark$$

$$£3,00,000 \times \$0.04$$

$$\Rightarrow \$12,000 \times 5.5\% \Rightarrow \$660 \quad \checkmark$$

(for 180 days)

$$\text{Total Outflow under option contract} \quad \underline{\underline{\$595,560}} \quad \checkmark$$

4) No Hedging:-

<u>Exp. S/R on</u> <u>₹/₹</u>	<u>Prob</u>	<u>Exp. Value</u>
$\frac{1}{2} = \$1.91$	.25	$\$1.91 \times .25$
$\$1.95$	.60	$\$1.95 \times .60$
$\$2.05$	.15	$\$2.05 \times .15$
	<u>1</u>	<u>$\frac{1}{2} = \\$1.955$</u>

Total Outflow under No Hedging:-

$$\Rightarrow \text{£ } 3,00,000 \times \$1.955$$

$$\Rightarrow \underline{\underline{\$ 5,86,500}}$$

Decision:-

- 1) Payment under forward hedging $\Rightarrow \$ 5,88,000$
- 2) Payment under MM Hedge $\Rightarrow \$ 6,05,411.63$
- 3) Payment under Option Hedging $\Rightarrow \$ 5,95,560$
- 4) Payment under No Hedging $\Rightarrow \$ 5,86,500$

The Best Strategy is "No Hedging"
for XYZ Ltd. as payment is minimum
in this case.

QUESTION NO. 32E

On 19th April following are the spot rate

Spot	EUR/USD 1.20000	USD/INR 44.8000
------	-----------------	-----------------

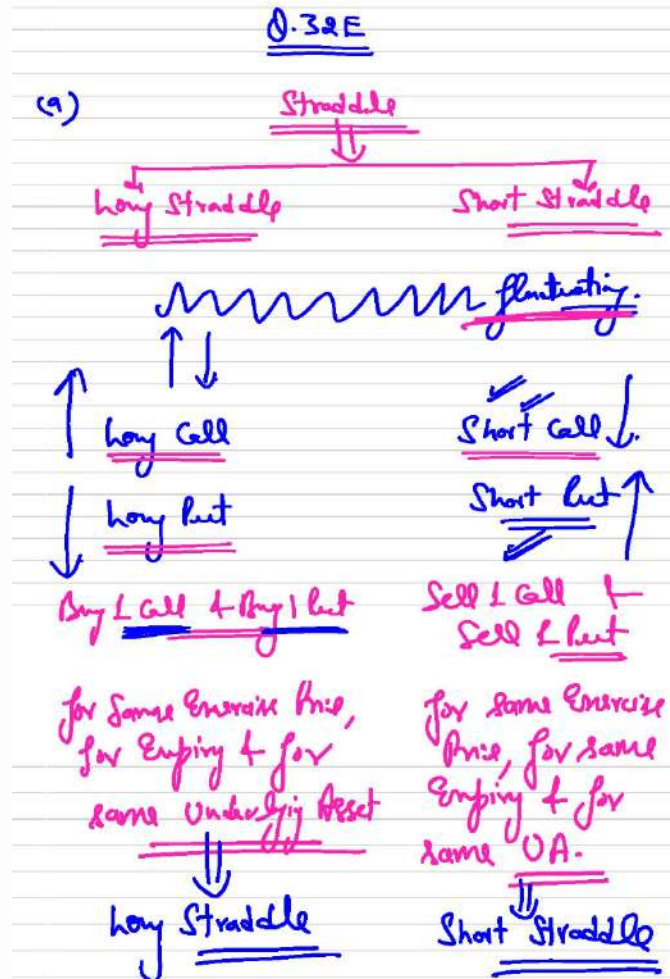
Following are the quotes of European Options:

Currency Pair	Call/Put	Strike price	Premium	Expiry date
EUR/USD	Call	1.2000	\$ 0.035	July 19
EUR/USD	Put	1.2000	\$ 0.04	July 19

USD/INR	Call	44.8000	₹ 0.12	Sep. 19
USD/INR	Put	44.8000	₹0.04	Sep. 19

- a) A trader sells an at - the - money spot straddle expiring at three months (July 19). Calculate gain or loss if three months later the spot rate is EUR/USD 1.2900.
- b) Which strategy gives a profit to the dealer if five months later (Sept19) expected spot rate is USD/INR 45.00. Also calculate profit for a transaction USD 1.5 million.

Solution :



(a) Short Straddle:-

Sell 1 Call & Sell 1 Put i.e.
 1 Short Call & 1 Short Put for the
 same exercise price, for the same
 expiring & for the same underlying Asset.

Short Call	Short Put
X = 1 EUR = 12000 USD	X = 1 EUR = 12000 USD

$$OP = 1\text{EUR} = \$0.035 \quad | \quad OP = 1\text{EUR} = \$0.04$$

on Expiry $S = 1\text{EUR} = \text{USD } 1.2900$

S-X

$$1.2900 - 1.2000 > 0$$

Call Buyer will exercise against us

$$GP = (-) 0.0900$$

$$NP = GP + OP \\ = (-) 0.0900 + 0.035$$

$$NP \Rightarrow (-) 0.055 \$$$

$$\text{i.e. } 1\text{EUR} = (-) 0.055 \$$$

X-S

$$1.2000 - 1.2900 < 0$$

but buyer will not exercise against us

$$GP = 0$$

$$NP = 0 + OP \\ \Rightarrow 0 + \$0.04$$

$$NP = \$0.04$$

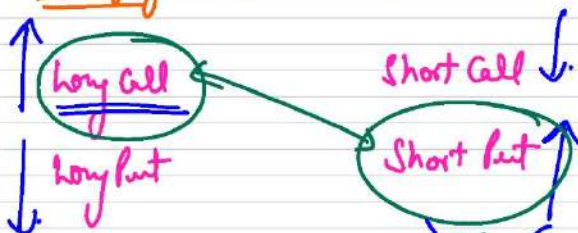
$$1\text{EUR} = + \$0.04$$

$$\text{Net pay-off} \Rightarrow (-) 0.055 \$ + 0.04$$

$$\text{Net pay-off} \Rightarrow 1\text{EUR} \Rightarrow (-) 0.015 \$$$

(b) $X = 1\text{USD} = \text{₹ } 44.8000$

on Expiry $S = 1\text{USD} = \text{₹ } 45.0000$ ✓



Long Call

$$X = 1\text{USD} = \text{₹ } 44.8000$$

$$OP = 1\text{USD} = \text{₹ } 0.12$$

OK

~~Short Put~~

$$X = 1\text{USD} = \text{₹ } 44.8000$$

$$OP \Rightarrow 1\text{USD} = \text{₹ } 0.04$$

If Expected S/R on Expiry = 1 USD = ₹45

S-X

$$45 - 44.80 > 0$$

Call Buyer will
Generate

$$GP = 0.20 \text{ ₹}$$

$$NP = GP - OP$$

$$\Rightarrow 0.20 - 0.12$$

$$NP \Rightarrow 1 \text{ USD} = ₹0.08$$

X-S

$$44.80 - 45.00 < 0$$

But Buyer will not
exercise against us

$$GP = 0$$

$$NP = GP + OP$$

$$= 0 + ₹0.04$$

$$NP = ₹0.04$$

$$1 \text{ USD} = ₹0.04$$

Long Call Strategy gives more profit
to the dealer. Hence, should be
accepted / opted.

Profit for \$1.5 million:-

$$\Rightarrow \$1,500,000 \times 0.08 \text{ ₹}$$

$$\Rightarrow ₹1,20,000$$

LOS 38 : Calculation of Return under FOREX

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

P_0 = Price at the beginning

I = Income from Interest/Dividend

P_1 = Price at the End

C = Change in exchange rate.

QUESTION NO. 33A

An Indian investor invests in a bond in America. If the price of the bond in the beginning of the period is \$ 100 and it is \$ 105 at the end of the period. The coupon interest during the period is \$7. The US dollar appreciates during this period by 3%. Find the return on investment in terms of home country currency.

Solution :

Q.32A

Return in terms of Home Currency:-

1) Return from Foreign Asset (Bonds):-

$$\Rightarrow \frac{D_1 - D_0 + I_1}{D_0} \times 100$$

$$\Rightarrow \frac{105 - 100 + 7}{100} \times 100$$

$$\Rightarrow 12\% \text{ p.a.}$$

2) Return from Foreign Currency fluctuation

↑ ⇒ +3% +ve for Indian Investor

Returns in Home Currency:-

$$(1 + R_{FA})(1 + R_{FC}) - 1 \Rightarrow \%$$

$$\Rightarrow (1 + 12)(1 + 03) - 1$$

$$\Rightarrow 15.36\% \text{ p.a.}$$

QUESTION NO. 33D

With the relaxation of investment norms in India in international market upto \$ 2,50,000 Mr. X to hedge himself against the risk of declining Indian economy and weakening of Indian Rupee during last few year decided to diversify into International Market.

Accordingly, Mr. X invested a sum of ₹ 1.58 crore on 1.1.20x1 in Standard & Poor Index. On 1.1.20x2 Mr. X sold his investment. The other relevant data is given below:

	1.1.20x1	1.1.20x2
Index of Stock Market in India	7395	?
Standard & Poor Index	2028	1919
Exchange Rate	62.00/62.25	67.25/67.50

You are required to:

- Determine the return for a US investor.
- Determine return of Mr. X of holding period.
- Determine the value of Index of Stock Market in India as on 1.1.20x2 at which Mr. X would be indifferent between investment in Standard & Poor Index and Indian Stock Market.

Solution :

Q. 32D (2)

(i) Return of a US Investor:-

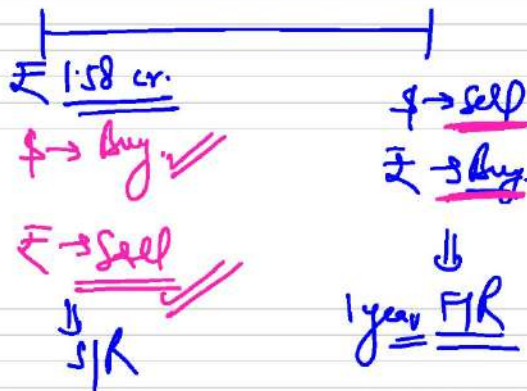
$$\Rightarrow \frac{\text{Ending Price} - \text{Initial Price}}{\text{Initial Price}} \times 100$$

$$\Rightarrow \frac{1919 - 2028}{2028} \times 100$$

$$\Rightarrow (-) 5.37\% \text{ p.a.}$$

(ii) Return of Mr. X :-

$$\text{Initial Investment} = \text{₹ } 1.58 \text{ cr.}$$

Equivalent US \$ invested in US (\$4) :-

$$\text{₹ } 1.58 \text{ cr.} \times \frac{1}{62.25} \$$$

$$\Rightarrow \$ 253815.26$$

$$4 = ₹ 62.00 - ₹ 62.25$$

$$1 ₹ = \frac{1}{62.25} - \frac{1}{62.00} \$$$

$$\text{Purchase price of } \$4 \Rightarrow 2028$$

$$\text{No. of } \$4 \text{ indices purchased :-}$$

$$\frac{\$ 253815.26}{2028} \Rightarrow 125.16 \text{ units}$$

Ending Value of SFL (fric) $\Rightarrow 1919$

$$\text{Value} \Rightarrow \$ \Rightarrow 1919 \times 125.16 \text{ units} \\ \Rightarrow \$ 240182.04$$

Equivalent (£)

$$\$ 240182.04 \times ₹ 67.25 \\ \Rightarrow ₹ 16152242.19$$

MR:-

$$1\$ = ₹ 67.25 - 67.50$$

% Return for Mr. X:-

$$\Rightarrow \frac{16152242.19 - 158,00,000}{158,00,000} \times 100$$

$$\Rightarrow 2.23\% \text{ p.a.}$$

(iii) Initial Investment = ₹ 1.58 cr.

Current price of Indian Index $\Rightarrow 7395$

$$\text{No. of units} \Rightarrow \frac{158,00,000}{7395} \Rightarrow 2136.58 \text{ units}$$

Let Ending Price of Indian Index = X

$$\frac{2136.58 \times X - 158,00,000}{158,00,000} \times 100 = 2.23\%$$

$$\Rightarrow 2136.58x - 1.58x \Rightarrow 352340$$

$$\Rightarrow 2136.58x \Rightarrow 161,58,340$$

$$\Rightarrow x \Rightarrow \frac{16158340}{2136.58}$$

Price of Indian index to be indifferent $\Rightarrow 7559.90 \approx \boxed{7560}$

LOS 39 : 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 40 : Treatment of withholding Tax

QUESTION NO. 35A

A USA based company is planning to set up a software development unit in India. Software developed in the Indian unit will be bought back by the US parent at a transfer price of USD \$ 10 million. The unit will remain in existence in India for one year; the software is expected to get developed within this time frame. The US based company will be subject to corporate tax of 30 percent and a withholding tax of 10 per cent in India and will not be eligible for tax credit in the US. The software developed will be sold in the US market for US \$ 12.0 million. Other estimates are as follows

Rent for fully furnished unit with necessary- hardware in India	₹ 15,00,000
Man power cost (80 software professional will be working for 10 hours each day)	₹ 400 per man hour
Administrative and other costs	₹ 12,00,000

Advise the US Company on financial viability of the project. The rupee-dollar rate is ₹ 48 / \$.

Solution :

Q.35A

Cal. of Net Profit after tax:-

Revenue:-
 $\$10,000,000 \times ₹48 \Rightarrow ₹480,00,000$

less: Cost:-

Rent ₹15,00,000

Man power Cost:- ₹1168,00,000
 (1 year = 365 Days)
 $[80 \times 10 \times 400 \times 365]$

Admin Cost ₹12,00,000

Profit before tax ₹360,00,000

less: Corporate tax @ 30% ₹ 1081,50,000

Profit after tax ₹ 2523,50,000

less: Withholding tax @ 10% (CTDS) ₹ 252,35,000

Repatriation amount (in rupees) ₹ 2271,15,000

Net profit after tax

Repatriation amount in '\$' \$ 4.73 millions

Advice:

The Cost of Development of software in India for the US Based company

is \$ 5.27 millions.

As the USA Based Co. is expected to sell the software in the US at \$ 12 million, it is advised to develop the software in India.

LOS 41 : 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:

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

QUESTION NO. 36B

A German subsidiary of an US based MNC has to mobilize 100000 Euro's working capital for the next 12 months. It has the following options:

Loan from German Bank	:	@ 5% p.a.
Loan from US Parent Bank	:	@ 4% p.a.
Loan from Swiss Bank	:	@ 3% p.a.

Banks in Germany charge an additional 0.25% p.a. towards loan servicing. Loans from outside Germany attract withholding tax of 8% on interest payments. If the interest rates given above are market determined, examine which loan is the most attractive using interest rate differential.

Solution :

Q.36B

Net Cost under each of the option:-

(i) Loan from German Bank:-

(Cost):-

$$\Rightarrow 5\% \text{ p.a.} + 0.25\% \text{ p.a.}$$

$$\Rightarrow \underline{5.25\% \text{ p.a.}}$$

(ii) Loan from US Parent Bank:-

(a) Effective Rate of Interest:-

$$x(1 - 0.08) = 4\%$$

$$x = \frac{4\%}{(1 - 0.08)}$$

$$\Rightarrow \underline{4.35\% \text{ p.a.}}$$

(b) Premium on US \$:-

$$\leftarrow 0.96\%$$

Assume:-

$$\text{S/R } 1\text{£} = 1\text{\$}$$

$$\text{Int}_{\$} = 4\%$$

$$\text{Int}_{\text{£}} = 5\%$$

Using I.R.P:-

$$\frac{\text{FR } \text{£}/\$}{\text{SR } \text{£}/\$} = \frac{(1 + \text{Int}_{\text{£}})}{(1 + \text{Int}_{\$})}$$

$$\frac{\text{FR}}{1} = \frac{(1 + 0.05)}{(1 + 0.04)}$$

$$\therefore \text{1 year FR} = 1\$ = \text{£}1.0096$$

Premium on \$

$$\frac{\text{FR} - \text{SR}}{\text{SR}} \times 100$$

$$= \frac{1.0096 - 1}{1} \times 100$$

Net Cost

5.31% p.a.

(iii) Loan from Swiss Bank:-

(a) Effective rate of interest

$$\frac{3\%}{(1 - .08)} \Rightarrow \underline{\underline{3.26\%}}$$

(b) Premium on Swiss franc:- 1.94%

Assume 1 SF = 1 £

As per RPT:-

$$\frac{FR \text{ £} / \text{£}}{1} = \frac{(1 + .05)}{(1 + .03)}$$

1 year FR 1 SF = 1.0194 £

Premium on SF

$$\left[\frac{1.0194 - 1}{1} \times 100 \right]$$

Net Cost

5.20% p.a.

Thus, loan from Swiss Bank is the best option as the total cost is minimum in this case i.e. 5.20% p.a.

Total Outflow including interest

$$\text{is } \text{£ } 1,00,000 + 5.20\% \Rightarrow \underline{\underline{\text{£ } 1,05,200}}$$

LOS 42 : 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 43 : Nostro Account, Vostro Account and LORO AccountNostro 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.

Vostro Account [Yours account with us]

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

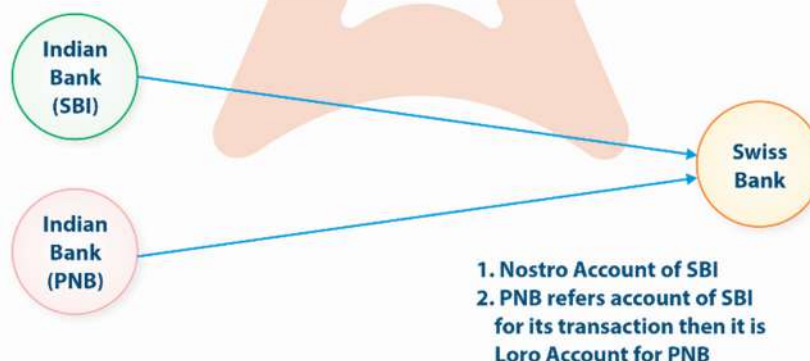
Example: Current account of Swizz bank in India with SBI bank in Rupee (₹) currency

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 of Dollars (FC)	Cr. [Credit] Inflow of Dollars (FC)
-------------	-------------------------------------	-------------------------------------

2. Exchange Position A/c/

Particulars	Long Dollar Buy (FC)	Short Dollar Sell (FC)
-------------	----------------------	------------------------

1

Spot Buy

Nostro
(Cash) A/c

Exchange
Position A/c

Inflow of Dollars (Credit)

Long Position

2

Spot Sell

Nostro
(Cash) A/c

Exchange
Position A/c

Outflow of Dollars (Debit)

Short Position

3

Forward Buy

Nostro
(Cash) A/c

Exchange
Position A/c

No Impact

Long Position

4

Forward Sell

Nostro
(Cash) A/c

Exchange
Position A/c

No Impact

Short Position

5

**Forward Buy
Contract Cancelled**

Nostro
(Cash) A/c

Exchange
Position A/c

No Impact

Short Position

6

**Forward Sell
Contract Cancelled**

Nostro
(Cash) A/c

Exchange
Position A/c

No Impact

Long Position

7

**FC
Draft Made**

Nostro
(Cash) A/c

Exchange
Position A/c

No Impact

Short Position

8

**DD
Cancelled**

Nostro
(Cash) A/c

Exchange
Position A/c

No Impact

Long Position

11

Remittance
By TTNostro
(Cash) A/cExchange
Position A/c

Outflow of Dollars (Debit)

Short Position

10

BR
CancelledNostro
(Cash) A/cExchange
Position A/c

No Impact

Short Position

9

Bill
ReceivableNostro
(Cash) A/cExchange
Position A/c

No Impact

Long Position

QUESTION NO. 38A

You as a dealer in foreign exchange have the following position in Swiss Francs on 31st October, 2009:

	Swiss Francs (SF)
Balance in the Nostro A/c Credit	1,00,000
Opening Position Overbought	50,000
Purchased a bill on Zurich	80,000
Sold forward TT	60,000
Forward purchase contract cancelled	30,000
Remitted by TT	75,000
Draft on Zurich cancelled	30,000

What steps would you take, if you are required to maintain a credit Balance of Swiss Francs 30,000 in the Nostro A/c and keep as overbought position on Swiss Francs 10,000?

Solution :

Q.38A

Nostro A/c → FC → (SF)		
Particulars	Dr. (outflow of SF)	Cr. (inflow of SF)
Opening Balance	—	1,00,000
→ Spot Sell	75,000	—
	75,000	1,00,000
Credit Balance [Cl. Bal.]	25,000	—
	1,00,000	1,00,000

Exchange Position A/c (SF)		
Particulars	Long position (SF)	Short position (SF)
Opening Balance → over-bought	50,000	—
→ Purchase a bill on Zurich	80,000	—
→ Sold forward TT	—	60,000
→ Forward purchase Contract Cancelled	—	30,000
→ Spot Sell (Commitment by TT)	—	75,000
→ DD on Zurich Cancelled	30,000	—
	1,60,000	165,000
Cl. Balance → oversold	5,000	—
	165,000	165,000

Decision

1) The Dealer has to Buy Spot TT
SF 5000 to increase in balance in
 Nostro A/c to SF 30,000

2)

of Bal.
 Spot Buy.

<u>Long</u>	<u>Short</u>
	5000
5000	
<u>5000</u>	<u>5000</u>

Balance.

Forward Buy

<u>NIL</u>	—
10,000	

This would bring overhauled position
 in Exchange position A/c to NIL.

3) Since, the bank requires over-bought
 position of SF 10,000, it has to

purchase forward SF 10,000