Premium/Discount $= \dfrac{F - S}{Average} \times 100 \times \dfrac{12}{2.5}$

Bid rate $= \dfrac{66.2640 - 66.2525}{\frac{66.2640 + 66.2525}{2}} \times 100 \times \dfrac{12}{2.5}$

$= 0.0833\%$ Premium

Ask rate $= \dfrac{67.6083 - 67.5945}{\frac{67.6083 + 67.5945}{2}} \times 100 \times \dfrac{12}{2.5}$

$= 0.0980\%$ Premium.

(4) COVER DEAL

Question – 22

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 rates were

US$ 1	= H.K. $ 7.5880	7.5920

Local inter bank market rates for US$ were

Spot US$ 1	= ₹ 42.70	42.85

Calculate cover rate and ascertain the profit or loss in the transaction. Ignore brokerage.

(SM TYK – 07)

Solution:

Calculation of Cover Rate

Buy $ from local Inter Bank Market @ ₹/$ 42.85

Buy HK $ from London Market @ HK$/$ 7.5880

₹/HK$ Cover Rate $= 42.85 \times \dfrac{1}{7.5880} = 5.6471$

Calculation Profit/Loss

Amount received from customer (HK$1,00,00,000 × 5.70) = ₹ 5,70,00,000

Amount paid on cover deal (HK$1,00,00,000 × 5.6471)	= ₹ 5,64,70,000
Profit	= ₹ 5,29,000

Question – 23

You, a foreign exchange dealer of your bank, are informed that your bank has sold a T.T. on Copenhagen for Danish Kroner 10,00,000 at the rate of Danish Kroner 1 = ₹ 6.5150. You are required to cover the transaction either in London or New York market. The rates on that date are as under:

Mumbai – London	₹ 74.3000	₹ 74.3200
Mumbai – New York	₹ 49.2500	₹ 49.2625
London – Copenhagen	DKK 11.4200	DKK 11.4350
New York – Copenhagen	DKK 07.5670	DKK 07.5840

In which market will you cover the transaction, London or New York, and what will be the exchange profit or loss on the transaction? Ignore brokerages.

(SM TYK – 08 & Exam November – 2013)

Solution:

Calculation of Cover Rate

London Market

- Buy £ from Bank @ ₹/£ 74.3200
- Buy DKK from Bank @ DKK/£ 11.4200

$$₹/DKK = ₹\ 74.3200 \times \frac{1}{11.4200}$$

$$= 6.5079$$

New York Market

- Buy $ from Bank @ ₹/$ 49.2625
- Buy DKK from Bank @ DKK/$ 7.5670

$$₹/DKK = ₹\ 49.2625 \times \frac{1}{7.5670}$$

$$= 6.5102$$

Covered from London Market is better & Cover Rate ₹/DKK is 6.5079.

Calculation of Profit/Loss

Amount received from customer (DKK 10,00,000 × 6.5150)	= ₹ 65,15,000
Amount paid on cover deal (DKK 10,00,000 × 6.5079)	= ₹ 65,07,900
Profit to Bank	= ₹ 7,100

(5) EXCHANGE RATE DETERMINATION

(I) INTEREST RATE PARITY

Question – 24

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

(SM TYK – 31)

Solution:

£/$ = £ 0.7570

Calculation of 3 Months FR using IRP

IRP Equation

$$\frac{F}{S} = \frac{1 + r_A}{1 + r_B}$$

$$\frac{F}{£\ 0.7570} = \frac{1 + (7.5\% \times 3/12)}{1 + (3.5\% \times 3/12)}$$

$$\frac{F}{£\ 0.7570} = \frac{1.01875}{1.00875}$$

$$F = \frac{£\ 0.7570 \times 1.01875}{1.00875}$$

$$F = £\ 0.7645.$$

Question – 25

The US dollar is selling in India at ₹ 55.50. If the interest rate for 6 months borrowing in India is 10% per annum and the corresponding rate in USA is 4%.

(i) Do you expect that US dollar will be at a premium or at discount in the Indian Forex Market?

(ii) What will be the expected 6-months forward rate for US dollar in India? and

(iii) What will be the rate of forward premium or discount?

(SM TYK – 14)

Solution:

(i) As per IRP, Currency of a country having lower rate of interest will be at premium in comparison to currency of country having higher rate of Interest. In this question US $ will be at premium due to lower rate of Interest.

(ii) Calculation of 6 months FR using IRP

$$\frac{F}{S} = \frac{1 + r_a}{1 + r_b}$$

$$\frac{F}{₹\ 55.50} = \frac{1 + (10\% \times 6/12)}{1 + (4\% \times 6/12)}$$

$$\frac{F}{₹\ 55.50} = \frac{1.05}{1.02}$$

$$F = \frac{55.50 \times 1.05}{1.02}$$

$$= ₹\ 57.13$$

(iii) Calculation of premium a discount in $

$$= \frac{F - S}{S} \times 100 \times \frac{12}{6}$$

$$= \frac{57.13 - 55.50}{55.50} \times 100 \times \frac{12}{6}$$

= 5.87% premium in $.

(II) COVERED INTEREST ARBITRAGE

Question – 26

Spot rate 1 US $ = ₹ 48.0123

180 days Forward rate for 1 US $ = ₹ 48.8190

Annualized interest rate for 6 months – Rupee = 12%

Annualized interest rate for 6 months – US $ = 8%

Is there any arbitrage possibility? If yes how an arbitrageur can take advantage of the situation, if he is willing to borrow ₹ 40,00,000 or US $83,312.

(SM TYK – 26)

Solution:

Calculation of Premium is $ & Interest Rate Difference

Premium is $ $= \left(\dfrac{48.8190 - 48.0123}{48.0123}\right) \times 100 \times \dfrac{12}{6}$

$= 3.36\%$ p.a.

Interest Rate difference = 12% – 8% = 4%

Yes, there is a possibility of arbitrage because premium in $ is not equal to interest rate difference.

Since premium in $ is less than interest rate difference, hence borrow from USA and invest in India.

Arbitrage Process

Today

- Borrow $ 83,312 from USA @ 8% P.a. for 6 months.
- Sell $ at SR ($ 83,312 × ₹ 48.0123) = ₹ 40,00,000
- Invest ₹ 40,00,000 @ 12% p.a. for 6 Months.
- Contract to buy $ at 6 months FR.

After 6 Months

Cash Inflows

Investment Amount (₹)

(₹ 40,00,000 × 1.06) = ₹ 42, 40, 000

Buy \$ at FR $\left(\frac{₹\ 42,40,000}{48.8190}\right)$ = \$ 86,851.43

Cash Outflows

Repayment of loan

\$ 83,312 (1.04) = \$ 86,644.48

Arbitrage Gain = (\$ 86,851.43 = \$ 86,644.48)

= \$ 206.95

Or \$ 206.95 × 48.8190 = ₹10,103

Question – 27

Given the following information:

Exchange rate – 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?

(SM TYK – 27, Exam May – 2011)

Solution:

Calculation of Premium in DM & Interest Rate Difference

Premium is DM $= \left(\frac{\$\ 0.670 - \$\ 0.665}{\$\ 0.665}\right) \times 100 \times \frac{12}{3}$

= 3.007% p.a.

Interest Rate Difference = 9% – 7% = 2%

Since premium in DM is more than interest rate difference, hence borrow in Can $ & Invest is DM.

Arbitrage Process

It is assumed that we borrow can $1,000.

Today

Borrow Can $ 1,000 @ 9% p.a. for 3 months.

Sell Can \$ at SR $\frac{\text{Can \$ 1000}}{0.665}$ = DM 1,503.7594

Invest DM 1,503.7594 @ 7% p.a. for 3 Months.

After 3 Months

Cash Inflows

Investment Amount

DM = ₹ 1,503.7594 (1.0175)

= 1,530.0752

Sell DM at FR = 1,530.0752 × 0.670

= Can $ 1,025.15

Cash Outflows

Repayment = Can $ 1,000 (1.0225)

= Can $ 1,022.50

Arbitrage gain = (Can $ 1,025.15 – Can $ 1022.50)

= $ 2.65.

Question – 28

Spot rate 1 US$ = ₹ 68.50

USD premium on a six month forward in 3%. The annualized interest in US is 4% and 9% in India.

Is there any arbitrage possibility? If yes, how a trader can take advantage of the situation if he is willing to borrow USD 3 million.

(Exam November – 2018)

Solution:

(i) Calculation of Forward Rate

$$\text{Premium in \$} = \frac{F - S}{S} \times 100 \times \frac{12}{6}$$

$$6 = \frac{F - 68.50}{68.50} \times 100 \times \frac{12}{6}$$

$$6 \times \frac{6}{12} = \frac{F - 68.50}{68.50} \times 100$$

$$0.03 = \frac{F - 68.50}{68.50}$$

$$2.055 = F - 68.50$$

$$F = ₹\ 70.56$$

(ii) Premium in \$ = 6% P.a.

Interest Rate Different = 9 – 4 = 5%

Yes, there is an arbitrage possibility because premium in \$ is not equal to interest rate difference.

Since premium in \$ in more than interest rate difference hence borrow from India & invest in USA.

Arbitrage Process.

Today

- Buy \$ at SR $\left(\frac{₹\ 20,55,00,000}{68.50}\right)$ = \$ 30,00,000
- Invest \$ in USA & 4% p.a. for 6 months.
- Contract to sell \$ at 6 months FR

After 6 Months

Cash Inflows

Investment Amount in ($) [$ 30,00,000 (1.02)] = $ 30,60,000

Sell $ at 6 Months FR [$ 30,60,000 × 70.56] = ₹ 21,59,13,600

Cash outflows

Repayment [₹ 20,55,00,000 (1.045)] = ₹ 21,47,47,500

Arbitrage Gain = ₹ 11,66,100

or $\frac{11,66,100}{70.56}$ = $ 16,526

(III) PURCHASING POWER PARITY

Question – 29

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

(SM TYK – 30, Exam May – 2010)

Solution:

Calculation of expected rate applying PPP

1 year

$$\frac{ES_1}{₹\ 46} = \frac{1.08}{1.04}$$

$$ES_1 = \frac{46 \times 1.08}{1.04} = ₹\ 47.77$$

2 year

$$\frac{ES_2}{47.77} = \frac{1.08}{1.04}$$

$$ES_2 = \frac{₹\ 47.77 \times 1.08}{1.04} = ₹\ 49.61$$

3 year

$$\frac{ES_3}{49.61} = \frac{1.08}{1.04}$$

$$ES_3 = \frac{₹\ 49.61 \times 1.08}{1.04} = ₹\ 51.52$$

4 year

$$\frac{ES_4}{51.52} = \frac{1.08}{1.04}$$

$$ES_4 = \frac{₹\ 51.52 \times 1.08}{1.04} = ₹\ 53.50$$

(IV) INTERNATIONAL FISHER EFFECT

Question – 30

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%

(i) Compute the nominal rate of return to the US investor.

(ii) Compute the real depreciation /appreciation of Rupee.

(iii) What should be the exchange rate if relevant purchasing power parity holds good?

(iv) What will be the real return to an Indian investor in Sensex?

(RTP May – 2022 & January – 2021)

Solution:

(i) Calculation of nominal Rate of Return to US Investor

Size of investment = $ 20,00,000

Sell $ 1 year ego = $ 20,00,000 × ₹ 42.50