

FOREX CLASS 19

HOME WORK SUPPORT

COVERAGE

Question			Answer			Lecture Time
Q. No	Page no.	Book	Q. No	Page no.	Book	
29	13	HW Q BOOK	29	20	HW ANS BOOK	00:00:33 TO 00:02:18
30	13	HW Q BOOK	30	21	HW ANS BOOK	00:02:19 TO 00:03:07
31	14	HW Q BOOK	31	22	HW ANS BOOK	00:03:08 TO 00:07:36
32	14	HW Q BOOK	32	23	HW ANS BOOK	00:07:37 TO 00:09:58
EQ 1	65	HW ANS BOOK	EQ 1	66	HW ANS BOOK	00:09:59 TO 00:12:27
EQ 2	66	HW ANS BOOK	EQ 2	66	HW ANS BOOK	00:12:28 TO 00:13:36
EQ 3	67	HW ANS BOOK	EQ 3	67	HW ANS BOOK	00:13:37 TO 00:16:33

PART IV: INTERNATIONAL PARITY CONDITIONS

Topic 17 IRP EQUATION

Question 29: SSEI HW Book Page No. 13

If the present interest rate for 6 months borrowings in India is 9% per annum and the corresponding rate in USA is 2% per annum, and the US\$ is selling in India at Rs. 64.50/\$.

Then Recommend:

- i. Will US \$ be at a premium or at a discount in the Indian forward market?
- ii. The expected 6 month forward rate for US\$ in India.
- iii. The rate of forward premium/discount.

(Source: ICAI)

ANSWER:

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

ii. Calculation of the forward rate:

$$\frac{1 + R_h}{1 + R_f} = \frac{F_1}{E_0}$$

Where: R_h is home currency interest rate, R_f is foreign currency interest rate, F_1 is end of the period forward rate, and E_0 is the spot rate.

Therefore

$$\frac{1 + (0.09/2)}{1 + (0.02/2)} = \frac{1 + (0.09/2)}{1 + (0.02/2)} = \frac{F_1}{64.50}$$

$$\frac{1 + 0.045}{1 + 0.01} = \frac{F_1}{64.50}$$

$$\text{or } \frac{1.045}{1.01} \times 64.50 = F_1$$

$$\text{or } \frac{67.4025}{1.01} = F_1$$

$$\text{or } F_1 = \text{Rs.}66.74$$

iii. Rate of premium:

$$\frac{66.74 - 64.50}{64.50} \times \frac{12}{6} \times 100 = 6.94\%$$

PART IV: INTERNATIONAL PARITY CONDITIONS

Topic 17 IRP EQUATION

Question 30: SSEI HW Book Page No. 13

The United States Dollar is selling in India at ₹ 45.50. If the interest rate for a 6-months borrowing in India is 8% per annum and the corresponding rate in USA is 2%.

- i. Do you expect United States Dollar to be at a premium or at discount in the Indian forward market?
- ii. What is the expected 6-months forward rate for United States Dollar in India; and
- iii. What is the rate of forward premium or discount?

(Source: ICAI)

ANSWER:

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

ii. Calculation of the forward rate:

$$\frac{1 + R_h}{1 + R_f} = \frac{F_1}{E_0}$$

Where: R_h is home currency interest rate, R_f is foreign currency interest rate, F_1 is end of the period forward rate, and E_0 is the spot rate.

$$\text{Therefore } \frac{1 + (0.08 / 2)}{1 + (0.02 / 2)} = \frac{F_1}{45.50}$$

$$\frac{1 + 0.04}{1 + 0.01} = \frac{F_1}{45.50}$$

$$\text{or } \frac{(1.04)}{1.01} \times 45.50 = F_1$$

$$\text{or } \frac{47.32}{1.01} = F_1$$

$$\text{or } F_1 = 46.85$$

iii. Rate of premium:

$$\frac{46.85 - 45.50}{45.50} \times \frac{12}{6} \times 100 = 5.93\%$$

PART IV: INTERNATIONAL PARITY CONDITIONS

Topic 17 IRP EQUATION

Question 31: SSEI HW Book Page No. 14

On 1st April, 3 months interest rate in the US and Germany are 6.5 per cent and 4.5 per cent per annum respectively. The \$/DM spot rate is 0.6560. What would be the forward rate for DM for delivery on 30th June?

(Source: FOD)

ANSWER:

Interest Rate parity Theorem – The theorem states that in equilibrium the difference in interest rates between two countries is equal to the difference between the forward and spot rates of exchanges. The mathematical formula representing the theorem is given below:

$$\frac{i_A - i_B}{1 + i_B} = \frac{F_0 - S_0}{S_0}$$

Where,

i_A = Interest rate of US 6.5% or 0.065

i_B = Interest rate of Germany 4.5% or 0.045

F_0 = Forward rate at the end of one year

S_0 = Spot rate 1 \$ = 0.6560 DM

$$\frac{0.065 - 0.045}{1 + 0.045} = \frac{F_0 - 0.6560}{0.6560}$$

$$\frac{0.02}{1.045} = \frac{F_0 - 0.6560}{0.6560}$$

$$0.02 \times 0.6560 = (1.045 \times F_0) - (1.045 \times 0.6560)$$

$$0.01312 = 1.045 F_0 - 0.68552$$

$$1.045 F_0 = 0.68552 + 0.01312$$

$$1.045 F_0 = 0.69864$$

$$F_0 = 0.69864/1.045 = 0.66855$$

Forward rate after 12 months = 0.66855

Forward premium p.a.

$$= \text{Forward rate} - \text{Spot rate} = 0.66855 - 0.6560 = 0.01255$$

$$\text{Forward premium for 3 months} = 0.01255/4 = 0.003137$$

Forward rate for 3 months for delivery on 30th June

$$= \text{Spot rate} + 3 \text{ months forward premium} = 0.6560 + 0.003137 = 0.6591$$

Alternatively,

Particulars	USD	DM
Spot	0.6560	1.000
Interest rate p.a	6.5%	4.5%
Interest for 91 days	0.0106	0.0112
Amount after 91 days	0.6666	1.0112
∴ Forward rate (0.6666/0.6592)	0.6666	0.6592 1.0112

Alternatively,

$$\text{Forward rate} = \frac{0.6560 \times [1 + (0.065 \times \frac{91}{365})]}{1 + (0.045 \times \frac{91}{365})} = 0.6592$$

PART IV: INTERNATIONAL PARITY CONDITIONS

Topic 17 IRP EQUATION

Question 32: SSEI HW Book Page No. 14

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?

(Source: FOD)

ANSWER:

As per interest rate parity

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

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

$$= \text{£}0.7570 \left[\frac{1.01875}{1.00875} \right]$$

$$= \text{£}0.7570 \times 1.0099 = \text{£}0.7645$$

$$= \text{UK £}0.7645 / \text{US\$}$$

PART IV: INTERNATIONAL PARITY CONDITIONS

EXTRA QUESTION

Topic 17 IRP EQUATION

Question 1: HW ANS BOOK PAGE 65

A UK based airline company sold 5 private jets to a company in USA . The purchase price of a each jet is 1 million dollars with a payment term of 60 days. Upon payment, the airline Company will convert the dollars into Pounds . The present spot rate for dollar per pound is 1.22 , whereas the 60-day forward rate is 1.20.

You are required to calculate and explain:

- i. If airline Company were to hedge its foreign-exchange risk, what would it do? What transactions are necessary?
- ii. Is the dollar at a forward premium or at a forward discount?
- iii. What is the implied differential in interest rates between the two countries?

(Use interest-rate parity assumption).

(Source: FOD)

ANSWER:

- i. If airline Company were to hedge its foreign exchange risk, it would enter into forward contract of selling dollar 60 days forward. It would sell dollar 5 million 60 days forward. Upon delivery of 5 million dollars 60 days hence, it would receive GBP 5million/1.20= 4,166,667. If it were to receive GBP payment today it would receive GBP 5 million/1.22= 4,098,361. Hence, airline Company will be better off by 68306 GBP if it hedges its foreign exchange risk.
- ii. The dollar is at a forward premium. This is because the 60 days forward rate of dollar per pound is less than the current spot rate of dollar per pound. This implies that dollar is expected to be strengthened i.e. Fewer dollars will be required to buy pound.
- iii. The interest rate parity assumption is that high interest rates on a currency are offset by forward discount and low interest rate on a currency is offset by forward premiums.

Further, the spot and forward exchange rates move in tandem, with the link between them based on interest differential. The movement between two currencies to take advantage of interest rates differential is a major determinant of the spread between forward and spot rates. The forward discount or premium is approximately equal to interest differential between the currencies i.e.

$$[F_{(usd/gbp)} - S_{(usd/gbp)}] / S_{(usd/gbp)} \times 365/60 = r_{usd} - r_{gbp}$$

$$[1.20 - 1.22 / 1.22] \times 365/60 = r_{usd} - r_{gbp}$$

$$\text{or } -0.0997 = r_{\text{usd}} - r_{\text{gbp}}$$

Therefore, the differential in interest rate is -9.97% , which means if interest rate parity holds, interest rate in the UK should be 9.97% higher than in USA

PART IV: INTERNATIONAL PARITY CONDITIONS

EXTRA QUESTION

Topic 17 IRP EQUATION

Question 2: HW ANS BOOK PAGE 66

Three-month T-bills in India have a nominal rate of 8.2 percent, while default-free US bonds that mature in 3 months have a nominal rate of 4 percent. In the spot exchange market, 1 dollar equals 82 rupees. If interest rate parity holds, what is the 3-month forward exchange rate?

(Source: FOD)

ANSWER:

Given interest rates are in the form of SAR. So we need to find the effective interest for 3 months period (8.2/4 and 4/4)

$$82 \times (1.0205)/(1.01) = 82.85$$

PART IV: INTERNATIONAL PARITY CONDITIONS

EXTRA QUESTION

Topic 17 IRP EQUATION

Question 3: HW ANS BOOK PAGE 67

The following table shows interest rates for the United States Dollar and Indian rupees. The spot exchange rate is 81.20 rupee per Dollar. Complete the missing entries:

	3 Months	6 Months	1 Year
Dollar interest rate			
(annually compounded)	4.2%	5%	?
Rupee interest rate			
(annually compounded)	8%	?	8.6%
Forward rupee per Dollar	?	?	82.72
Forward discount per Rupee			
percent per year	?	4.5%	

(Source: FOD)

ANSWER:

Computation of Missing Entries in the Table: For computing the missing entries in the table we will use Interest Rates Parity (IRP) theorem. This theorem states that the exchange rate of two countries will be affected by their interest rate differential. In other words, the currency of one country with a lower interest rate should be at a forward premium in terms of currency of country with higher interest rates and vice versa. This implies that the exchange rate (forward and spot) differential will be equal to the interest rate differential between the two countries i.e.

$$\text{Interest rate differential} = \text{Exchange rate differential} \text{ or } \frac{(1+r_f)}{(1+r_d)} = \frac{S_{f/d}}{F_{f/d}}$$

Where r_f is the rate of interest of country F (say the foreign country), r_d is rate of interest of country D (say domestic country), $S_{f/d}$ is the spot rate between the two countries F and D and $F_{f/d}$ is the forward rate between the two countries F and D.

3 months

Dollar interest rate = 4.2% (annually compounded)

Rupee interest rate = 8 % (annually compounded)

Then Forward rupee per Dollar rate would be

$$= 81.2(1.02/1.0105)$$

$$= \text{Rupees } 81.9634 \text{ per US Dollar}$$

NOTE: The above solution is as per ICAI. But we know that the given rate is EAR

So as per the logic the 3 month forward rate would have been $81.2[1.08/1.042]^{0.25} = 81.9304$

Further Forward discount per rupee per cent per year = Interest Differential i.e. $8 - 4.2 = 3.8\%$

Alternatively, more precisely it can also be computed as follows:

Spot Per rupee Rate = $1 / 81.20 =$ US Dollar 0.0123 per rupee

One Year Forward Rate = $0.0123(1.042/1.08) = 0.0119$

Accordingly, the discount per annum will be = $[(0.0123-0.0119)/0.0123] \times 100 = 3.25\%$.

6 months

Forward discount on rupee % per year = $- 4.5\%$ or $- 2.25\%$ for 6 months

Hence 6 months Forward rate = $81.20 / (100\% - 2.25\%)$

Forward rupee per Dollar = 83.0690 rupee

Let r be the rupee interest rate (annually compounded) then as per IRP Theory:

$$81.2[(1+r/2) / (1.025)] = 83.0690$$

On solving the equation we get the value of $r = 9.72\%$ i.e. Rupee interest rate (annually compounded)

NOTE: The above solution is as per ICAI. But we know that the given rate is EAR

So as per the logic $81.2[(1+r)/(1.05)]^{0.5} = 83.0690$

On solving this we get the value of r as 9.89%

1 Year

Rupee interest rate = 8.6% (annually compounded)

Forward rupee per Dollar = 82.72

As per Interest Rate Parity the relationship between the two countries rate and spot rate is i.e.

$$[(1+r) / (1.086)] = 81.2/82.72$$

Accordingly, the Dollar interest rate = 6.60%

The completed Table will be as follows:

	3 Months	6 Months	1 Year
Dollar interest rate			
(annually compounded)	4.2%	5%	6.6%
Rupee interest rate			
(annually compounded)	8%	9.72(9.89)	8.6%
Forward rupee per Dollar	81.96(81.93)	83.069	82.72
Forward discount per rupee			
Percent per year	3.8% or 3.25%	4.5%	