FOREX CLASS 20

CLASS WORK COVERAGE

To streamline our learning process, I've categorized the questions we'll tackle in class into four distinct groups:

1. ***Classic:*** *These questions are exactly as presented in your book, providing a familiar foundation.*
2. ***Transformed:*** *Here, we've converted book questions into multiple-choice format to enhance your analytical skills.*
3. ***Adapted:*** *These are similar to book questions but with altered numbers or names, presented as multiple-choice questions for varied practice.*
4. ***Original:*** *These are entirely new questions not found in your book, designed to challenge and expand your understanding.*

This structure will help us navigate through a range of problems, ensuring a comprehensive grasp of the material. Looking forward to our next session!

Q. No	Type	Book	Page No.
50	Classic	CW Q BOOK	20
51	Classic	CW Q BOOK	20
52	Classic	CW Q BOOK	20

PART IV: INTERNATIONAL PARITY CONDITIONS

Topic 18 COVERED INTEREST ARBITRAGE

Question 50: SSEI CW Book Page No. 20

If the interest rate for the next 6 months for the US$ is 1.5% (annual compounding). The interest rate for the € is 2% (annual compounding). The spot price of the € is US $ 1.665. The forward price is expected to be US$ 1.664. Please determine correct forward price and recommend an arbitrage strategy.

(Source: ICAI)

ANSWER:

WRONG ANSWER BY ICAI

The correct forward price is given by:

$$F(0,T) = S_0 \frac{(1+r_{US\$})^T}{(1+r_{Euro})^T} = 1.665(1.015)/(1.02) = 1.6568$$

Because the forward price is higher than the model price, we will sell the forward contract. If transaction costs could be covered, we would buy the € in the spot market at $1.665 and sell it in the forward market at $1.664. We would earn interest at the foreign interest rate of 2 percent. By selling it forward, we could then convert back to dollars at the rate of $1.664. In other words, $1.665 would be used to buy 1 unit of the €, which would grow to 1.02 units (the 2 percent € rate). Then 1.02 € would be converted back to 1.02($1.664) = $1.69728. This would be a return of $1.69728/$1.665 – 1 = 0.019387 or 1.94 percent, which is better than the US rate.

CORRECT ANSWER BY SANJAY SARAF SIR

As per IRP $F/1.665 = (1.015/1.02)^{0.5}$

F = 1.6609 USD/EURO

Arbitrage can be done through the following route

Let us assume amount of borrowing to be $1,00,000

Step 1 : Borrow 1,00,000$ at 1.5% for 6 months

Amount of outflow after 6 months = $1,00,000(1.015)^{0.5}$ = 1,00,747.21$

Step 2: Convert 1,00,000 $ spot@ 1.6665 getting 1,00,000/1.665 = EURO 60,060.06

Step 3: Invest euro @ 2% for 6 months

Amount receivable after 6 months = 60,060.06(1.02)^0.5 = 60,657.68 euros

Step 4: Sell EURO 6m forward @1.664

So inflow after 6 months = 60,657.68 × 1.664 = $1,00,934.39

Arbitrage profit = $1,00,934.39 - $1,00,747.21 = $ 187.18

Question 51: SSEI CW Book Page No. 20

The risk free rate of interest rate in USA is 8% p.a. and in UK is 5% p.a. The spot exchange rate between US $ and UK £ is 1$ = £ 0.75.

Assuming that is interest is compounded on daily basis then at which forward rate of 2 year there will be no opportunity for arbitrage.

Further, show how an investor could make risk-less profit, if two year forward price is 1 $ = 0.85 £.
Given $e^{0.-06} = 0.9413$ & $e^{-0.16} = 0.852$, $e^{0.16} = 1.1735$, $e^{-0.1} = 0.9051$

(Source: ICAI)

ANSWER:

WEIRD ANSWER BY ICAI

2 year Forward Rate will be calculated as follows:

$$F = Se^{(r_{uk} - r_{us})t}$$

Where F = Forward Rate

S = Spot Rate

rUK = Risk Free Rate in UK

rUS = Risk Free Rate in US

t = Time

Accordingly,

$F = 0.75e^{(0.05 - 0.08)2}$

$= 0.75 \times 0.9413$

$= 0.706$

Thus,

1 US $ = £ 0.706

If forward rate is 1 UK $ = 0.85$ then an arbitrage opportunity exists. Take following steps.

(a) Should borrow UK £

(b) Buy US $

(c) Enter into a short forward contract on US $

Accordingly,

The riskless profit would be

a. Say borrow £ $0.706e^{-(0.05)(2)}$ = £ 0.639 and invest in UK for 2 years.

b. Now buy US $ at US $ $1e^{-(0.08)2}$ = US $ 0.852, so that after two year it can be used to close out the position.

c. After two year the investment in US $ will become US $ 0.852 $e^{(0.08)(2)}$ = US $ 0.852 x 1.1735 = 1 US $

d. Sell this US $ for £ 0.85 and repay loan of £ 0.639 along with interest i.e £ 0.706. Thus arbitrage profit will be
US$ 0.85 – US$ 0.706 = 0.144 $.

ALTERNATE METHOD OF ANSWER BY SANJAY SARAF SIR

ALTERNATE METHOD TO FIND ARBITRAGE PROFIT

Let us assume that the amount borrowed be 1,00,000 pounds

STEP 1: Borrow 1,00,000 pounds @ 5% p.a. for 2 years
Outflow after 2 years = $1,00,000 \times e^{(0.05 \times 2)}$ = 1,10,485.03 pounds

STEP 2: Sell 1,00,000 pounds spot @ 0.75 GBP/USD getting 1,00,000/0.75 = $ 1,33,333.33

STEP 3: invest $ @ 8% p.a. for 2 years
We will get $1,33,333.33 \times e^{(0.08 \times 2)}$ = $1,56,466.67

STEP 4: Sell 2 year forward @ 0.85 getting 1,56,466.67 × 0.85 = 1,32,996.67 GBP

Arbitrage profit = 1,32,996.67 – 1,10,485.03 = 22,511.64 GBP approx

Question 52: SSEI CW Book Page No. 20

Mercy is a Forex Dealer with XYZ Bank. She notices following information relating to Canadian Dollar (CAD) and German Deutschmark (DEM):

Exchange rate	CAD 0.775 per DEM (Spot)
	CAD 0.780 per DEM (3 months)
Interest rates	DEM 7% p.a.
	CAD 9% p.a.

i. Assuming that there is no transaction cost determine does the Interest Rate Parity holds in above quotations.

ii. If yes, then explain the steps that would be required to make an arbitrage profit if Mercy is authorized to work with CAD 1 Million for the same purpose. Also determine the profit that would be made in CAD.

Note: Ignore the decimal points in the amounts. ***(Source: ICAI)***

ANSWER:

i. For 3 months, r_{CAD} = 2.25% and r_{DEM} = 1.75%. Since the exchange rate is in CAD/ DEM term the appropriate equation for Interest Rate Parity is as follows:

$$\frac{F}{S} = \frac{(1 + r_{CAD})}{(1 + r_{DEM})}$$

$$\frac{0.780}{0.775} = \frac{(1 + 0.0225)}{(1 + 0.0175)}$$

$1.00645 \neq 1.00491$

Since both sides are not equal, Interest Rate Parity does not hold.

ii. Since IRP does not hold there is an arbitrage opportunity.
Interest Differential = 2.25% - 1.75% = 0.50%

$$\text{Premium} = \frac{0.780 - 0.775}{0.775} \times 100 = 0.645\%$$

Since the interest rate differential is smaller than the premium, it will be profitable to place money in Deutschmarks the currency whose 3-months interest is lower.

The following operations are carried out:

i. Borrow CAD 1 Million at 9 per cent for 3- months;

ii. Change this sum into DEM at the spot rate = (1,000,000/0.775) = 1,290,323

iii. Place DM 1,290,323 in the money market for 3 months to obtain a sum of DM

Principal:	1,290,323
Add: Interest @ 7% for 3 months	22,581
Total	1,312,904

iv. Sell DEM at 3-months forward to obtain CAD = (1,312,904 x 0.780) = CAD 1,024,065

v. Refund the debt taken in CAD with the interest due on it, i.e.,

	CAD
Principal	1,000,000
Add: Interest @9% for 3 months	22,500
Total	1,022,500

Net arbitrage gain = CAD 1,024,065 – CAD 1,022,500 = CAD 1,565