

1.

Assume the following information: You have \$1,000,000 to invest. 12-month deposit rate in U.S. = 12% 12-month deposit rate in U.K. = 16% The Bank of America offers: Current spot rate of pound (Bid/Ask) = \$1.6000/1.6050 12-month forward rate (Bid/Ask) = \$1.5700/1.5750

Based on IRP, what should be the theoretical 12-month forward rate of pound? Compute both bid and ask.

If you will invest in U.K and use the spot rate and forward contract as quoted by Bank of America, what will be the amount of U.S. dollars you have after 12 months?

If you will invest in U.K and use Bank of America's spot rate but the theoretical forward rate based on IRP, what will be the amount of U.S. dollars you have after 12 months?

Ans:

Solution:

$$1) F(\text{bid}) = (1 + 0.12) / (1 + 0.16) \times 1.6000 = \$1.5448$$

$$F(\text{ask}) = (1 + 0.12) / (1 + 0.16) \times 1.6050 = \$1.5497$$

[Quotation is in Pound/\$. So Interest rate parity $F/S = \{1 + \text{Interest for \$}\} / \{1 + \text{Interest for Pound}\}$]

$$2) (1,000,000 / 1.0650) \times (1 + 0.16) \times 1.57 = \$1,134,704.05$$

$$3) (1,000,000 / 1.0650) \times (1 + 0.16) \times 1.5448 = \$1,116,490.97$$

2.

You have an opportunity to invest in Australia at an interest rate of 8%. Moreover, you expect the Australian dollar (A\$) to appreciate by 2%. What would be your effective return from this investment? What if the Australian dollar depreciates by 10% instead?

SOLUTION:

$$(1.08 \times 1.02) - 1 = 10.16\%; (1.08 \times 0.9) - 1 = -0.028\%$$

3.

The inflation rate in the U.S. is 3%, while the inflation rate in Japan is 1.3%. The current exchange rate for the Japanese yen (¥) is \$0.0075. After supply and demand for the Japanese yen has adjusted by purchasing power parity, what is the new exchange rate for the yen?

SOLUTION:

$$(1.03 / 1.013) \times \$0.0075 = \$0.0076 / ¥$$

4.

Assume that the inflation rate becomes much higher in the U.K. relative to the U.S. How will this affect the value of the British pound? Why? Please explain within 2-3 sentences. Also, assume that interest rates in the U.K. begin to rise relative to interest rates in the U.S. Will this change in interest rates affect the value of the British pound? Why? Please explain within 2-3 sentences.

Pound will decrease. According to PPP, UK consumer will purchase more goods from US that are cheaper. Higher demand leads to higher imports, which in turn lead to higher demand for US dollars and larger supply of Pound. According to IRP, Pound will increase in short term but decrease in forward. Higher interest rate in UK leads to higher demand in pound, push up pound value in short term. In long run, US investors have to exchange back from pound to US dollar after the investment period, and push up demand

5.

A weakening of the U.S. dollar with respect to the British pound would likely reduce the U.S. exports to Britain and increase U.S. imports from Britain over time.

A) true. B) false.

ANSWER: B.

6. If a U.S.-based MNC focused completely on importing, then its valuation would likely be adversely affected if most currencies were expected to appreciate against the dollar over time. A) true. B) false. ANSWER: A

7. Assume that the inflation rate in Barbados is 3.20%, while the inflation rate in the U.S. is 3.00%. According to PPP, the Barbados dollar (BBD) should _____ by _____%.

- A) appreciate; 0.1938%
- B) depreciate; 0.1938%
- C) appreciate; 0.1942%
- D) depreciate; 0.1942%
- E) appreciate; 0.2000%

ANSWER: B

SOLUTION: $(1.03/1.032) - 1 = - .1938\%$.

8.

Assume that interest rate parity holds, and the euro's interest rate is 9% while the U.S. interest rate is 12%. Then the euro's interest rate increases to 11% while the U.S. interest rate remains the same. As a result of the increase in the interest rate on euros, the euro's forward _____ will _____ in order to maintain interest rate parity. A) discount; increase B) discount; decrease C) premium; increase D) premium; decrease E) uncertain ANSWER: D

9. See the excel sheet. 10. See the PP presentation

11.

Condition (1): $F_a > \beta S_b$

Condition (2): $F_b < \alpha S_a$ where

S_b : Spot market bid rate;

S_a : Spot market ask rate;

F_b : Forward market bid rate;

F_a : Forward market ask rate;

$\beta = (1+r_b)/(1+r_a)$, r_b deposit rate of quoted currency, r_a borrowing rate of base currency;

$\alpha = (1+r_a)/(1+r_b)$, r_a borrowing rate of quoted currency, r_b deposit rate of base currency;

Therefore to have covered interest arbitrage either F_a or F_b is required. So the arbitrage steps will be such so that at last we have to apply either ***Fa-purchase of base currency*** OR ***Fb-sale of base currency***

Case I: Fa-purchase of base currency

Steps: i) Borrow 1S\$;

ii) Convert S\$ Spot into Rs;

iii) Invest Rs;

iv) With the matured amount of Rs investment purchase forward S\$ to repay the borrowed amount ;

[Since F_a is involved in this type of arbitrage so base currency is borrowed in step 1]

Case I: Fb-Sale of base currency

Steps: i) Borrow 1Rs;

ii) Convert Rs Spot into S\$;

iii) Invest S\$;

iv) With the matured amount of S\$ investment sale forward S\$ against Rs to repay the borrowed amount;

[Since F_b is involved in this type of arbitrage so quoted currency is borrowed in step 1]

The following illustration for easy understanding but will not be a part of Q11.

To further illustrate let us take the following quotations:

S\$/Rs. spot: 34.8750/35.1250;

3 month forward: 35.6195/35.9805;

Euro Rupee interest: 17.50/18.50;

Euro S\$ interest: 5.75/6.25;

COMPUTATION

Case I:

- i) Borrow 1S\$ at 6.25% p.a for 3 months; matured amount = $(1+0.0625*3/12) = 1.0156$;
- ii) Convert S\$ Spot into Rs @ 34.875. 1S\$ gives 34.875Rs.
- iii) Invest Rs @ 17.50%. matured amount = $(34.875)*(1+0.1750*3/12) = 36.400781$
- iv) Purchase forward S\$ to repay S\$ loan @ 35.9805. S\$ available $36.400781/35.9805 = 1.0117 < \text{amount to be paid (1.0156 as shown in step 1)}$

Therefore no arbitrage in this leg.

Case II:

- v) Borrow 1Rs at 18.50% p.a for 3 months; matured amount = $(1+0.1850*3/12) = 1.0463$;
- vi) Convert Rs Spot into S\$ @ 35.1250. 1Rs gives $(1/35.1250)$ S\$.
- vii) Invest S\$ @ 5.75%. matured amount = $(1/35.1250)*(1+0.0575*3/12) = 0.0289$ S\$
- viii) Purchase forward Rs to repay Rs loan @ 35.6195. Rs available $35.6195*0.0289 = 1.0294$ Rs $< \text{amount to be paid (1.0463 as shown in step 1)}$

Therefore no arbitrage in this leg also.

So we have just found that with the given rates no arbitrage is possible in either leg. It was already learnt that two conditions must be satisfied to prevent covered interest arbitrage. Let us now see whether these two conditions are satisfied or not.

Condition (1): $F_a > \beta S_b$

$$\beta = (1+rb)/(1+ra) = (1 + 0.1750*3/12)/(1+0.0625*3/12) = 1.0277$$

$$\beta S_b = 1.0277 * 34.8750 = 35.8410$$

Actual $F_a = 35.9805 > 35.8410$. So in case (I) no arbitrage.

In this case forward premium or discount is $(35.9805-34.8750)/34.8750 * 12/3 * 100 = 12.68\%$ p.a

Interest differential in money market = $17.50-6.25 = 11.25\%$ p.a

By borrowing at 6.25% and investing at 17.50, the player gains 11.25%. But in foreign exchange market by purchasing S\$ forward, an appreciating currency, the player loses 12.68%. Thereby net loss $12.68-11.25 = 1.43\%$ p.a, therefore no arbitrage gain in case (I)

Condition (2): $F_b < \alpha S_a$

$$\alpha = (1+ra)/(1+rb) = (1 + 0.185*3/12)/(1+0.0575*3/12) = 1.0314$$

$$\alpha S_a = 1.0314 * 35.1250 = 36.2279$$

Actual $F_b = 35.6195 < 36.2279$. So in case (II) no arbitrage.

In this case forward premium or discount is $(35.6195-35.1250)/35.1250 * 12/3 * 100 = 5.631\%$ p.a

Interest differential in money market = $18.5-5.75 = 12.75\%$ p.a

By borrowing at 18.5% and investing at 5.75% the player is making a loss of 12.75%. But in forward market by purchasing a depreciating currency (Rs) with an appreciating currency (S\$), the player makes a gain of 5.631%. But the net loss is $12.75-5.631 = 7.119$. So there is no arbitrage gain in Case (II)

But even when there are no covered interest arbitrage gains, a firm may still find it profitable to employ the direct way of obtaining a currency through money market. Covered interest arbitrage is applied by speculators who have no position. But traders like exporter or importer having positions in foreign exchange market (Payables or Receivables) may find money market more beneficial than forward/spot market even in absence of Covered interest arbitrage. Whether these opportunities are available or not could be found out by 4 additional conditions. These are:

Condition (1): $F_a > \beta S_a$

Condition (2): $F_a < \alpha S_a$

Condition (3): $F_b < \alpha S_b$

Condition (4): $F_b > \beta S_b$

12.

With the given rates find out Condition $F_a > \beta S_b$, and state the reasons as explained in the above illustration.

13.

Last Para of the above illustration.

14.

See class note. Only the steps not computation.

15-20

See class note.

21.

