

ACF305

International Financial and Risk
Management

Week 4 tutorial

Question 1

Suppose that the CAD/GBP exchange rate is 2 and that the 360-day interest rates are 10% for the CAD and 21% for the GBP.

- (a) What is the forward rate for 360 days?
- (b) What is the swap rate?
- (c) What is the (percentage) forward premium?
- (d) What is the annualized forward premium?
- (e) How well does the simple interest differential (-11%) perform as a yardstick for evaluating the forward premium quoted by a bank?

Solution

(a) $2 \cdot (1.10/1.21) = 1.8182$ $F_{t,T} = S_t (1 + r_{t,T}) / (1 + r^*_{t,T})$

(b) $1.8182 - 2 = -0.1818$ $F_{t,T} - S_t$

(c) $(1.8182 - 2)/2 = -9.09\%$ $(F_{t,T} - S_t) / S_t$

(d) -9.09%

(e) In this case, not very well. Because the maturity of the forward contract is relatively long and the per annum interest rates are high, the p.a. interest differential is not an accurate estimate of the annualized percentage forward premium.

$$(F_{t,T} - S_t) / S_t \approx r_{t,T} - r^*_{t,T}$$

Question 2

Given the following data, compute the value today of an outstanding forward purchase contract initiated at t_0 for 1,000,000 units of foreign currency (where the exchange rate is HC/FC). Does the new value represent a gain or loss to the holder of the old contract? (Hint: First compute the new forward rate.)

HC/FC	S_t	$F_{t_0,T}$ (old)	$r_{t,T}$	$r^*_{t,T}$
(a) THB/NZD	20.5	22.0	3.5%	2.5%
(b) INR/EUR	57.5	54.2	1.25%	3.0%
(c) JPY/GBP	283.0	289.4	4.5%	3.5%
(d) CHF/GBP	2.2	1.8	2.0%	3.0%

Solution

(a) The new forward rate is: $F_{t,T} = 20.5 * 1.035/1.025 = 20.7$

Therefore, the value of the outstanding contract equals $[(20.7 - 22.0)/1.035] * 1,000,000 = \text{THB } -1,256,039$. To the holder of the old forward contract, this means a loss because the forward rate for NZD decreased since time t_0 . In other words, to replace the old contract with a new one, the holder of the old contract must pay the counterpart THB 1,256,039.

(b) The new forward rate is: $F_{t,T} = 57.5 * 1.0125/1.03 = 56.52$

Therefore, the value of the outstanding contract equals $[(56.52 - 54.2)/1.0125] * 1,000,000 = \text{INR } 2,291,358$. This means a gain to the holder of the contract.

Solution

(c) The new forward rate is: $F_{t,T} = 283 * 1.045/1.035 = 285.73$
Therefore, the value of the outstanding contract equals $[(285.73 - 289.4)/1.045] * 1,000,000 = \text{JPY } -3,511,962$. This means a loss to the holder of the contract.

(d) The new forward rate is: $F_{t,T} = 2.2 * 1.02/1.03 = 2.18$
Therefore, the value of the outstanding contract equals $[(2.18 - 1.8)/1.02] * 1,000,000 = \text{CHF } 372,549$. This means a gain to the holder of the contract.

Question 3

You are given the following data: the spot exchange rate is INR/NOK 21; the p.a. simple interest rate on a three-month deposit is 8% in India and 6% in Norway. Compute:

- (a) The time-T NOK value of a time-t NOK 100 investment.
- (b) The time-t INR value of a time-T INR 100 loan.
- (c) The forward rate for a three-month forward contract.
- (d) The time-T INR proceeds from a time-T NOK 100 forward sale, given the forward rate computed in (c).
- (e) The present value of the proceeds in question (d).
- (f) The time-t INR value of a time-t NOK 100 spot sale.
- (g) The time-t value, in INR, of the proceeds of a time-T NOK 100 loan.

Solution

(a) $\text{NOK } 100 * (1 + 0.06/4) = \text{NOK } 101.50$

(b) $\text{INR } 100 / (1 + 0.08/4) = \text{INR } 98.04$

(c) $\text{INR/NOK } 21 * (1 + 0.08/4)/(1 + 0.06/4) = \text{INR/NOK } 21.103$

(d) $\text{NOK } 100 * \text{INR/NOK } 21.103 = \text{INR } 2,110.30$

(e) $\text{INR } 2,110.30 / (1 + 0.08/4) = \text{INR } 2,068.92$

(f) $\text{NOK } 100 * \text{INR/NOK } 21 = \text{INR } 2,100$

(g) $\text{NOK } 100 / (1 + 0.06/4) * \text{INR/NOK } 21 = \text{INR } 2,068.97$

Question 4

Given the following data, are there any arbitrage opportunities?
If so, how would you make a risk-free profit?

HC/FC	S_t	$F_{t,T}$	$r_{t,T}$	$r^*_{t,T}$
(a) INR/NOK	20.5	20.60	3.5%	2.5%
(b) JPY/NZD	57.5	57.10	1.25%	3.0%
(c) ZWD/USD	283.0	285.73	4.5%	3.5%
(d) CHF/GBP	2.2	2.18	2.0%	3.0%

Solution

(a) From the spot and interest rate data, we can create a synthetic contract at the forward rate of $20.5 * 1.035/1.025 = 20.7$. Relative to the synthetic rate, the direct forward rate is too low. In order to make a risk-free profit, you buy forward NOK 1 at INR 20.6 and sell NOK forward at the synthetic rate of 20.7.

(b) From the spot and interest rate data, we can create a synthetic contract at the forward rate of $57.5 * 1.0125/1.03 = 56.52$. Relative to the synthetic rate, the direct forward rate is too high. In order to make a risk-free profit, you sell forward NZD 1 at JPY 57.1 and purchase NZD forward at the synthetic rate of 56.52.

(c) $283 * 1.045/1.035 = 285.73$ (no arbitrage opportunity).

(d) $2.2 * 1.02/1.03 = 2.18$ (no arbitrage opportunity).

Question 5

How do you evaluate the following claim: **"The forward rate, if computed from IRP (CIP), entirely ignores expectations.** In reality, the market evaluates the currency's prospects, and takes into account not just the expected value but also the risks. Any theory which would have us mechanically compute the forward rate from the current spot rate and the interest rates is totally crazy." Before formulating your comments, think about the direction of causality (if any) implied by IRP.

Solution

The two claims – (1) the forward rate reflects the risk-adjusted expectations and (2) the forward rate can be computed from the spot and interest rates – are perfectly compatible because the spot rate and the interest rates are not determined exogenously. Rather, the spot rate takes into account (1) the risk-adjusted expected future value of the currency, (2) the foreign interest rate that is earned between t and T when foreign exchange is bought spot rather than forward and (3) the domestic interest foregone when one buys spot rather than forward. Stated differently, both the spot and the forward rate are based on the risk-adjusted expectations and the difference between these exchange rates merely reflects the net (dis)advantage that arises from postponed payment and delivery.