# Topic 4: Foreign Currency Derivatives

**THINGS TO NOTE:**

1. Tutorial for this topic will be held in Week 6 (week of Monday 25th March).
2. The aim of this topic is to introduce students to foreign currency derivatives that will be used in Topic 5. We are not covering Swaps in the tutorial.

***OPTIONS***

1. What is the difference between an American and a European option? Which one should trade at a higher price? **(*)**
2. If the exchange rate is $0.66/DM, the strike price of a call option expiring in 3 months is $0.70/DM and the option premium is $0.06/DM, what is the intrinsic value of the option? Does it have time value? **(*)**
3. Suppose you can buy on the PHLX a call option to buy yen at $0.01/Yen for maturity in two months. The premium is 1.26 cents per 100 yen. What would be the total cost of purchasing this call option? **(*)**
4. Citicorp sells a call option on Deutsche marks [contract size is DM 500,000 (DM 62,500 × 8)] at a premium of $0.04 per DM. If the exercise price is $0.71 and the spot price of the DM at expiration date is $0.73, what is Citicorp's profit (loss) on the call option? **(*)**
5. Suppose that Bechtel Group wants to hedge a bid on a Japanese construction project. But because the yen exposure is contingent on acceptance of its bid, Bechtel decides to buy a put option for the ¥15 billion bid amount rather than sell it forward. In order to reduce its hedging cost, however, Bechtel simultaneously sells a call option for ¥15 billion with the same strike price. Bechtel reasons that it wants to protect its downside risk on the contract and is willing to sacrifice the upside potential in order to collect the call premium. Comment on Bechtel's hedging strategy. **(*)**

***FUTURES***

1. Explain the basic differences between the operation of the currency forward market and the futures market. **(*)**
2. What is the major difference in the obligation of one with a long position in a futures (or forward) contract in comparison to an options contract? **(*)**

3. The price of the March 2002 Mexican Peso (MXP) futures contract is $ 0.10068. You believe the spot price in December will be $ 0.11000. What speculative position would you enter into to attempt to profit from your beliefs? Calculate your anticipated profit assuming you take a position in three contracts. What is the size of your profit (loss) if the futures price is indeed an unbiased predictor of the future spot price and this price materializes?
4. On Monday morning, an investor takes a long position in a Pound futures contract that matures on Wednesday afternoon. The agreed-upon price is $1.78 for £62,500. At the close of trading on Monday, the futures price has risen to $1.79. At Tuesday close, the price rises further to $1.80. At Wednesday close, the price falls to $1.785, and the contract matures. The investor takes delivery of the Pounds at the prevailing price of $1.785. Detail the daily settlement process. What will be the investor's profit (loss)? **(*)**
5. Suppose that DEC buys a Swiss Franc futures contract (size is SFr $125,000) at a price of $0.83. If the spot rate for the Swiss Franc at the date of settlement is SFr 1 = $0.8250, what is DEC's gain or loss on this contract?
6. Suppose that Texas Instruments (TI) must pay a French supplier €10 million in 90 days.

a. Explain how TI can use currency futures to hedge its exchange risk. How many futures contracts will TI need to fully protect itself?
b. Explain how TI can use currency options to hedge its exchange risk. How many options contracts will TI need to fully protect itself?
c. Discuss the advantages and disadvantages of using currency futures versus currency options to hedge TI's exchange risk.

***SWAPS***

1. Discuss the basic motivation for companies to enter into currency swaps.
2. Dell Computers would like to borrow pounds and Virgin Airlines wants to borrow dollars. Because Dell is better known in the United States, it can borrow on its own dollars at 7 percent and pounds at 9 percent, whereas Virgin can on its own borrow dollars at 8 percent and pounds at 8.5%. **(*)**

a. Suppose Dell wants to borrow £10 million for two years, Virgin wants to borrow $16 million for two years, and the current ($/£) exchange rate is $1.60. What swap transaction would accomplish this objective? Assume the counterparties would exchange principal and interest payments with no rate adjustments. **(*)**

b. What savings are realized by Dell and Virgin?

c. Suppose, in fact, that Dell can borrow dollars at 7 percent and pounds at 9 percent, whereas Virgin can borrow dollars at 8.75 percent and pounds at 9.5 percent. What range of interest rates would make this swap attractive to both parties?

d. Based on the scenario in part (c), suppose Dell borrows dollars at 7 percent and Virgin borrows pounds at 9.5 percent. If the parties swap their current proceeds, with Dell paying 8.75 percent to Virgin for pounds and Virgin paying 7.75 percent to Dell for dollars, what are the cost savings to each party?

3. Suppose that IBM would like to borrow fixed-rate yen, whereas Korea Development Bank (KDB) would like to borrow floating-rate dollars. IBM can borrow fixed-rate yen at 4.5 percent or floating-rate dollars at LIBOR + 0.25 percent. KDB can borrow fixed-rate yen at 4.9 percent or floating-rate dollars at LIBOR + 0.8 percent.

a. What is the range of possible cost savings that IBM can realize through an interest rate/currency swap with KDB?

b. Assuming a notional principal equivalent to $125 million, and a current exchange rate of ¥105/$, what do these possible cost savings translate into in yen terms?

c. Redo Parts a and b assuming that the parties use Bank of America, which charges a fee of 8 basis points to arrange the swap.

4. Company A, a low-rated firm, desires a fixed-rate, long-term loan. A currently has access to floating interest rate funds at a margin of 1.5% over LIBOR. Its direct borrowing cost is 13% in the fixed-rate bond market. In contrast, company B, which prefers a floating-rate loan, has access to fixed-rate funds in the Eurodollar bond market at 11% and floating-rate funds at LIBOR + ½%.

a. How can A and B use a swap to advantage?

b. Suppose they split the cost savings. How much would A pay for its fixed-rate funds? How much would B pay for its floating-rate funds?

5. What factors underlie the economic benefits of swaps? **(*)**

6. In May 1988, Walt Disney Productions sold to Japanese investors a 20-year stream of projected yen royalties from Tokyo Disneyland. The present value of that stream of royalties, discounted at 6 percent (the return required by the Japanese investors), was ¥93 billion. Disney took the yen proceeds from the sale, converted them to dollars, and invested the dollars in bonds yielding 10 percent. According to Disney's chief financial officer, Gary Wilson, "In effect, we got money at a 6 percent discount rate, reinvested it at 10 percent, and hedged our royalty stream against yen fluctuations--all in one transaction."

a. At the time of the sale, the exchange rate was ¥124 = $1. What dollar amount did Disney realize from the sale of its yen proceeds?

b. Demonstrate the equivalence between Walt Disney's transaction and a currency swap.

c. Comment on Gary Wilson's statement. Did Disney achieve the equivalent of a free lunch through its transaction?

7. A medium-sized Australian Company (A) needs to borrow £6.7 million ($10 million at the current exchange rate of S(£/$) = 0.67) for five years to establish a division in the U.K. A British firm (B) needs to borrow $10 million for five years to set up an Australian division. The two face the following borrowing costs (annual coupon payments): **(*)**

| | $i_{\$}$ | $i_{£}$ |
|---|---|---|
| A | 5.5% | 8.5% |
| B | 5.25% | 8.0% |

Consider the following arrangement. A borrows $10 million, B borrows £6.7 million. Each agrees to pay the principal repayment obligation of the other, and in addition A will pay B £562,800 at the end of each year, and B will pay A $550,000 at the end of each year.

**(Past Exam Question)**

(a) What are the effective yearly payments for each party? What are the interest rates (no compounding)?

(b) Who gains more from the swap, A or B? Why?