

**37011 Financial Markets Instruments****Whiteboard Tutorial 8**

1. At time zero the 120–180 day FRA rate is set at 5% and the principal is \$1,000,000. Suppose that in 120 days' time the 60-day rate turns out to be 5.5%, i.e., this is the actual spot interest rate which applies from day 120 to day 180. What is the payoff of the FRA?
2. Consider the above FRA and suppose that at time 90 days from now, the spot interest rate for 30 days is 4% and the spot interest rate for 90 days is 5%. Assume simple compounding for all rates. What is the value of the FRA at this point in time?
3. Suppose an investor has entered into a 30–to–60 day FRA on the notional principal of \$1,000,000 to receive 4.25% in arrears. If after 15 days the 15-day bill rate is 4.20% and the 45-day bill rate is 4.35%, what is the value of the FRA at this time?
4. Suppose a company has a semi-annual swap position to receive fixed at 4.6% and pay BBSW on a notional principal of \$10,000,000. If there are 2 years remaining on the swap and the current 6-month BBSW is 4.5% for all maturities, what is the value of the swap to the company?
5. Consider the swap in the previous example. If two months have passed so that the swap matures in 22 months and the 6-month BBSW is now 4.56% for all maturities, what is the value of the swap to the company?
6. What is the swap rate on a five-year swap with semi-annual payment frequency consistent with the term structure that you extracted in Question 2 of Whiteboard Tutorial 2? Use loglinear interpolation of discount factors if necessary.
7. Suppose that the following swap rates (for semi-annual payment frequency) are observed in the market:

Swap length in years	Swap rate
1	3.50%
2	4.25%
3	4.80%
4	4.50%
5	4.00%
7	4.00%
10	3.00%

- (a) Determine the term structure of discount factors consistent with these swap rates. Use loglinear interpolation of discount factors where necessary.
  - (b) Suppose that three months ago a company entered into a five-year swap on a notional of \$10 million with semi-annual payment frequency to receive a fixed rate of 3.8% and pay the floating rate, and that three months ago the six-month rate was 3.2%. Based on the current term structure, what is the value of this swap? Use loglinear interpolation of discount factors where necessary.
8. Suppose that domestic interest rates are 3% continuously compounded for all maturities and foreign interest rates are 6% continuously compounded for all maturities. Suppose further that the spot exchange rate is 0.6 units of domestic currency per unit of foreign currency. If the swap is set up according to the

conventions presented in the lecture, what are the cashflows on a ten-year swap with semi-annual payment frequency and foreign notional of one million?

9. Suppose that the term structure of domestic instantaneous forward rates is given by

$$f(0, T) = 0.025 + 0.035e^{-0.2T} \quad (1)$$

Suppose further that the term structure of foreign instantaneous forward rates is given by

$$\tilde{f}(0, T) = 0.06 - 0.035e^{-0.2T} \quad (2)$$

and the spot exchange rate (in units of domestic currency per unit of foreign currency) is 1.6.

- (a) If the swap is set up according to the conventions presented in the lecture, what are the cashflows on a ten-year swap with semi-annual payment frequency and foreign notional of one million?
  - (b) If in five years' time the spot exchange rate and the interest rate term structures are the same as now, what is the value of the swap?
10. Consider an accumulating (a.k.a. *accreting*) principal interest rate swap, with semi-annual payment frequency, where the notional principal is \$1 million initially and increases by \$50,000 each payment period (i.e., the second period payment is based on a notional of \$1,050,000, and so on). The swap runs for five years. If the term structure of domestic instantaneous forward rates is given by (1), what is the fixed rate that sets the initial value of the swap to zero?
11. Consider the interest rate swap example from Slides 32–38 in Lecture 7. Suppose now that a bank serves as a financial intermediary and charges a fee of 0.2%. The companies still agree to share the remaining benefit equally. What is the appropriate swap arrangement if X wishes to borrow floating and Y wishes to borrow fixed?
12. Assuming the same interest rates as on Slide 32 of Lecture 7, construct the swap arrangement if the rates given are for investment, rather than borrowing, and X wants a fixed rate investment while Y wants a floating rate investment. Assume that the financial intermediary charges 0.2%.
13. Suppose that the best borrowing rates available to X and Y are

	AUD floating	EUR floating
X	BBSW + 0.5%	EURIBOR + 1.6%
Y	BBSW + 0.2%	EURIBOR + 0.5%

and X wishes to borrow EUR and Y wishes to borrow AUD for five years. Assume that the floating rates are quarterly.

- (a) Construct a swap transaction via a financial intermediary to benefit from the comparative advantage. Assume that the FI charges a fee of 10 bp for arranging the swap and that the remaining benefit is shared equally between X and Y.
- (b) If the current spot exchange rate is 1.63 AUD per EUR, and the term structure of market interest rates faced by the FI is given by (1) for AUD and (2) for EUR, what is the present value (in AUD) of this deal to the FI if the notional is ten million EUR? Adjust the fee of the FI so that the PV is exactly 16,300 AUD. If the FI wants to eliminate its exposure to exchange rate risk, what are the forward contracts that it has to enter?