FINA 690G - Innovations in Financial Engineering

Homework Two

1. A currency swap has a remaining life of 15 months. It involves exchanging interest rate at 20 million British pound for interest at 10% on $30 million once a year. The term structure of interest rates in both the United Kingdom and the United States is currently flat, and if the swap were negotiated today the interest rates would be 8% in dollars and 11% in sterling. All interest rates are quoted with annual compounding. The current exchange rate (dollars per pound sterling) is 1.65. What is the value of the swap to the party paying sterling?

2. Why is the expected loss from a default on a swap less than the expected loss from the default on a loan with the same principal?

3. A bank finds that its assets are not matched with its liabilities. It is taking floating rate deposits and making fixed rate loans. How can swaps be used to offset the risk?

4. The one-year LIBOR rate is 10%. A bank trades swaps where a fixed rate of interest is exchanged for 12-month LIBOR with payments being exchanged annually. Two- and three-year swap rates (expressed with annual compounding) are 11% and 12% per annum. Estimate the two-year and three-year LIBOR zero rates.

5. Company X is based in the United Kingdom and would like to borrow $50 million at a fixed rate of interest for 5 years in US funds. Since the company is not well known in the United Kingdom, this has proved to be impossible. However, the company has been quoted 12% per annum on fixed-rate five-year sterling funds. Company Y is based in the United States and would like to borrow the equivalent of $50 million in sterling for 5 years at a fixed rate of interest. It has been unable to get a quote but has been offered US dollars at 10.5% per annum. Five-year government bonds currently yield 9.5% per annum in the United States and 10.5% in the United Kingdom. Suggest an appropriate currency swap that will net the financial intermediary 0.5% per annum.

6. In the accrual swap, the fixed side accrues only when the floating reference rate lies below a certain level. Discuss how the analysis can be extended to cope with a situation where the fixed side accrues only when the floating reference rate is above one level and below another.

7. Explain why a bank might choose to discount cash flows on a currency swap at a rate slightly different from LIBOR.

8. Suppose that a swap specifies that a fixed rate is exchanged for twice the LIBOR rate. Can the swap be valued using the "assume forward rates are realized" rule?

9. What is the value of a 5-year swap where LIBOR is paid in the usual way and in return LIBOR compound at LIBOR is received on the other side. The principal on both sides is $100 million. Payment dates on the pay side and compounding dates on the receive side are every 6 months and the yield curve is flat at 5% with semiannual compounding.

10. Suppose that a dealer quotes these terms on a 5-year swap: fixed-rate payer to pay 9.5% for LIBOR and floating-rate payer to pay LIBOR for 9.2%. How would the dealer quote the terms by reference to the yield on 5-year Treasury notes?

11. Suppose that a life insurance company has issued a three-year guaranteed investment contract with a fixed rate of 10%. Under what circumstances might it be feasible for the life insurance company to invest the funds in a floating rate security and enter into a three-year interest rate swap in which it pays a floating rate and receives a fixed rate?

12. Consider the three-year swap shown below.

Period	Day count	Futures price
1	91	
2	90	95.85
3	91	95.45
4	91	95.28
5	91	95.10
6	94	94.97
7	91	94.85
8	90	94.75
9	91	94.60
10	91	94.50
11	91	94.35
12	93	94.24
13	91	94.10

Suppose that one year later the Eurodollar CD futures prices are as

Period	Day count	Futures price
1	91	
2	94	96.70
3	91	96.70
4	90	96.66
5	91	96.60
6	91	96.55
7	91	96.52
8	93	96.47
9	91	96.40

What is the value of the swap?