Assignment 5

Question 1 is an exercise in determining a mutually beneficial swap. Question 2) is an application of Swap pricing, while Question 3) uses immunization techniques. Question 4) uses a factor yield model to control risk.

1) Companies A and B have been offered the following rates per annum on a 20 million dollar 5 year loan. Company A: fixed 12%, floating rate libor +0.1%. Company B: fixed rate 13.4%, floating rate: libor+0.6%. Company A requires a floating rate loan, company B requires a fixed rate loan.
   a) If you were negotiating a swap between the two parties what is the most (in percent) that you could charge both companies for your services?
   b) Design a swap that will net an intermediary 0.1% per annum and appear equally attractive to both companies.

2) Consider a Swap where in six months and again in one year you pay 6 month LIBOR and receive a fixed semi–annual rate of 3 percent. The current annualized 6 month and one year yields are 4.25 and 5 percent respectively. If LIBOR for the current period is 2.25 percent semi–annually, what is the current value of your swap given a notional principal of $76 million?

3) Suppose that you have committed to pay a lump sum of $10,000 to another company at the end of each of the next two years. (I.e. you are at the beginning of 1997 and you have a commitment at the beginning of 1998 and 1999).
   a) If the yield curve is flat at 5%, what is the present value of this liability?
   b) What is the duration of this liability?
   c) If you choose to immunize this liability what conditions should you place on the present value, duration and convexity of the asset that you would choose to use.
   d) As an investment advisor what criterion would *you* use to select the asset with the characteristics of c)?

4) You have two bonds: one and two: Bond 1 has a duration of 5 years and a convexity of 30 Bond 2 has a duration of 7 years and a convexity of 52. The factor yield model is:

$$y_1 = 0.4 + 0.7F$$

and

$$y_2 = 0.5 + 0.6F.$$

a) Suppose that I have a position in bond 1, how many dollars worth of bond 2 do I need to be short per dollar that I am long in bond 1 for my overall position to be factor–adjusted duration neutral?

b) Will the factor adjusted convexity increase or decrease my return?

c) If the factor F, is very volatile does the convexity effect reduce or enhance the attractiveness of this position?