Assignment 10, due December 10

Corrections: (none yet)

1. (See Allen's notes, Section 10) Suppose the credit risk free discount factors are as follows:

1Y	.9450
2Y	.8900
3Y	.8250
4Y	.7550
5Y	.6700

   (a) Calculate the par swap rate of a forward starting swap that starts at the end of year 2 and pays annual coupons for three years (so that the coupon payments are at the ends of years 3, 4, and 5).

   (b) Using the result of part (a), calculate the value of a swaption on a 3 year annual payment swap to receive the floating rate and pay a fixed rate of 6.5% that is exercisable in two years. If the swap is exercised, it has three years to run from the exercise date (same years as part (a)). Use Black's model based on an annual interest rate volatility of 15%.

   (c) Calculate the value of a caplet that allows the holder to pay 6.5% instead of the one year credit risk free rate during year 3 (one payment due at the end of year 3 for borrowing during year 3). Assume an annual interest rate volatility of 18%.

2. (See Allen's notes, section 11) Use the risk free discount rates from Problem (1) together with the following half year rates:

.5Y	.9650
1.5Y	.9200
2.5Y	.8550
3.5Y	.7850
4.5Y	.7100

   Suppose also that the (risk neutral) conditional default probabilities (probability of default in year n given survival until year n) are:

1Y	2%
2Y	2.5%
3Y	3%
4Y	3.5%
5Y	4%

Assume that the recovery rate upon default is 25%.

(a) Calculate the breakeven swap spread (the par CDS spread) for a five year CDS with annual swap payments. What would be the value to the protection provider of a five year CDS with annual swap rate of 1.75%?

(b) Calculate the par coupon rate for a 5 year corporate bond with annual coupon payments. What would be the price if the bond had an annual coupon of 8%?