

Finance 462
Problem Set #4

- 1) Suppose that you are bidding on a 5 year Treasury with a 6% coupon rate (assume this bond makes annual interest payments equal to 6% of the face value) and a face value of \$1,000.

- a) Using the Vasicek model from the first project, calculate a predicted path for the interest rate over the next five years (assume the change in the interest rate is an annual change – therefore you only need to calculate four interest rates). Use the current 1 year spot rate (you can find this in the *Wall Street Journal*) for your starting value.

$$\Delta i_t = \kappa(\theta - i_t) + \sigma \varepsilon_t$$

$$\varepsilon_t \in N(0,1)$$

- b) Now, recalculate the value of the bond using the actual yield curve (again, you can find this information in the *Wall Street Journal*).
c) Why are your answers to (a) and (b) different?

- 2) Suppose you have a 10 year STRIP (discount bond). The current yield on 10 year bonds is 5.5%.

- a) Calculate the value of the STRIP
b) Calculate the Dollar duration of the STRIP. If interest rates fell by 1%, what does the duration imply about the bond's price?
c) Suppose that the 10 year interest rate fell to 4.5%, calculate the new price of the bond.
d) Why are your answers to (c) and (d) different?

- 3) Suppose that you purchase a 3 year Treasury note with a 4% coupon annual coupon payment and a \$10,000 face value.

- a) Calculate the price of this bond assuming a 5% yield to maturity
b) Calculate the duration of this bond.
c) By how much will this bond drop in value if the interest rate rises by 50 basis points (.5%)?
d) What would the key durations for this bond be?

- 4) Consider the following two assets. Each asset makes one payment, but that payment is defined by the “state of the world”.

State	1 Year Spot rate	Payout (Asset 1)	Payout (Asset 2)
1	5%	100	100
2	7%	100	110
3	3%	100	105

That is, if state 2 occurs, Asset A pays \$100, Asset B pays \$110 and the interest rate is 7%.

Assuming each state is equally likely to occur, calculate the value of each asset.

- 5) Using the *Wall Street Journal* compare the prices/yields of T-Bills and TIPS. What do these spreads suggest about the market's forecasts of inflation over the coming years?