

Finance 34600 – Investment Theory

Outline for Lecture 6 Fixed Income Securities

Lecture 6 covers fixed income securities, their pricing, and their properties. We will begin by reviewing the basics of bond pricing. Through this discussion, we will derive the general relationships between bond characteristics, bond prices, and yields.

After developing the foundations of bond pricing, we will move on to discuss interest rates (yields). We will begin by describing how default risk affects the yields on bonds. We will then characterize the term structure of interest rates and discuss several theories about the relationship between bond maturity and yields. To develop these theories, we will also cover the calculation of forward rates.

Finally, we will discuss the measurement and management of interest rate risk in fixed income securities. Our discussion here will focus on the calculation of duration and its use in the measurement of interest rate risk.

Suggested Problems:

Ch. 10: 3, 4, 5, 8, 9, 35, 37.

Ch. 11: 1, 2, 6, 9, 11, 24, 29, plus concept checks 11.1, 11.2, and 11.6.

Chapter 10:

3. Two bonds have identical times to maturity and coupon rates. One is callable at 105, the other at 110. Which should have the higher yield to maturity? Why?
4. Consider a bond with a 10% coupon and a yield to maturity of 8%. If the bond's YTM remains constant, will the price of the bond one year from now be higher, lower, or unchanged? Why?
5. Under the expectations hypothesis, if the yield curve is upward sloping, the market must expect an increase in short-term interest rates. True/False/Uncertain? Explain.
8. The yield curve is upward sloping. Can you conclude that investors expect short-term rates to rise? Why or why not?
9. Consider a bond paying a coupon rate of 10% per year semi-annually, while the market interest rate is 8% (4% per six months). The bond has three years to maturity.
 - a) Find the bond's price today and six months from now after the next coupon is paid (assuming market interest rates do not change).
 - b) What is the total rate of return on the bond during this six month period?
35. The yield-to-maturity on one-year zero-coupon bonds is 8%. The yield-to-maturity on two-year zero-coupon bonds is 9%.
 - a) What is the forward rate of interest for the second year?
 - b) If you believe the expectations hypothesis, what is your best guess as to the expected short term interest rate next year?
 - c) If you believe the liquidity preference theory, is your best guess as to the expected short term rate next year higher, lower, or the same as in (b)? Why?
37. The current yield curve for default-free zero-coupon bonds is as follows:

Maturity (yrs)	YTM
1	10%
2	11%
3	12%

- a) What are the implied one-year forward rates in years 2 and 3?
- b) Assume that the expectations hypothesis of the term structure is correct. If market expectations are accurate, what will the yield curve for one and two year maturities be next year?
- c) If you purchase a two-year zero-coupon bond now, what is the expected total rate of return over the next year? What if you purchase a three-year zero-coupon bond? (Hint: compute the current and expected future prices. You can ignore taxes.)

Chapter 11:

1. A nine-year bond has a yield of 10% and a duration of 7.194 years. If the bond's yield changes by 50 basis points, what is the percentage change in the bond's price?
2. Find the duration of a 6% coupon bond making annual coupon payments if it has three years to maturity and a yield-to-maturity of 6%. What is the duration if the yield to maturity is 10%?
6. Rank the interest rate sensitivity of the following pairs of bonds.
 - a) Bond A is an 8% coupon bond, with 20 years to maturity, selling at par value
Bond B is an 8% coupon bond, with 20 years to maturity, selling below par value
 - b) Bond A is a noncallable, 8% coupon bond, with 20 years to maturity, selling at par
Bond B is a callable, 9% coupon bond, with 20 years to maturity, selling a par
9. You will be paying \$10,000 a year in tuition expenses at the end of each of the next two years. Bonds currently yield 8%.
 - a) What is the present value and duration of your tuition obligation?
 - b) What maturity zero-coupon bond would immunize your obligation?
 - c) Suppose you buy a zero-coupon bond with value and duration equal to your obligation. Now suppose that interest rates immediately increase to 9%. What happens to your net position, that is, to the difference between the value of the bond and that of your tuition obligation? What happens if interest rates instead fall to 7%?
11. You are managing a portfolio of \$1 million. Your target duration is 10 years and you can choose from two bonds: a zero-coupon bond with five years to maturity and a perpetuity, each with a yield of 5%.
 - a) How much of each bond will you hold in your portfolio?
 - b) How will these fractions change next year if the target duration is now 9 years?
24. The following questions appeared on past CFA exams.
 - a) Which set of conditions will result in a bond with the greatest price volatility?
 - i) A high coupon bond with short maturity
 - ii) A high coupon bond with long maturity
 - iii) A low coupon bond with short maturity
 - iv) A low coupon bond with long maturity
 - b) An investor who expects declining interest rates would be likely to purchase a bond that has a _____ coupon and a _____ term to maturity.
 - i) low, long
 - ii) high, short
 - iii) high, long
 - iv) zero, long

- c) With a zero-coupon bond:
 - i) Duration equals the weighted average term to maturity
 - ii) Term to maturity equals duration
 - iii) Weighted average term to maturity equals the term to maturity
 - iv) All of the above

 - d) As compared with bonds selling at par value, deep discount bonds will have:
 - i) Greater reinvestment risk
 - ii) Greater price volatility
 - iii) Less call protection
 - iv) None of the above
29. Long-term treasury bonds are currently selling at yields to maturity of nearly 8%. You expect interest rates to fall. The rest of the market thinks that interest rates will remain unchanged over the coming year. In each question below, choose the bond that will provide the higher capital gain if you are correct. Briefly explain your answer.
- a) (1) a Baa-rated bond with 8% coupon and 20 years to maturity
(2) an Aaa-rated bond with 8% coupon and 20 years to maturity
 - b) (1) an A-rated bond with 4% coupon and 20 years to maturity, callable at 105
(2) an A-rated bond with 8% coupon and 20 years to maturity, callable at 105
 - c) (1) a 6% coupon treasury bond with 20 years to maturity and YTM of 8%
(2) a 9% coupon treasury bond with 20 years to maturity and YTM of 8%