

PROBLEM SET: Bond Portfolios

Exercise 1.

[5]

Consider an equally weighted portfolio of two bonds, A and B. Bond A is a zero coupon bond with 1 year to maturity. Bond B is a zero coupon bond with 3 years to maturity. Both bonds have face values of 100. The current interest rate is 5%.

1. Determine the bond prices.
2. Your portfolio is currently worth 2000. Find the number of each bond invested.
3. Determine the duration of the portfolio.
4. Determine the convexity of your position.

Exercise 2.

Bond Pricing and Interest Rate Sensitivity [4]

A 3 year bond with a face value of \$100 makes annual coupon payments of 10%. The current interest rate (with annual compounding) is 9%.

1. Find the bond's current price.
2. Suppose the interest rate changes to 10%, determine the new price of the bond by direct calculation.
3. Instead of direct calculation, use duration to estimate the new price and compare it to the correct price.
4. Use convexity to improve on your estimation using duration.

Exercise 3.

Portfolio Duration [1]

A company invests \$1,000 in a five-year zero coupon bond and \$4,000 in a ten-year zero-coupon bond.

1. What is the duration of the portfolio?

Exercise 4.

Discount bond [1]

A discount (zero coupon) bond with a principal of 100 has a maturity of 6 years. The term structure of interest rates is flat with a (continuously compounded) interest rate of 5%.

1. Determine the duration of the bond.