

Homework #3

Due: At class time on Tuesday, July 9.

Instructor:

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1. A coupon bond makes periodic “coupon payments” and a final “face value payment.” A coupon bond is typically described in terms of

- a *face value* F ,
- a *maturity* T ,
- a number of *compounding periods* m per year, and
- a *coupon rate* q .

We'll assume that “today” is $t = 0$, that the first compounding period starts today, and that the maturity is an integer multiple of $\frac{1}{m}$ of a year.

This coupon bond makes *coupon payments*

$$C = q \times F \times \frac{1}{m}$$

at times

$$\left\{ \frac{1}{m}, \frac{2}{m}, \frac{3}{m}, \dots, \frac{mT-1}{m}, \frac{mT}{m} = T \right\}.$$

The bond also pays the *face value* at maturity. This payment of F is made at the same time as the final coupon payment, and is in addition to that payment. So the final payment at time $t = \frac{mT}{m} = T$ is $C + F$.

Consider a coupon bond with face value $F = \$1000$ and maturity $T = 2$ years, making $m = 2$ coupon payments per year at the coupon rate $q = .05 = 5\%$.

- What are amounts of the payments this bond makes, and at what times are these payments made?
- Assume that the interest rate r for deposits and loans is $r = .06 = 6\%$, and that we are compounding monthly. Find the present value of each of these payments. What is the total present value of all the payments.
- Describe how to construct a portfolio of zero coupon bonds that makes the same payments as this coupon bond.