

Financial Econometrics

Problem Set

Exercise 1. [3]

Consider the following prices of zero-coupon bonds with nominal value of \$1,000 and maturities $T = 1, 2, 3, 4$: $P_{0,1} = 968.52$. $P_{0,2} = 929.02$. $P_{0,3} = 915.15$. $P_{0,4} = 905.95$. Discounting in discrete, annual.

1. Compute the spot rates implied by these prices, and plot the yield curve.
2. Use the information in the above bond prices to find the price of a coupon bond with maturity 4 years from now, annual coupon rate $c = 7\%$ and face value \$1000. Is the bond selling a premium, par or discount?

Exercise 2. Bond Price [2]

Consider a 5-year bond with a nominal value of \$100, a yield to maturity of 7% (with annual compounding frequency) and a 10% coupon rate (with annual coupon frequency).

1. Determine the bond price.

Exercise 3. [3]

A 10%, two year bond is traded at a price of 90. The current one year spot rate is $r(0, 1) = 12\%$ (with discrete, annual compounding). The bond has a face value of 100.

1. Determine the duration and convexity of the bond, using both the full term structure and the Macaulay style calculations.

Exercise 4. [3]

In their book, Copeland and Weston gives the following exercise:

Interplanetary starship captain José Ching has been pondering the investment of his recent pilot's bonus of 1000 stenglers. His choice is restricted to two securities: Galactic Steel, selling for 20 stenglers per share, and Nova Nutrients, at 10 stenglers per share. The future state of his solar system is uncertain. If there is a war with a nearby group of asteroids, Captain Ching expects Galactic Steel to be worth 36 stenglers per share. However, if peace prevails, Galactic Steel will be worth only 4 stenglers per share. Nova Nutrients should sell at a future price of 6 stenglers per share in either eventuality.

Your Mission, should you accept is, is to answer the following question:

1. If you have the possibility to transfer wealth across period as money (or stenglers, as it were), would you ever expect to observe the above prices in equilibrium?

Exercise 5. Bonds [4]

You observe the three risk free bonds A, B and C:

Bond	Price	Cashflow in period		
		1	2	3
A	95	100	0	0
B	90	10	110	0
C	85	10	10	110

1. What is the current value of receiving one dollar at time 3?
2. What are the interest rates (with annual compounding) implied in these prices?

Another risk free bond D is traded, with the following cash flows:

time:	1	2	3
D	20	20	520

2. What is the current price of bond D?