

EE431/438 Economics of Financial Markets and Institutions  
 Bond Price Sensitivity

Exercise

This exercise is optional. If you want feedback, please come to visit me during my office hours or you may make an appointment via email before February 11, 2013.

**Bond Price Sensitivity : Generally,**

Bonds with longer maturities are more price sensitive to interest rate changes.  
 Bonds with higher coupon rates are less price sensitive to interest rate changes.  
 Bonds with higher yield are less price sensitive to interest rate changes.

1. Consider two twenty-year annual coupon bonds. The first bond has a 5% coupon and the second bond has a 14% coupon. Par value is equal to 1,000.

(a) Suppose YTM of both bonds is equal to 5% initially. Calculate the initial price of the two bonds.

- i. The first bond initial price = .....
- ii. The second bond initial price = .....

(b) Suppose YTM of bond bonds goes up to 6%. Calculate the price after the change in interest rate.

- i. The first bond price after change = .....
- ii. The second bond price after change = .....

(c) Calculate and compare the percentage change in price for both bonds after the interest rate goes up by 1% (from 5% to 6%).

i. Percentage change in price for the first bond =  $\frac{\text{price after change}-\text{intial price}}{\text{initial price}}$

ii. Percentage change in price for the first bond =  $\frac{\text{price after change}-\text{intial price}}{\text{initial price}}$

- iii. The percentage change in price for the first bond is ..... the second bond.
- iv. Bonds with lower coupon rate is ..... price sensitive to change in interest rate than bonds with higher coupon rate.

2. Consider two twenty-year annual coupon bonds. Both have 5% coupon.

(a) Initially, the first bond has 5% yield to maturity and the second bond has 14% yield to maturity. Calculate the initial price of the two bonds.

- i. The first bond initial price = .....
- ii. The second bond initial price = .....

(b) Suppose the interest rate goes up by 1%. Thus, the first bond's yield to maturity increases to 6% (5%+1%) and the second bond's yield to maturity increases to 15% (14%+1%).

i. The first bond price after change = .....

ii. The second bond price after change = .....

(c) Calculate and compare the percentage change in price for both bonds after the interest rate goes up by 1% (from 5% to 6%).

i. Percentage change in price for the first bond =  $\frac{\text{price after change}-\text{intial price}}{\text{initial price}}$

ii. Percentage change in price for the first bond =  $\frac{\text{price after change}-\text{intial price}}{\text{initial price}}$

iii. The percentage change in price for the first bond is ..... the second bond.

iv. Bonds with lower YTM is ..... price sensitive to change in interest rate than bonds with higher YTM.

- Note that we cannot use just only some examples to make a conclusion about how the bond prices are sensitive to changes in interest rate. We need to avoid fallacy of composition. The examples are just for giving some ideas on how the bond price sensitivity to interest rate change depends on many factors, yield to maturity, coupon rate, time to maturity. An analytical proof which gives us a general result is complicated. It is not included in EE431. The subject talks about financial market and insitutions in general. We do not have enough time to study the bond market in particular. We can measure the bond price sensitivity by using Duration which is included in the subject.