The Meaning of Interest Rates
ECON 4673
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Answers

1. *Do bondholders fare better when the yield to maturity increases or when it decreases? Why?*

   When the yield to maturity increases, this represents a decrease in the price of the bond. If the bondholder were to sell the bond at that lower price, the capital gains would be smaller (capital losses larger), so the bondholder would be worse off.

2. *When is the current yield a good approximation of the yield to maturity?*

   The current yield will be a good approximation to the yield to maturity whenever the bond price is very close to par or when the maturity of the bond is over about ten years. This is because cash flows farther in the future have such small present discounted values that the value of a long-term coupon bond is close to a perpetuity with the same coupon rate.

3. *If interest rates decline, which would you rather be holding, long-term bonds or short-term bonds? Why? Which type of bond has the greater interest-rate risk?*

   You would prefer to hold long-term bonds because their price would increase more than the price of the short-term bonds, giving them a higher return. Longer-term bonds are more susceptible to higher price fluctuations than shorter-term bonds, and thus, have a greater interest-rate risk.

4. *If the interest rate is 10%, what is the present value of a security that pays you $1,100 next year, $1,210 the year after, and $1,331 the year after that?*

$$PV = \$1{,}100/(1 + 0.10) + \$1{,}210/(1 + 0.10)^2 + \$1{,}331/(1 + 0.10)^3$$
$$PV = \$3{,}000.$$

5. *State the Fisher equation. If expected inflation falls and the nominal interest rate is stuck at zero, briefly explain how the real interest rate responds.*

   Nominal interest rate (R) = Real interest rate (r) + Expected inflation rate (π^e)
   If π^e falls and R = 0 then r must increase.

6. *What is the yield to maturity on a simple loan for $1 million that requires a repayment of $2 million in five years' time?*

$$\$1 \text{ million} = \$2 \text{ million}/(1+i)^5$$
$$(1+i)^5 = \$2 \text{ million}/\$1 \text{ million}$$
$$1 + i = 2^{1/5}$$
$$i = 1.149 - 1$$
$$i = 0.149$$
$$i = 14.9\%$$

7. *What is the price of a perpetuity that has a coupon of $50 per year and a yield to maturity of 2.5%? If the yield to maturity doubles, what will happen to the perpetuity's price?*

   When i = 0.025,

   $$\text{Price} = \$50/(0.025)$$
   $$\text{Price} = \$2{,}000$$

   When i = 0.05,

   $$\text{Price} = \$50/(0.05)$$
   $$\text{Price} = \$1{,}000$$

8. *A $1,000-face-value bond has a 10% coupon rate, its current price is $960, and its price is expected to increase to $980 next year. Calculate the current yield, the expected rate of capital gain, and the expected rate of return.*

   The coupon payment: C = $1,000*0.10 = $100.
   The coupon rate: C/P = $100/$960 = 0.104 = 10.4%.
   The expected rate of capital gain: g = ($980 – $960)/$960 = 20/960 = 0.021 = 2.1%.
   The expected rate of return: R = C/P + g = 10.4% + 2.1% = 12.5%.