

1) A bond that pays 9% is currently priced at \$1,200. What is the nominal interest rate? What is the current interest rate?

nominal interest = 9%
"named rate"
2-k.a. coupon rate

$$\text{current yield} = \frac{\text{annual interest}}{\text{market price}} = \frac{\$90}{\$1200} = 0.075 = 7.5\% \text{ current rate}$$

2) A 9%, 20-year bond has a par value of \$1,000 and a call price of \$1,050. It is callable in 5 years. The bond is currently selling for \$1,110. Calculate the current yield, yield-to-maturity, and yield-to-call of this bond.

$$\text{current yield} = \frac{\text{Annual interest}}{\text{mkt price}} = \frac{\$90}{\$1110} = 0.081081 \approx 8.11\%$$

$$\text{Yield to Call} = \frac{\text{Annual Interest} + \frac{\text{Call Price} - \text{Market Price}}{\text{Number of Years to Call}}}{\frac{\text{Call Price} + \text{Market Price}}{2}}$$

$$\text{Yield to Maturity} = \frac{\text{Annual Interest} + \frac{\text{Par Value} - \text{Market Price}}{\text{Number of Years to Maturity}}}{\frac{\text{Par Value} + \text{Market Price}}{2}}$$

$$= \frac{\$90 + \frac{1050 - 1110}{5}}{\frac{1050 + 1110}{2}} = \frac{\$90 + (-12)}{1080} = \frac{\$78}{1080} = 0.07222 \approx 7.22\% \text{ Yield-to-call}$$

$$= \frac{\$90 + \frac{1000 - 1110}{20}}{\frac{1000 + 1110}{2}} = \frac{90 + (-5.50)}{1055} = \frac{84.50}{1055} = 0.0800947 \approx 8.01\% \text{ YTM}$$

3) A married couple from California is in the 35% Federal tax bracket and the 11% California tax bracket. They are considering a 5% Arizona municipal bond (Federal tax-free), a 4 1/2% California bond (double tax-free) or a 7% corporate bond (fully-taxable). Which bond offers the highest after-tax interest rate?

5% Arizona (0.05) Bond Taxable Equivalent Yield (Fed tax-exempt) = $\frac{0.05}{1.0 - 0.35} = \frac{0.05}{0.65} = 0.076923 \approx 7.69\%$ Arizona taxable equivalent yield

4 1/2% California (0.045) Bond Taxable Equivalent Yield (Fed + CALIF tax-exempt) = $\frac{0.045}{1.0 - [0.35 + (0.11 * (1.0 - 0.35))]} = \frac{0.045}{0.5785} = 0.07778 \approx 7.78\%$ California taxable equivalent yield

7% Corporate Bond ← no calculations necessary

CALIF bond is highest

4) Using annual compounding, find the prices for the following bonds:

- a) 9%, 10-year bond priced to yield 7%
b) 5%, 20-year bond priced to yield 8%

5% \$50, 20-year bond 8% pricing

$$\begin{aligned} \text{bond price} &= \text{present value of interest stream} + \text{present value of repayment of principal} \\ &= \text{annual interest} * \text{present value multiplier of stream (left table)} + \text{par value} * \text{present value of lump sum (right table)} \\ &= \$90 * 7.024 + 1000 * 0.508 \\ &= \$632.16 + \$508 \\ &= \$1140.16 \text{ premium bond} \end{aligned}$$

$$\begin{aligned} \text{bond price} &= \text{present value of interest stream} + \text{present value of repayment of principal (lump sum)} \\ &= \text{annual interest} * \text{present value multiplier of stream (left table)} + \text{par value} * \text{present value multiplier of lump sum (right table)} \\ &= \$50 * 9.818 + 1000 * 0.215 \\ &= \$490.90 + 215 \\ &= \$705.90 \text{ discount bond} \end{aligned}$$