BUS-123 Spring 2012
Instr: F. Paiano

Bond Prices and Yields
Worksheet #1

Name: KEY
Chap 10 Worksheet

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" a.k.a. coupon rate

$9\% * 1000 = \$90$

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

$9\% * 1000 = \$90$

$$\text{current yield} = \frac{\text{Annual interest}}{\text{mkt price}} = \frac{\$90}{\$1110} = 0.081081 \cong 8.1\%$$ current yield

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

$$= \frac{\$90 + \frac{1000 - 1110}{20}}{\frac{1000 + 1110}{2}} \quad \frac{-110}{20} = -5.50$$

$$= \frac{90 + (-5.50)}{1055} = \frac{84.50}{1055} = 0.0800947 \cong 8.0\% \text{ YTM}$$

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

$$= \frac{\$90 + \frac{1050 - 1110}{5}}{\frac{1050 + 1110}{2}} \quad \frac{-60}{5} = -12$$

$$= \frac{\$90 + (-12)}{1080} = \frac{\$78}{1080} = 0.07222 \cong 7.2\%$$ Yield-to-call

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 4½% 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

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

4½% California (0.045) Bond

$$\text{Taxable Equivalent Yield (Fed \& CALIF tax-exempt)} = \frac{0.045}{1.0 - \left[0.35 + \left(0.11 * (1.0 - 0.35)\right)\right]} = \frac{0.045}{0.5785} = 0.077787 \cong 7.8\%$$

$1.0 - [0.35 + (0.11 * 0.65)]$

$1.0 - 0.4215$

0.5785

California bond 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%

9% $90 annual interest

10-year bond 7% pricing

$$\text{bond price} = \text{present value of interest income stream} + \text{present value of repayment of principal}$$

$$= \text{annual interest} * \text{present value multiplier of stream (right table)} + \text{par value} * \text{present value of lump sum (left table)}$$

$$= \$90 * 7.024 + \$1000 * 0.508$$

$$= \$632.16 + \$508$$

$$= \$1140.16$$ premium bond

5% $50 annual interest 20-year bond 8% pricing

$$\text{bond price} = \text{present value of interest income stream} + \text{present value of repayment of principal (lump sum)}$$

$$= \text{annual interest} * \text{present value multiplier of stream (right table)} + \text{par value} * \text{present value multiplier of lump sum (left table)}$$

$$= \$50 * 9.818 + \$1000 * 0.215$$

$$= \$490.90 + \$215$$

$$= \$705.90$$ discount bond