**Chapter 6 - Homework Questions and Problems Answers**

**1. Interpreting Bond Yields.** Is the yield to maturity on a bond the same thing as the required return? Is YTM the same thing as the coupon rate? Suppose today a 10 percent coupon bond sells at par. Two years from now, the required return on the same bond is 8 percent. What is the coupon rate on the bond now? The YTM?

**Answer:** The yield to maturity is the required rate of return on a bond expressed as a nominal annual interest rate. For noncallable bonds, the yield to maturity and required rate of return are interchangeable terms. Unlike YTM and required return, the coupon rate is not a return used as the interest rate in bond cash flow valuation, but is a fixed percentage of par over the life of the bond used to set the coupon payment amount. For the example given, the coupon rate on the bond is still 10 percent, and the YTM is 8 percent.

**3. Bond Prices.** Lycan, Inc., has 7 percent coupon bonds on the market that have 9 years left to maturity. The bonds make annual payments and have a par value of $1,000. If the YTM on these bonds is 8.4 percent, what is the current bond price?

**Answer:** The price of any bond is the PV of the interest payment, plus the PV of the par value. Notice this problem assumes an annual coupon. The price of the bond will be:

$P = \$70(\{1 - [1/(1 + .084)]^{9}\} / .084) + \$1{,}000[1 / (1 + .084)^{9}]$
$P = \$913.98$

We would like to introduce shorthand notation here. Rather than write (or type, as the case may be) the entire equation for the PV of a lump sum, or the PVA equation, it is common to abbreviate the equations as:

$\text{PVIF}_{R,t} = 1 / (1 + R)^{t}$ which stands for Present Value Interest Factor

$\text{PVIFA}_{R,t} = (\{1 - [1/(1 + R)]^{t}\} / R)$ which stands for Present Value Interest Factor of an Annuity

These abbreviations are shorthand notation for the equations in which the interest rate and the number of periods are substituted into the equation and solved. We will use this shorthand notation in the remainder of the solutions key. The bond price equation for this problem would be:

$P = \$70(\text{PVIFA}_{8.4\%,9}) + \$1{,}000(\text{PVIF}_{8.4\%,9})$ $P = \$913.98$

**6. Bond Prices.** Harrison Co. issued 15-year bonds one year ago at a coupon rate of 6.1 percent. The bonds make semiannual payments. If the YTM on these bonds is 5.3 percent, what is the current dollar price assuming a $1,000 par value?

**Answer:** To find the price of this bond, we need to realize that the maturity of the bond is 14 years. The bond was issued one year ago, with 15 years to maturity, so there are 14 years left on the bond. Also, the coupons are semiannual, so we need to use the semiannual interest rate and the number of semiannual periods. The price of the bond is:

$P = \$30.50(\text{PVIFA}_{2.65\%,28}) + \$1{,}000(\text{PVIF}_{2.65\%,28})$ $P = \$1{,}078.37$

**7. Bond Yields.** Stein Co. issued 15-year bonds two years ago at a coupon rate of 5.4 percent. The bonds make semiannual payments. If these bonds currently sell for 94 percent of par value, what is the YTM?

**Answer:** Here, we are finding the YTM of a semiannual coupon bond. The bond price equation is:

$P = \$940 = \$27(\text{PVIFA}_{R\%,26}) + \$1{,}000(\text{PVIF}_{R\%,26})$

Since we cannot solve the equation directly for $R$, using a spreadsheet, a financial calculator, or trial and error, we find:

$R = 3.037\%$

Since the coupon payments are semiannual, this is the semiannual interest rate. The YTM is the APR of the bond, so:

YTM = 2 × 3.037% YTM = 6.07%

**9. Calculating Real Rates of Return.** If Treasury bills are currently paying 4.5 percent and the inflation rate is 1.6 percent, what is the approximate real rate of interest? The exact real rate?

**Answer:** The approximate relationship between nominal interest rates ($R$), real interest rates ($r$), and inflation ($h$), is:

$R = r + h$

Approximate $r = .045 - .016$
Approximate $r = .0285$, or 2.85%

The Fisher equation, which shows the exact relationship between nominal interest rates, real interest rates, and inflation, is:

$(1 + R) = (1 + r)(1 + h)$
$(1 + .045) = (1 + r)(1 + .016)$
Exact $r = [(1 + .045) / (1 + .016)] - 1$
Exact $r = .0281$, or 2.81%