26. **Components of Bond Returns**  Bond $A$ is a premium bond with a 10% coupon rate. Bond $B$ is a 6% coupon bond currently selling at a discount. Both bonds make annual payments, have a YTM of 8% and have eight years to maturity. What is the current yield for each bond? If interest rates remain unchanged, what is the expected capital gains yield over the next year for each bond?
The current yield is given by

\[
\text{Current yield} = \frac{\text{Annual coupon payment}}{\text{Bond price}}
\]

For each bond, we have

\[
\frac{P_A}{F_A} = \frac{.10}{.08} \left(1 - \left(\frac{1}{1.08}\right)^8\right) + \frac{1}{(1.08)^8} = 111.49\%
\]

\[
\frac{P_B}{F_B} = \frac{.06}{.08} \left(1 - \left(\frac{1}{1.08}\right)^8\right) + \frac{1}{(1.08)^8} = 88.51\%
\]
The current yield for each bond is then

Bond A: \[ \frac{0.10 \times F_A}{P_A} = \frac{0.10}{P_A/F_A} = \frac{0.10}{1.1149} = 8.97\% \]

Bond B: \[ \frac{0.06 \times F_B}{P_B} = \frac{0.06}{P_B/F_B} = \frac{0.06}{0.8851} = 6.78\% \]
Practice Questions

If the yield to maturity remains 8% over the coming year, the price of each bond next year will be

\[
\frac{P_A}{F_A} = \frac{.10}{.08} \left( 1 - \left( \frac{1}{1.08} \right)^7 \right) + \frac{1}{(1.08)^7} = 110.41\%
\]

\[
\frac{P_B}{F_B} = \frac{.06}{.08} \left( 1 - \left( \frac{1}{1.08} \right)^7 \right) + \frac{1}{(1.08)^7} = 89.59\%
\]
The capital gains yield for a bond is the return on the price appreciation only. That is, the capital gains yield of a bond from time $t$ to time $t + 1$ is

$$\text{Capital gains yield} = \frac{P_{t+1} - P_t}{P_t}.$$
Practice Questions

The capital gains yield of each bond in the present example is

Bond A: \[
\frac{P_{A,1} - P_{A,0}}{P_{A,0}} = \frac{P_{A,1}/F_A - P_{A,0}/F_A}{P_{A,0}/F_A} = \frac{1.1041 - 1.1149}{1.1149} = -0.97\%
\]

Bond B: \[
\frac{P_{B,1} - P_{B,0}}{P_{B,0}} = \frac{P_{B,1}/F_B - P_{B,0}/F_B}{P_{B,0}/F_B} = \frac{0.8959 - 0.8851}{0.8851} = 1.22\%
\]
27. **Holding Period Yield**  The YTM on a bond is the return you earn on your investment if interest rates don’t change and you keep the bond until maturity. If you actually sell the bond before it matures, your realized return is known as the holding period yield (HPY). For the following bond, assume a $1,000 face value and annual coupon payments

(a) What is the return on your investment if you buy a 10-year, 9%-coupon, bond for $1,150 and hold it to maturity?

(b) What is the return on your investment if you sell the bond after two years, the YTM being then 1% lower than when you purchased the bond?
Practice Questions

The answer to (a) is the YTM \( y \), which is such that

\[
1,150 = \frac{90}{y} \left( 1 - \left( \frac{1}{1+y} \right)^{10} \right) + \frac{1,000}{(1+y)^{10}}.
\]

The return on this investment is \( y = 6.88\% \).
If the YTM after two years is 5.88%, the bond price at that time is

\[ P = \frac{90}{.0588} \left( 1 - \left( \frac{1}{1.0588} \right)^8 \right) + \frac{1,000}{(1.0588)^8} = $1,195.\]
The holding period yield \((y_h)\) if the bond is held to two years is then such that

\[
1,150 = \frac{90}{y_h} \left( 1 - \left( \frac{1}{1+y_h} \right)^2 \right) + \frac{1,195}{(1+y_h)^2}
\]

which gives \(y_h = 9.69\%\).

Note that this assumes that each coupon payment is reinvested at 9.69\%. 
Practice Questions

Suppose that coupon payments are reinvested at 6%. The holding period yield would then be such that

\[ 1,150 = \frac{90 \times 1.06 + 90 + 1,195}{(1 + y_h)^2}, \]

which gives

\[ y_h = \left( \frac{90 \times 1.06 + 90 + 1,195}{1,150} \right)^{1/2} - 1 = 9.56\%. \]