

### Answer on Question #53056, Economics / Finance

Calculate the price of the bond with a coupon rate of 12% having 5 years to maturity. Its par value is 10,000 dollars and the discount rate is 12%

#### Solution:

The price or value of a bond is determined by discounting the bond's expected cash flows to the present using the appropriate discount rate. This relationship is expressed for a coupon bond by the following formula:

$$\text{Bond value} = C \cdot \left[ \frac{1 - \frac{1}{(1+r)^t}}{r} \right] + \frac{F}{(1+r)^t}$$

Where

C = the annual coupon payment

t = the number of years remaining until maturity.

r = the required return on the bond

F = the face value of the bond, or par value

In given task we will assume that coupon payments are made semi-annually to bond holders and that the next coupon payment is expected in six months. Because two coupon payments will be made each year for five years, we will have a total of 10 coupon payments. Thus, we have determined the number of coupon payments.

Now, we need find the value of each coupon payment. We divide the coupon rate in half (as we assume the coupon payments are semi-annual). As a result, each semi-annual coupon payment will be  $\$600 = \$10,000 \cdot \frac{12\%}{2}$ . Like the coupon rate, the required yield of 12% must be divided by two because the number of periods used in the calculation has doubled.

Therefore, the required semi-annual yield is 6% ( $\frac{12\%}{2}$ ).

Then, we can substitute the given data into the formula noted above.

$$\begin{aligned} \text{Bond value} &= \$600 \cdot \left[ \frac{1 - \frac{1}{(1 + 0.06)^{10}}}{0.06} \right] + \frac{\$10,000}{(1 + 0.06)^{10}} = 4416.052231 + 5583.947769 \\ &= \$10,000 \end{aligned}$$

In this case coupon,  $r_d$ (required rate of return) = coupon rate and the price of the bond is equal to the face value of the bond, or par value.