8. Award: 0 out of 10.00 points

Both Bond Sam and Bond Dave have 6 percent coupons, make semiannual payments, and are priced at par value. Bond Sam has five years to maturity, whereas Bond Dave has 18 years to maturity.

a. If interest rates suddenly rise by 2 percent, what is the percentage change in the price of Bond Sam and Bond Dave? **(A negative answer should be indicated by a minus sign. Do not round intermediate calculations and enter your answers as a percent rounded to 2 decimal places, e.g., 32.16.)**
b. If rates were to suddenly fall by 2 percent instead, what would be the percentage change in the price of Bond Sam and Bond Dave? **(Do not round intermediate calculations and enter your answers as a percent rounded to 2 decimal places, e.g., 32.16.)**

a. Bond Sam		%
a. Bond Dave		%
b. Bond Sam		%
b. Bond Dave		%

References

Worksheet Learning Objective: 07-02 Explain bond values and yields and why they fluctuate.

Difficulty: 2 Intermediate Section: 7.1 Bonds and Bond Valuation

Both Bond Sam and Bond Dave have 6 percent coupons, make semiannual payments, and are priced at par value. Bond Sam has five years to maturity, whereas Bond Dave has 18 years to maturity.

a. If interest rates suddenly rise by 2 percent, what is the percentage change in the price of Bond Sam and Bond Dave? **(A negative answer should be indicated by a minus sign. Do not round intermediate calculations and enter your answers as a percent rounded to 2 decimal places, e.g., 32.16.)**
b. If rates were to suddenly fall by 2 percent instead, what would be the percentage change in the price of Bond Sam and Bond Dave? **(Do not round intermediate calculations and enter your answers as a percent rounded to 2 decimal places, e.g., 32.16.)**

a. Bond Sam	-8.11+/-1%	%
a. Bond Dave	-18.91+/-1%	%
b. Bond Sam	8.98+/-1%	%
b. Bond Dave	25.49+/-1%	%

Explanation:

Note: Intermediate answers are shown below as rounded, but the full answer was used to complete the calculation.

Any bond that sells at par has a YTM equal to the coupon rate. Both bonds sell at par, so the initial YTM on both bonds is the coupon rate, 6 percent. If the YTM suddenly rises to 8 percent:

P_{Sam} = \$30(PVIFA$_{4.0\%,10}$) + \$1,000(PVIF$_{4.0\%,10}$) = \$918.89
P_{Dave} = \$30(PVIFA$_{4.0\%,36}$) + \$1,000(PVIF$_{4.0\%,36}$) = \$810.92

The percentage change in price is calculated as:

Percentage change in price = (New price − Original price)/Original price

ΔP_{Sam}% = (\$918.89 − 1,000)/\$1,000 = −.0811, or −8.11%
ΔP_{Dave}% = (\$810.92 − 1,000)/\$1,000 = −.1891, or −18.91%

If the YTM suddenly falls to 4 percent:

P_{Sam} = \$30(PVIFA$_{2.0\%,10}$) + \$1,000(PVIF$_{2.0\%,10}$) = \$1,089.83
P_{Dave} = \$30(PVIFA$_{2.0\%,36}$) + \$1,000(PVIF$_{2.0\%,36}$) = \$1,254.89

ΔP_{Sam}% = (\$1,089.83 − 1,000)/\$1,000 = .0898, or 8.98%
ΔP_{Dave}% = (\$1,254.89 − 1,000)/\$1,000 = .2549, or 25.49%

All else the same, the longer the maturity of a bond, the greater is its price sensitivity to changes in interest rates.

Calculator Solution:

If both bonds sell at par, the initial YTM on both bonds is the coupon rate, 6 percent. If the YTM suddenly rises to 8 percent:

P_{Sam}					
Enter	10	8%/2		±\$60/2	±\$1,000
	N	I/Y	PV	PMT	FV
Solve for			\$918.89		

ΔP_{Sam}% = (\$918.89 − 1,000)/\$1,000 = −.0811, or −8.11%

P_{Dave}					
Enter	36	8%/2		±\$60/2	±\$1,000
	N	I/Y	PV	PMT	FV
Solve for			\$810.92		

ΔP_{Dave}% = (\$810.92 − 1,000)/\$1,000 = −.1891, or −18.91%

If the YTM suddenly falls to 4 percent:

P_{Sam}					

Enter	10	4%/2		±$60/2	±$1,000
	N	I/Y	PV	PMT	FV
Solve for			$1,089.83		

$\Delta P_{Sam}\% = (\$1,089.83 - 1,000)/\$1,000 = .0898$, or 8.98%

P_{Dave}					
Enter	36	4%/2		±$60/2	±$1,000
	N	I/Y	PV	PMT	FV
Solve for			$1,254.89		

$\Delta P_{Dave}\% = (\$1,254.89 - 1,000)/\$1,000 = .2549$, or 25.49%

All else the same, the longer the maturity of a bond, the greater is its price sensitivity to changes in interest rates.