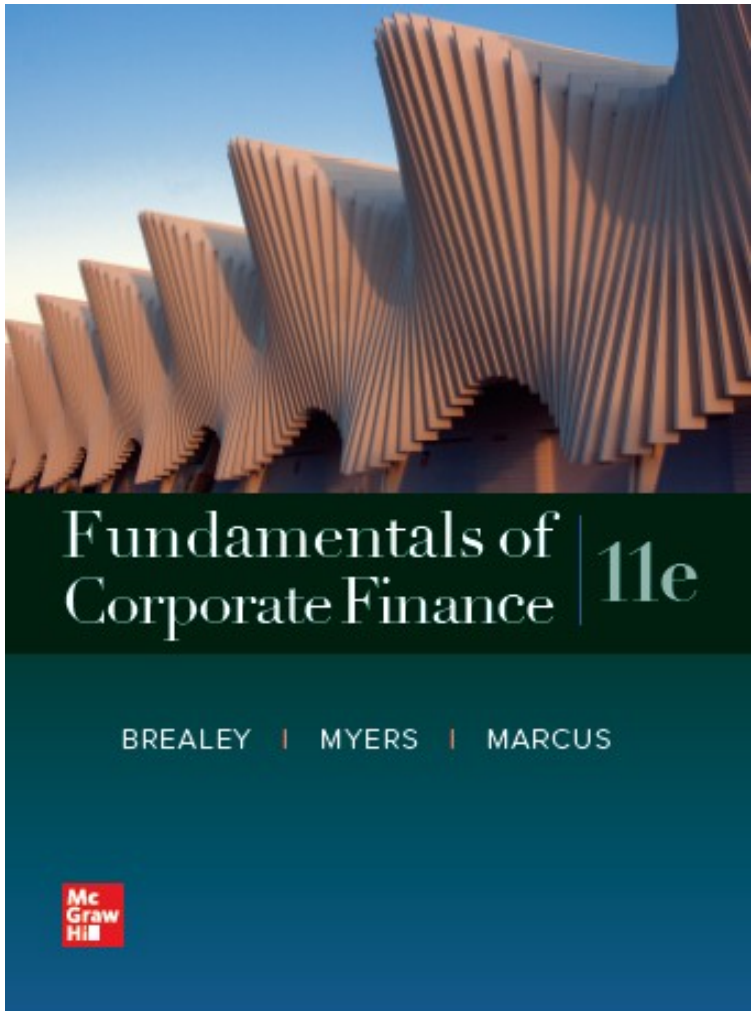
Fundamentals of Corporate Finance, 11th Edition

CHAPTER 6: Valuing Bonds



Topics Covered

6.1 The Bond Market

6.2 Interest Rates and Bond Prices

6.3 Yield to Maturity

6.4 Bond Rates of Returns

6.5 The Yield Curve

6.6 Corporate Bonds and the Risk of Default

Bonds

- Bond
  - Security that obligates the issuer to make specified payments to the bondholder
- Debt Contract; Debt is less risky than Equity
- Debt
  - “First in Line” to get paid
- Equity
  - “Last in Line” to get paid

Bonds

- Bond
  - Security that obligates the issuer to make specified payments to the bondholder
- Face Value (Par Value or Principal Value)
  - Payment at the maturity of the bond
- Coupon
  - The interest payments made to the bondholder
- Coupon Rate
  - Annual interest payment, as a percentage of face value

Bonds

- *You need a 6.5% annual return to justify the risks of the following financial contract: you will receive annual payments of $50 for five years and one lump sum payment of $1,000 in five years. What price should you pay for the contract?*

- We calculated the price to be $937.66
- Bond sells at a **discount**
- **"i" vs. "r"**

Bonds i vs r

WARNING

The coupon rate IS NOT the discount rate used in the Present Value calculations

- " i" versus " r"
- The coupon rate merely tells us what cash flow the bond will produce
- Since the coupon rate is listed as a %, this misconception is quite common

Bond Prices

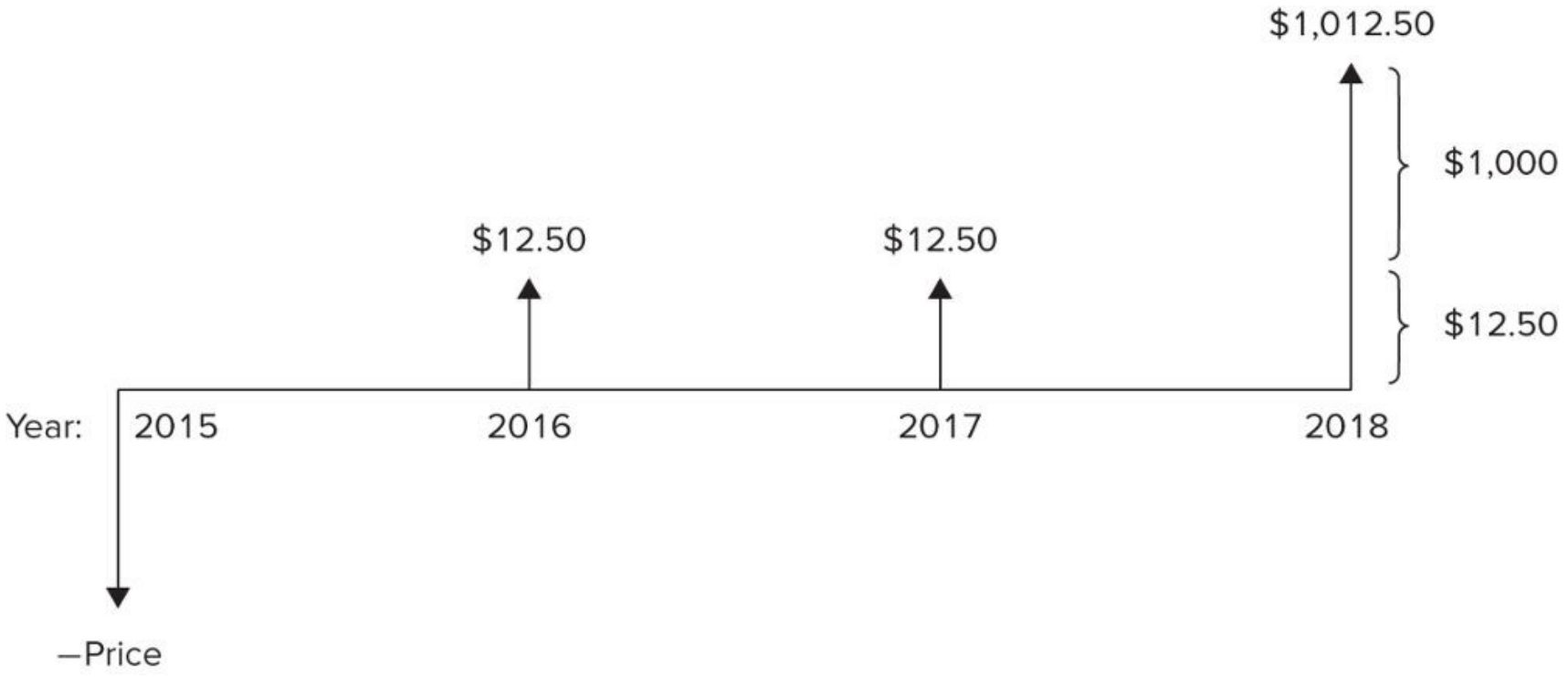
- The price of a bond is the present value of all cash flows generated by the bond (i.e. coupons and face value) discounted at the required rate of return

$$PV = \frac{cpn}{(1+r)^1} + \frac{cpn}{(1+r)^2} + \ldots + \frac{(cpn + par)}{(1+r)^t}$$

cpn is commonly used as an abbreviation for *coupon*

Bond Prices

Cash flows to an investor in the 1.25% coupon bond maturing in 2018



Bond Prices

Example

What is the price of a 1.25 % annual coupon bond, with a $1,000 face value, which matures in 3 years? Assume a required return of 1.194%.

$$PV = \frac{12.50}{(1.01194)^1} + \frac{12.50}{(1.01194)^2} + \frac{1{,}012.50}{(1.01194)^3}$$

$$PV = \$1{,}001.64$$

Bond sells at a **premium**

Bond Prices

Example (continued) ***Excel***

What is the price of a 1.25 % annual coupon bond, with a $1,000 face value, which matures in 3 years? Assume a required return of 1.194%.

Bond prices are quoted as a percentage of par

Interest Rates and Bond Prices

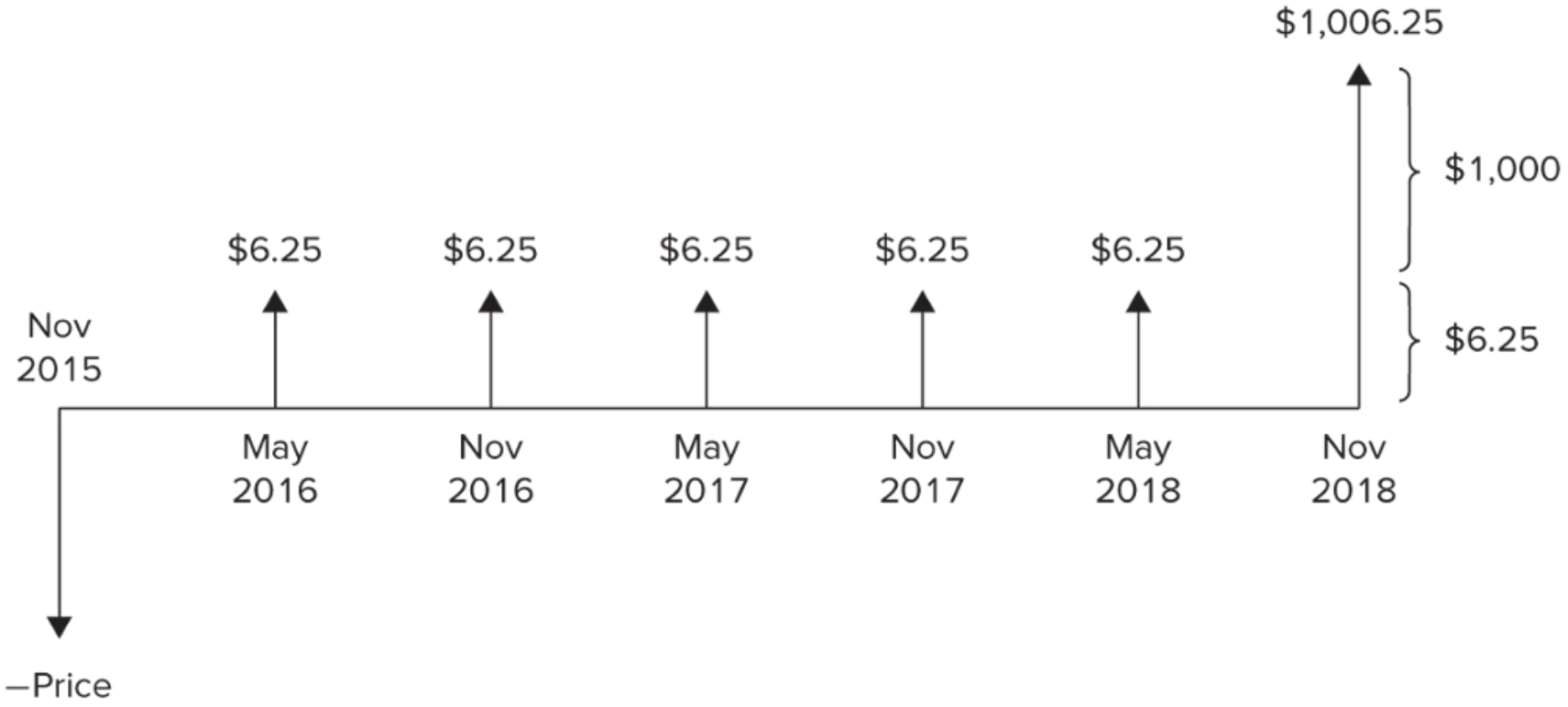
Example

Q: *How did the calculation change, given semi-annual coupons versus annual coupon payments?*

- Twice as many payments, cut in half, over the same time period.

Interest Rates and Bond Prices

Cash flows to an investor in the 1.25% coupon bond maturing in 2018. The bond pays semiannual coupons, so there are two payments of $6.25 each year.



Interest Rates and Bond Prices (10 of 17)

Example (continued) Excel

What is the price of the bond if the required rate of return is 0.597% AND the coupons are paid semi-annually?

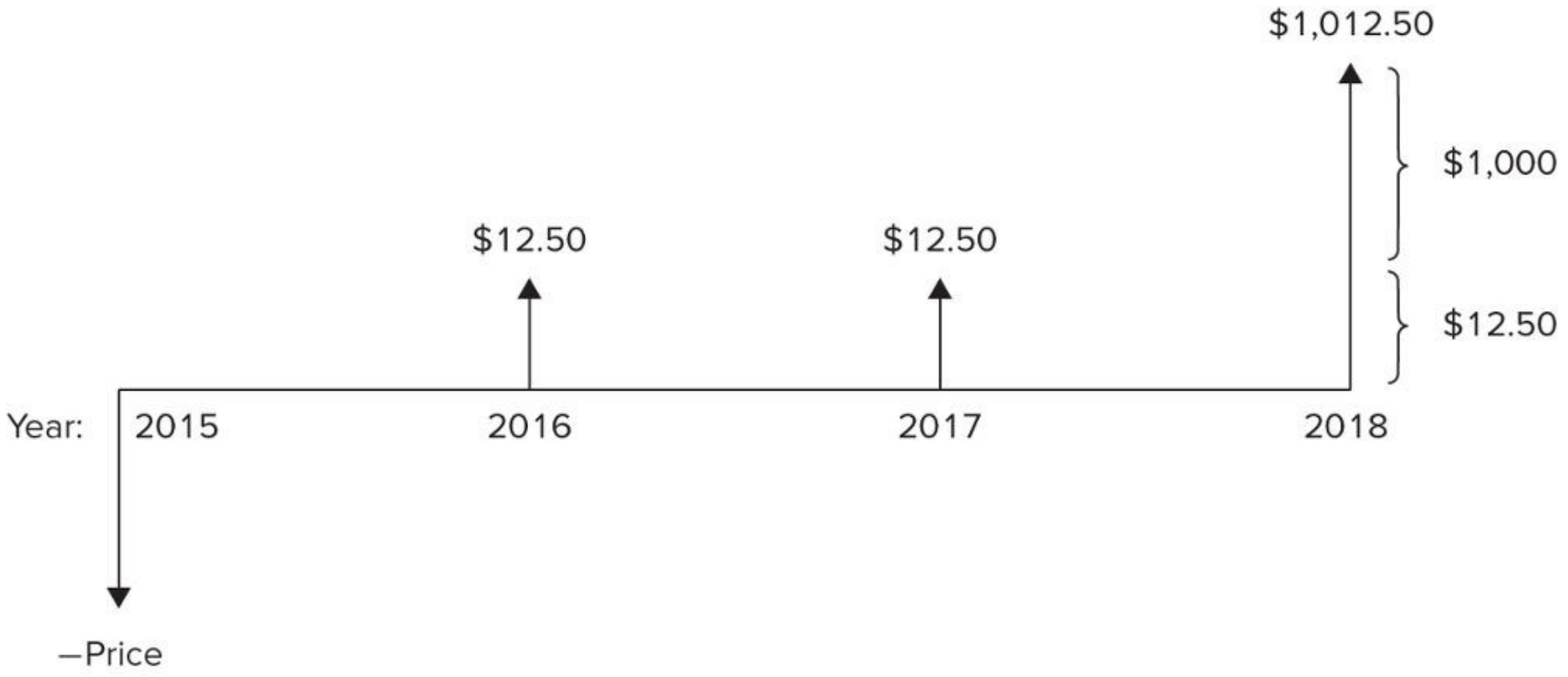
$$PV = \frac{6.25}{(1.00597)^1} + \frac{6.25}{(1.00597)^2} + \ldots + \frac{6.25}{(1.00597)^5} + \frac{1{,}006.25}{(1.00597)^6}$$

$$PV = \$1{,}001.65$$

Price % = 100.165%

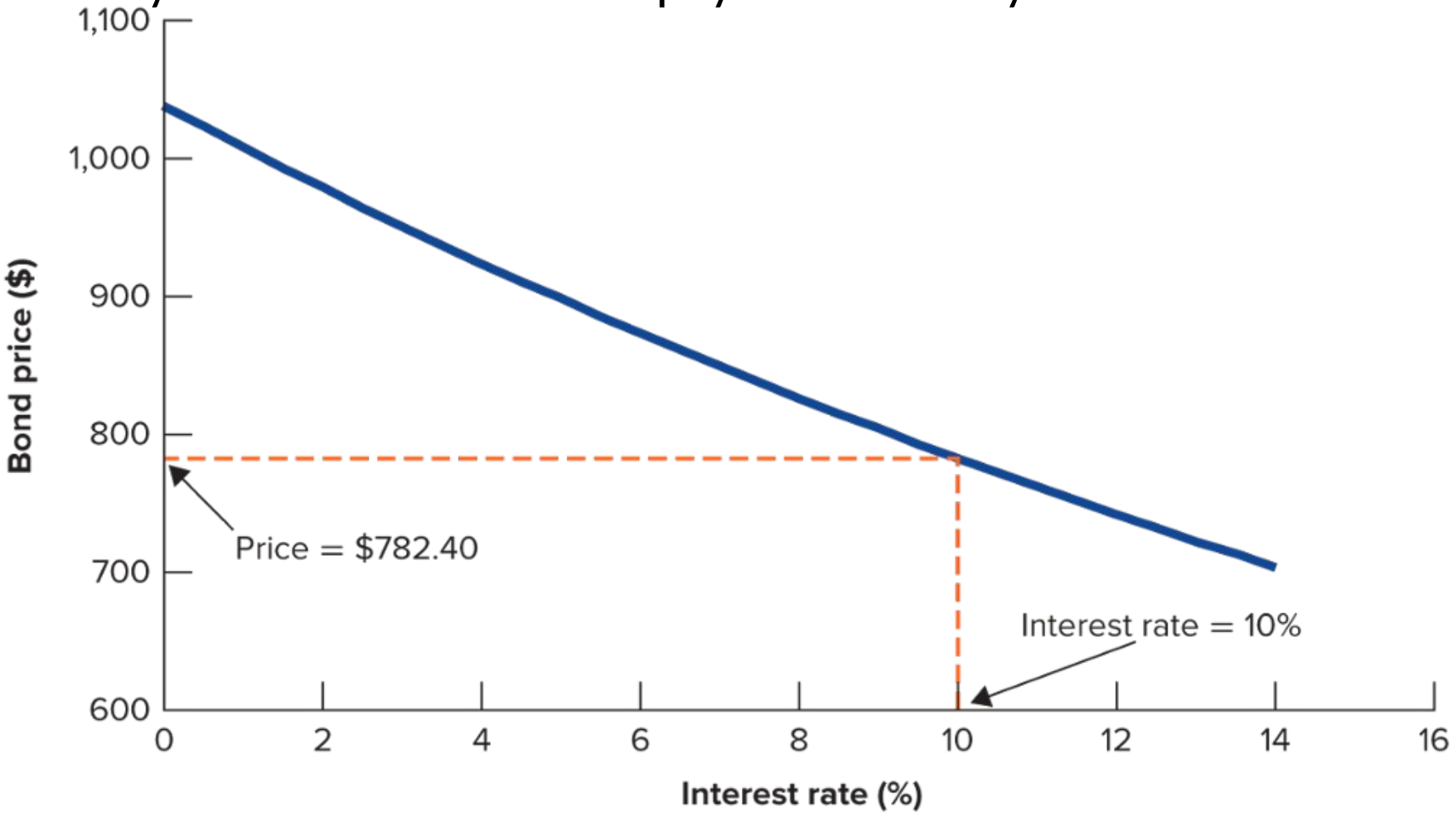
Bond Prices

Cash flows to an investor in the 1.25% coupon bond maturing in 2018 **Excel**



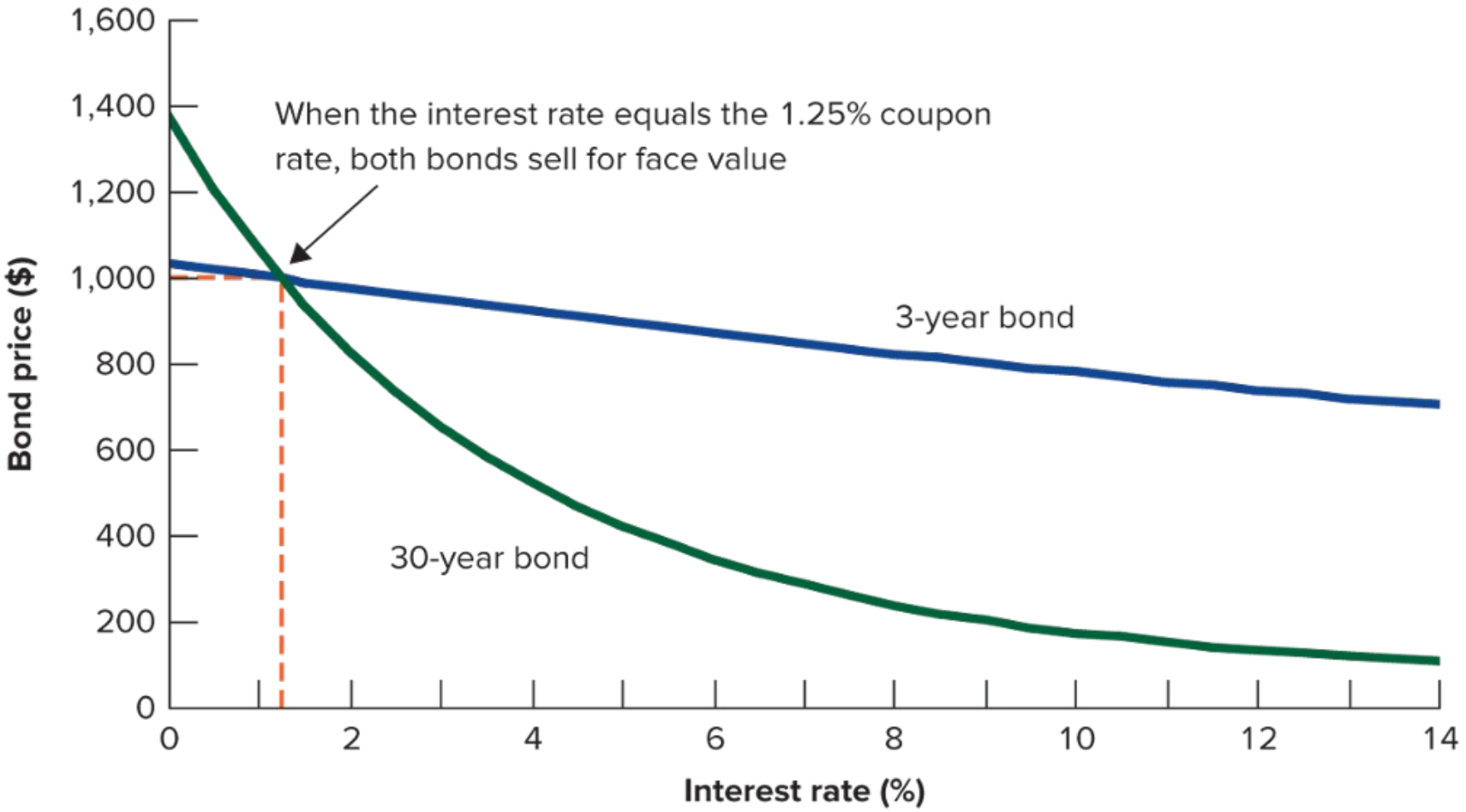
Interest Rates and Bond Prices

The value of the 1.25% bond falls as interest rates rise; 3-year Bond with annual payments if r skyrockets to 10%



Interest Rates and Bond Prices
Interest Rate Risk

Different maturity bonds have different interest rate risk



Interest Rate Risk

3-yr Bond vs. 30-yr Bond; both i = 1.25%

What is price if r = 1.25%? $1,000 (100%)

What happens if r increases to 2%?

Do 3-yr Bond:

PV function: .02 Rate, 3 NPER, 12.50 PMT 1,000 FV

$978.37 (97.84%)

Interest Rate Risk

3-yr Bond vs. 30-yr Bond; both i = 1.25%

What is price if r = 1.25%? $1,000 (100%)

What happens if r increases to 2%?

Now do 30-yr Bond:

PV function: .02 Rate, 30 NPER, 12.50 PMT 1,000 FV

$832.03 (83.20%)

Interest Rate Risk

3-yr Bond dropped from $1,000 to $978.37

30-yr Bond dropped from $1,000 to $832.03

Conclusion: The longer the Maturity, the greater the Interest Rate Risk (Interest Rate Risk also called Maturity Risk); the greater the Risk, the higher the required return

The Yield Curve (1 of 2)

- Term Structure of Interest Rates
  - A listing of bond maturity dates and the interest rates that correspond with each date
- Yield Curve
  - Plot of relationship between Treasury bond yields to maturity and time to maturity (generally upward sloping because longer maturities pose greater Interest Rate Risk)

The Yield Curve (2 of 2)

Treasury strips are bonds that make a single payment. The yields on Treasury strips in November 2015 show that investors received a higher yield on longer term bonds.