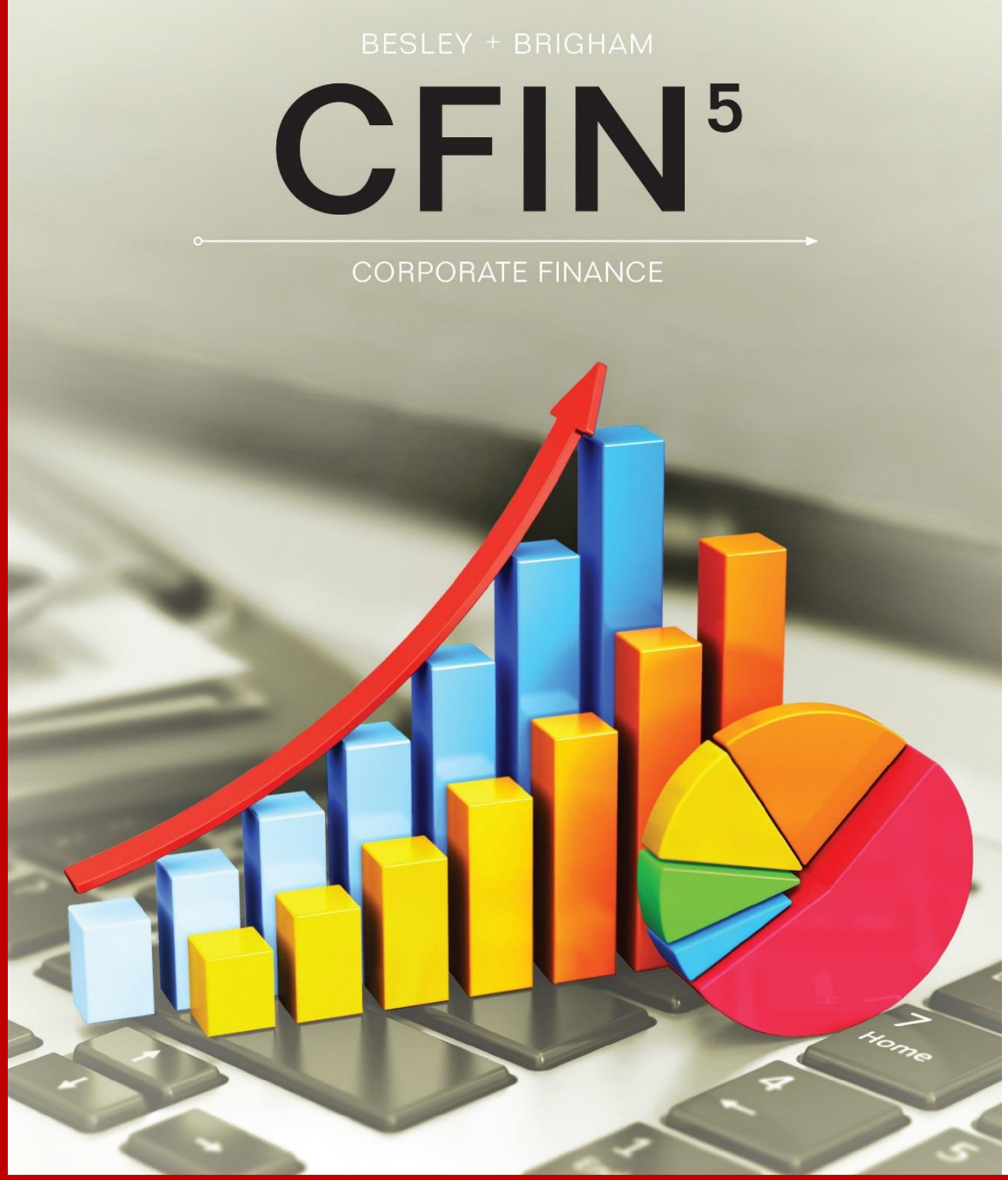


Chapter 6
Bonds (Debt)—Characteristics and Valuation

Learning Outcomes

LO.1 Describe the basic characteristics of debt and some of the different types of debt.

LO.2 Discuss bond ratings and the information that they provide to investors.

LO.3 Explain how bond prices are determined.

Learning Outcomes (cont.)

LO.4 Explain how bond yields (market rates) are determined.

LO.5 Describe the relationship between bond prices and interest rates, and explain why it is important for investors to understand this relationship

Debt Characteristics

- Principal Value = Face Value = Maturity Value = Par Value
- Interest Payments
- Maturity Date
- Priority to Assets and Earnings
- Control of the Firm (Voting Rights)

Types of Debt—Short-Term Debt

- Treasury Bills
  - Discounted securities issued by U.S. government to finance operations.
- Repurchase Agreement
  - One firm sells financial asses to another firm with the promise to repurchase the securities later at a higher price.
- Federal Funds
  - Overnight loans from one bank to another.

Types of Debt—Short-Term Debt (cont.)

- Banker's Acceptance
  - "A postdated check."
- Commercial Paper
  - A type of promissory note (IOU) issued by large, financially sound firms.
- Certificate of Deposit
  - Represents a time deposit at a bank or other financial intermediary.

Types of Debt—Short-Term Debt (cont.)

- Eurodollar Deposit
  - A deposit in a bank outside the United States that is not converted to the currency of the foreign country.
- Money Market Mutual Funds
  - Pooled funds that are invested in money market instruments and managed by investment companies.

Types of Debt—Long-Term Debt

- Term Loans
  - Loans obtained from a financial institution, on which the borrower agrees to make a series of payments, consisting of interest and principal, on specific dates.
- Bonds
  - A long-term contract where a borrower agrees to make payments of interest during the life of the loan and then repay the principal amount borrowed at the end of the life of the bond.

Common Bonds

- Government Bond
  - Municipal bonds are issued by state and local governments
  - Treasury bonds are issued by the U.S. Treasury
- Corporate Bond
- Mortgage Bond
  - A bond backed by fixed assets

Common Bonds (cont.)

- Debenture
  - An unsecured bond
- Subordinated Debenture
  - A bond that has a claim on assets only after the senior debt has been paid off in the event of liquidation

Types of Corporate Bonds

- Income Bond
  - A bond that pays interest only if the firm earns enough income
- Putable Bond
  - Bond that can be redeemed at the bondholder's option if the firm takes a particular action

Types of Corporate Bonds (cont.)

- Indexed (Purchasing Power) Bond
  - A bond with interest payments that are based on an inflation index; helps protect the bondholder from inflation.
- Floating-rate bonds
  - The bond's rate "floats" with market interest rates rather than with the inflation rate.

Other Debt Instruments

- Zero (or Very Low) Coupon Bonds
  - Bonds that pay no annual interest; sold at a discount below par.
- Junk Bonds
  - High-yield, high-risk bonds generally used to finance mergers, leveraged buyouts, and troubled companies.

Bond Contract Features

- Indenture—a formal agreement (contract) between the issuer of a bond and the bondholders.
  - Trustee—an official who ensures that the bondholders' interests are protected and the terms of the indenture are carried out.
  - Restrictive Covenant—a provision in a debt contract that constrains the actions of the borrower.

Bond Contract Features (cont.)

- Call Provision—a provision in a bond contract that gives the issuer the right to redeem the bonds under specified terms prior to the normal maturity date.
  - Refunding—retiring an existing bond issue using the proceeds of a newly issued bond.

Bond Contract Features (cont.)

- Sinking Fund—a required annual payment designed to pay off a bond or preferred stock issue
  - Firms handle a sinking fund in one of two ways:
    - Call in for redemption a certain percentage of the bonds each year.
    - Buy the required amount of bonds in the open market.

Bond Contract Features (cont.)

- Convertible Feature
  - Permits the bondholder to convert the bond into shares of common stock at a fixed price.
  - One-way conversion—investors cannot convert the stocks back to bonds.

Foreign Debt Instruments

- Foreign debt—debt sold by a foreign borrower, but denominated in the currency of the country in which it is sold.
- Eurodebt—debt sold in a country other than the one in whose currency it is denominated.

Bond Ratings

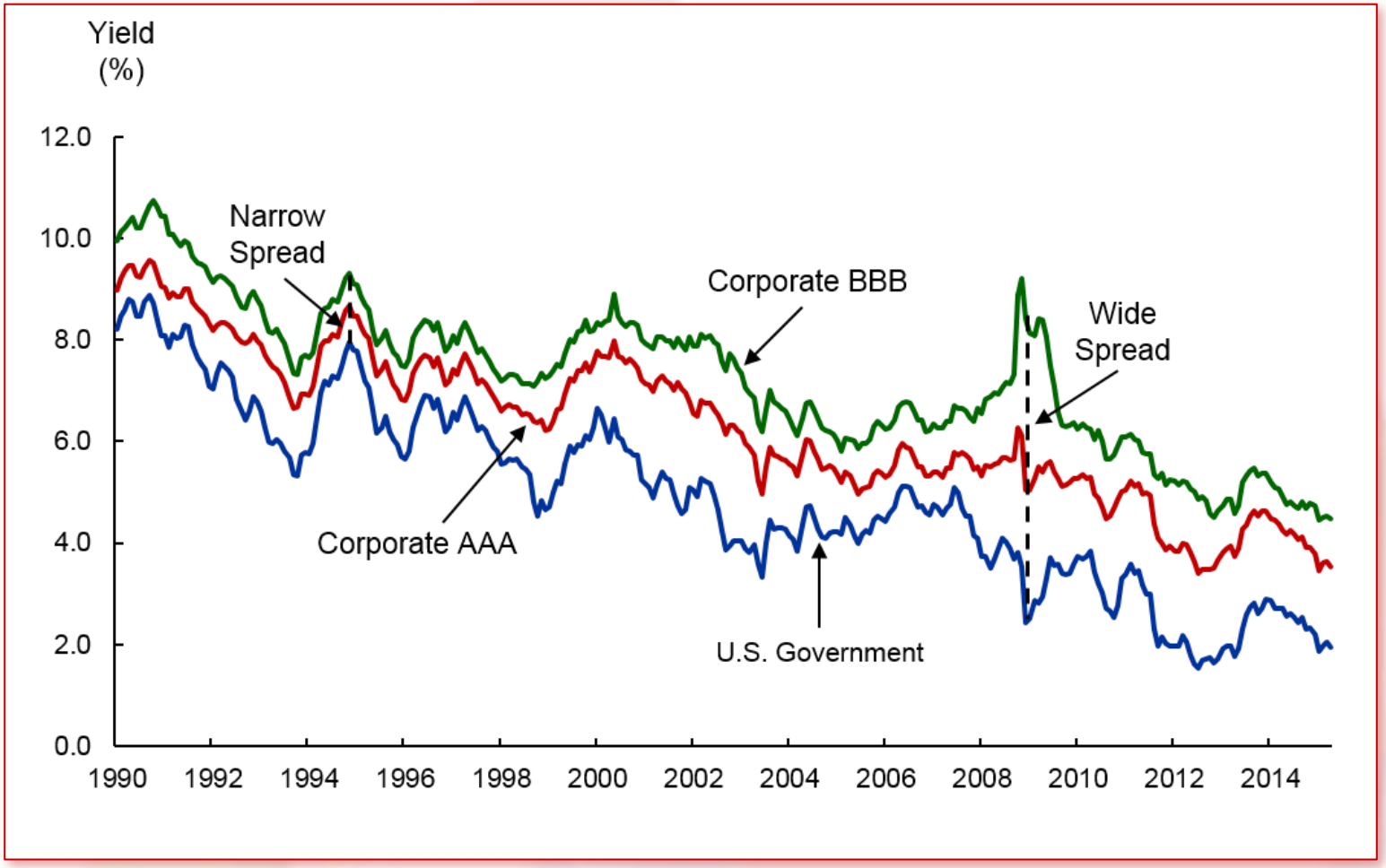
- Triple-A and Double-A bonds are extremely safe
- Investment Grade Bonds—the lowest-rated bonds that many banks and other institutional investors can legally hold

					Junk Bonds			
	High Quality		Investment Grade		Substandard		Speculative	
Investment Risk:	**Low**		**Medium**		**High**		**Extremely High**	
Moody's	Aaa	Aa	A	Baa	Ba	B	Caa	C
S&P	AAA	AA	A	BBB	BB	B	CCC	D

Bond Rating Criteria

- Financial strength of the company
- Collateral provisions
- Seniority of the debt
- Restrictive covenants
- Sinking fund or deferred call provision
- Litigation possibilities
- Regulation

Yields on Selected Long-Term Bonds, 1990 - 2015



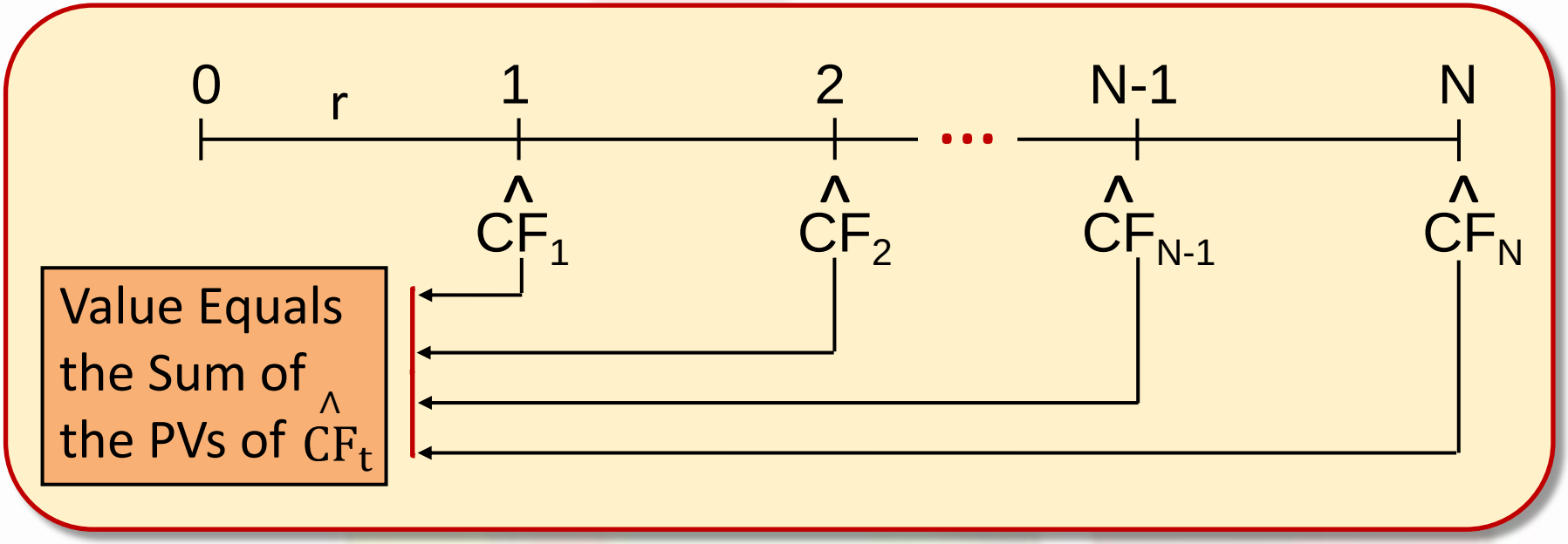
Importance of Bond Ratings

- A bond's rating is an indication of its default risk.
- Most bonds are purchased by institutional investors who are legally restricted to investment-grade securities (Baa or higher).
- Changes in ratings affect a firm's ability to borrow long-term capital and the cost of using that capital.

Basic Valuation

- Based on “The Time Value of Money” concepts, we know that the value of anything is based on the present value of the cash flows the asset is expected to produce in the future.

Basic Valuation Model



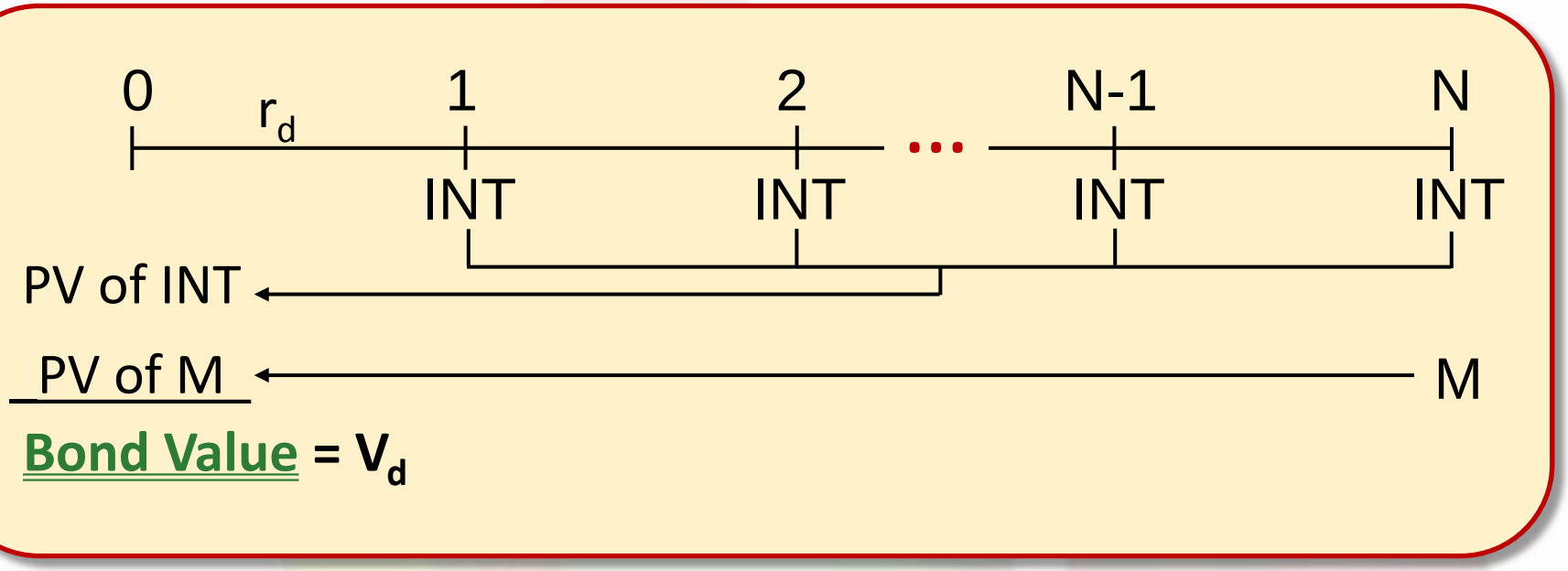
r = asset's required rate of return

$\hat{CF}_t$ = cash flow the asset is expected to generate in Year t

Valuation of Bonds

- Principal Amount, Face Value, Maturity Value, Par Value
  - The amount of money the firm borrows and promises to repay at some future date (maturity).
- Coupon Payment
  - The specified number of dollars of interest paid each period on a bond, generally each six months.

Bond Value



r_d = bond's required rate of return

N = years to maturity

INT = dollar interest paid each year

M = maturity value of bond

Bond Value

$$\text{Bond Value} = V_d = \text{INT}\left[\frac{1-\frac{1}{(1+r_d)^N}}{r_d}\right] + M\left[\frac{1}{(1+r_d)^N}\right]$$

Genesco 10%, 15-year, $1,000 Bonds

- Face (Par) Value of Bond = $1,000
- Annual $100 interest payments (10% coupon rate)
- Maturity in 15 years
- Risk Free Rate = 4%
- Specific Risk Premium = 6%
- What is the theoretical value of the bond today?

Genesco 10%, 15-year, $1,000 Bonds With Annual Coupon

Use:

=PV()

Inputs:

N = 15

I/Y = 10%

PV = 1,000.00

PMT = 100

FV = 1,000

Genesco 10%, 15-year, $1,000 Bonds

- Numerical solution:

$$V_d = \$100\left[\frac{1-\frac{1}{(1.10)^{15}}}{0.10}\right] + \$1{,}000\left[\frac{1}{(1.10)^{15}}\right]$$

$$= \$100(7.60608) + \$1{,}000(0.23939)$$

$$= \$1{,}000$$

Bond Value with Semiannual Compounding

$$V_d = \left(\frac{INT}{2}\right)\left[\frac{1 - \frac{1}{\left(1 + r_d/2\right)^{2 \times N}}}{\left(r_d/2\right)}\right] + \frac{M}{\left(1 + r_d/2\right)^{2 \times N}}$$

Genesco 10%, 14-year, $1,000 Bonds

- Face (Par) Value of Bond = $1,000
- Semi-Annual $50 interest payments (10% coupon rate)
- Maturity in 14 years
- Risk Free Rate = 4%
- Specific Risk Premium = 4%
- What is the theoretical value of the bond today?

Genesco 10%, 14-year, $1,000 Bonds With Semi-Annual Coupon

Use:

=PV()

Inputs:

N = 14 x 2 = 28

PMT = 100/2 = 50

I/Y = 8/2 = 4%

FV = 1,000

PV = 1,166.63

Yield to Maturity (YTM)

- YTM is the average rate of return earned on a bond if it is held to maturity.

Yield to Maturity (YTM)

- Suppose that you were offered a 10-year, 8 percent coupon, $1,000 par value bond at a price of $875. Interest from this bond is paid semiannually. What is this bond's YTM?

YTM Computation—Equation

- YTM is the average rate of return earned on a bond if it is held to maturity.

$$V_d = \frac{\$40}{\left(1+\frac{r_d}{2}\right)^1} + \frac{\$40}{\left(1+\frac{r_d}{2}\right)^2} + \cdots + \frac{\$40+\$1{,}000}{\left(1+\frac{r_d}{2}\right)^{20}}$$

$$\$875 = \frac{\$40}{\left(1+\frac{YTM}{2}\right)^1} + \frac{\$40}{\left(1+\frac{YTM}{2}\right)^2} + \cdots + \frac{\$40+\$1{,}000}{\left(1+\frac{YTM}{2}\right)^{20}}$$

Genesco 8%, 10-year, $1,000 Bonds With Semi-Annual Coupon

Use:

=RATE()

Inputs:

N = 10 x 2 = 20

PMT = 80/2 = -40

PV = 875

FV = -1,000

RATE = 5%

YTM = 5% x 2 = 10%

Yield to Call (YTC)

- YTC is the average rate of return earned on a bond if it is held until the first call date.

$$V_d = \frac{INT}{\left(1+\frac{r_d}{2}\right)^1} + \frac{INT}{\left(1+\frac{r_d}{2}\right)^2} + \cdots + \frac{INT + Call\ price}{\left(1+\frac{r_d}{2}\right)^{N_c}}$$

$$V_d = \frac{INT}{\left(1+\frac{YTC}{2}\right)^1} + \frac{INT}{\left(1+\frac{YTC}{2}\right)^2} + \cdots + \frac{INT + Call\ price}{\left(1+\frac{YTC}{2}\right)^{N_c}}$$

N_c = number of interest periods to the first call date

Yield to Call (YTC)

- Suppose that the bond can be called in four (4) years at a call price of $1,080.

Genesco 8%, 10-year, $1,000 Bonds With Semi-Annual Coupon – 4 Year Call @ 108

Use:

=RATE()

Inputs:

N = 4 x 2 = 8

PMT = 80/2 = -40

PV = 875

FV = -1,080

RATE = 6.87%

YTC = 6.87% x 2 = 13.74%

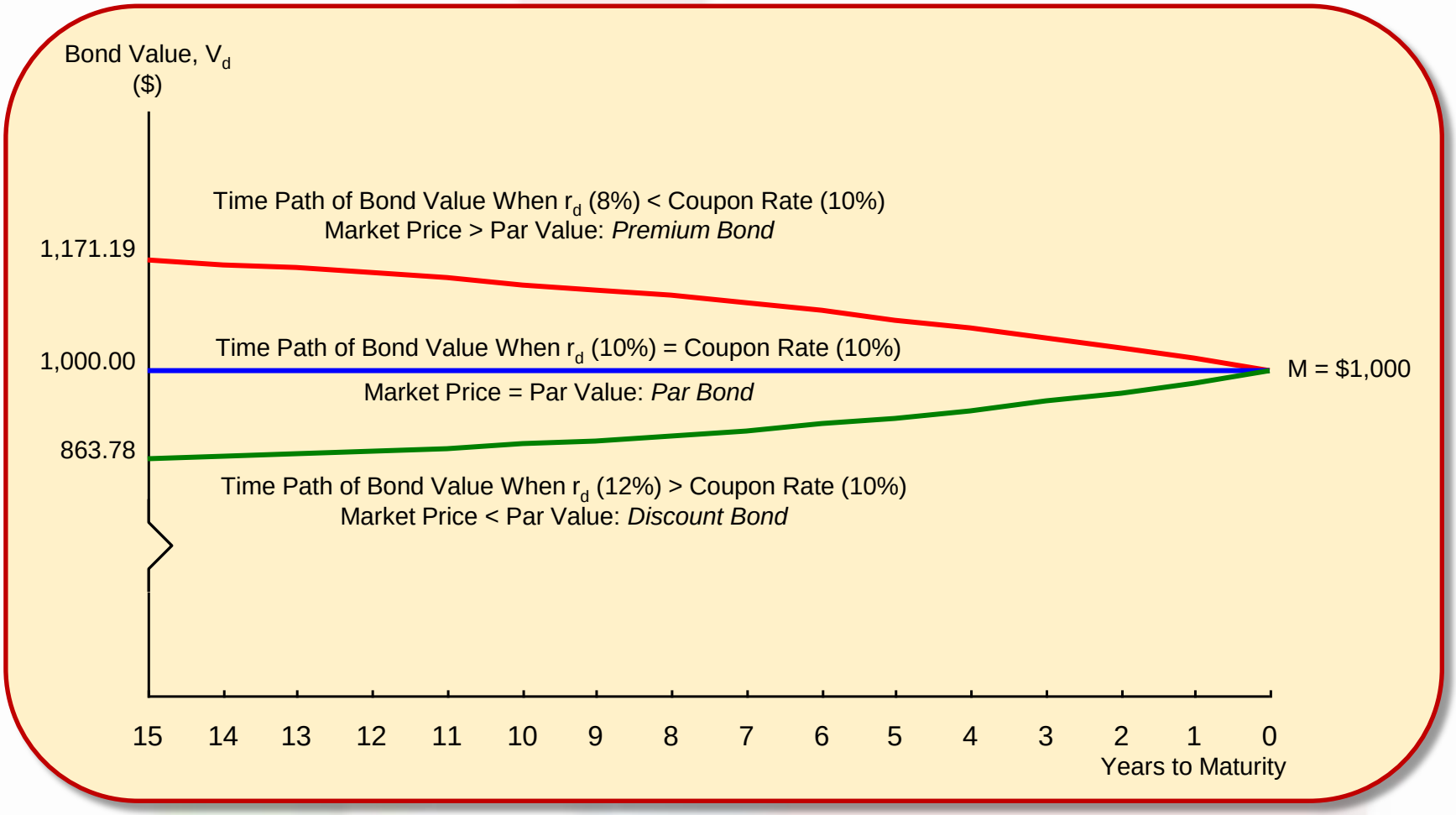
Interest Rates and Bond Values

Relationship of Market Rate, r_d, with Coupon Rate C = 10%	Bond Value, V_d (N = 15, PMT = 100, FV = 1,000, and I/Y = r_d)	Relationship of Market Price, V_d, and Maturity Value, M = $1,000
$r_d = 10\% = C$	$1,000.00	$V_d = M$ Sells at par.
$r_d = 12\% > C$	863.78	$V_d < M$ Sells at a discount
$r_d = 8\% < C$	1,171.19	$V_d > M$ Sells at a premium

Changes in Bond Values Over Time

- Whenever the going rate of interest, r_d, equals the coupon rate, a bond will sell at its par value
- An *increase* in interest rates will cause the price of an outstanding bond to *fall*; a *decrease* in interest rates will cause the price to *rise*.
- The market value of a bond will always approach its par value as its maturity date approaches, provided the firm does not go bankrupt.

Time Path of the Value of a 10%, $1,000 Par Value Bond When Market Interest Rates are 8%, 10%, and 12%



Bond Yield (Return)

- Bond Yield = r_d = Current (interest) yield + Capital gains yield

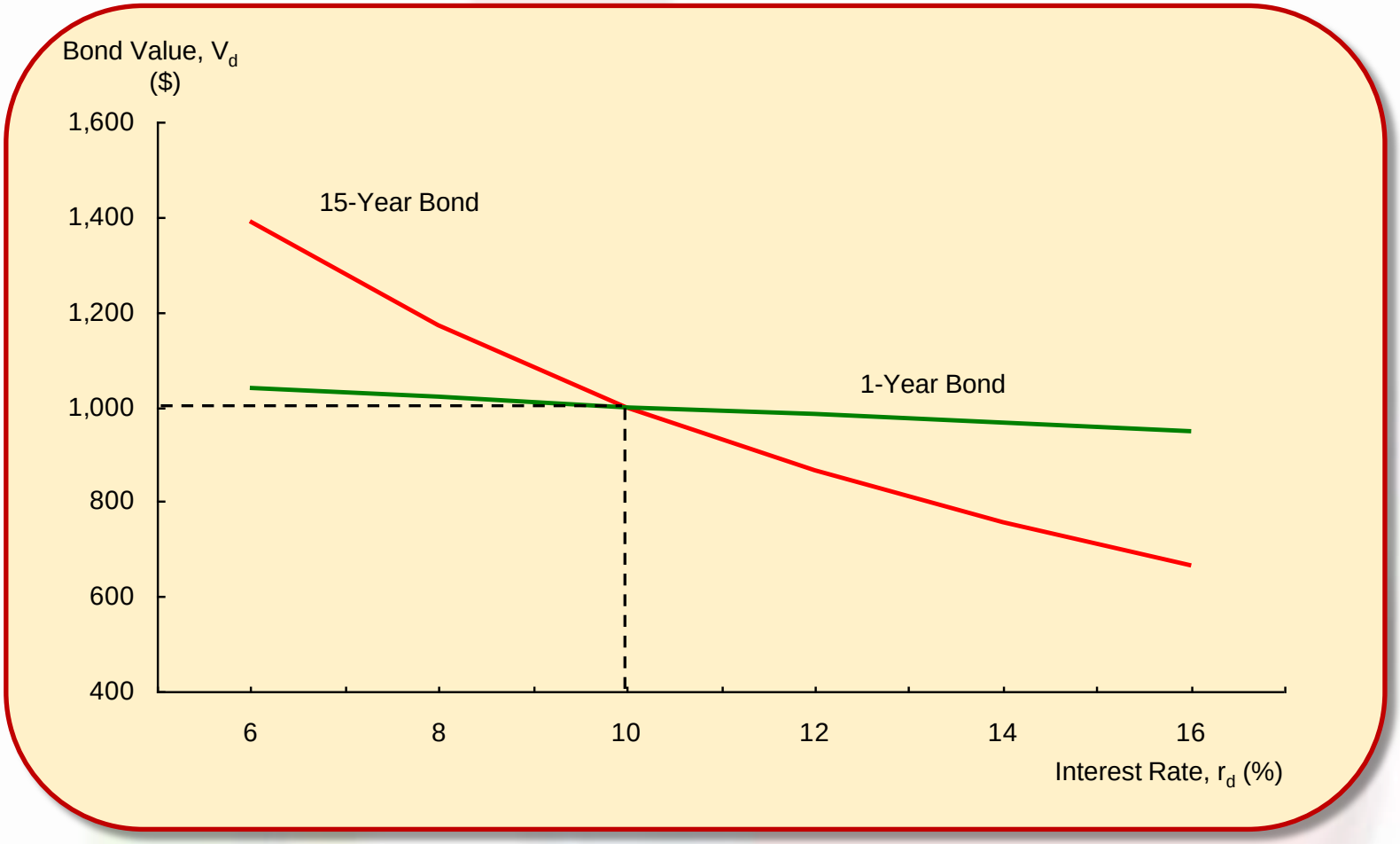
$$\text{Bond yield} = \text{Current (interest) yield} + \text{Capital gains yield}$$

$$= \frac{\text{INT}}{V_{d,\text{Begin}}} + \frac{V_{d,\text{End}} - V_{d,\text{Begin}}}{V_{d,\text{Begin}}}$$

Interest Rate Risk on a Bond

- Interest Rate Price Risk
  - The risk of changes in bond prices to which investors are exposed due to changing interest rates.
- Interest Rate Reinvestment Rate Risk
  - The risk that income from a bond portfolio will vary because cash flows have to be reinvested at current (perhaps lower) market rates.

Value of Long and Short-Term 10% Annual Coupon Rate Bonds



Chapter 7
Stocks (Equity)—Characteristics and Valuation

Learning Outcomes

LO.1 Explain what equity is, and identify some of the features and characteristics of (a) preferred stock and (b) common stock.

LO.2 Describe how stock prices (values) are determined when (a) dividends grow at a constant rate and (b) dividend growth is nonconstant.

Learning Outcomes (cont.)

LO.3 Describe some approaches (techniques) other than strict application of time value of money models that investors use to value stocks.

LO.4 Identify factors that affect stock prices.

Types of Equity (Stock)

- Preferred Stock: hybrid security
  - Similar to bonds with fixed dividend payments.
  - Similar to common stock because dividends are not required to be paid and there is no specified maturity date.
- Common Stock

Preferred Stock Features

- Par Value
  - The nominal or face value of a stock or bond.
- Cumulative Dividends
  - Any preferred dividends not paid in previous periods must be paid before common dividends can be distributed.
- Maturity
  - Has no specific maturity date.

Preferred Stock Features (cont.)

- Priority to Assets and Earnings
  - Preferred dividends are paid *after* interest on debt is paid.
  - Preferred dividends must be paid *before* common stock dividends are paid.
- Control of the Firm (Voting Rights)
  - Almost all preferred stock is nonvoting stock.
- Convertibility
  - Preferred stock that can be converted to common stock at the option of the investor.

Preferred Stock Features (cont.)

- Other Provisions
  - Call provision—gives the issuing corporation the right to call in the preferred stock for redemption.
  - Sinking fund—calls for the repurchase and retirement of a given percentage of the preferred stock at particular times
  - Participating—shares (participates) with common stockholders in the distribution of the firm's earnings.

Common Stock Features

- Par Value
  - Legally, represents a stockholder's minimum financial obligation in the event the corporation is liquidated.
- Dividends
  - The firm has no legal obligation to pay common stock dividends.
- Maturity
  - Generally has no specific maturity date.

Common Stock Features (cont.)

- Priority to Assets and Earnings
  - Dividends can be paid only after interest on debt and preferred dividends are paid.
- Control of the Firm (Voting Rights)
  - Common stockholders have the right to elect the firm's directors and to vote on various proposals
- Preemptive Right
  - Gives stockholders the right to purchase additional shares of stock sold by the firm on a pro rata basis before the shares can be offered to new investors.

Types of Common Stock

- Classified Stock
  - Common stock that is given a special designation, such as Class A, Class B, etc., to meet special needs of the company.
- Founder's Shares
  - A class of stock owned by the firm's founders who have sole or modified voting rights in the early years.

Equity Instruments in International Markets

- American Depository Receipts
  - Certificates created by banks that represent ownership in stocks of foreign countries.
- Foreign Equity
  - Yankee stock—stock of a foreign company traded in the United States.
  - Euro stock—stock traded in a country other than the company's home country, except in the United States.

Stock Valuation Models—Terms

- $\hat{D}_t$ = the dividend *expected* to be paid at the end of Year t
- $\hat{P}_t$ = the *expected* price of the stock at the end of Year t
- P_0 = the *actual* price of the stock at the end of Year t
- g = the *expected* growth rate in dividends
- r_s = required rate of return; the minimum rate investors demand to invest in the stock

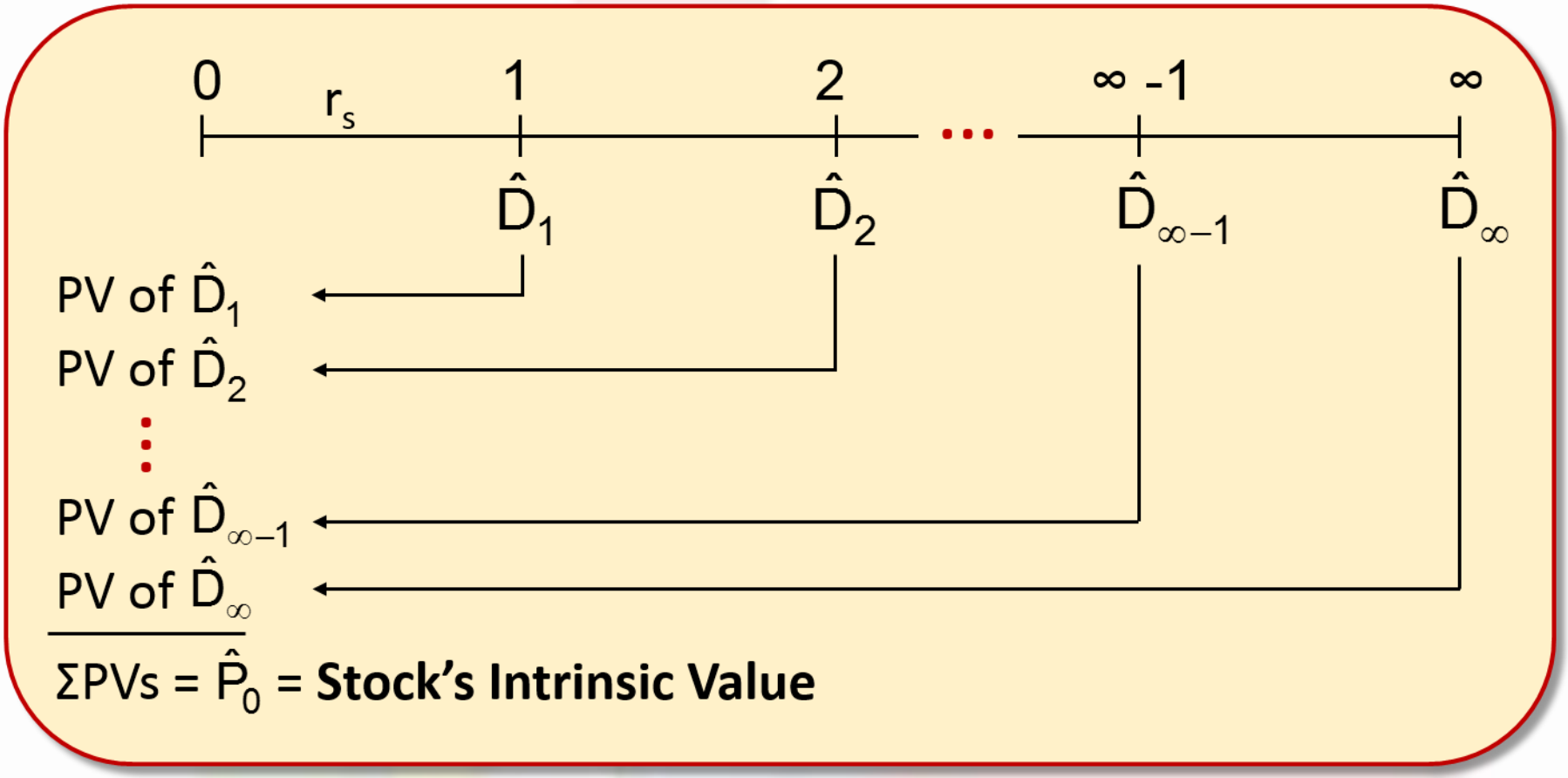
Stock Valuation Models—Terms

- $\frac{\hat{D}_1}{P_0}$ = the *expected* dividend yield during the coming year
- $\frac{\hat{P}_1 - P_0}{P_0}$ = the *expected* capital gains yield during the coming year
- $\hat{r}_s$ = the *expected* rate of return during the coming year = dividend yield + capital gains yield

Stock Valuation Models—Terms

- If the expected rate of return, $\hat{r}_s$, is greater than or equal to the required rate of return, r_s, the stock is a good investment; otherwise it is not a good investment.
  - Good investment: $\hat{r}_s \geq r_s$
  - Bad investment: $\hat{r}_s < r_s$

Expected Dividends as the Basis for Stock Values—Cash Flow Timeline



Expected Dividends as the Basis for Stock Values

$$\text{Stock Value} = V_s = \hat{P}_0 = \frac{\hat{D}_1}{(1+r_s)^1} + \frac{\hat{D}_2}{(1+r_s)^2} + \cdots + \frac{\hat{D}_\infty}{(1+r_s)^\infty}$$

$$= \sum_{t=1}^{\infty} \frac{\hat{D}_t}{(1+r_s)^t}$$

Valuing Stocks with Constant, or Normal, Growth

- Growth that is expected to continue into the foreseeable future at about the same rate as that of the economy as a whole.
- g = constant growth stated as a decimal

Valuing Stocks with Constant, or Normal, Growth (g)

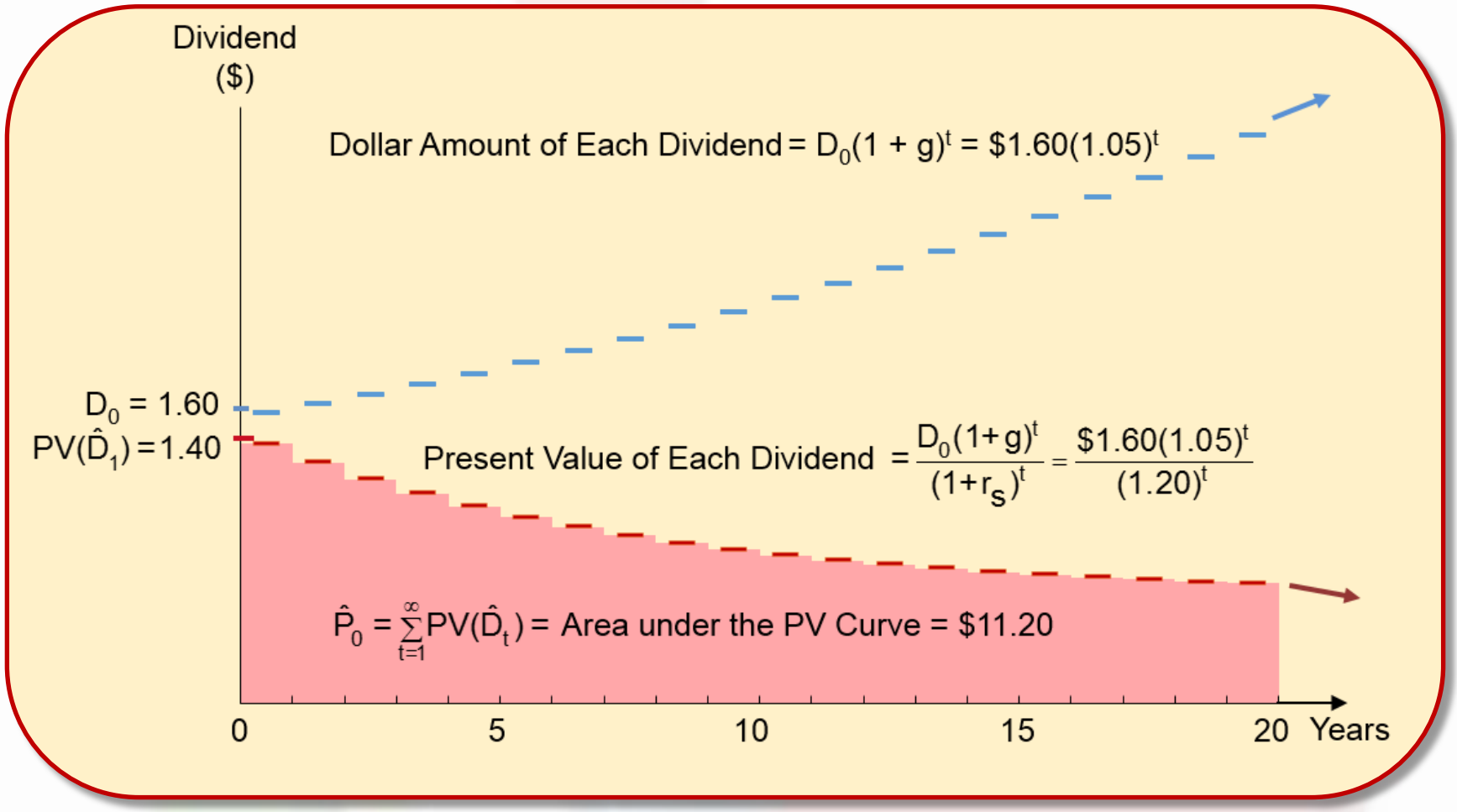
$$\hat{P}_0 = \frac{D_0(1+g)^1}{(1+r_s)^1} + \frac{D_0(1+g)^2}{(1+r_s)^2} + \cdots + \frac{D_0(1+g)^\infty}{(1+r_s)^\infty}$$

$$= \frac{D_0(1+g)}{r_s - g} = \frac{\hat{D}_1}{r_s - g} = \text{Value of a constant growth stock}$$

Valuing Stocks with Constant, or Normal, Growth (g)

- Next expected dividend divided by the required return minus the growth rate

Present Value of Dividends of a Constant Growth Stock: $D_0 = \$1.60$, $g = 5\%$, $r_s = 20\%$



Special Case of Constant Growth: g = 0

$$\hat{P}_0 = \frac{D_0(1+g)}{r_s - g} = \frac{D}{r_s}$$

Expected Rate of Return on a Constant Growth Stock

$$\hat{r}_s = \frac{\hat{D}_1}{P_0} + g$$

Expected rate of return = Expected dividend yield + Expected growth rate, or capital gains yield

Valuing Stocks with Nonconstant Growth

- Nonconstant Growth: The part of the life cycle of a firm in which its growth is either much faster or much slower than that of the economy as a whole.

Valuing Stocks with Nonconstant Growth—Step 1

- Start computing the dividends that are expected to be paid during the nonconstant growth period.
- Continue computing dividends until you compute the *last* dividend that is affected by nonconstant growth.
- Using the investors' required rate of return, r_s, compute the present values of all the nonconstant growth dividends, and then sum the present values.

Valuing Stocks with Nonconstant Growth—Step 2

- Compute the *first* dividend that is affected by the constant growth rate.
- Use the first "constant growth dividend" to compute the value of the stock at the *end of the nonconstant growth period*; all future dividends will grow at a constant rate, g_{norm}.
- A modified version of the constant growth equation is used to compute the value of the stock at the end of the nonconstant growth period, $\hat{P}_t$.
- Find the PV of $\hat{P}_t$.

Valuing Stocks with Nonconstant Growth—Step 3

- Sum the results of Step 1 and Step 2 to find the intrinsic value of the stock, $\hat{P}_0$.

Valuing Stocks with Nonconstant Growth—Example

- Dividends will grow at a 20 percent rate for the next three (3) years; i.e., $g_1 = g_2 = g_3 = 20\%$.
- Beginning in Year 4, dividends will grow at a 5 percent rate, which will continue for the rest of the firm's life; i.e., $g_4 = \ldots = g_\infty = 5\% = g_{norm}$.
- Last dividend paid was \$1; i.e., $D_0 = \$1.00$.
- $r_s = 15\%$

Valuing Stocks with Nonconstant Growth—Example: Step 1

- Compute nonconstant growth dividends:

$$\hat{D}_1 = \$1.00(1.20) = \$1.2000$$

$$\hat{D}_2 = \$1.20(1.20) = \$1.4400$$

$$\hat{D}_3 = \$1.44(1.20) = \$1.7280$$

- Compute PV of nonconstant growth dividends:

$$\text{PV of nonconstant growth dividends} = \frac{\$1.2000}{(1.15)^1} + \frac{\$1.4400}{(1.15)^2} + \frac{\$1.7280}{(1.15)^3}$$

$$= \$3.2685$$

Valuing Stocks with Nonconstant Growth—Example: Step 2

- Compute the first constant growth dividend:

$$\hat{D}_4 = \$1.7280(1.05) = \$1.8144$$

- Use $\hat{D}_4$ to compute the value of the stock at the end of Year 3 (the end of nonconstant growth):

$$\hat{P}_3 = \frac{\$1.8144}{0.15 - 0.05} = \$18.1440$$

- Compute the PV of $\hat{P}_3$:

$$\text{PV of } \hat{P}_3 = \frac{\$18.1440}{(1.15)^3} = \$11.9300$$

Valuing Stocks with Nonconstant Growth—Example: Step 3

- Sum the results of Step 1 and Step 2 to find the intrinsic value of the stock:

$$\hat{P}_0 = \$3.2685 + \$11.9300$$

$$= \$15.1985 \approx \$15.20$$

Other Stock Valuation Models

- P/E Ratios
  - The higher the P/E ratio the more investors are willing to pay for each dollar earned by the firm.
  - P/E ratio gives an indication of a stock's "payback period."

$$P/E = \frac{\text{Market price per share of common stock}}{\text{Earnings per share}}$$

Changes in Stock Prices

- Prices move opposite to changes in rates of return.
- Prices move in the same direction as changes in cash flows expected from the stock in the future.