The Target Capital Structure

- Capital Structure—the combination of debt and equity used to finance a firm.
- Target Capital Structure—the ideal mix of debt, preferred stock, and common equity with which the firm plans to finance its investments.

The Target Capital Structure

- Four factors that influence capital structure decisions:
  - Firm's business risk
  - Firm's tax position
  - Financial flexibility
  - Managerial attitude

What is Business Risk?

- The risk associated with the firm's operations, ignoring any financing effects.
- Factors that affect business risk:
  - Sales variability
  - Input price variability
  - Ability to adjust output prices with changes in input prices
  - The extent to which costs are fixed, which is operating leverage

What is Operating Leverage?

- Operating Leverage—use of fixed operating costs
- If most costs are fixed (do not decline when demand falls) then firm has a high degree of operating leverage (DOL)

What is Financial Risk?

- Financial Leverage—the extent to which fixed-income securities (debt and preferred stock) are used in a firm's capital structure.
- Financial Risk—additional risk placed on stockholders as a result of financial leverage.

Business Risk versus Financial Risk

- Business risk depends on business factors such as competition, product liability, and operating leverage.
- Financial risk depends only on the types of securities issued: More debt, more financial risk.

Determining the Optimal Capital Structure:

- Seek to maximize the price of the firm's stock.
- Changes in use of debt cause changes the firm's required rate of return, and thus in the stock price.
- Cost of debt varies with capital structure.
- Financial leverage increases financial risk, which, in turn, increases overall risk and the firm's WACC.

Determining the Optimal Capital Structure:

- Objective—maximize the firm's value, which means to *minimize* its WACC = r.

$$\text{Firm's Value} = \frac{\hat{CF}_1}{(1+r)^1} + \frac{\hat{CF}_2}{(1+r)^2} + \ldots + \frac{\hat{CF}_\infty}{(1+r)^\infty}$$

$$= \frac{\hat{CF}_1}{(1+WACC)^1} + \frac{\hat{CF}_2}{(1+WACC)^2} + \ldots + \frac{\hat{CF}_\infty}{(1+WACC)^\infty}$$

EBIT/EPS Analysis

- EBIT/EPS analysis can be used to evaluate the attractiveness of a particular capital structure by examining how different proportions of debt affect a firm's EPS.
- Although maximizing EPS does not maximize value exactly, we can approximate the optimal capital structure using EBIT/EPS analysis.

The Effect of Capital Structure on Stock Prices and the Cost of Capital

- The optimal capital structure maximizes the price of a firm's stock.
- The optimal capital structure always calls for a debt/assets ratio that is lower than the one that maximizes expected EPS.

EBIT/EPS Analysis: Example—Firm Currently Has No Debt; Assets = $400,000

The firm can issue debt and repurchase shares of stock at $10 per share based on the following schedule:

Equity	Amount of Debt	Debt/Asset Ratio	Cost of Debt, r_d	Shares of Stock Outstanding
$400,000	$ 0	0%	0.0%	40,000
360,000	40,000	10	5.0	36,000
320,000	80,000	20	6.0	32,000
280,000	120,000	30	7.0	38,000
240,000	160,000	40	9.0	24,000
200,000	200,000	50	13.0	20,000
160,000	240,000	60	18.0	16,000

EBIT/EPS Analysis: Example

Assuming that operating expenses, such as cost of goods sold, depreciation, and so forth, are not affected by capital structure decisions, the firm is expected to generate EBIT as follows:

Type of Economy	Probability	EBIT = NOI
Boom	0.1	$200,000
Normal	0.6	120,000
Recession	0.3	40,000

EBIT/EPS Analysis: Example

Debt/Assets = 0%:

Debt = $0

Interest = $0

Equity = $400,000

Shares of stock = $400,000/$10 = 40,000

Type of Economy	Boom	Normal	Recession
Probability	0.1	0.6	0.3
EBIT	$200,000	$120,000	$40,000
Interest	(0)	(0)	(0)
Taxable income, EBT	200,000	120,000	40,000
Taxes (40%)	(80,000)	(48,000)	(16,000)
Net income	$120,000	$72,000	$24,000
EPS = NI/(40,000 shrs)	$3.00	$1.80	$0.60
Expected EPS		$1.56	
σ_{EPS}		$0.72	
CV_{EPS}		0.46	

EBIT/EPS Analysis: Example

Debt/Assets = 20%:

Debt = 0.2($400,000) = $80,000
Interest = 0.06($80,000) = $4,800

Equity = $400,000 - $80,000 = $320,000
Shares of stock = $320,000/$10 = 32,000

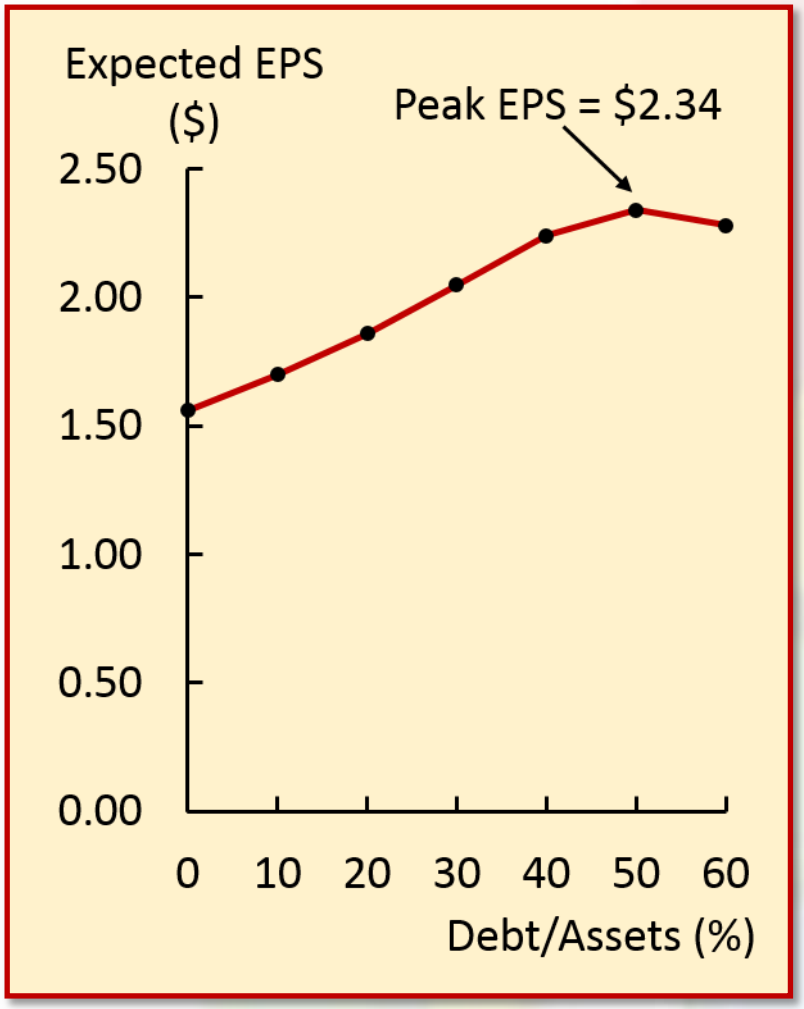
Type of Economy	Boom	Normal	Recession
Probability	0.1	0.6	0.3
EBIT	$200,000	$120,000	$40,000
Interest	(4,800)	(4,800)	(4,800)
Taxable income, EBT	195,200	115,200	35,200
Taxes (40%)	(78,080)	(46,080)	(14,080)
Net income	$117,120	$69,120	$21,120
EPS = NI/(32,000 shrs)	$3.66	$2.16	$0.66
Expected EPS		$1.86	
σ_{EPS}		$0.90	
CV_{EPS}		0.48	

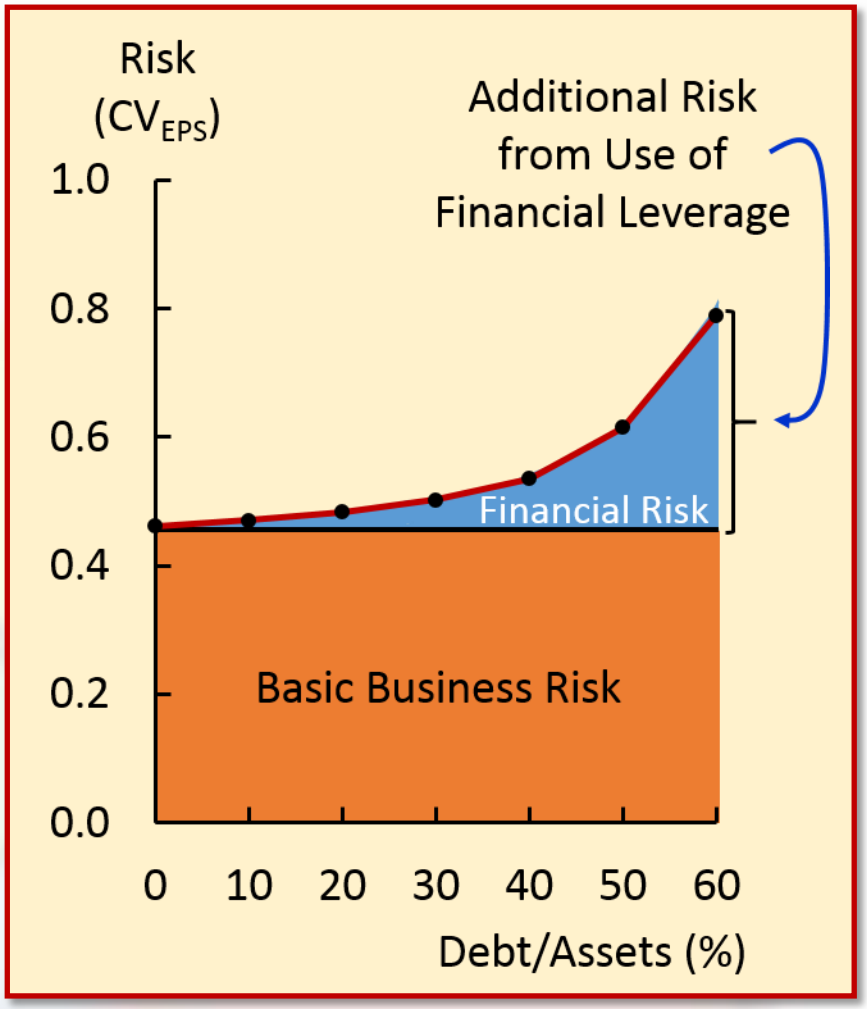
EBIT/EPS Analysis: Example

Summarizing the results for all levels of debt, we have:

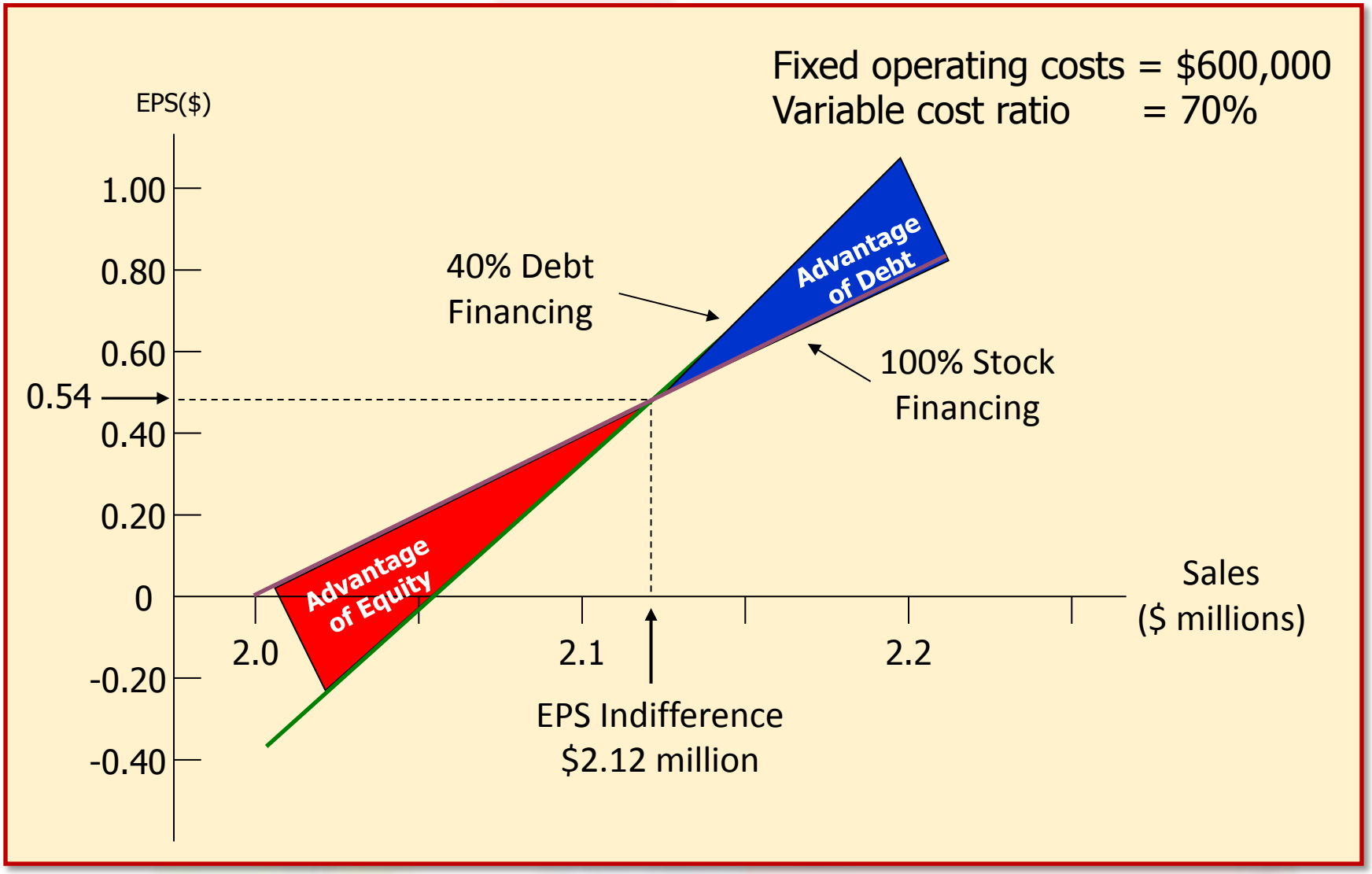
Proportion of Debt	Expected EPS	Standard Deviation	Coefficient of Variation
0%	$1.56	$0.72	0.46
10	1.70	0.80	0.47
20	1.86	0.90	0.48
30	2.05	1.03	0.50
40	2.24	1.20	0.54
50	2.34	1.44	0.62
60	2.28	1.80	0.79

Relationships Among Expected EPS, Risk and Financial Leverage





EBIT/EPS Analysis: Example

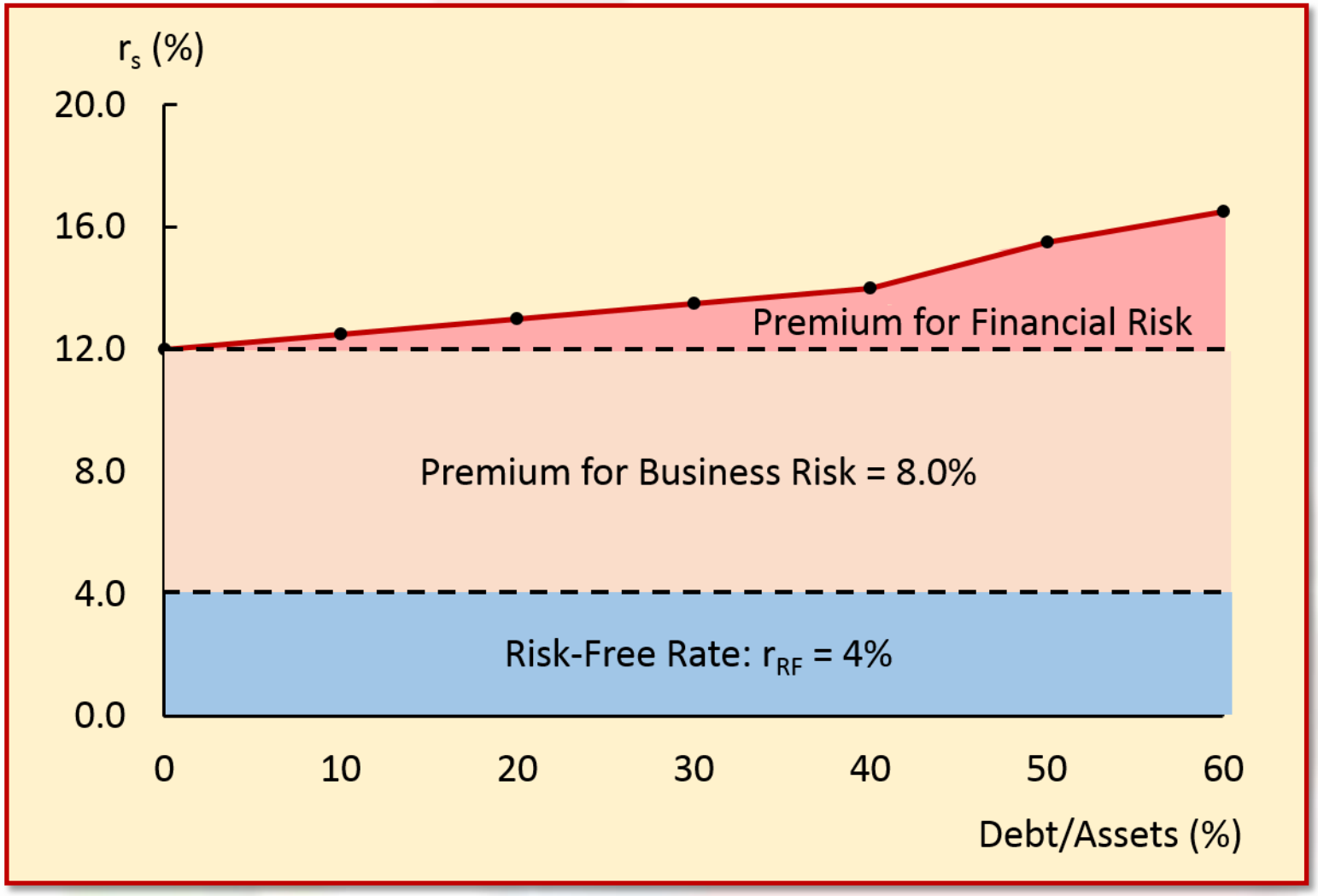


Capital Structure, Stock Price, and Cost of Capital

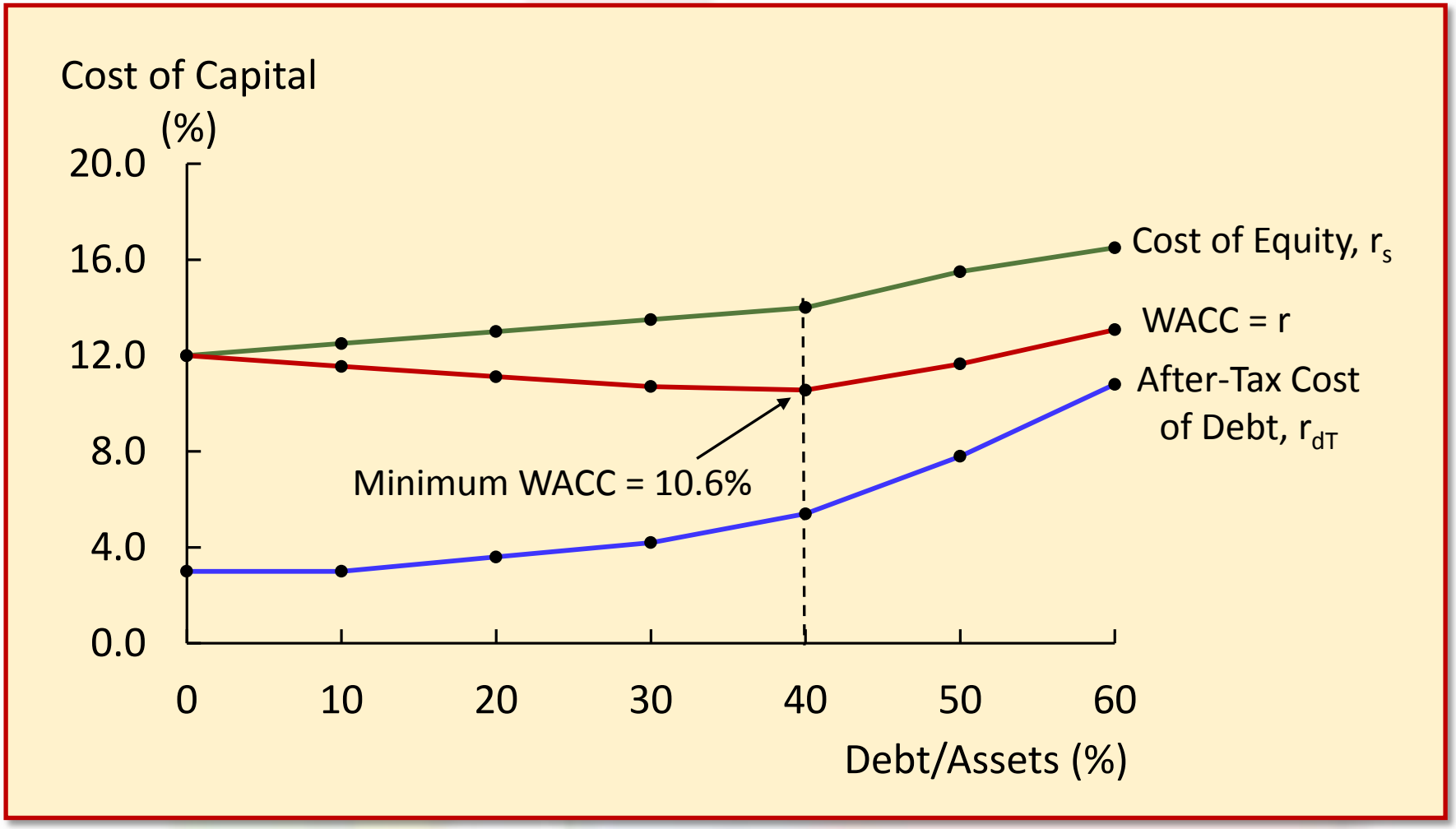
% Debt	r_{dT}	Expected EPS	Estimated Beta, β_s	Cost of Equity*, r_s = 4% + 5%(β_s)	Estimated Stock Price = EPS/r_s	WACC
0%	0.0%	$1.56	1.6	12.0%	$13.00	12.00%
10	3.0	1.70	1.7	12.5	13.60	11.55
20	3.6	1.86	1.8	13.0	14.31	11.12
30	4.2	2.05	1.9	13.5	15.17	10.71
40	5.4	2.24	2.0	14.0	16.00	10.56
50	7.8	2.34	2.3	15.5	15.10	11.65
60	10.8	2.28	2.5	16.5	13.82	13.08

* (r_{RF} = 4%; RP_M = 5%)

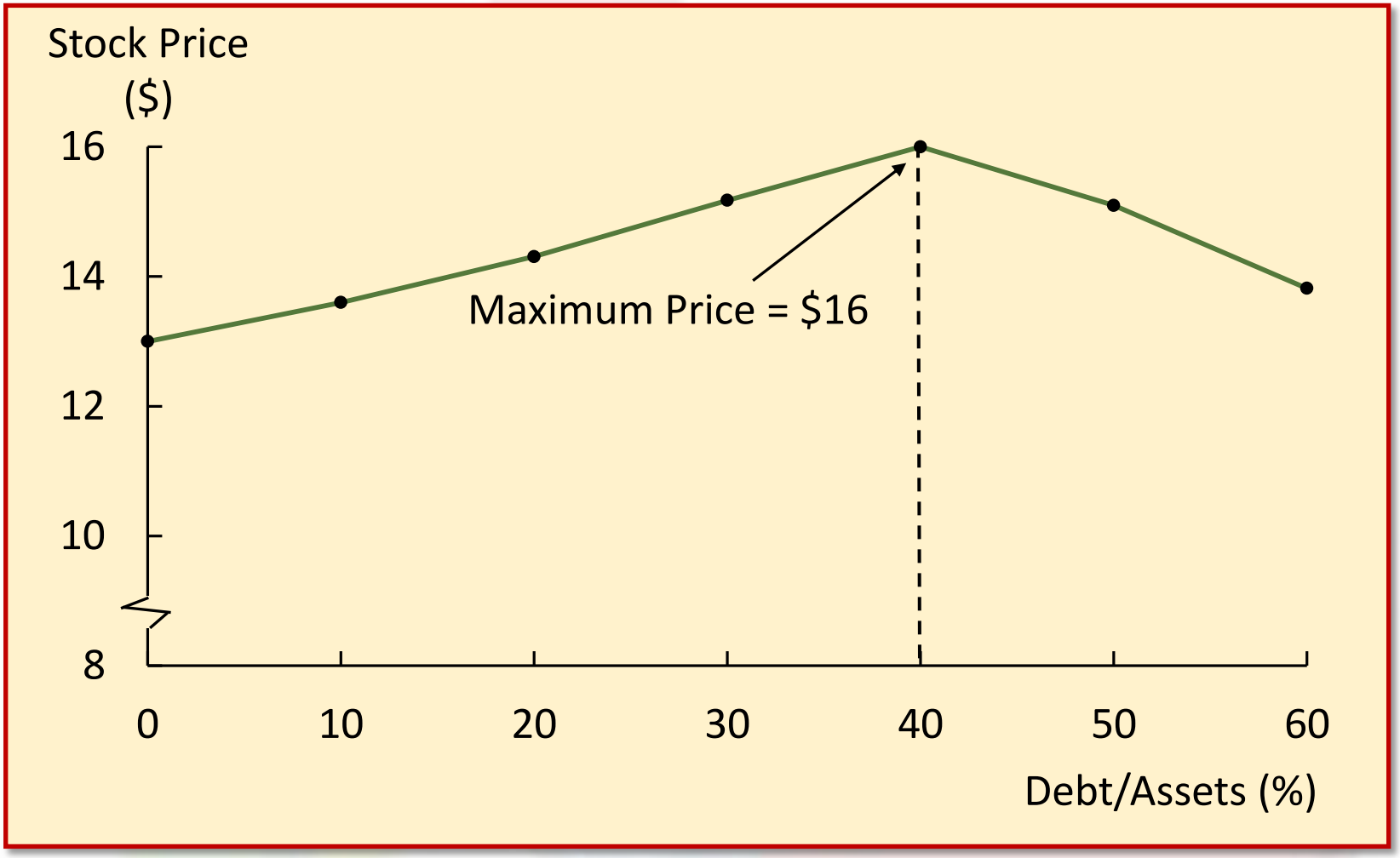
Cost of Equity, r_s, at Different Capital Structures (r_{RF} = 4%)



Relationship Between Capital Structure and Cost of Capital



Relationship Between Capital Structure and Stock Price



Degree of Operating Leverage (DOL) (cont.)

- DOL gives an indication of business risk

$$DOL = \frac{Q(P - V)}{Q(P - V) - F} = \frac{S - VC}{S - VC - F}$$

$$= \frac{\text{Gross profit}}{\text{EBIT}}$$

Degree of Operating Leverage (DOL)—Example

	Expected Outcome	Sales = –5% of Expectations	% Δ
Sales	$250,000	$237,500	-5.0%
Variable costs (60%)	(150,000)	(142,500)	-5.0
Gross profit	100,000	95,000	-5.0
Fixed costs	(75,000)	(75,000)	0.0
NOI = EBIT	$ 25,000	$ 20,000	-20.0

$$\text{DOL} = \frac{\text{Gross profit}}{\text{EBIT}} = \frac{\$100{,}000}{\$25{,}000} = 4.0\text{x} = \frac{-20\%}{-5\%}$$

Degree of Financial Leverage (DFL)—Example

	Expected Outcome	Sales = –5% of Expectations	% Δ
EBIT	$25,000	$20,000	-20.0%
Interest	(12,500)	(12,500)	0.0
Earnings before taxes	12,500	7,500	-40.0
Taxes (40%)	(5,000)	(3,000)	-40.0
Net income	$ 7,500	$ 4,500	-40.0

$$DFL = \frac{EBIT}{EBIT - I} = \frac{\$25,000}{\$25,000 - \$12,500} = 2.0x = \frac{-40\%}{-20\%}$$

Degree of Total Leverage (DTL) (cont.)

- The percentage change in EPS that results from a given percentage change in sales.

$$\text{Degree of total leverage} = \text{DTL} = \frac{\%\ \text{change in sales}}{\%\ \text{change in EPS}}$$

$$= \text{DOL} \times \text{DFL}$$

$$= \frac{\text{Gross profit}}{\text{EBIT}} \times \frac{\text{EBIT}}{\text{EBIT} - \text{I}} = \frac{\text{Gross profit}}{\text{EBIT} - \text{I}}$$

$$= \frac{\text{Q}(\text{P} - \text{V})}{\text{Q}(\text{P} - \text{V}) - \text{F} - \text{I}} = \frac{\text{S} - \text{VC}}{\text{S} - \text{VC} - \text{F} - \text{I}}$$

- DTL gives an indication of combined risk.

Degree of Total Leverage (DTL)—Example

	Expected Outcome	Sales = –5% of Expectations	% Δ
Sales	$250,000	$237,500	-5.0%
Variable costs (60%)	(150,000)	(142,500)	-5.0
Gross profit	100,000	95,000	-5.0
Fixed costs	(75,000)	(75,000)	0.0
NOI = EBIT	25,000	20,000	-20.0
Interest	(12,500)	(12,500)	0.0
Earnings before taxes	12,500	7,500	-40.0
Taxes (40%)	(5,000)	(3,000)	-40.0
Net income	$ 7,500	$ 4,500	-40.0

Degree of Total Leverage (DTL)—Example (cont.)

$$DTL = \frac{\text{Gross profit}}{\text{EBIT - I}} = \frac{\$100{,}000}{\$25{,}000 - \$12{,}500}$$

$$= \frac{\$100{,}000}{\$12{,}500} = 8.0x$$

$$= DOL \times DFL = 4.0 \times 2.0 = 8.0x$$

Liquidity and Capital Structure Difficulties with Analysis

- We cannot determine exactly how either P/E ratios or equity capitalization rates (r_s values) are affected by different degrees of financial leverage.
- Managers might be more or less conservative than the average stockholder, thus might set a different target capital structure than the optimal one.
- Managers should not use leverage to the point where the firm's long-run viability is endangered.

Liquidity and Capital Structure

- Financial strength indicators
  - Times-Interest-Earned (TIE) Ratio
    - Ratio that measures the firm's ability to meet its annual interest obligations.
    - Calculated by dividing earnings before interest and taxes by interest charges.

Trade-Off Theory

- Interest is tax-deductible expense, therefore using debt is less expensive than using common or preferred stock.
- Interest rates rise as debt/asset ratio increases.
- Probability of bankruptcy increases as debt/assets ratio increases.

Trade-Off Theory (cont.)

- To a point, the value of a firm increases as it uses more debt.
- The optimal debt level occurs when the tax savings of additional debt are just offset by the increase in costs associated with a greater chance of bankruptcy.
- Theory and empirical evidence support these ideas, but the points cannot be identified precisely.

Signaling Theory

- Many large, successful firms use much less debt than the trade-off theory suggests, which led to the development of the signaling theory.
- Signal—an action taken by a firm's management that provides clues to investors about how management views the firm's prospects

Signaling Theory

- Symmetric Information—investors and managers have identical information about the firm's prospects.
- Asymmetric Information—managers have better information about their firms' prospects than do outside investors.

Signaling Theory (cont.)

- Reserve Borrowing Capacity
  - Ability to borrow money at a reasonable cost when good investment opportunities arise
  - Firms often use less debt than “optimal” to ensure that they can obtain debt capital later if needed.

Variations in Capital Structures among Firms

- Wide variations in use of financial leverage among industries and firms within an industry.

Capital Structures Around the World

- We cannot state that one financial system is better than another in the sense that firms in one country are more efficient than those in another.
- As U.S. firms become increasingly involved in worldwide operations, they must become increasingly aware of worldwide conditions; must be prepared to adapt to conditions in the various countries in which they do business.

Dividend Policy

- Dividends
  - Payments made to stockholders from the firm's earnings, whether those earnings were generated in the current period or in previous periods.
- Dividends affect capital structure:
  - Retaining earnings increases common equity relative to debt.
  - Financing with retained earnings is cheaper than issuing new common equity.

Dividend Policy and Stock Value

- Dividend Irrelevance Theory
  - Theory states that a firm's dividend policy has no effect on either its value or its cost of capital.
  - Investors value dividends and capital gains equally.

Dividend Policy and Stock Value (cont.)

- Dividend Relevance Theory
  - A firm's value is affected by its dividend policy.
  - The optimal dividend policy is the one that maximizes the firm's value.
- Optimal Dividend Policy
  - Strikes a balance between current dividends and future growth that maximizes the firm's stock price.

Investors and Dividend Policy

- Information Content, or Signaling
  - Signaling hypothesis says that investors regard dividend changes as signals of management's earnings forecasts.
- Clientele Effect
  - The tendency of a firm to attract the type of investor who likes its dividend policy.

Investors and Dividend Policy (cont.)

- Free Cash Flow Hypothesis
  - All else equal, firms that pay dividends from cash flows that cannot be reinvested in positive net present value projects (free cash flows) have higher values than firms that retain free cash flows.

Dividend Payments in Practice

- Residual Dividend Policy
  - The dividend is set equal to the actual earnings minus the amount of retained earnings needed to finance the firm's optimal capital budget.
- Stable, Predictable Dividend Policy
  - Annual dividend payment remains constant or is increasing at a constant rate
  - The annual dividend is fairly predictable by investors.

Types of Dividend Payments in Practice

- Constant Payout Ratio
  - Same percentage of earnings—e.g., 40 percent—is paid each year.
- Low Regular Dividend Plus Extras
  - A low regular dividend is paid every year; an "extra" dividend is paid when the firm has good years.

Types of Dividend Payments in Practice—Example

Following is information about a firm:

	Year 1	Year 2	Year 3	Year 4
Net income	$500,000	$300,000	$800,000	$150,000
Capital budget	$300,000	$350,000	$200,000	$140,000
Number of shares	250,000	250,000	250,000	250,000
Payout ratio	60.0%	60.0%	60.0%	60.0%
Low regular dividend	$0.75	$0.75	$0.75	$0.75
Extra: % above $400,000	40.0%	40.0%	40.0%	40.0%

Types of Dividend Payments in Practice—Example: Residual Dividend

Number of shares 250,000

	Year 1	Year 2	Year 3	Year 4
Net income	$500,000	$300,000	$800,000	$150,000
Capital budget	300,000	350,000	200,000	140,000
Total dividend	$200,000	$ 0	$600,000	$ 10,000
Dividend/share (DPS)	$0.80	$0.00	$1.39	$0.75

Types of Dividend Payments in Practice—Example: Stable Dividend

Number of shares	250,000			
	Year 1	Year 2	Year 3	Year 4
Total dividend	$250,000	$250,000	$250,000	$250,000
Dividend/share (DPS)	$1.00	$1.00	$1.00	$1.00

Types of Dividend Payments in Practice—Example: Constant Payout Ratio

Number of shares 250,000

	Year 1	Year 2	Year 3	Year 4
Net income	$500,000	$300,000	$800,000	$150,000
Payout ratio	60.0%	60.0%	60.0%	60.0%
Total dividend	$300,000	$180,000	$480,000	$90,000
Dividend/share (DPS)	$1.20	$0.72	$1.92	$0.36

Total dividend in Year 1 = 0.60($500,000) = $300,000

DPS = $300,000/250,000 = $1.20

Types of Dividend Payments in Practice—Example: Low Regular Dividend Plus Extras

Number of shares 250,000

	Year 1	Year 2	Year 3	Year 4
Net income	$500,000	$300,000	$800,000	$150,000
Low regular dividend	$0.75	$0.75	$0.75	$0.75
Extra: % above $400,000	40.0%	40.0%	40.0%	40.0%
Total dividend	$227,500	$187,500	$347,500	$187,500
Dividend/share (DPS)	$0.91	$0.75	$1.39	$0.75

Total dividend in Year 1 = $0.75(250,000) + 0.40($500,000 - $400,000)
= $187,500 + $40,000 = $227,500

DPS = $227,500/250,000 = $0.91

Types of Dividend Payments in Practice—Example: Summary

Dividend Policy	Year 1	Year 2	Year 3	Year 4
Residual	$0.80	$0.00	$2.40	$0.04
Stable	1.00	1.00	1.00	1.00
Constant P/O	1.20	0.72	1.92	0.36
Low regular plus	0.91	0.75	1.39	0.75

Least amount of variability, thus gives the perception of the least amount of risk

Dividend Payments in Practice

- Declaration Date—date on which a firm's board of directors issues a statement declaring a dividend.
- Holder-of-Record Date—date on which the company opens the ownership books to determine who will receive the next dividend payment.

Dividend Payments in Practice

- Ex-Dividend Date—date on which the right to the next dividend no longer accompanies a stock; generally two business days prior to the holder-of-record date.
- Payment Date—date on which the company actually pays the dividend (either by paper or electronic check).

Factors Influencing Dividend Policy

- Constraints on dividend payments:
  - Debt contract restrictions
  - Cannot exceed “retained earnings”
  - Cash availability
  - IRS restrictions on improperly accumulated retained earnings

Factors Influencing Dividend Policy (cont.)

- Investment opportunities
  - Availability of good capital budgeting projects affects the amount of dividends paid out
- Alternative sources of capital
- Ownership dilution
- Effects of dividend policy on r_s

Stock Dividends and Stock Splits

- Both stock dividends and stock splits increase the number of shares outstanding—"divide the same pie into smaller pieces."
- Unless the stock dividend or stock split conveys information, or is accompanied by another event like higher dividends, the per share stock price adjusts (falls) so as to keep each investor's wealth unchanged.

Stock Dividends and Stock Splits (cont.)

- But splits/stock dividends may help firm reach an "optimal price range" (psychological range).
- Neither action by itself has economic value in the sense that each does nothing to change stockholders' wealth.

Stock Split

- An action taken to change the stock price per share.
- Many firms believe their stock has an optimal price range within which their stock should trade.
  - If the price of the stock exceeds the price range, then the firm will execute a regular stock split.
  - If the price of the stock is below the price range, then the firm will execute a "reverse" stock split.
- When a "regular" stock split is initiated, generally the price of the stock actually settles above "split price."
  - Information content.
  - Impact—increase the number of shares; lower the market price per share.

Stock Dividend

- Dividends paid in the form of stock rather than cash.
- Like stock splits, a stock dividend does not have specific economic value:
  - Increases the total number of shares of stock each stockholder owns.
  - Stock price per share decreases.
- A firm might use a stock dividend to keep the price of its stock within a particular range.

Balance Sheet Effects of a 2-for-1 Stock Split

- If a firm initiates a 2-for-1 stock split, two "new" shares of stock are exchanged for one "old" share. The before-split and after-split balance sheet would be (changes are highlighted in blue):

Before the split:

Common stock at par (50,000 shares, $2 par)	$100,000
Additional paid-in capital	200,000
Retained earnings	300,000
Total common stockholders' equity	$600,000

After the split:

Common stock at par (100,000 shares, $1 par)	$100,000
Additional paid-in capital	200,000
Retained earnings	300,000
Total common stockholders' equity	$600,000

Balance Sheet Effects of a Stock Dividend

- If a firm "pays" a 10 percent stock dividend, each stockholder receives 10 percent more shares. The before-split and after-split balance sheet would be (changes are highlighted in blue):

Before the split:

Common stock at par (50,000 shares, $2 par)	$100,000
Additional paid-in capital	200,000
Retained earnings	300,000
Total common stockholders' equity	$600,000

After the split:

Common stock at par (55,000 shares, $2 par)	$110,000
Additional paid-in capital	290,000
Retained earnings	200,000
Total common stockholders' equity	$600,000

Price Effects of Stock Splits and Stock Dividends

- Both stock splits and stock dividends increase the number of outstanding shares of stock and decrease stock price.
- Splits and stock dividends create no economic value by themselves.

Price Effects of Stock Splits and Stock Dividends (cont.)

- Studies have shown that the market price of the stock affected by such actions might change if
  - investors expect future earnings and cash dividends to increase (decrease), in which case the price will increase (decrease) above the relative price associated with the stock split or the stock dividend.
  - the future expectations do not pan out, in which case the price of the stock will eventually settle at a price that yields an economic change in investors' wealth approximately equal to zero.

Stock Repurchases

- At times, firms repurchase shares of stock rather than paying dividends.

Reasons for Stock Repurchases

- To distribute excess funds to stockholders
- To adjust the firm's capital structure
- To acquire shares needed for employee options or compensation
- To protect against a takeover attempt

Advantages of Stock Repurchases

- A company can use a stock repurchase to distribute excess cash (free cash flows) without increasing the amount of the "regular" dividends that might otherwise be paid during the year.
- A repurchase is an effective method to immediately change the firm's capital structure when the proportion of equity is substantially higher than the target capital structure prescribes.

Advantages of Stock Repurchases (cont.)

- A repurchase can be used to minimize the "dilution effect" associated with exercising stock options by management and other employees.
- Stockholders do not have to sell their shares to the company during a repurchase period.
- Many investors believe that a stock repurchase program is a signal from management that the firm's stock is undervalued in the financial markets, and thus it is a bargain to purchase.

Disadvantages of Stock Repurchases

- The company might pay too much for stock that is repurchased.
- The interval between one stock repurchase and another one generally is irregular, which means that participating investors cannot rely on the cash that they receive from stock repurchases.