CHAPTER 16

FINANCIAL LEVERAGE AND CAPITAL STRUCTURE POLICY

KEY CONCEPTS AND SKILLS

- Understand the effect of financial leverage on cash flows and the cost of equity
- Understand the impact of taxes and bankruptcy on capital structure choice
- Understand the basic components of the bankruptcy process

CHAPTER OUTLINE

- The Capital Structure Question
- The Effect of Financial Leverage
- Capital Structure and the Cost of Equity Capital
- M&M Propositions I and II with Corporate Taxes
- Bankruptcy Costs
- Optimal Capital Structure
- The Pie Again
- The Pecking-Order Theory
- Observed Capital Structures
- A Quick Look at the Bankruptcy Process

CAPITAL RESTRUCTURING

- We are going to look at how changes in capital structure affect the value of the firm, *all else equal*
- Capital restructuring involves changing the amount of leverage a firm has without changing the firm's assets
- The firm can increase leverage by issuing debt and repurchasing outstanding shares
- The firm can decrease leverage by issuing new shares and retiring outstanding debt

CHOOSING A CAPITAL STRUCTURE

- What is the primary goal of financial managers?
  - Maximize stockholder wealth
- We want to choose the capital structure that will maximize stockholder wealth
- We can maximize stockholder wealth by maximizing the value of the firm or minimizing the WACC

THE EFFECT OF LEVERAGE

- How does leverage affect the EPS and ROE of a firm?
- When we increase the amount of debt financing, we increase the fixed interest expense
- If we have a really good year, then we pay our fixed cost and we have more left over for our stockholders
- If we have a really bad year, we still have to pay our fixed costs and we have less left over for our stockholders
- Leverage amplifies the variation in both EPS and ROE

EXAMPLE: FINANCIAL LEVERAGE, EPS AND ROE – PART I

- We will ignore the effect of taxes at this stage
- What happens to EPS and ROE when we issue debt and buy back shares of stock?

Financial Leverage Example

EXAMPLE: FINANCIAL LEVERAGE, EPS AND ROE – PART II

- Variability in ROE
  - Current: ROE ranges from 6% to 20%
  - Proposed: ROE ranges from 2% to 30%
- Variability in EPS
  - Current: EPS ranges from $.60 to $2.00
  - Proposed: EPS ranges from $.20 to $3.00
- The variability in both ROE and EPS increases when financial leverage is increased

BREAK-EVEN EBIT

- Find EBIT where EPS is the same under both the current and proposed capital structures
- If we expect EBIT to be greater than the break-even point, then leverage may be beneficial to our stockholders
- If we expect EBIT to be less than the break-even point, then leverage is detrimental to our stockholders

EXAMPLE: BREAK-EVEN EBIT

$$\frac{EBIT}{500{,}000} = \frac{EBIT - 250{,}000}{250{,}000}$$

$$EBIT = \left[\frac{500{,}000}{250{,}000}\right](EBIT - 250{,}000)$$

$$EBIT = 2EBIT - 500{,}000$$

$$EBIT = \$500{,}000$$

$$EPS = \frac{500{,}000}{500{,}000} = \$1.00$$

Break-even Graph

CORPORATE BORROWING CONCLUSIONS

- Based on what we have seen so far, we can draw the following three conclusions:
  - 1. The effect of financial leverage depends on the company's EBIT. When EBIT is relatively high, leverage is beneficial.
  - 2. Under the expected scenario, leverage increases the returns to shareholders, as measured by both ROE and EPS.
  - 3. Shareholders are exposed to more risk under the proposed capital structure because the EPS and ROE are much more sensitive to changes in EBIT in this case.

CORPORATE BORROWING AND HOMEMADE LEVERAGE

- It is tempting to make a fourth conclusion as follows:
  - 4. Because of the impact that financial leverage has on both the expected return to stockholders and the riskiness of the stock, capital structure is an important consideration.

- Surprisingly, this fourth conclusion is incorrect.
  - The reason is that shareholders can adjust the amount of financial leverage by borrowing and lending on their own.
  - This use of personal borrowing to alter the degree of financial leverage is called **homemade leverage**.

EXAMPLE: HOMEMADE LEVERAGE

- The following example illustrates that it actually makes no difference whether or not the company adopts the proposed capital structure, because any stockholder who prefers the proposed capital structure can simply create it using homemade leverage.
- Buying 100 shares within the proposed capital structure provides the same outcome as buying 200 shares within the original capital structure.
  - Buying the extra 100 shares would require the investor to take on a loan for $2,000
  - This assumes that the investor can borrow at the same interest rate as the company.

EXAMPLE: HOMEMADE LEVERAGE

TABLE 16.5

Proposed Capital Structure versus Original Capital Structure with Homemade Leverage

	Recession	Expected	Expansion
Proposed Capital Structure			
EPS	$ .50	$ 3.00	$ 5.50
Earnings for 100 shares	50.00	300.00	550.00
Net cost = 100 shares × $20 = $2,000			
Original Capital Structure and Homemade Leverage			
EPS	$ 1.25	$ 2.50	$ 3.75
Earnings for 200 shares	250.00	500.00	750.00
Less: Interest on $2,000 at 10%	200.00	200.00	200.00
Net earnings	$ 50.00	$300.00	$550.00
Net cost = 200 shares × $20 − Amount borrowed = $4,000 − 2,000 − $2,000			

CAPITAL STRUCTURE THEORY

- Modigliani and Miller (M&M)Theory of Capital Structure
  - Proposition I – firm value
  - Proposition II – WACC
- The value of the firm is determined by the cash flows to the firm and the risk of the assets
- Changing firm value
  - Change the risk of the cash flows
  - Change the cash flows

CAPITAL STRUCTURE THEORY UNDER THREE SPECIAL CASES

- Case I – Assumptions
  - No corporate or personal taxes
  - No bankruptcy costs
- Case II – Assumptions
  - Corporate taxes, but no personal taxes
  - No bankruptcy costs
- Case III – Assumptions
  - Corporate taxes, but no personal taxes
  - Bankruptcy costs

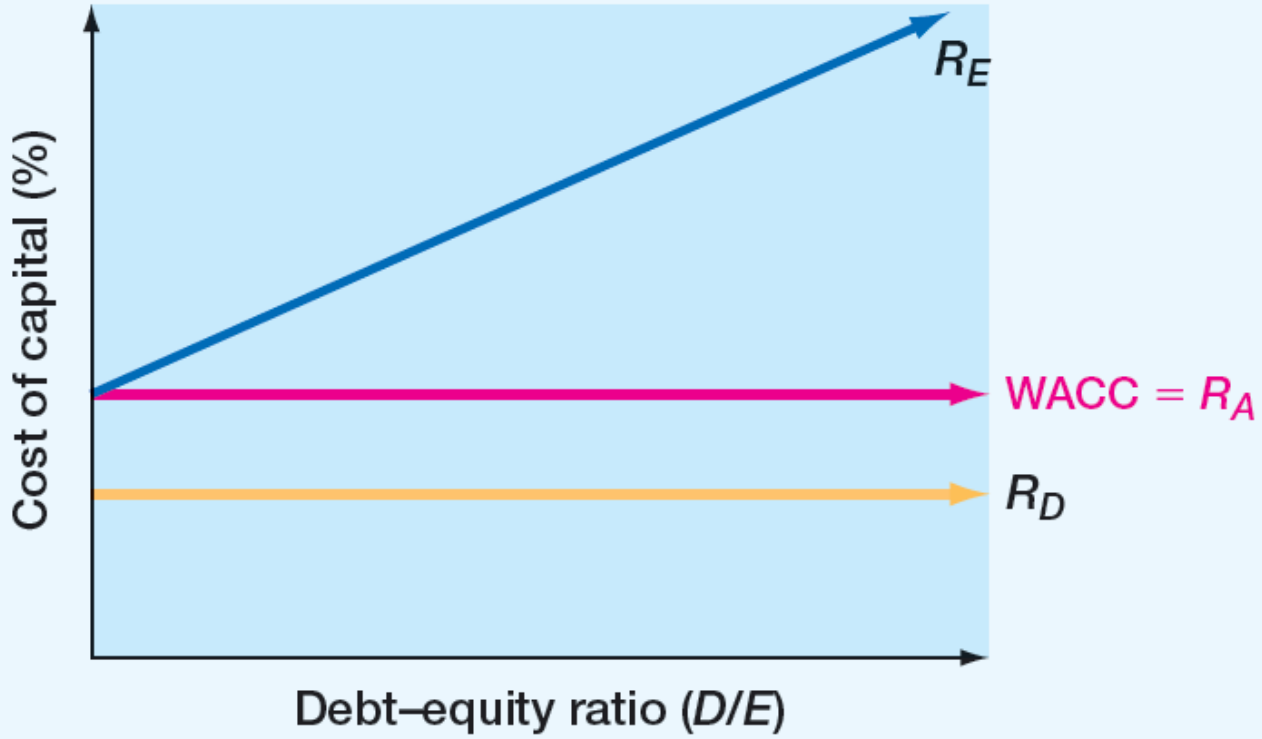
CASE I – PROPOSITIONS I AND II

- Proposition I
  - The value of the firm is NOT affected by changes in the capital structure
  - The cash flows of the firm do not change; therefore, value doesn't change
- Proposition II
  - The WACC of the firm is NOT affected by capital structure

CASE I - EQUATIONS

- $WACC = R_A = (E/V)R_E + (D/V)R_D$
- $R_E = R_A + (R_A - R_D)(D/E)$
  - R_A is the "cost" of the firm's business risk, i.e., the risk of the firm's assets
  - $(R_A - R_D)(D/E)$ is the "cost" of the firm's financial risk, i.e., the additional return required by stockholders to compensate for the risk of leverage

FIGURE 16.3



$$R_E = R_A + (R_A - R_D) \times (D/E) \text{ by M\&M Proposition II}$$

$$R_A = \text{WACC} = \left(\frac{E}{V}\right) \times R_E + \left(\frac{D}{V}\right) \times R_D$$

where $V = D + E$

EXAMPLE: CASE I

- Data
  - Required return on assets = 16%; cost of debt = 10%; percent of debt = D/V = 45%
- What is the debt-to-equity ratio?
  - D/E = (D/V) / (E/V) = (D/V) / (1 – D/V)
  - D/E = (0.45) / (1 – 0.45) = 0.8182
- What is the cost of equity?
  - R_E = 16% + (16% - 10%)(.8182) = 20.91%
- Suppose instead that the cost of equity is 25%, what would the the debt-to-equity ratio then to be?
  - 25% = 16% + (16% - 10%)(D/E)
  - D/E = (25% - 16%) / (16% - 10%) = 1.5

THE CAPM, THE SML AND PROPOSITION II

- How does financial leverage affect systematic risk?
- CAPM: $R_A = R_f + \beta_A(R_M - R_f)$
  - Where β_A is the firm's asset beta and measures the systematic risk of the firm's assets
- Proposition II
  - Replace R_A with the CAPM and assume that the debt is riskless ($R_D = R_f$)
  - $R_E = R_f + \beta_A(1+D/E)(R_M - R_f)$

BUSINESS RISK AND FINANCIAL RISK

- $R_E = R_f + \beta_A(1+D/E)(R_M - R_f)$
- CAPM: $R_E = R_f + \beta_E(R_M - R_f)$
  - $\beta_E = \beta_A(1 + D/E)$
- Therefore, the systematic risk of the stock depends on:
  - Systematic risk of the assets, β_A, or "Business risk"
  - Level of leverage, D/E, or "Financial risk"

CASE II – CASH FLOW

- Interest is tax deductible
- Therefore, when a firm adds debt, it reduces taxes, all else equal
- The reduction in taxes increases the cash flow of the firm
- How should an increase in cash flows affect the value of the firm?

EXAMPLE: CASE II

	Unlevered Firm	Levered Firm
EBIT	5,000	5,000
Interest	0	500
Taxable Income	5,000	4,500
Taxes (34%)	1,700	1,530
Net Income	3,300	2,970
CFFA	3,300	3,470

INTEREST TAX SHIELD

- Annual interest tax shield
  - Tax rate times interest payment
  - 6,250 in 8% debt = 500 in interest expense
  - Annual tax shield = .34(500) = 170
- Present value of annual interest tax shield
  - Assume perpetual debt for simplicity
  - PV = 170 / .08 = 2,125
  - PV = $D(R_D)(T_C) / R_D = DT_C = 6{,}250(.34) = 2{,}125$

CASE II – PROPOSITION I

- The value of the firm increases by the present value of the annual interest tax shield
  - Value of a levered firm (V_L) = value of an unlevered firm (V_U) + PV of interest tax shield
  - Value of equity = Value of the firm – Value of debt
- Assuming perpetual cash flows
  - $V_U = EBIT(1-T) / R_U$
  - $V_L = V_U + DT_C$

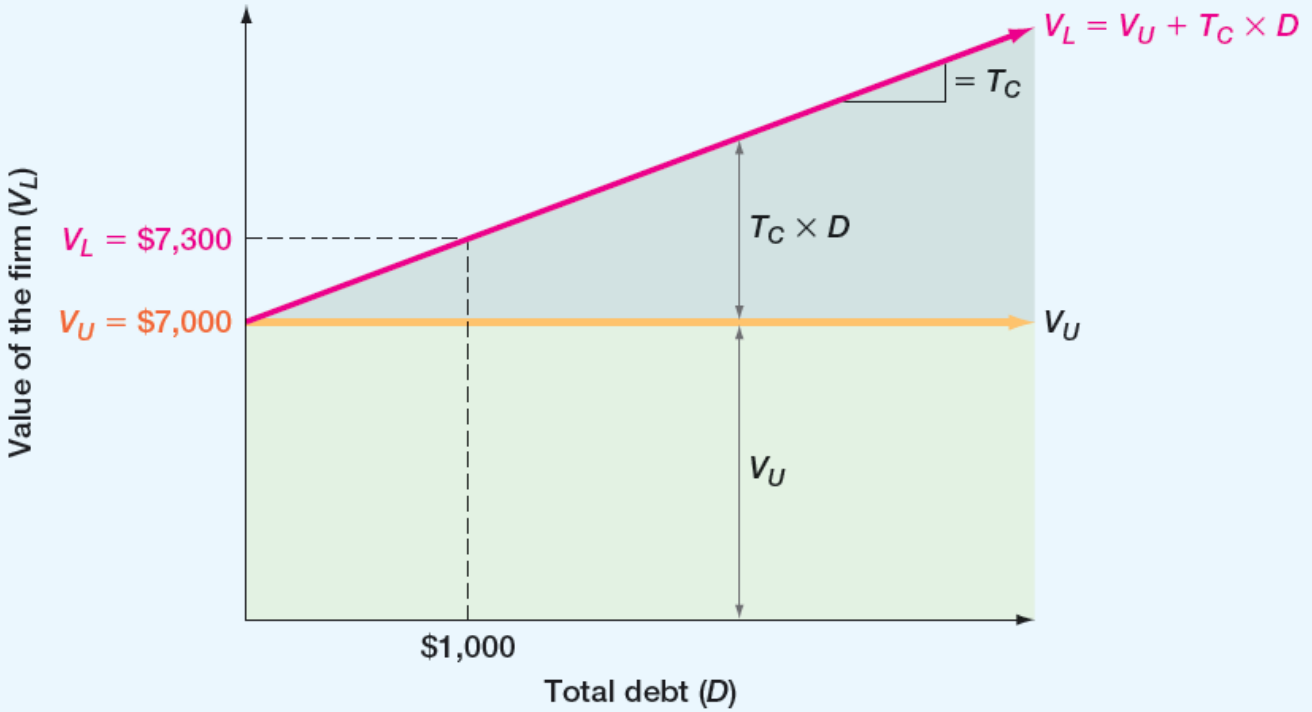
EXAMPLE: CASE II – PROPOSITION I

- Data
  - EBIT = 25 million; Tax rate = 35%; Debt = $75 million; Cost of debt = 9%; Unlevered cost of capital = 12%

- $V_U = 25(1-.35) / .12 = \$135.42$ million
- $V_L = 135.42 + 75(.35) = \$161.67$ million

- E = 161.67 – 75 = $86.67 million

FIGURE 16.4



The value of the firm increases as total debt increases because of the interest tax shield. This is the basis of M&M Proposition I with taxes.

FIGURE 16.4
M&M Proposition I with Taxes

CASE II – PROPOSITION II

- The WACC decreases as D/E increases because of the government subsidy on interest payments
  - $R_A = (E/V)R_E + (D/V)(R_D)(1-T_C)$
  - $R_E = R_U + (R_U - R_D)(D/E)(1-T_C)$
- Example
  - $R_E = 0.12 + (0.12-0.09)(75/86.67)(1-.35)$
    $= 13.69\%$
  - $R_A = (86.67/161.67)(0.1369)$
    $+ (75/161.67)(9)(1-.35)$
    $R_A = 10.05\%$

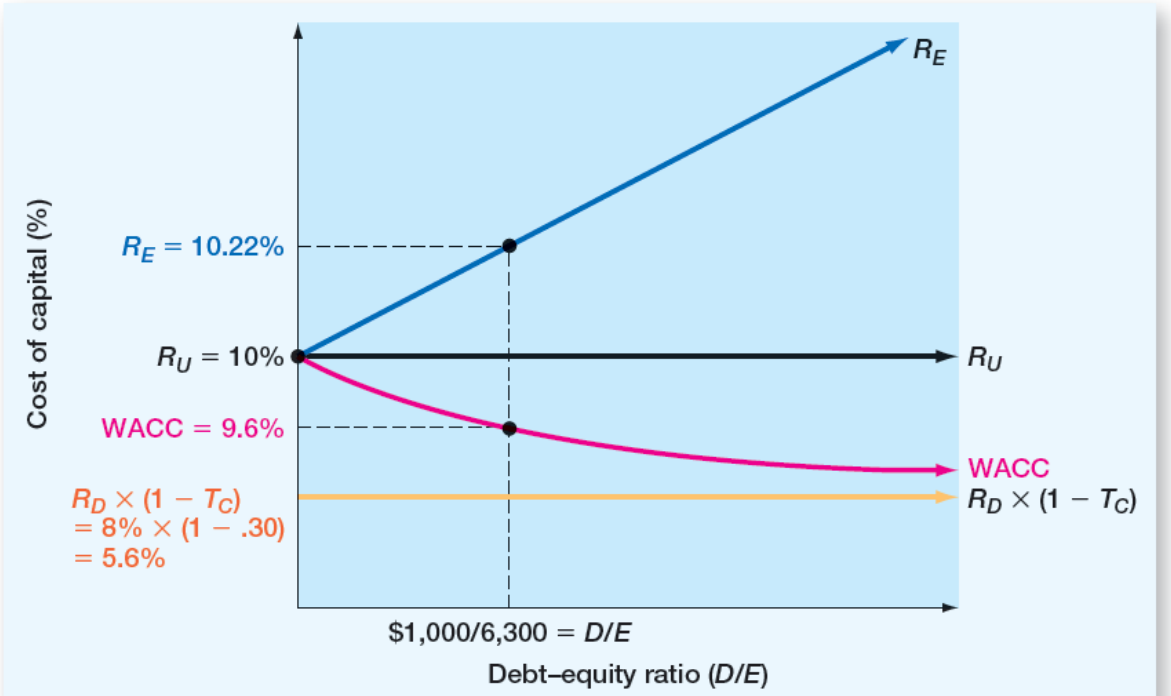
EXAMPLE: CASE II – PROPOSITION II

- Suppose that the firm changes its capital structure so that the debt-to-equity ratio becomes 1.
- What will happen to the cost of equity under the new capital structure?
  - $R_E = 0.12 + (0.12 – 0.09)(1)(1-.35) = 13.95\%$
- What will happen to the weighted average cost of capital?
  - $R_A = 0.5(0.1395) + 0.5(9)(1-.35) = 9.9\%$

FIGURE 16.5

FIGURE 16.5

The Cost of Equity and the WACC: M&M Proposition II with Taxes



M&M Proposition I with taxes implies that a firm's WACC decreases as the firm relies more heavily on debt financing:

$$\text{WACC} = \left(\frac{E}{V}\right) \times R_E + \left(\frac{D}{V}\right) \times R_D \times (1 - T_C)$$

M&M Proposition II with taxes implies that a firm's cost of equity, R_E, rises as the firm relies more heavily on debt financing:

$$R_E = R_U + (R_U - R_D) \times (D/E) \times (1 - T_C)$$

CASE III

- Now we add bankruptcy costs
- As the D/E ratio increases, the probability of bankruptcy increases
- This increased probability will increase the expected bankruptcy costs
- At some point, the additional value of the interest tax shield will be offset by the increase in expected bankruptcy cost
- At this point, the value of the firm will start to decrease, and the WACC will start to increase as more debt is added

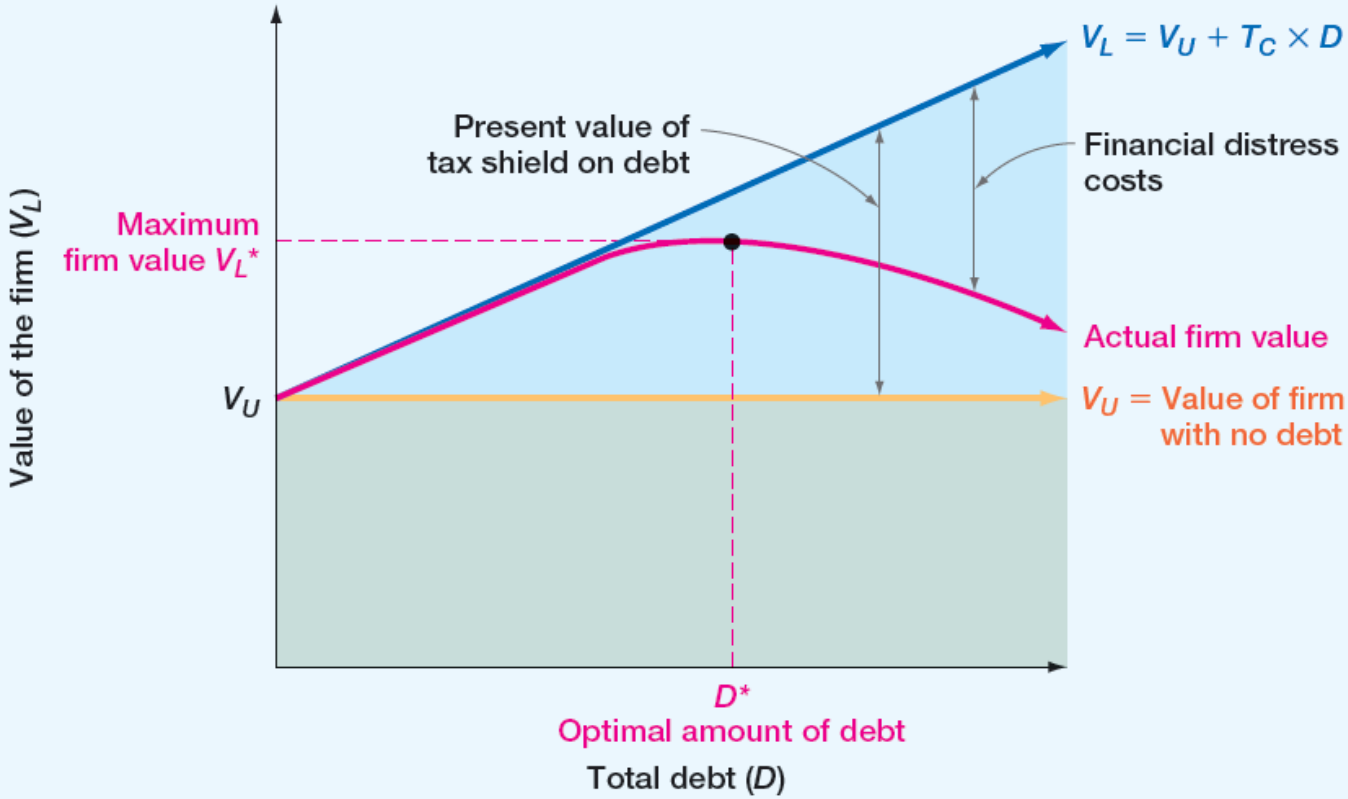
BANKRUPTCY COSTS

- Direct costs
  - Legal and administrative costs
  - Ultimately cause bondholders to incur additional losses
  - Disincentive to debt financing
- Financial distress
  - Significant problems in meeting debt obligations
  - Firms that experience financial distress do not necessarily file for bankruptcy

MORE BANKRUPTCY COSTS

- Indirect bankruptcy costs
  - Larger than direct costs, but more difficult to measure and estimate
  - Stockholders want to avoid a formal bankruptcy filing
  - Bondholders want to keep existing assets intact so they can at least receive that money
  - Assets lose value as management spends time worrying about avoiding bankruptcy instead of running the business
  - The firm may also lose sales, experience interrupted operations and lose valuable employees

FIGURE 16.6



According to the static theory, the gain from the tax shield on debt is offset by financial distress costs. An optimal capital structure exists that just balances the additional gain from leverage against the added financial distress cost.

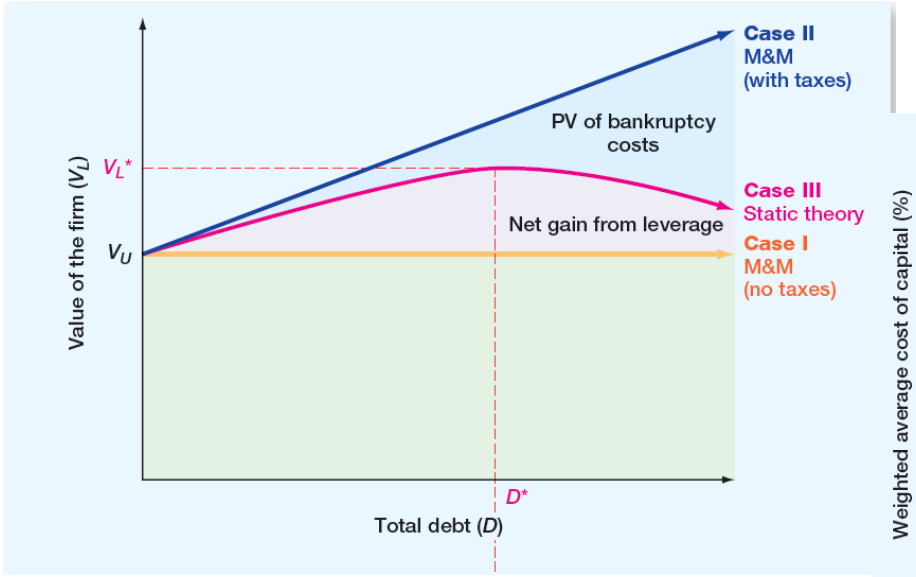
FIGURE 16.7

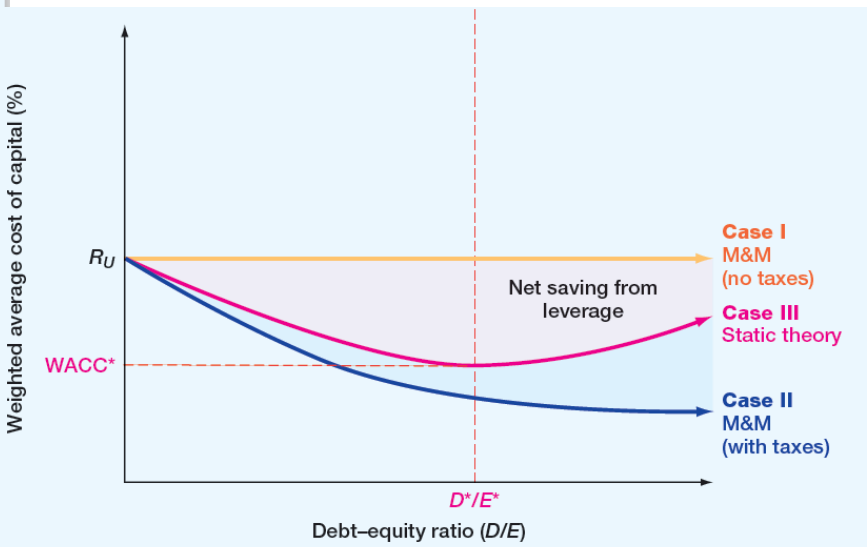
According to the static theory, the WACC falls initially because of the tax advantage of debt. Beyond the point D^*/E^*, it begins to rise because of financial distress costs.

CONCLUSIONS

- Case I – no taxes or bankruptcy costs
  - No optimal capital structure
- Case II – corporate taxes but no bankruptcy costs
  - Optimal capital structure is almost 100% debt
  - Each additional dollar of debt increases the cash flow of the firm
- Case III – corporate taxes and bankruptcy costs
  - Optimal capital structure is part debt and part equity
  - Occurs where the benefit from an additional dollar of debt is just offset by the increase in expected bankruptcy costs

FIGURE 16.8





Case I
With no taxes or bankruptcy costs, the value of the firm and its weighted average cost of capital are not affected by capital structures.

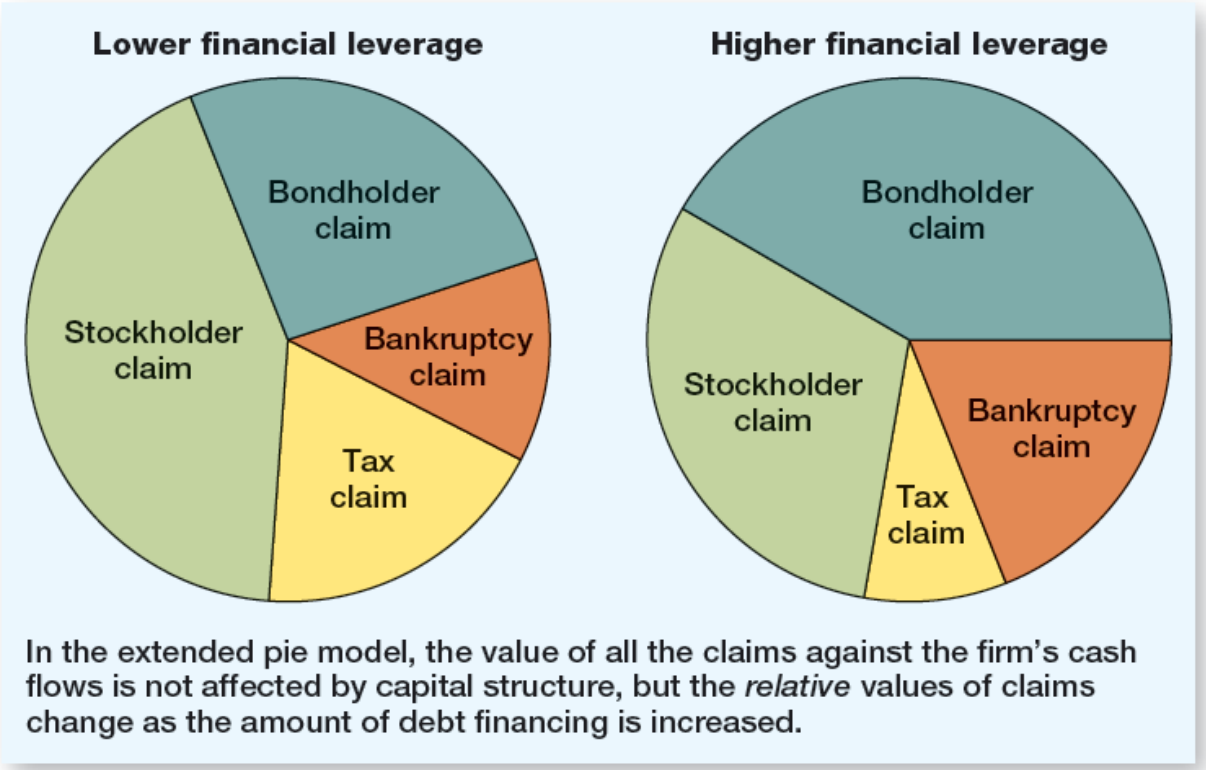
Case II
With corporate taxes and no bankruptcy costs, the value of the firm increases and the weighted average cost of capital decreases as the amount of debt goes up.

Case III
With corporate taxes and bankruptcy costs, the value of the firm, V_L, reaches a maximum at D^*, the point representing the optimal amount of borrowing. At the same time, the weighted average cost of capital, WACC, is minimized at D^*/E^*.

MANAGERIAL RECOMMENDATIONS

- The tax benefit is only important if the firm has a large tax liability
- Risk of financial distress
  - The greater the risk of financial distress, the less debt will be optimal for the firm
  - The cost of financial distress varies across firms and industries, and as a manager you need to understand the cost for your industry

FIGURE 16.9



In the extended pie model, the value of all the claims against the firm's cash flows is not affected by capital structure, but the *relative* values of claims change as the amount of debt financing is increased.

FIGURE 16.9
The Extended Pie Model

THE VALUE OF THE FIRM

- Value of the firm = marketed claims + nonmarketed claims
  - Marketed claims are the claims of stockholders and bondholders
  - Nonmarketed claims are the claims of the government and other potential stakeholders
- The overall value of the firm is unaffected by changes in capital structure
- The division of value between marketed claims and nonmarketed claims may be impacted by capital structure decisions

THE PECKING-ORDER THEORY

- Theory stating that firms prefer to issue debt rather than equity if internal financing is insufficient.
  - Rule 1: Use internal financing first
  - Rule 2: Issue debt next, new equity last
- The pecking-order theory is at odds with the tradeoff theory:
  - There is no target D/E ratio
  - Profitable firms use less debt
  - Companies like financial slack

OBSERVED CAPITAL STRUCTURE

- Capital structure does differ by industry
- Differences according to *Cost of Capital 2010 Yearbook by Ibbotson Associates, Inc.*
  - Lowest levels of debt
    - Drugs with 8.46% debt-to-equity
    - Computer equipment with 10.02% debt-to-equity
  - Highest levels of debt
    - Cable television with 193.88% debt-to-equity
    - Airlines with 177.19% debt-to-equity

WORK THE WEB EXAMPLE

- You can find information about a company's capital structure relative to its industry, sector and the S&P 500 at Reuters
- Click on the web surfer to go to the site
  - Choose a company and get a quote
  - Choose Financials

BANKRUPTCY PROCESS – PART I

- Business failure – business has terminated with a loss to creditors
- Legal bankruptcy – petition federal court for bankruptcy
- Technical insolvency – firm is unable to meet debt obligations
- Accounting insolvency – book value of equity is negative

BANKRUPTCY PROCESS – PART II

- Liquidation
  - Chapter 7 of the Federal Bankruptcy Reform Act of 1978
  - Trustee takes over assets, sells them and distributes the proceeds according to the absolute priority rule
- Reorganization
  - Chapter 11 of the Federal Bankruptcy Reform Act of 1978
  - Restructure the corporation with a provision to repay creditors

QUICK QUIZ

- Explain the effect of leverage on EPS and ROE
- What is the break-even EBIT, and how do we compute it?
- How do we determine the optimal capital structure?
- What is the optimal capital structure in the three cases that were discussed in this chapter?
- What is the difference between liquidation and reorganization?

ETHICS ISSUES

- Suppose managers of a firm know that the company is approaching financial distress.
  - Should the managers borrow from creditors and issue a large one-time dividend to shareholders?
  - How might creditors control this potential transfer of wealth?

COMPREHENSIVE PROBLEM

- Assuming perpetual cash flows in Case II - Proposition I, what is the value of the equity for a firm with following values?:
  - EBIT = $50 million
  - Tax rate = 40%
  - Debt = $100 million
  - Cost of debt = 9%
  - Unlevered cost of capital = 12%

CHAPTER 16

END OF CHAPTER