Fundamentals of Corporate Finance, 2/e

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Chapter 16:
Capital Structure Policy

Learning Objectives

1. DESCRIBE THE TWO MODIGLIANI AND MILLER PROPOSITIONS, THE KEY ASSUMPTIONS UNDERLYING THEM, AND THEIR RELEVANCE TO CAPITAL STRUCTURE DECISIONS. USE PROPOSITION 2 TO CALCULATE THE RETURN ON EQUITY.
2. DISCUSS THE BENEFITS AND COSTS OF USING DEBT FINANCING AND CALCULATE THE VALUE OF THE INCOME TAX BENEFIT ASSOCIATED WITH DEBT.
3. DESCRIBE THE TRADE-OFF AND PECKING ORDER THEORIES OF CAPITAL STRUCTURE CHOICE AND EXPLAIN WHAT THE EMPIRICAL EVIDENCE TELLS US ABOUT THESE THEORIES.

Learning Objectives

4. DISCUSS SOME OF THE PRACTICAL CONSIDERATIONS THAT MANAGERS ARE CONCERNED WITH WHEN THEY CHOOSE A FIRM'S CAPITAL STRUCTURE.

Capital Structure and Firm Value

- A firm's capital structure is the mix of financial securities used to finance its activities.
- The mix will always include common stock and will often include debt and preferred stock.
- The firm may have several classes of common stock, for example with different voting rights and possibly different claims on the cash flows available to stockholders.

Capital Structure and Firm Value

- The debt at a firm can be long term or short term, secured or unsecured, convertible or not convertible into common stock, and so on.
- Preferred stock can be cumulative or noncumulative and convertible or not convertible into common stock.
- The fraction of the total financing that is represented by debt is a measure of the financial leverage in the firm's capital structure.

Capital Structure and Firm Value

- A higher fraction of debt indicates a higher degree of financial leverage.
- The amount of financial leverage in a firm's capital structure is important because it affects the value of the firm.

Capital Structure and Firm Value

- THE OPTIMAL CAPITAL STRUCTURE
  - **Managers at a firm choose a capital structure so that the mix of securities making up the capital structure minimizes the cost of financing the firm's activities.**
  - **The capital structure that minimizes the cost of financing the firm's projects is also the capital structure that maximizes the total value of those projects and, therefore, the overall value of the firm.**

Capital Structure and Firm Value

- THE MODIGLIANI AND MILLER PROPOSITIONS
  - **M&M Proposition 1**

    Modigliani and Miller Proposition 1 states that the capital structure decisions a firm makes will have no effect on the value of the firm if:

    - *There are no taxes.*
    - *There are no information or transaction costs.*
    - *The real investment policy of the firm is not affected by its capital structure decisions.*

Capital Structure and Firm Value

- THE MODIGLIANI AND MILLER PROPOSITIONS
  - **M&M Proposition 1**

    The real investment policy of the firm includes the criteria that the firm uses in deciding which real assets (projects) to invest in.

    The market value of the debt plus the market value of the equity must equal the value of the cash flows produced by the firm's assets.

$$V_{Firm} = V_{Assets} = V_{Debt} + V_{equity} \qquad (16.1)$$

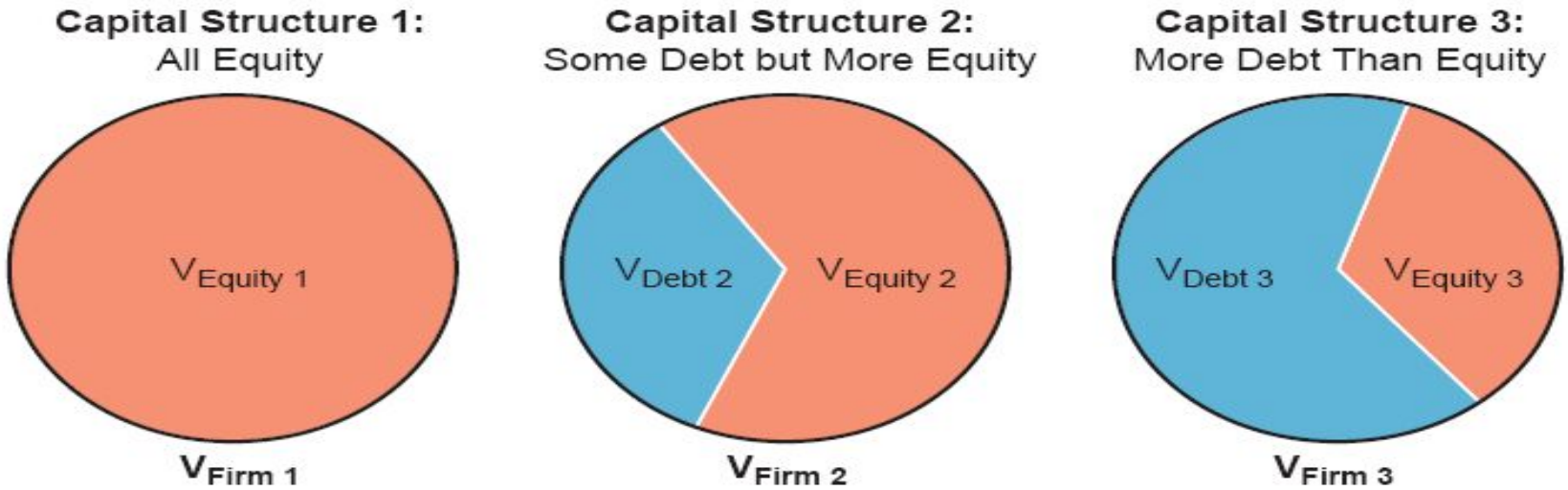
Capital Structure and Firm Value

- THE MODIGLIANI AND MILLER PROPOSITIONS
  - **M&M Proposition 1**

    The combined value of the equity and debt claims (represented by the present value of free cash flows, the firm's assets are expected to produce in the future) does not change when you change the capital structure of the firm if no one other than the stockholders and the debt holders are receiving cash flows.

    Such a change is called a financial restructuring, where a combination of financial transactions occur that change the capital structure of the firm without affecting its real assets.

Exhibit 16.1: Capital Structure and Firm Value under M&M Proposition 1



M & M Proposition 1 tells us that $V_{Firm\ 1} = V_{Firm\ 2} = V_{Firm\ 3}$

EXHIBIT 16.1

Capital Structure and Firm Value under M&M Proposition 1

The size of the pie represents the present value of the free cash flows that the assets of a firm are expected to produce in the future (V_{Firm}). The sizes of the slices reflect the value of the total cash flows that the debt holders (V_{Debt}) or stockholders (V_{Equity}) are entitled to receive for three different capital structures. Under the three conditions identified by M&M, the total value of the cash flows to the debt holders and stockholders does not change, regardless of which capital structure the firm uses.

Capital Structure and Firm Value

- THE MODIGLIANI AND MILLER PROPOSITIONS
  - **M&M Proposition 2**

    states that the cost of (required return on) a firm's common stock is directly related to the debt-to-equity ratio.

If a firm has one type of equity:

$$\text{WACC} = x_{\text{Debt}} k_{\text{Debt}} + x_{\text{cs}} k_{\text{cs}} \qquad (16.2)$$

If we rearrange equation 16.2, we have:

$$k_{cs} = k_{Assets} + \left(\frac{V_{Debt}}{V_{cs}}\right)(k_{Assets} - k_{Debt}) \qquad (16.3)$$

Capital Structure and Firm Value

- THE MODIGLIANI AND MILLER PROPOSITIONS
  - **M&M Proposition 2 - Eq. 16.3 reflects two sources of risk in cash flows to stockholders.**

    Business risk – It is associated with the characteristics of the firm's business activities.

    Financial risk - It is associated with the capital structure of the firm which reflects the effect that the firm's financing decisions have on the riskiness of the cash flows that the stockholders will receive. It is associated with required payments to a firm's lenders.

Exhibit 16.4: Illustrations of M&M Proposition 2

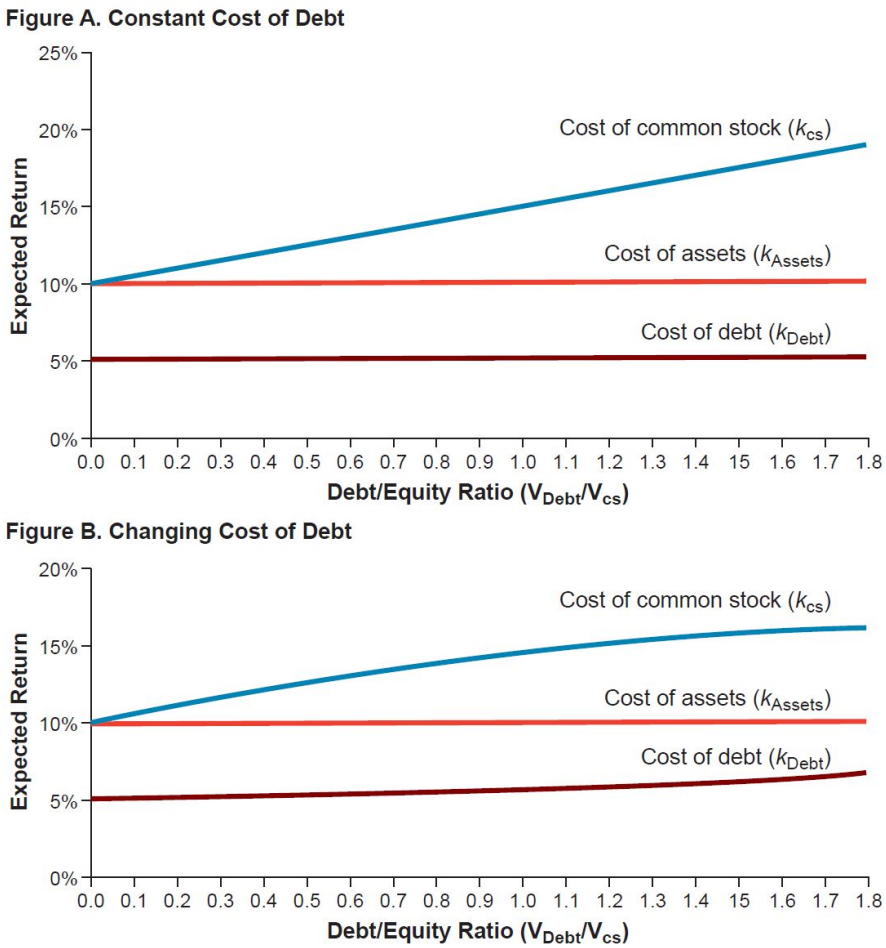


EXHIBIT 16.4
Illustrations of M&M Proposition 2

The costs of assets, common stock, and debt for different debt-to equity ratios. Figure A assumes that the cost of debt remains constant, and Figure B assumes that the cost of debt increases with leverage. The cost of assets, which is the return that investors require to compensate them for business risk, does not change with leverage. As M&M Proposition 2 tells us, the cost of common stock increases with leverage.

Exhibit 16.2: Relations between Business Risk, Financial Risk, and Total Equity Risk

EXHIBIT 16.2 **Relations between Business Risk, Financial Risk, and Total Equity Risk**

The total risk associated with the cash flows that stockholders are entitled to receive reflects the risk related to the firm's assets (business risk) and the risk related to the way those assets are financed (financial risk). (We assume here that net income is a reasonable measure of these cash flows.)

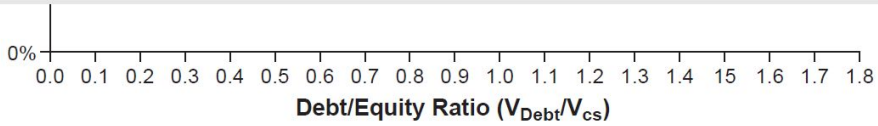
Revenue − Cost of goods sold	Business risk
Gross profit − Selling, general & admin. expenses	×
Operating profit − Interest expense	Financial risk
Earnings before tax − Income tax	=
Net income	Total equity risk

Exhibit 16.3: Illustration of Relations between Business Risk, Financial Risk, and Total Risk

EXHIBIT 16.3 **Illustration of Relations between Business Risk, Financial Risk, and Total Risk**

The exhibit shows how a decrease in revenue affects net income (total equity risk) for four different combinations of debt (financial risk) and operating leverage (business risk). In columns 1 and 2, we see the effect on a firm with no debt and low operating leverage; in columns 3 and 4, no debt and high operating leverage; in columns 5 and 6, debt and low operating leverage; and in columns 7 and 8, debt and high operating leverage. As you can see, total equity risk, represented by the percent drop in net income, is greater when operating leverage is higher (for example, compare columns 1 and 2 with columns 3 and 4) and when a firm has financial risk (for example, compare columns 1 and 2 with columns 5 and 6). Furthermore, financial risk magnifies operating risk (for example, compare columns 3 and 4 with columns 7 and 8).

	No Financial Risk				Financial Risk			
	Low Operating Leverage		High Operating Leverage		Low Operating Leverage		High Operating Leverage	
Column	1	2	3	4	5	6	7	8
Variable costs as a percent of total costs	80%		40%		80%		40%	
Interest expense	$0.00		$0.00		$15.00		$15.00	
	Before	After	Before	After	Before	After	Before	After
Revenue	$100.00	$80.00	$100.00	$80.00	$100.00	$80.00	$100.00	$ 80.00
− Cost of goods sold (VC)	60.00	48.00	30.00	24.00	60.00	48.00	30.00	24.00
Gross Profit	$ 40.00	$32.00	$ 70.00	$56.00	$ 40.00	$32.00	$ 70.00	$ 56.00
− Selling, general & admin. (FC)	15.00	15.00	45.00	45.00	15.00	15.00	45.00	45.00
Operating profits	$ 25.00	$17.00	$ 25.00	$11.00	$ 25.00	$17.00	$ 25.00	$ 11.00
− Interest expense	0.00	0.00	0.00	0.00	15.00	15.00	15.00	15.00
Earnings before tax	$ 25.00	$17.00	$ 25.00	$11.00	$ 10.00	$ 2.00	$ 10.00	−$4.00
− Income taxes (35%)	8.75	5.95	8.75	3.85	3.50	0.70	3.50	−1.40
Net income	$ 16.25	$11.05	$ 16.25	$ 7.15	$ 6.50	$ 1.30	$ 6.50	−$2.60
Percent change in net income		−32.0%		−56.0%		−80.0%		−140.0%



Capital Structure and Firm Value

- THE MODIGLIANI AND MILLER PROPOSITIONS
  - **M&M Proposition 2 example**

    After its restructuring, Millennium Motors will be financed with 20 percent debt and 80 percent common equity. The return on assets is 10 percent and the return on debt is 5 percent. What is the cost of equity for the firm?

$$k_{cs} = 0.10 + \left(\frac{0.2}{0.8}\right)(0.10 - 0.05) = 0.1125, \text{ or } 11.25\%$$

Capital Structure and Firm Value

- THE MODIGLIANI AND MILLER PROPOSITIONS
  - **What the M&M Propositions Tell Us**

    M&M analysis tells us exactly where we should look if we want to understand how capital structure affects firm value and the cost of equity. If financial policy matters, it must be because of:

    - *Taxes.*
    - *Information or transaction costs.*
    - *Capital structure choices that affect a firm's real investment policy.*

The Benefits and Costs of Using Debt

- THE BENEFITS OF DEBT
  - **Interest Tax Shield Benefit**

    The most important benefit from including debt in a firm's capital structure stems from the fact that firms can deduct interest payments for tax purposes but cannot deduct dividend payments.

    This makes it less costly to distribute cash to security holders through interest payments than through dividends.

Exhibit 16.5: Capital Structure and Firm Value with Taxes

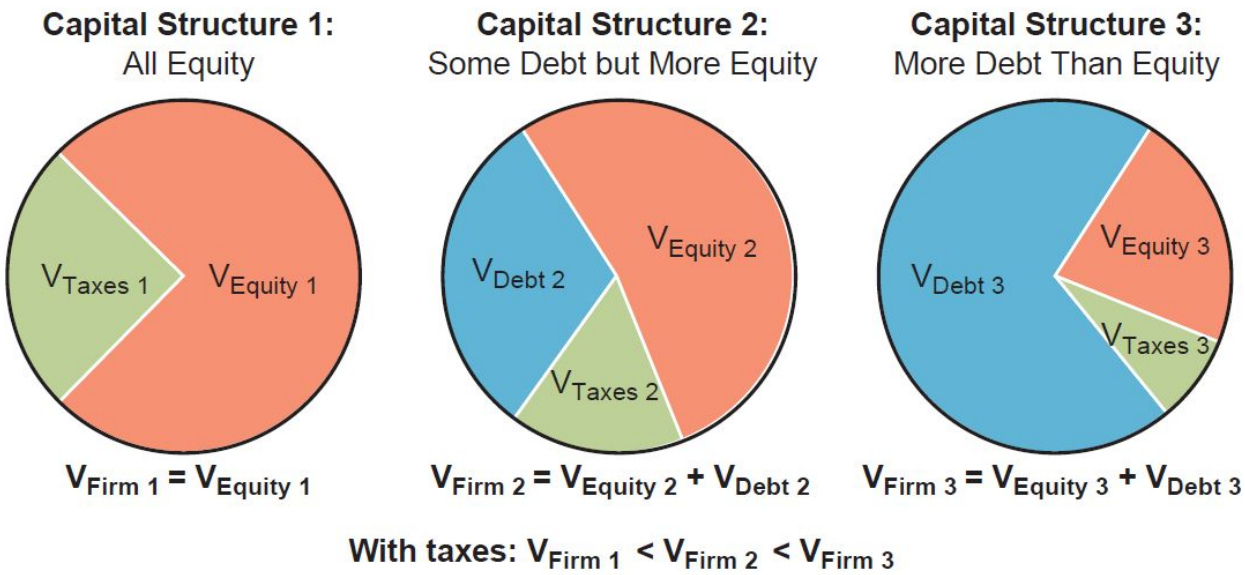


EXHIBIT 16.5

Capital Structure and Firm Value with Taxes

Leverage can increase the value of a firm when interest payments are tax deductible but dividend payments are not. The pie on the left represents a firm financed entirely with equity. The slice labeled $V_{Taxes\ 1}$ reflects the proportion of the cash flows from operations that this firm pays in taxes. The two pies to the right illustrate how the value of the cash flows paid in taxes decreases as leverage is increased. By reducing the fraction paid in taxes, leverage increases the value of the firm in these examples.

The Benefits and Costs of Using Debt

- THE BENEFITS OF DEBT
  - **Interest Tax Shield Benefit**

    The total dollar amount of interest paid each year, and therefore the amount that will be deducted from the firm's taxable income, is "$D \times k_{Debt}$".

    This will result in a reduction in taxes paid (the interest tax shield) of "$D \times k_{Debt} \times t$", where t is the firm's marginal tax rate that applies to the interest expense deduction.

The Benefits and Costs of Using Debt

- THE BENEFITS OF DEBT
  - **Interest Tax Shield Benefit**

    If this reduction will continue in perpetuity, the present value of the tax savings from debt, is:

$$V_{\text{Tax savings debt}} = PVA_{\infty} = \frac{CF}{i} = \frac{D \text{ x } k_{Debt} \text{ x } t}{i}$$

The Benefits and Costs of Using Debt

- THE BENEFITS OF DEBT
  - **Interest Tax Shield Benefit**

    Since the firm will benefit from the interest tax shield only if it is able to make the required interest payments, the cash savings associated with the tax shield are about as risky as the cash flow stream associated with the interest payments.

$$V_{\text{Tax-savings debt}} = D \times T \qquad (16.4)$$

The Benefits and Costs of Using Debt

- THE BENEFITS OF DEBT
  - **Effect of Debt Example**

    You are considering borrowing $1,000,000 at an interest rate of 6 percent for your pizza business. Your pizza business generates pretax cash flows of $300,000 each year and pays taxes at a rate of 25 percent. What is the value of your firm without debt, and how much would debt increase its value? What is WACC before and after restructuring?

    V_{Firm} = [$300,000 × (1 – 0.25)]/0.10 = $2,250,000

    Value of tax shield = $1,000,000 × 0.25 = $250,000

The Benefits and Costs of Using Debt

- THE BENEFITS OF DEBT
  - **Effect of Debt Example**

WACC before financial restructuring = k_{cs} = 10%

After restructuring:
Value of equity = \$2,500,000 - \$1,000,000 = \$1,500,000

After-tax cash flows to stockholders
= [\$300,000 - (\$1,000,000 × 0.06)] × (1 - 0.25) = \$180,000
k_{cs} = \$180,000/1,500,000 = 0.12, or 12 percent

WACC = (\$1,000,000/\$2,500,000)(0.06)(1 - 0.25) + (\$1,500,000 /\$2,500,000)(0.12)
= 0.09, or 9%.

The Benefits and Costs of Using Debt

- THE BENEFITS OF DEBT
  - **Interest Tax Shield Benefit**

    The perpetuity model assumes that

    - *The firm will continue to be in business forever.*
    - *The firm will be able to realize the tax savings in the years in which the interest payments are made (the firm's EBIT will always be at least as great as the interest expense).*
    - *The firm's tax rate will remain constant.*

Exhibit 16.6: How Firm Value Changes

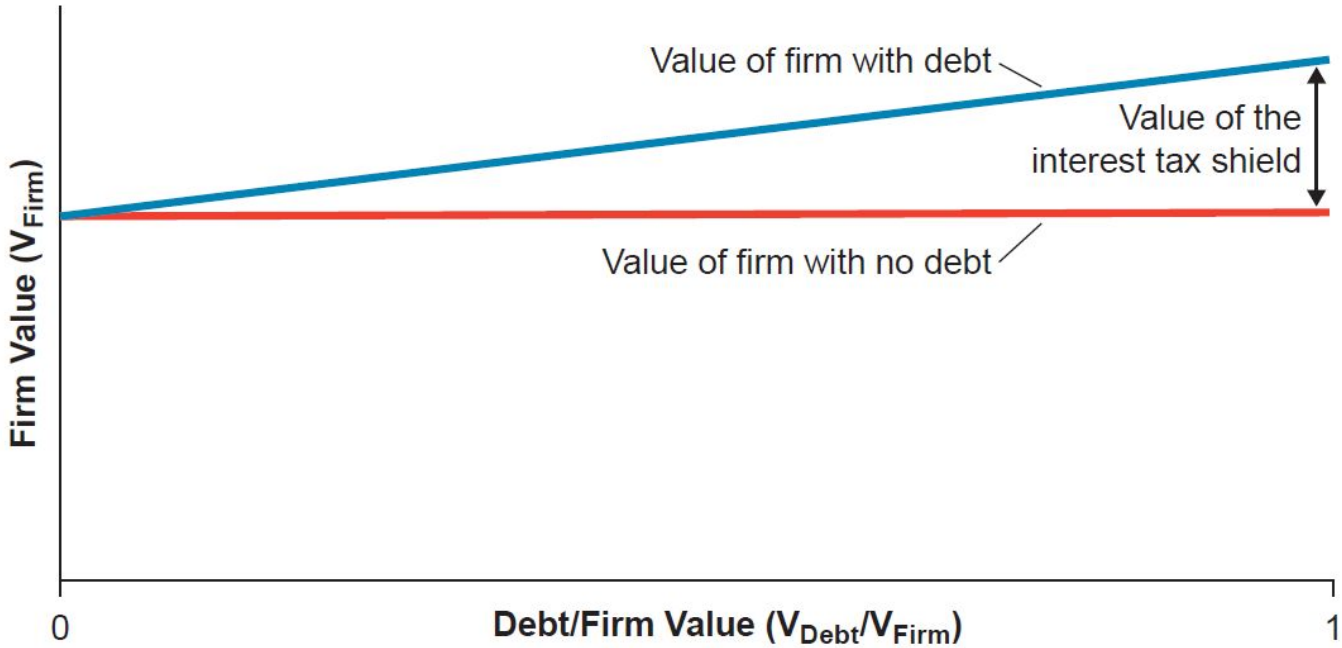


EXHIBIT 16.6

How Firm Value Changes with Leverage When Interest Payments Are Tax Deductible and Dividends Are Not

The value of a firm increases with leverage when interest payments are tax-deductible and dividend payments are not, and when the second and third M&M conditions—that there are no information or transaction costs and that the real investment policy of the firm is not affected by its capital structure decisions—apply.

Exhibit 16.7: The Effect of Taxes on the Firm Value and WACC of Millennium Motors

EXHIBIT 16.7 **The Effect of Taxes on the Firm Value and WACC of Millennium Motors**

The value of Millennium Motors increases and its WACC decreases with the amount of debt in the capital structure. The calculations assume that the cost of debt remains constant regardless of the amount of leverage and that the second and third M&M conditions apply.

	Total debt				
	$0	**$200**	**$400**	**$600**	**$800**
Cost of debt	5.00%	5.00%	5.00%	5.00%	5.00%
EBIT	$100.00	$100.00	$100.00	$100.00	$100.00
Interest expense	—	10.00	20.00	30.00	40.00
Earnings before taxes	$100.00	$ 90.00	$ 80.00	$ 70.00	$ 60.00
Taxes (35%)	35.00	31.50	28.00	24.50	21.00
Net income	$ 65.00	$ 58.50	$ 52.00	$ 45.50	$ 39.00
Dividends	$ 65.00	$ 58.50	$ 52.00	$ 45.50	$ 39.00
Interest payments	—	10.00	20.00	30.00	40.00
Payments to investors	$ 65.00	$ 68.50	$ 72.00	$ 75.00	$ 79.00
Value of equity	$650.00	$520.00	$390.00	$260.00	$130.00
Cost of equity	10.00%	11.25%	13.33%	17.50%	30.00%
Firm value	$650.00	$720.00	$790.00	$860.00	$930.00
WACC	10.00%	9.03%	8.23%	7.56%	6.99%

The Benefits and Costs of Using Debt

- THE BENEFITS OF DEBT
  - **Other Benefits**

    Underwriting spreads and out-of-pocket costs are more than three times as large for stock sales as they are for bond sales.

    Debt provides managers with incentives to focus on maximizing the cash flows that the firm produces since interest and principal payments must be made when they are due.

The Benefits and Costs of Using Debt

- THE BENEFITS OF DEBT
  - **Other Benefits**

    Because managers must make these interest and principal payments or face the prospect of bankruptcy, not making the payments can destroy a manager's career.

    Debt can be used to limit the ability of bad managers to waste the stockholders' money on things such as fancy jet aircraft, plush offices, and other negative-NPV projects that benefit the managers personally.

The Benefits and Costs of Using Debt

- THE COSTS OF DEBT
  - **Financial managers limit the amount of debt in their firms' capital structures in part because there are costs that can become quite substantial at high levels of debt.**
  - **At low levels of debt, the benefits are greater than the costs, and adding additional debt increases the overall value of the firm.**

The Benefits and Costs of Using Debt

- THE COSTS OF DEBT
  - **At some point, the costs begin to exceed the benefits, and adding more debt financing destroys firm value.**
  - **Financial managers want to add debt just to the point at which the value of the firm is maximized.**

The Benefits and Costs of Using Debt

- THE COSTS OF DEBT
  - **Bankruptcy costs**

    Also referred to costs of financial distress, are costs associated with financial difficulties that a firm might get into because it uses too much debt financing.

    The term bankruptcy cost is used rather loosely in capital structure discussions to refer to costs incurred when a firm gets into financial distress.

    Firms can incur bankruptcy costs even if they never actually file for bankruptcy.

The Benefits and Costs of Using Debt

- THE COSTS OF DEBT
  - **Bankruptcy costs**

    Direct Bankruptcy costs are out-of-pocket costs that a firm incurs as a result of financial distress.

    They include things such as fees paid to lawyers, accountants, and consultants.

    Indirect Bankruptcy costs are costs associated with changes in the behavior of people who deal with a firm in financial distress.

The Benefits and Costs of Using Debt

- THE COSTS OF DEBT
  - **Bankruptcy costs**

    Some of this firm's potential customers will decide to purchase a competitor's products because of:

    - *Concerns that the firm will not be able to honor its warranties.*
    - *Parts or service will not be available in the future.*

    Some customers will demand a lower price to compensate them for these risks.

The Benefits and Costs of Using Debt

- THE COSTS OF DEBT
  - **Agency Costs**

    Result from conflicts of interest between principals and agents where one party, known as the principal, delegates its decision-making authority to another party, known as the agent.

    The agent is expected to act in the interest of the principal, but agents sometimes have interests that conflict with those of the principal.

The Benefits and Costs of Using Debt

- THE COSTS OF DEBT
  - **Agency Costs**

    Stockholder-Manager Agency Costs – occur to the extent that if the incentives of the managers are not perfectly identical to those of the stockholders, managers will make some decisions that benefit themselves at the expense of the stockholders.

    Using debt financing provides managers with incentives to focus on maximizing the cash flows that the firm produces and limits the ability of bad managers to waste the stockholders' money on negative-NPV projects.

The Benefits and Costs of Using Debt

- THE COSTS OF DEBT
  - **Agency Costs**

    These benefits amount to reductions in the agency costs associated with the principal-agent relationship between stockholders and managers.

    While the use of debt financing can reduce agency costs, it can also increase these costs by altering the behavior of managers who have a high proportion of their wealth riding on the success of the firm, through their stockholdings, future income, and reputations.

The Benefits and Costs of Using Debt

- THE COSTS OF DEBT
  - **Agency Costs**

    The use of debt increases the volatility of a firm's earnings and the probability that the firm will get into financial difficulty.

    Increased risk causes managers to make more conservative decisions.

    Stockholder-Lender Agency Costs – occur when investors lend money to a firm and delegate authority to the stockholders to decide how that money will be used.

The Benefits and Costs of Using Debt

- THE COSTS OF DEBT
  - **Agency Costs**

    Lenders expect that the stockholders, through the managers they appoint, will invest the money in a way that enables the firm to make all of the interest and principal payments that have been promised.

    However, stockholders may have incentives to use the money in ways that are not in the best interests of the lenders.

The Benefits and Costs of Using Debt

- THE COSTS OF DEBT
  - **Agency Costs**

    Lenders know that stockholders have incentives to distribute some or all of the funds that they borrow as dividends and so they protect themselves against this sort of behavior by including provisions in the lending agreements that limit the ability of stockholders to pay dividends and conduct other behaviors.

    These protections are however, not foolproof.

The Benefits and Costs of Using Debt

- THE COSTS OF DEBT
  - **Agency Costs**

    One example of this behavior is known as the asset substitution problem, where once a loan has been made to a firm, the stockholders have an incentive to substitute less risky assets for more risky assets such as negative-NPV projects.

The Benefits and Costs of Using Debt

- THE COSTS OF DEBT
  - **Agency Costs**

    Another example behavior is known as the underinvestment problem and it occurs in a financially distressed firm when the value that is created by investing in a positive-NPV project is likely to go to the lenders instead of the stockholders; therefore the firm forgoes financing and undertaking the project.

Two Theories of Capital Structure

- THE TRADE-OFF THEORY
  - **The trade-off theory of capital structure says that managers choose a specific target capital structure based on the trade-offs between the benefits and the costs of debt.**
  - **The theory says that managers will increase debt to the point at which the costs and benefits of adding an additional dollar of debt are exactly equal because this is the capital structure that maximizes firm value.**

Exhibit 16.8: Trade-Off Theory of Capital Structure

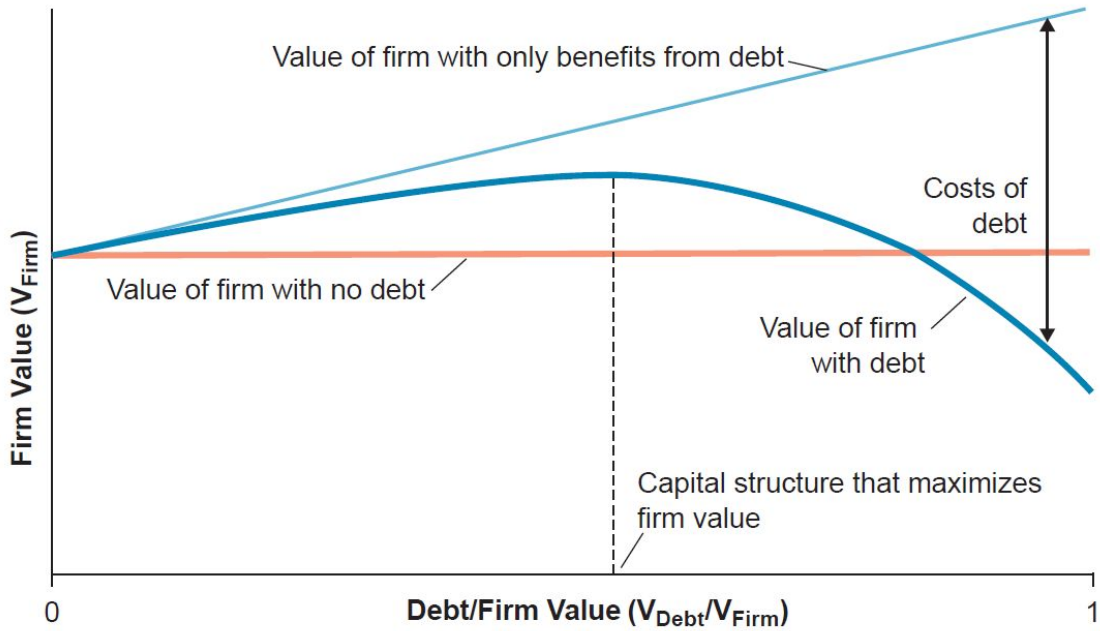


EXHIBIT 16.8
Trade-Off Theory of Capital Structure

The benefits and costs of debt combine to affect firm value. For low levels of debt, adding more debt to a firm's capital structure increases firm value because the additional (marginal) benefits are greater than the additional (marginal) costs. However, at some point, which is the point at which the value of the firm is maximized, the costs of adding more debt begin to outweigh the benefits, and the value of the firm decreases as more debt is added. The difference between the upward-sloping line and the curved line reflects the costs associated with debt.

Two Theories of Capital Structure

- THE PECKING ORDER THEORY
  - **The pecking order theory recognizes that different types of capital have different costs. This leads to a pecking order in the financing choices that managers make. Managers choose the least expensive capital first then move to increasingly costly capital when the lower-cost sources of capital are no longer available.**

Two Theories of Capital Structure

- THE PECKING ORDER THEORY
  - **Managers view internally generated funds, or cash on hand, as the cheapest source of capital.**
  - **Debt is more costly to obtain than internally generated funds but is still relatively inexpensive.**
  - **Raising money by selling stock is the most expensive.**

Two Theories of Capital Structure

- THE EMPIRICAL EVIDENCE
  - **When researchers compare the capital structures in different industries, they find evidence that supports the trade-off theory.**
  - **Some researchers argue that, on average, debt levels appear to be lower than the trade-off theory suggests they should be.**

Exhibit 16.9: Average Capital Structures for Selected Industries at the End of 2004

EXHIBIT 16.9 **Average Capital Structures for Selected Industries at the End of 2009**

This table shows average capital structures for different industries as of the end of 2009. The industries are arranged in order of declining debt-to-firm value ratios, where firm value is estimated as the market value of equity plus the book value of debt. Industries with a great many tangible assets, such as the building construction, air transportation, and gas, electric, and sanitary services industries, tend to have larger debt-to-firm value ratios.

Industry Description	Number of Firms	Debt/Firm Value
Building construction	23	0.52
Financial services	1,090	0.48
Air transportation	51	0.47
Paper and allied product manufacturers	56	0.42
Gas, electric, and sanitary services	225	0.40
Communications (including telephone companies)	231	0.38
Printing, publishing, and related industries	55	0.33
Transportation equipment (including automobiles)	127	0.31
Food stores	54	0.29
Furniture and fixture manufacturers	27	0.24
Food manufacturers	142	0.24
Electronic and other electrical equipment (including computer) manufacturers	516	0.18
Business service companies	667	0.15
Chemicals and allied products (including drug companies)	629	0.15

Source: Estimated by authors using data from the Standard and Poor's Compustat database.

Two Theories of Capital Structure

- THE EMPIRICAL EVIDENCE
  - **More general evidence also indicates that the more profitable a firm is, the less debt it tends to have, which is exactly opposite what the trade-off theory suggests we should see.**
  - **This evidence is consistent with the pecking order theory.**
  - **The pecking order theory is also supported by the fact that, in an average year, public firms actually repurchase more shares than they sell.**

Two Theories of Capital Structure

- THE EMPIRICAL EVIDENCE
  - **Both the trade-off theory and the pecking order theory offer some insights into how managers choose the capital structures for their firms but neither is able to explain all of the capital structure choices that we observe.**

Practical Considerations in Choosing a Capital Structure

- Managers don’t think only in terms of a trade-off or a pecking order but are also concerned with how their financing decisions will influence the practical issues that they must deal with when managing a business.
- Financial flexibility is an important consideration in many capital structure decisions.

Practical Considerations in Choosing a Capital Structure

- Managers must ensure that they retain sufficient financial resources in the firm to take advantage of unexpected opportunities as well as unforeseen problems.
- They try to manage their firms' capital structures in a way that limits the risk to a reasonable level.

Practical Considerations in Choosing a Capital Structure

- Managers think about leverage and the effect that interest expense has on the reported dollar value of net income.
- Managers consider control implications when choosing between equity and debt financing of the firm.