Chapter 17

Capital Structure: Limits to the Use of Debt
资本结构：债务运用的制约因素

Key Concepts and Skills

- Define the costs associated with bankruptcy
- Understand the theories that address the level of debt a firm carries
  - Tradeoff
  - Signaling
  - Agency Cost
  - Pecking Order
- Know real world factors that affect the debt to equity ratio

Costs of Financial Distress

- Bankruptcy risk versus bankruptcy cost 破产风险vs破产成本
- The possibility of bankruptcy has a negative effect on the value of the firm.
- However, it is not the risk of bankruptcy itself that lowers value.
- Rather, it is the costs associated with bankruptcy.
- It is the stockholders who bear these costs.

Costs of Financial Distress

	Knight Corporation		Day Corporation	
	Boom Times (prob. 50%)	Recession (prob. 50%)	Boom Times (prob. 50%)	Recession (prob. 50%)
Cash flow	$100	$50	$100	$50
Payment of interest and principal on debt	49	49	60	50
Distribution to stockholders	$ 51	$ 1	$ 40	$ 0

Day Corporation		
	Boom Times (prob. 50%)	Recession (prob. 50%)
Earnings	$100	$50
Debt repayment	60	35
Distribution to stockholders	$ 40	$ 0

Bankruptcy cost $15

Leverage increases the likelihood of bankruptcy. However, bankruptcy does not, by itself, lower the cash flows to investors. Rather, it is the costs associated with bankruptcy that lower cash flows.

Description of Financial Distress Costs

- Direct Costs
  - Legal and administrative costs
  - “Accountants pore over fiscal ledgers at $325 an hour. Lawyers toil into the night—at $385 an hour. Financial advisers from one of the nation’s most prominent investment houses labor for the taxpayers at $150,000 a month. Clerks stand by the photocopy machines, running up bills that sometimes exceed $3,000.” -- *Los Angeles Times*
- Indirect Costs
  - Sales are frequently lost because of both fear of impaired service and loss of trust
  - “75 percent of Americans would not purchase an automobile from a bankrupt company because the company might not honor the warranty, and it might be difficult to obtain replacement parts.”
  - Though these costs clearly exist, it is quite difficult to measure them.

Agency Costs 代理成本

- When a firm has debt, conflicts of interest arise between stockholders and bondholders. Because of this, stockholders are tempted to pursue selfish strategies
- These conflicts of interest, which are magnified when financial distress is incurred, impose agency costs on the firm
  - Selfish Strategy 1: Incentive to take large risks 冒高风险的动机
  - Selfish Strategy 2: Incentive toward underinvestment 投资不足的动机
  - Selfish Strategy 3: Milking the property 撇脂
- These strategies are costly because they will lower the market value of the whole firm.

Selfish Strategy 1: Take Risks

Value of Entire Firm if Low-Risk Project Is Chosen

	Probability	Value of Firm	=	Stock	+	Bonds
Recession	.5	$100	=	$ 0	+	$100
Boom	.5	200	=	100	+	100

Value of Entire Firm if High-Risk Project Is Chosen

	Probability	Value of Firm	=	Stock	+	Bonds
Recession	.5	$ 50	=	$ 0	+	$ 50
Boom	.5	240	=	140	+	100

Given the firm's present levered state, stockholders will select the high-risk project, even though the high-risk project has a lower NPV.

Selfish Strategy 2: Underinvestment

	Firm without Project		Firm with Project Costing $1,000	
	Boom	Recession	Boom	Recession
Firm cash flows	$5,000	$2,400	$6,700	$4,100
Bondholders' claim	4,000	2,400	4,000	4,000
Stockholders' claim	$1,000	$ 0	$2,700	$ 100

- The project's cost is $1,000. Assume that the project generates cash flow of $1,700 in either state.
- The expected value of the stockholders' interest without the project is $500.The expected value with the project is $1,400.
- The stockholders' interest rises by only $900 (= $1,400 - $500) while costing $1,000.

Selfish Strategy 3: Milking the Property

- Liquidating dividends
  - Suppose our firm paid out a $200 dividend to the shareholders. This leaves the firm insolvent, with nothing for the bondholders, but plenty for the former shareholders.
  - Such tactics often violate bond indentures.
- Increase perquisites to shareholders and/or management
- Who pays for the cost of selfish investment strategies?

  Rational bondholders know that when financial distress is imminent, they cannot expect help from stockholders. Rather, stockholders are likely to choose investment strategies that reduce the value of the bonds. Bondholders protect themselves accordingly by raising the interest rate that they require on the bonds.

Can Costs of Debt Be Reduced? 能够降低债务成本吗？

Protective Covenants 保护性条款

- A negative covenant limits or prohibits actions that the company may take. Here are some typical negative covenants:

1. Limitations are placed on the amount of dividends a company may pay.
2. The firm may not pledge any of its assets to other lenders.
3. The firm may not merge with another firm.
4. The firm may not sell or lease its major assets without approval by the lender.
5. The firm may not issue additional long-term debt.

- A positive covenant specifies an action that the company agrees to take or a condition the company must abide by. Here are some examples:

1. The company agrees to maintain its working capital at a minimum level.
2. The company must furnish periodic financial statements to the lender.

Debt Consolidation 债务合并:

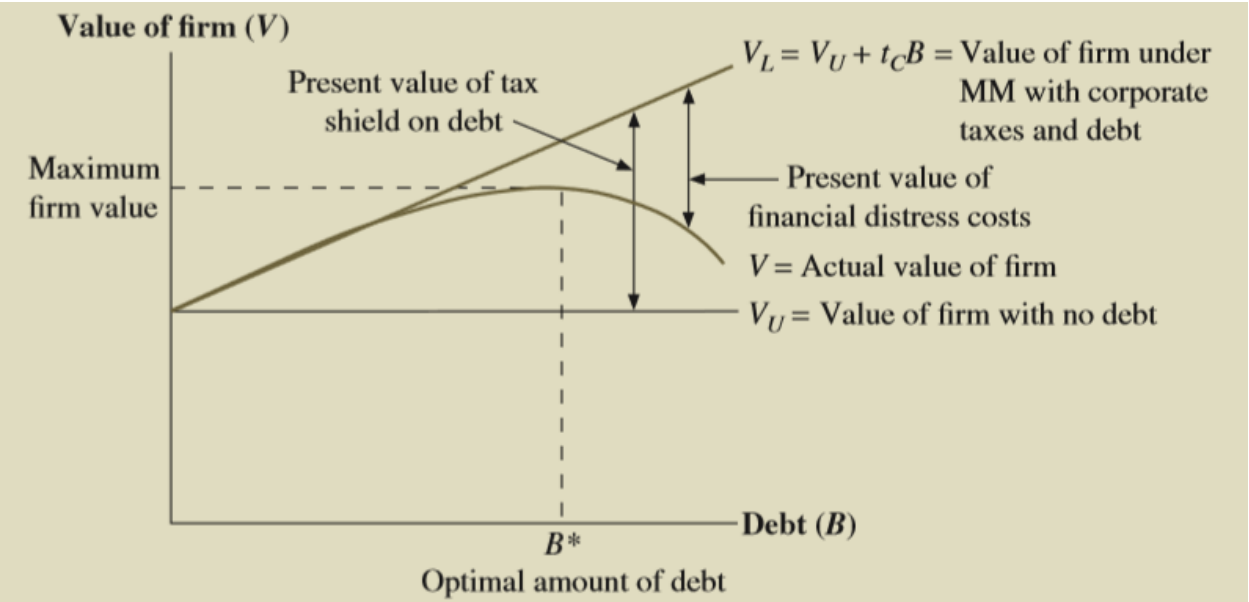
- If we minimize the number of parties, contracting costs fall

•Bond covenants, even if they reduce flexibility, can increase the value of the firm

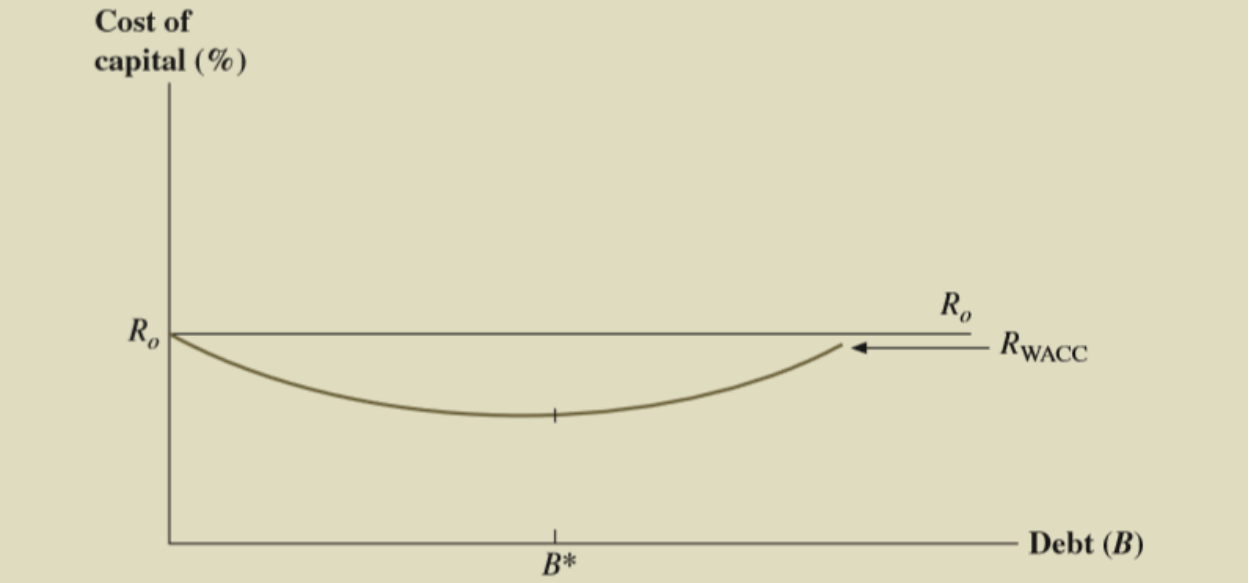
Tax Effects and Financial Distress

- There is a trade-off between the tax advantage of debt and the costs of financial distress.
- The implication is that there is an optimal amount of debt for any individual firm.
- It is difficult to express this with a precise and rigorous formula.

Tax Effects and Financial Distress

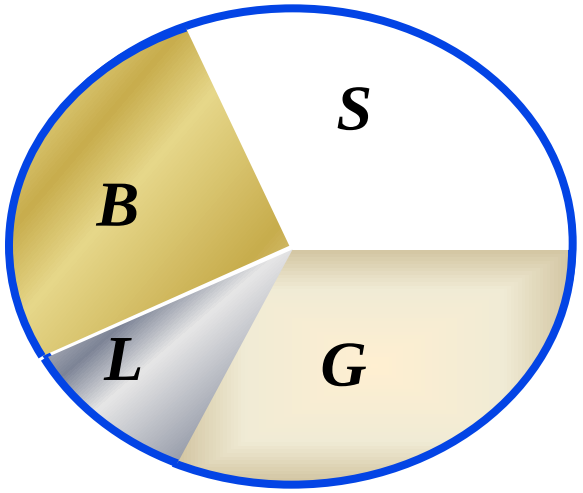


The tax shield increases the value of the levered firm. Financial distress costs lower the value of the levered firm. The two offsetting factors produce an optimal amount of debt at B^*.



The Pie Model

- Taxes and bankruptcy costs can be viewed as just another claim on the cash flows of the firm.
- Let *G* and *L* stand for payments to the government and bankruptcy lawyers, respectively.
- $V_T = S + B + G + L$

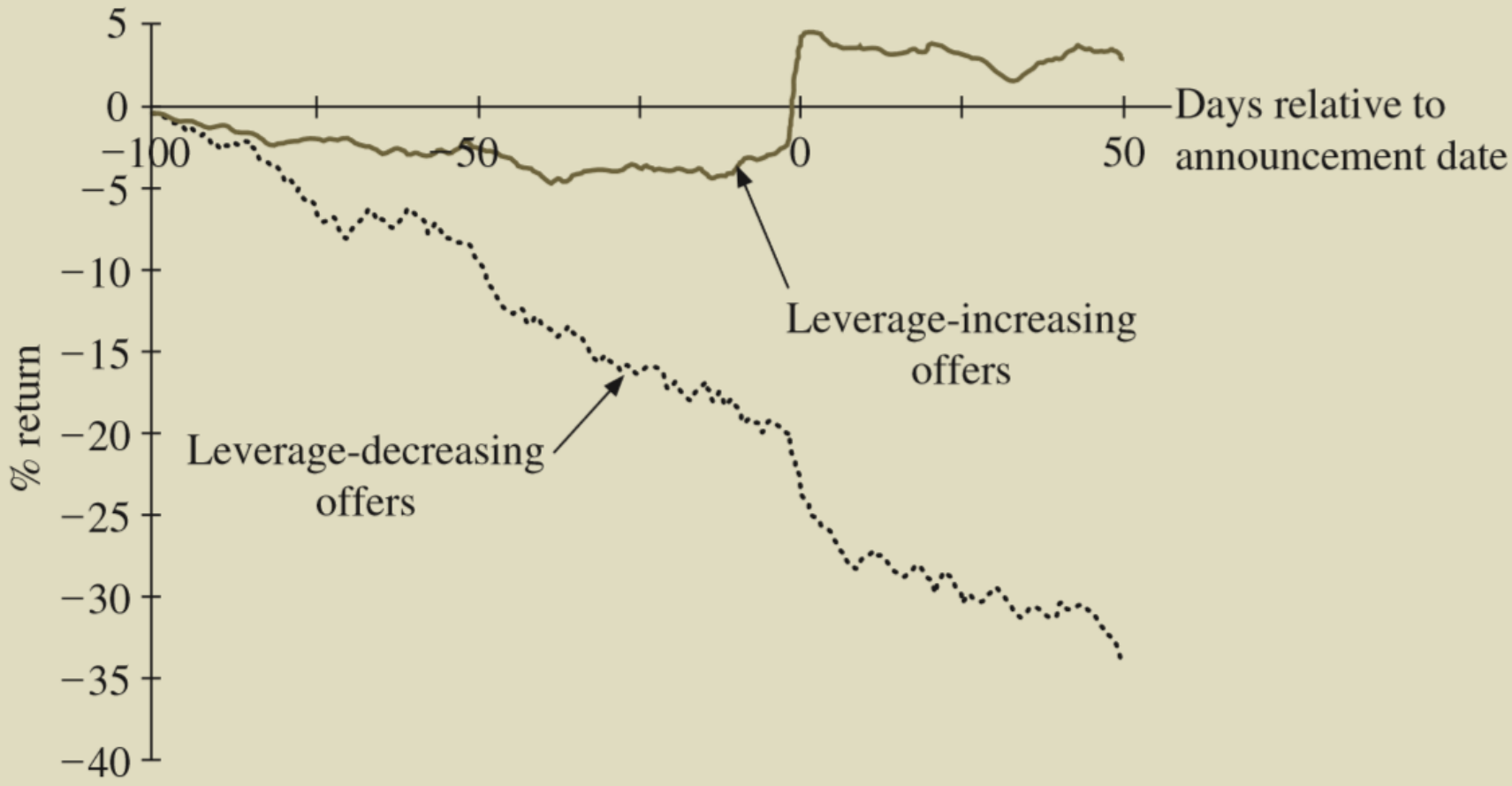


- *The essence of the M&M intuition is that V_T depends on the cash flow of the firm; capital structure just slices the pie into slices. Capital structure does not affect the total value, V_T*

Signaling

- The firm's capital structure is optimized where the marginal subsidy to debt equals the marginal cost.
- Investors view debt as a signal of firm value.
  - Firms with low anticipated profits will take on a low level of debt.
  - Firms with high anticipated profits will take on a high level of debt.
- Rational investors are likely to infer a higher firm value from a higher debt level. Thus, these investors are likely to bid up a firm's stock price after the firm has issued debt.
- A manager that takes on more debt than is optimal in order to fool investors will pay the cost in the long run.

Signaling



Exchange offers change the debt–equity ratios of firms. The graph shows that stock prices increase for firms whose exchange offers increase leverage. Conversely, stock prices decrease for firms whose offers decrease leverage.

SOURCE: K. Shah, "The Nature of Information Conveyed by Pure Capital Structure Changes," *Journal of Financial Economics* 36 (August 1994).

Agency Cost of Equity

- An individual will work harder for a firm if she is one of its owners than if she is just an employee. In addition, the individual will work harder if she owns a large percentage of the company than if she owns a small percentage
- Ms. Pagell is an owner–entrepreneur running a computer services firm worth $1 million. She currently owns 100 percent of the firm. Because of the need to expand, she must raise another $2 million. She can either issue $2 million of debt at 12 percent interest or issue $2 million in stock

	Debt Issue				Stock Issue			
Work Intensity	Cash Flow	Interest	Cash Flow to Equity	Cash Flow to Ms. Pagell (100% of equity)	Cash Flow	Interest	Cash Flow to Equity	Cash Flow to Ms. Pagell (33 1/3% of equity)
6-hour days	$300,000	$240,000	$ 60,000	$ 60,000	$300,000	0	$300,000	$100,000
10-hour days	400,000	240,000	160,000	160,000	400,000	0	400,000	133,333

1. She is likely to work harder if she issues debt. In other words, she has more incentive to shirk if she issues equity (160000-60000)-(133333-100000)
2. She is likely to obtain more perquisites (a big office, a company car, more expense account meals) if she issues stock. If she is a one-third stockholder, two-thirds of these costs are paid for by the other stockholders
3. Finally, she is more likely to take on capital budgeting projects with negative net present values. Managerial salaries generally rise with firm size

Agency Cost of Equity

- While managers may have motive to partake in perquisites, they also need opportunity. Free cash flow provides this opportunity.
- The *free cash flow hypothesis* says that an increase in dividends should benefit the stockholders by reducing the ability of managers to pursue wasteful activities.
- The *free cash flow hypothesis* also argues that an increase in debt will reduce the ability of managers to pursue wasteful activities more effectively than dividend increases.

The Pecking-Order Theory （优序融资理论）

- Asymmetric information: the manager must know more about his firm’s prospects than does the typical investor.
- 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
    - Because firms know that they will have to fund profitable projects at various times in the future, they accumulate cash today. They are then not forced to go to the capital markets when a project comes up.

Personal Taxes

- Individuals, in addition to the corporation, must pay taxes. Thus, personal taxes must be considered in determining the optimal capital structure.
- Dividends face double taxation (firm and shareholder), which suggests a stockholder receives the net amount:
    - $(1-T_C) \times (1-T_S)$
- Interest payments are only taxed at the individual level since they are tax deductible by the corporation, so the bondholder receives:
    - $(1-T_B)$

Personal Taxes

- If $T_S = T_B$ then the firm should be financed primarily by debt (avoiding double tax).
- The firm is indifferent between debt and equity when:

$$(1-T_C) \times (1-T_S) = (1-T_B)$$

Personal Taxes

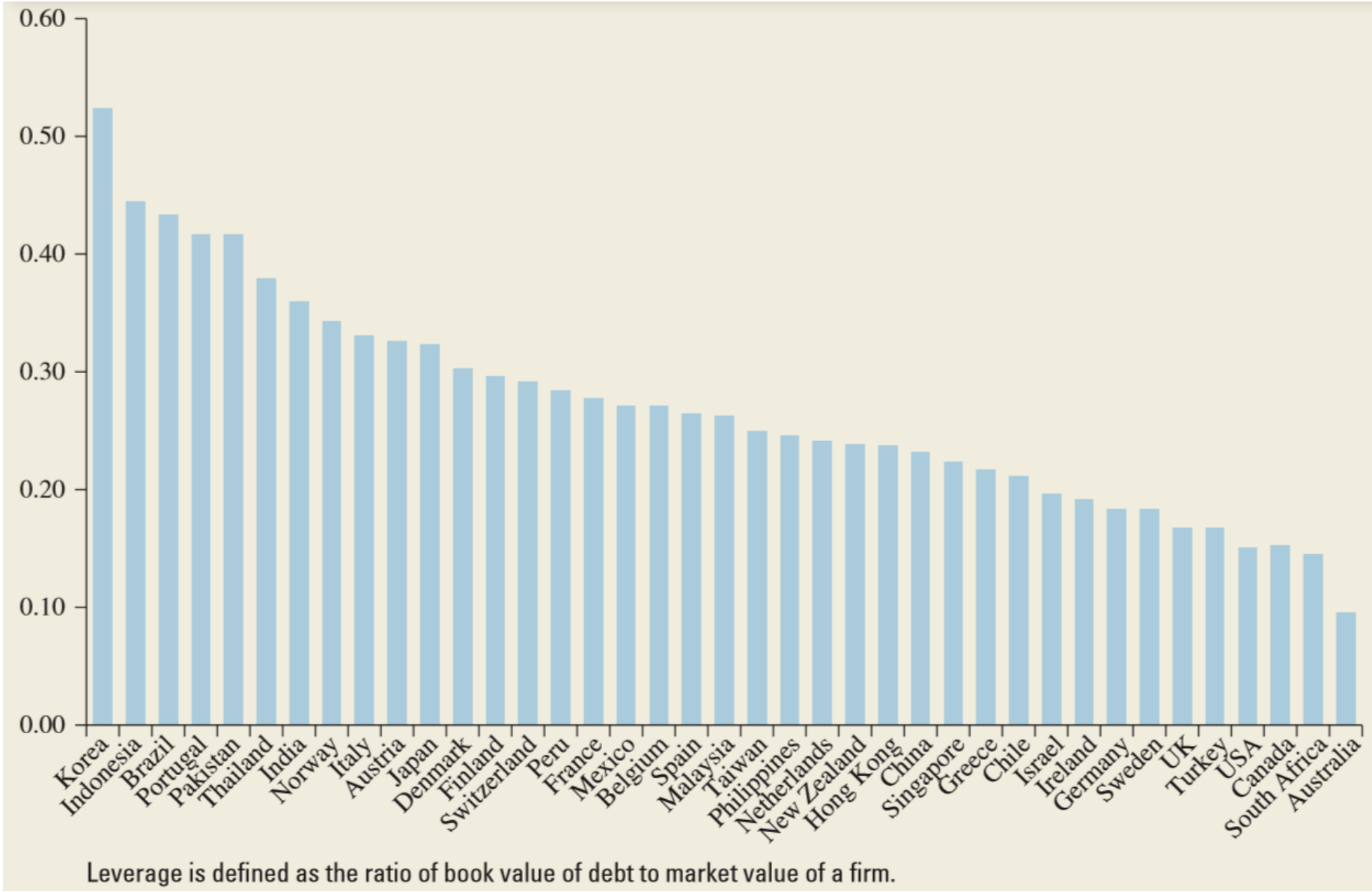
What should companies do in the real world?

- As of 2011, the corporate tax rate was 35 percent. For investors in the highest marginal tax bracket, interest income was also taxed at 35 percent. Investors in this highest bracket faced a 15 percent tax rate on dividends.
- Firms can repurchase shares with excess cash instead of paying a dividend. Although capital gains are also taxed at a maximum of 15 percent, the shareholder pays a capital gains tax only on the gain from sale, not on the entire proceeds from the repurchase. Thus, the effective tax rate on capital gains is actually lower than 15 percent. Because firms both pay dividends and repurchase shares, the effective personal tax rate on stock distributions must be below 15 percent.

How Firms Establish Capital Structure

- Most corporations have low Debt-Asset ratios.
- Changes in financial leverage affect firm value.
  - Stock price increases with leverage and vice-versa; this is consistent with M&M with taxes.
  - Another interpretation is that firms signal good news when they lever up.
- There are differences in capital structure across industries.
- There is evidence that firms behave as if they had a target Debt-Equity ratio.
- Capital structures of individual firms can vary significantly over time.

Median Leverage Ratio of Sample Firms in 39 Different Countries (1991–2006), source: Fan et al. (2010)



Capital Structure Ratios for Selected U.S. Nonfinancial Industries (medians), Five-Year Average, source: Ibbotson 2011 Cost of Capital Yearbook

	Debt as a Percentage of the Market Value of Equity and Debt (Industry Medians)
High Leverage	
Radio and television broadcasting stations	59.60
Air transport	45.89
Hotels and motels	45.55
Building construction	42.31
Natural gas distribution	33.11
Low Leverage	
Electronic equipment	10.58
Computers	9.53
Educational services	8.93
Drugs	8.79
Biological products	8.05

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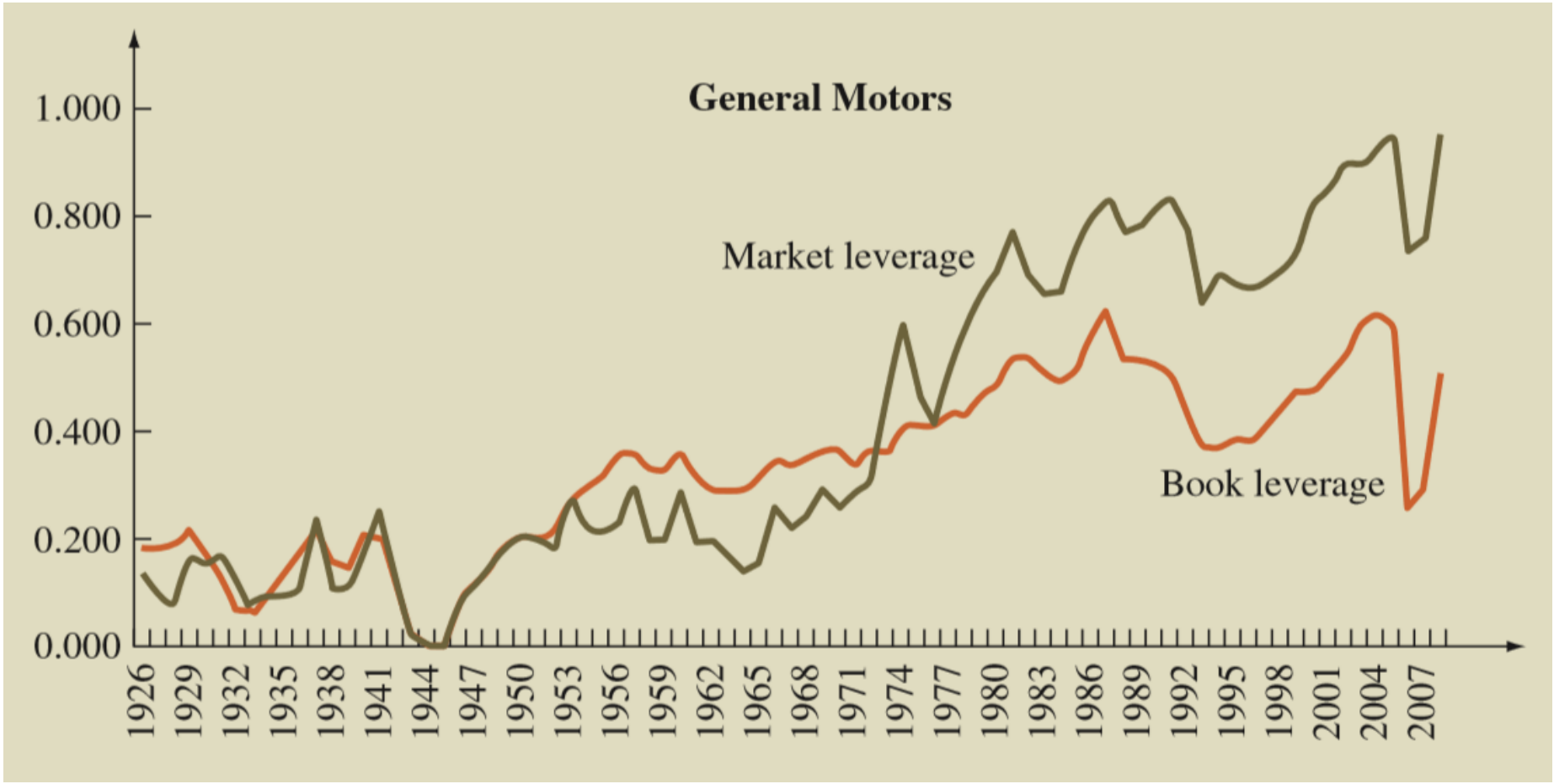
Leverage Ratios of General Motors, source: DeAngelo and Roll (2011)



Factors in Target D/E Ratio

- Taxes
  - Since interest is tax deductible, highly profitable firms should use more debt (i.e., greater tax benefit).
- Types of Assets
  - The costs of financial distress depend on the types of assets the firm has.
- Uncertainty of Operating Income
  - Even without debt, firms with uncertain operating income have a high probability of experiencing financial distress.
- Pecking Order and Financial Slack
  - Theory stating that firms prefer to issue debt rather than equity if internal financing is insufficient.

Quick Quiz

- What are the direct and indirect costs of bankruptcy?
- Define the “selfish” strategies stockholders may employ in bankruptcy.
- Explain the tradeoff, signaling, agency cost, and pecking order theories.
- What factors affect real-world debt levels?