How Much Should a Corporation Borrow?

Corporate Taxes

The interest of debt that the company pays is a **tax-deductible** expense. Thus the return to bondholders escapes taxation at the corporate level.

Some assumptions:

- The debt of the firm is fixed and permanent.

→ The company commits to refinance its present debt obligations when they mature and to keep rolling over its debt obligations indefinitely.

- The risk of the cash flows generated by tax shield every year is likely to be less than the risk of the operating assets of the firm
- The tax shields depend only on the corporate tax rate and on the firm's ability to earn enough to cover interest payments. The corporate tax rate has been pretty stable.
- The ability of the firm to earn its interest payments must be reasonably sure.

The risk of the tax shields is the **same** as that of the interest payments generating them.

$$Interest\ payment = return\ on\ debt \times amount\ borrowed = r_D \times D$$

$$PV(tax\ shield) = \frac{corporate\ tax\ rate \times interest\ payment}{expected\ return\ on\ debt} = \frac{T_c r_D D}{r_D} = T_c D$$

In this example, we assume that the amount of debt is fixed and stable over time.We use r_D as the discount rate to calculate PV of tax shield, to match the riskiness of interest payment.

$PV(tax\ shield)$ is less if the firm does not plan to borrow a permanent fixed amount, or if it may not have enough taxable income to use the interest tax shields.

How Do Interest Tax Shields Contribute to the Value of Stockholders' Equity?

TABLE 18.3 Normal and expanded market value balance sheets. In a normal balance sheet, assets are valued after tax. In the expanded balance sheet, assets are valued pretax, and the value of the government's tax claim is recognized on the right-hand side. Interest tax shields are valuable because they reduce the government's claim.

Normal Balance Sheet (Market Values)	
Asset value (present value of after-tax cash flows)	Debt
	Equity
Total assets	Total value
Expanded Balance Sheet (Market Values)	
Pretax asset value (present value of pretax cash flows)	Debt
	Government's claim (present value of future taxes)
	Equity
Total pretax assets	Total pretax value

*The table above shows an expanded balance sheet with **pretax** asset value on the left and the value of the government's tax claim recognized as a liability on the right.*

MM reveals that the value of the pie—in this case *pretax* asset value—is not changed by slicing.

The firm can reduce the size of the government's slice to make stockholders better off, by borrowing money for instance.

The *after-tax* value of the firm (the sum of its debt and equity values as shown in a normal market value balance sheet) **goes up** by PV(tax shield).

Recasting Johnson & Johnson's Capital Structure

Book Values			
Net working capital	$ 36,991	$ 13,152	Long-term debt
Long-term assets	72,124	19,372	Other long-term liabilities
		76,591	Equity
Total net assets	$109,115	$109,115	Total value
Market Values			
Net working capital	$ 36,991	$ 13,152	Long-term debt
PV interest tax shield	4,603	19,372	Other long-term liabilities
Long-term assets	290,530	299,600	Equity
Total net assets	$332,124	$332,124	Total value

TABLE 18.4A Simplified balance sheets for Johnson & Johnson, September 2014 (figures in millions).

Notes:
1. Market value is equal to book value for net working capital, long-term debt, and other long-term liabilities. Market value of equity = number of shares times closing price for September 2014. The difference between the market and book values of long-term assets is equal to the difference between the market and book values of equity.
2. PV interest tax shield assumes fixed, perpetual debt, with a 35% tax rate.

Book Values			
Net working capital	$ 36,991	$ 23,152	Long-term debt
Long-term assets	72,124	19,372	Other long-term liabilities
		66,591	Equity
Total net assets	$109,115	$109,115	Total value
Market Values			
Net working capital	$ 36,991	$ 23,152	Long-term debt
PV interest tax shield	8,103	19,372	Other long-term liabilities
Long-term assets	290,530	293,100	Equity
Total net assets	$335,624	$335,624	Total value

TABLE 18.4B Balance sheets for Johnson & Johnson with additional $10 billion of long-term debt substituted for stockholders' equity (figures in millions).

Note the difference between the two tables above and the footnote of TABLE 18.4A.

MM and Taxes

New proposition 1:

$$Value\ of\ firm = value\ if\ all\_equity\_financed + PV(tax\ shield)$$

In the special case of fixed, permanent debt:

$$Value\ of\ firm = value\ if\ all\_equity\_financed + T_c D$$

Several reasons why the calculations above overstate the value of interest tax shields

- It's wrong to think of debt as fixed and perpetual; a firm's ability to carry debt **changes** over time as profits and firm value fluctuate.
- Many firms face marginal tax rates **less than 35%**.
- Interest tax shields cannot be used unless there will be **future profits to shield**—and no firm can be absolutely sure of that.

Two possible explanations:

- Perhaps a fuller examination of the U.S. system of corporate *and personal* taxation will uncover a tax disadvantage of corporate borrowing, offsetting the present value of the interest tax shield.
- Perhaps firms that borrow incur *other costs*—bankruptcy costs, for example.

Corporate and Personal Taxes

The firm should try to minimize the present value of **all taxes** paid on corporate income. "All taxes" include *personal* taxes paid by bondholders and stockholders.

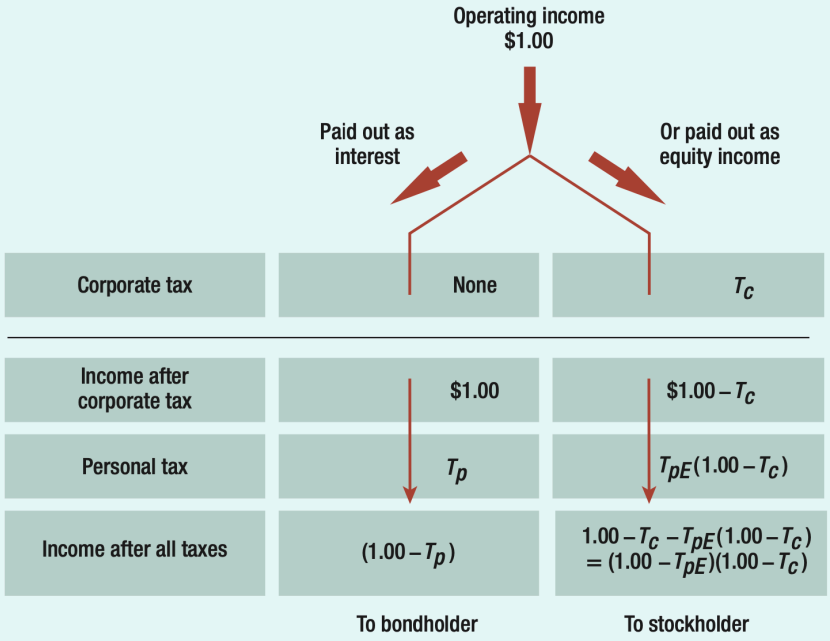

FIGURE 18.1

The firm's capital structure determines whether operating income is paid out as interest or equity income. Interest is taxed only at the personal level. Equity income is taxed at both the corporate and the personal levels. However, T_{pE}, the personal tax rate on equity income, can be less than T_p, the personal tax rate on interest income.

- T_p: *the personal tax rate on interest*
- T_{pE}: *the effective personal tax rate on equity income*

  → *can be well **below** T_p, depending on the mix of dividends and capital gains realized by shareholders; capital gains taxes can be deferred until shares are sold, so the top **effective** capital gains rate is usually less*

The firm's objective should be to arrange its capital structure to **maximize after-tax income**.

Corporate borrowing is better if $(1-T_p)$ is **more** than $(1-T_{pE}) \times (1-T_c)$.

$$Relative\ tax\ advantage\ of\ debt = \frac{1-T_p}{(1-T_{pE})(1-T_c)}$$

Two special cases:

1. $T_{pE} = T_p \rightarrow$ the relative advantage depends only on the *corporate rate*

   $$Relative\ advantage = \frac{1}{1-T_c}$$

   The tax advantage of corporate borrowing is exactly as MM calculated it.

2. $1 - T_p = (1 - T_{pE})(1 - T_c) \rightarrow$ corporate and personal taxes cancel to make debt policy irrelevant

   This case can happen only if T_c, the corporate rate, is *less* than the personal rate T_p *and* if T_{pE}, the effective rate on equity income, is *small*.

Costs of Financial Distress

Financial distress occurs when promises to creditors are broken or honored with difficulty. Sometimes financial distress leads to bankruptcy. Sometimes it only means skating on thin ice.

The consequences of financial distress:

- Sometimes financial distress leads to bankruptcy.
- Sometimes financial distress forces the firm to reduce investment, which may diminish shareholder's value.
- Sometimes the firm is reorganized and taken over by another company.

Investors know that levered firms may fall into financial distress, and they worry about it. That worry is reflected in the current market value of the levered firm's securities.

$$Value\ of\ firm = value\ if\ all\_equity\_financed + PV(tax\ shield) - PV(costs\ of\ financial\ distress)$$

The costs of financial distress depend on **the probability of distress** and **the magnitude of costs** encountered if distress occurs.

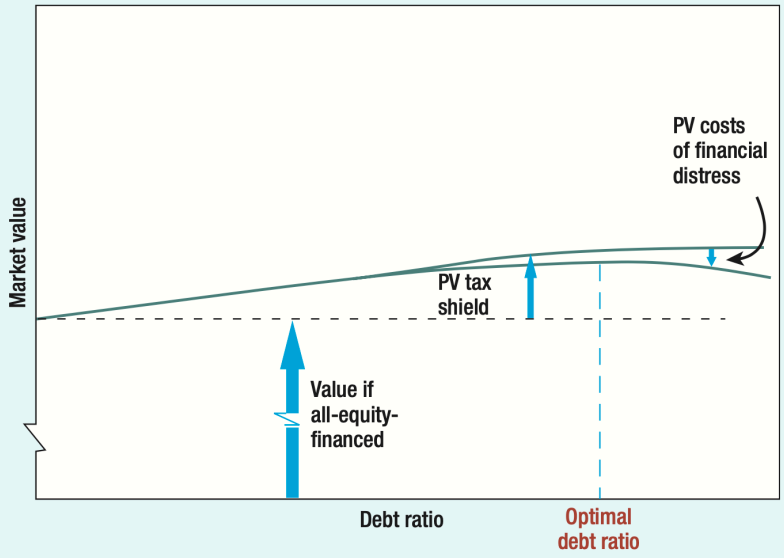

FIGURE 18.2

The value of the firm is equal to its value if all-equity-financed plus PV tax shield minus PV costs of financial distress. According to the trade-off theory of capital structure, the manager should choose the debt ratio that maximizes firm value.

How the trade-off between the tax benefits and the costs of distress could determine optimal capital structure.

The trade-off theory of capital structure:

- $PV(tax\ shield)$ initially **increases** as the firm borrows more. At moderate debt levels the probability of financial distress is trivial, and so $PV(cost\ of\ financial\ distress)$ is **small** and tax advantages dominate.
- At some point the probability of financial distress **increases rapidly** with additional borrowing; the costs of distress begin to take a substantial bite out of firm value. Also, if the firm can't be

sure of profiting from the corporate tax shield, the tax advantage of additional debt is likely to **dwindle** and eventually disappear.
- The theoretical optimum is reached when the present value of tax savings due to further borrowing is just offset by increases in the present value of costs of distress.

Summary of costs of financial distress

- Costs arising from bankruptcy or distorted business decisions before bankruptcy.
- *Direct cost*: legal and administrative costs when bankruptcy does occur
- *Indirect cost*: low liquidating price; limitations imposed by debt holders that may reduce investments in the firm

Costs of Financial Distress are different from agency costs.

Bankruptcy Costs

Corporate bankruptcies occur when stockholders exercise their **right to default**.

The right to default is valuable; when a firm gets into trouble, limited liability allows stockholders simply to walk away from it, leaving all its troubles to its creditors. The former creditors become the new stockholders, and the old stockholders are left with nothing.

Stockholders in corporations automatically get *limited liability.*

Bankruptcy has no necessary connection with financing. It is merely a legal mechanism for allowing creditors to take over when the decline in the value of assets triggers a default. *Bankruptcy costs* are the costs of using this mechanism.

Bankruptcy is the **result** of the decline in value.

The costs of bankruptcy come out of **stockholders'** pockets.

Creditors foresee the costs and foresee that **they** will pay them if default occurs, so they demand compensation in advance in the form of higher payoffs when the firm does *not* default, that is a **higher promised interest rate**. This reduces the possible payoffs to stockholders and reduces the present market value of their shares.

Direct versus Indirect Costs of Bankruptcy

Consent of the bankruptcy court is required for many routine business decisions, such as the sale of assets or investment in new equipment.

Sometimes the bankruptcy court is so anxious to maintain the firm as a going concern that it allows the firm to engage in negative-NPV activities until it is *administratively* insolvent: There was almost nothing for creditors, and the company was running out of cash to pay legal expenses.

Creditors may also shy away from bankruptcy because they worry about violations of absolute priority. *Absolute priority* means that creditors are paid in full before stockholders receive a penny.

Debt and Incentives

Bondholders' and shareholders, interest may be in conflict in some respects. Financial distress is costly when these conflicts of interest get in the way of proper operating, investment, and financing decisions. Stockholders are tempted to forsake the usual objective of maximizing the overall market value of the firm and to pursue narrower self-interest instead. They are tempted to play games at the expense of their creditors.

Risk Shifting: The First Game

Stockholders of levered firms gain when business risk increases. Financial managers who act strictly in their shareholders' interests (and *against* the interests of creditors) will **favor risky projects over safe ones**. They may even take risky projects with negative NPVs.

→ Such an operation may reduce the total firm value (market value) due to the project's negative NPV, but the value of bonds outstanding will drop much more dramatically while the value of common stock may in turn increase.

The temptation to play this game is strongest when **the odds of default are high**.

Refusing to Contribute Equity Capital: The Second Game

Assumption: The firm does not have enough cash to play the wild gamble game above. Now here comes an asset with relatively low risk and a positive NPV.

The firm may issue extra stocks to purchase this asset, and then the probability of default is less, and the payoff to the bondholder if default occurs is larger.

If we hold business risk constant, any increase in firm value is shared among bondholders and stockholders. The value of any investment opportunity to the firm's *stockholders* is reduced because project benefits must be shared with bondholders. Thus it may not be in the stockholders' self-interest to contribute fresh equity capital even if that means forgoing positive-NPV investment opportunities.

→ This problem theoretically affects all levered firms, but it is *most serious* when firms land in financial distress.

The greater the probability of default, the more bondholders have to gain from investments that increase firm value.

And Three More Games, Briefly

- **Cash In and Run**

→ *Shareholders persuade the debtholders to postpone the bankruptcy.*

Stockholders may be reluctant to put money into a firm in financial distress, but they are happy to take the money out—in the form of a cash dividend, for example. The market value of the firm's stock goes down by less than the amount of the dividend paid, because the decline in *firm* value is shared with creditors. This game is just "refusing to contribute equity capital" run in reverse.

- **Playing for Time**

→ *Shareholders distribute cash dividends as much as possible and leave an empty shell for the debtholders.*

When the firm is in financial distress, creditors would like to salvage what they can by forcing the firm to settle up. Naturally, stockholders want to delay this as long as they can. There are various devious ways of doing this, for example, through accounting changes designed to conceal the true extent of trouble, by encouraging false hopes of spontaneous recovery, or by cutting corners on maintenance, research and development, and so on, in order to make this year's operating performance look better.

- **Bait and Switch**

→ *Shareholders try to get more financing from the debtholders and move the money away.*

This game is not always played in financial distress, but it is a quick way to get *into* distress. You start with a conservative policy, issuing a limited amount of relatively safe debt. Then you suddenly switch and issue a lot more. That makes all your debt risky, imposing a capital loss on the "old" bondholders. Their capital loss is the stockholders' gain.

What the Games Cost

Playing these games means poor decisions about investments and operations, that is **agency costs of borrowing**.

Chain reaction:

The more the firm borrows

→ the greater is the temptation to play the games (assuming the financial manager acts in the stockholders' interest)

→ the present market value of the firm will be marked down

→ the fall in value comes out of the shareholders' pockets

Therefore, it is ultimately in their interest to **avoid temptation**. The easiest way to do this is to **limit borrowing** to levels at which the firm's debt is safe or close to it.

Banks and other corporate lenders are also not financial innocents. They realize that games may be played at their expense and so protect themselves by rationing the amount that they will lend or by imposing restrictions on the company's actions.

Costs of Distress Vary with Type of Asset

Major concerns:

- **Assets type:** tangible vs. intangible; general vs. specific

  → The direct bankruptcy costs are restricted to items such as legal and court fees, real estate commissions, and the time the lender spends sorting things out. A growth company whose most valuable assets are technology, investment opportunities, and its employees' human capital contains higher risk to invest in. Many of the intangible assets have value only as a part of a going concern.

  → Some assets, like good commercial real estate, can pass through bankruptcy and reorganization largely unscathed; the values of other assets are likely to be considerably diminished. The losses are greatest for the intangible assets that are linked to the health of the firm as a going concern—for example, technology, human capital, and brand image.

  → Highly profitable growth companies, such as Microsoft or Google, use mostly equity finance.

- **Solvency of assets:** high liquidity vs. low liquidity
- **Cash flows:** stable vs. unstable
- **Ownership structure:** simple vs. complicated
- **Backup financing:** with vs. without

Do not think only about the probability that borrowing will bring trouble. Think also of the value that may be lost if trouble comes.

The Pecking Order of Financing Choices

The pecking-order theory starts with **asymmetric information**—a fancy term indicating that managers know more about their companies' prospects, risks, and values than do outside investors.

Asymmetric information affects the choice between internal and external financing and between new issues of debt and equity securities.

Pecking order: Investment is financed according to such order:

1. With *internal funds*, reinvested earnings primarily
2. By *new issues of debt*
3. With *new issues of equity*

New equity issues are a last resort when the company runs out of debt capacity, that is, when the threat of costs of financial distress brings regular insomnia to existing creditors and to the financial manager.

Debt and Equity Issues with Asymmetric Information

If managers are better informed than investors and both groups are ratio- nal, then any company that can borrow will do so rather than issuing fresh equity. In other words, debt issues will be higher in the pecking order.

- If the financial manager is *optimistic* and thinks the stock price at present is undervalued, he or she may be reluctant to sell stocks at such a low price.
- If the financial manager is *pessimistic* and thinks the stock price at present is overvalued, he or she may also hesitate to issue stocks in afraid of forcing the stock price down and eliminating the existed advantages.

Asymmetric information is not always important and there are other forces at work, so issuing equity is **not impossible**.

Asymmetric information can explain **the dominance of debt financing** over new equity issues, at least for mature public corporations. Debt issues are frequent; equity issues, rare.

It's better to raise equity by plowing back earnings than issuing stock.

Implications of the Pecking Order

The pecking-order theory of corporate financing goes like this:

1. Firms prefer internal finance.
2. They adapt their target dividend payout ratios to their investment opportunities, while trying to avoid sudden changes in dividends.
3. Sticky dividend policies, plus unpredictable fluctuations in profitability and investment opportunities, mean that internally generated cash flow is sometimes more than capital expenditures and other times less. If it is more, the firm pays off debt or invests in marketable securities. If it is less, the firm first draws down its cash balance or sells its holdings of marketable securities.
4. If external finance is required, firms issue the safest security first. That is,they start with debt, then possibly hybrid securities such as convertible bonds, then perhaps equity as a last resort.

The pecking order explains **why the most profitable firms generally borrow less**—not because they have **low target debt ratios** but because they **don't need outside money**. Less profitable firms issue debt because they do not have internal funds sufficient for their capital investment programs and because debt financing is first on the pecking order of *external* financing.

In the pecking-order theory, the attraction of interest tax shields is assumed to be second-order. Debt ratios change when there is an imbalance of internal cash flow, net of dividends, and real investment opportunities.

- Highly profitable firms with limited investment opportunities work down to low debt ratios.
- Firms whose investment opportunities outrun internally generated funds are driven to borrow more and more.

This theory explains the inverse intraindustry relationship **between profitability and financial leverage**. Suppose firms generally invest to keep up with the growth of their industries. Then rates of investment will be **similar within an industry**. Given sticky dividend payouts, the least profitable firms will have less internal funds and will end up borrowing more.

→ **Leverage as a credible signal:** Managers use leverage to convince investors that the firm will grow, even if they cannot provide verifiable details.

The Trade-Off Theory vs. the Pecking-Order Theory—Some Evidence

The debt ratios of individual companies seemed to depend on four main factors:

1. **Size.** Large firms tend to have higher debt ratios.

   → *Trade-off theory:* Large companies are less exposed to costs of financial distress and would be expected to borrow more.

2. **Tangible assets.** Firms with high ratios of fixed assets to total assets have higher debt ratios.

   → *Trade-off theory:* Companies with tangible assets are less exposed to costs of financial distress and would be expected to borrow more.

3. **Profitability.** More profitable firms have lower debt ratios.

   → *Pecking-order theory:* Profitable firms use less debt because they can rely on internal financing.

4. **Market to book.** Firms with higher ratios of market-to-book value have lower debt ratios.

   → *Trade-off theory:* The market-to-book ratio is a measure of growth opportunities and growth companies could face high costs of financial distress and would be expected to borrow less.

   → *Pecking-order theory:* The market-to-book ratio is just another measure of profitability.

Summary:

Firms tend to have **higher** debt ratios: *larger, more fixed assets, less profitable, lower ratios of market-to-book value*

- The pecking order works best for **large, mature firms that have access to public bond markets**. These firms rarely issue equity. They prefer internal financing, but turn to debt markets if needed to finance investment.
- **Smaller, younger, growth firms** are more likely to rely on equity issues when external financing is required.

Market timing: Managers sell new shares when they believe the stock is overvalued, and rely on debt and retained earnings if they believe the stock is undervalued.

→ If the financial manager's views are more stable than investors', then he or she can take advantage by issuing shares when the stock price is too high and switching to debt when the price is too low.

Market timing could explain why companies tend to issue shares after run-ups in stock prices and also why aggregate stock issues are concentrated in bull markets and fall sharply in bear markets.

Summary: How does a firm behave

- The announcement of a stock issue drives down the stock price because investors believe managers are more likely to issue when shares are overpriced.
- Therefore firms prefer internal finance since funds can be raised without sending adverse signals.
- If external finance is required, firms issue debt first and equity as a last resort.

The Bright Side and the Dark Side of Financial Slack

It's better to be at the top of the pecking order than at the bottom.

Financial slack is valuable.

→ Having financial slack means having *cash, marketable securities, readily salable real assets*, and *ready access to debt markets or to bank financing*.

In the long run, a company's value rests **more on its capital investment and operating decisions** than on financing.

Appendix: Capital Structure: Putting It All Together

- Use the interest tax shield if your firm has consistent taxable income.
- Balance tax benefits of debt against costs of financial distress.
- Increase leverage to signal confidence in the firm's ability to meet its debt obligations.
- Be mindful that investors are aware that you have an incentive to issue securities that you know are overpriced.
- Rely first on retained earnings, then debt, and finally equity.
- Consider short-term debt for external financing when agency costs are significant.
- Do not change the firm's capital structure unless it departs significantly from the optimal level.
- Financial slack is valuable.

Summary

Chapter 18

Our task in this chapter was to show **why capital structure matters**. We did not throw away MM's proposition that capital structure is irrelevant; we added to it. However, we did not arrive at any simple, universal theory of optimal capital structure.

The trade-off theory emphasizes interest tax shields and the costs of financial distress. The value of the firm is broken down as

$$Value\ of\ firm = value\ if\ all\_equity\_financed + PV(tax\ shield) - PV(costs\ of\ financial\ distress)$$

According to this theory, the firm should increase debt until the value from $PV(tax\ shield)$ is just offset, at the margin, by increases in $PV(costs\ of\ financial\ distress)$.

The costs of financial distress are:

1. **Bankruptcy costs**
    1. *Direct costs* such as legal and accounting fees.
    2. *Indirect costs* reflecting the difficulty of managing a company undergoing liquidation or reorganization.
2. **Costs of financial distress short of bankruptcy**

    Doubts about a firm's creditworthiness can hobble its operations. Customers and suppliers will be reluctant to deal with a firm that may not be around next year. Key employees will be tempted to leave. Highly leveraged firms seem to be less vigorous product-market competitors.

    Conflicts of interest between bondholders and stockholders of firms in financial distress may lead to poor operating and investment decisions. Stockholders acting in their narrow self-interest can gain at the expense of creditors by playing "games" that reduce the overall value of the firm.

    The fine print in debt contracts is designed to prevent these games. But fine print increases the costs of writing, monitoring, and enforcing the debt contract.

The value of the interest tax shield would be easy to compute if we had only corporate taxes to worry about. In that case **the net tax saving from borrowing** would be just the marginal corporate tax rate T_c times $r_D D$, the interest payment. If debt is fixed, the tax shield can be valued by discounting at the borrowing rate r_D. **In the special case of fixed, permanent debt**

$$PV(tax\ shield) = \frac{T_c r_D D}{r_D} = T_c D$$

However, corporate taxes are only part of the story. If investors pay higher taxes on interest income than on equity income (dividends and capital gains), then interest tax shields to the corporation will be partly offset by higher taxes paid by investors. The low (23.8% maximum) U.S. tax rates on dividends and capital gains have **reduced the tax advantage** to corporate borrowing.

The trade-off theory balances the tax advantages of borrowing against the costs of financial distress. Corporations are supposed to pick **a target capital structure that maximizes firm value**. Firms with safe, tangible assets and plenty of taxable income to shield ought to have high targets. Unprofitable companies with risky, intangible assets ought to rely more on equity financing.

This theory of capital structure successfully explains many industry differences in capital structure, but it does not explain why the most profitable firms *within* an industry generally have the most conservative capital structures. **Under the trade-off theory, high profitability should mean high debt capacity *and* a strong tax incentive to use that capacity.**

There is a competing, **pecking-order theory, which states that firms use internal financing when available and choose debt over equity when external financing is required**. This explains why the less profitable firms in an industry borrow more—not because they have higher target debt ratios but because they need more external financing and because debt is next on the pecking order when internal funds are exhausted.

The pecking order is **a consequence of asymmetric information**. Managers know more about their firms than outside investors do, and they are reluctant to issue stock when they believe the price is too low. They try to time issues when shares are fairly priced or overpriced. Investors understand this, and interpret **a decision to issue shares as bad news**. That explains why stock price usually falls when a stock issue is announced.

Debt is better than equity when these information problems are important. Optimistic managers will prefer debt to undervalued equity, and pessimistic managers will be pressed to follow suit. The pecking-order theory says that equity will be issued only when debt capacity is running out and financial distress threatens.

The pecking-order theory stresses the value of financial slack. Without sufficient slack, the firm may be caught at the bottom of the pecking order and be forced to choose between issuing undervalued shares, borrowing and risking financial distress, or passing up positive-NPV investment opportunities.

There is, however, a dark side to financial slack. Surplus cash or credit tempts managers to over-invest or to indulge an easy and glamorous corporate lifestyle. When temptation wins, or threatens to win, a high debt ratio can help: It forces the company to disgorge cash and prods managers and organizations to try harder to be more efficient.