How Much Should a Corporation Borrow?

In Chapter 17 we found that debt policy rarely matters in well-functioning capital markets with no frictions or imperfections. Few financial managers would accept that conclusion as a practical guideline. If debt policy doesn't matter, then they shouldn't worry about it—financing decisions could be routine or erratic—it wouldn't matter. Yet financial managers do worry about debt policy. This chapter explains why.

If debt policy were completely irrelevant, then actual debt ratios should vary randomly from firm to firm and industry to industry. Yet almost all airlines, utilities, banks, and real estate development companies rely heavily on debt. And so do many firms in capital-intensive industries such as steel, aluminum, chemicals, petroleum, and mining. On the other hand, it is rare to find a pharmaceutical company or advertising agency that is not predominantly equity-financed. Glamorous growth companies rarely use much debt despite rapid expansion and often heavy requirements for capital.

The explanation of these patterns lies partly in the things we left out of the last chapter. We mostly ignored taxes. We assumed bankruptcy was cheap, quick, and painless. It isn't, and there are costs associated with financial distress even if legal bankruptcy is ultimately avoided. We ignored potential conflicts of interest between the firm's security holders. For example, we did not consider what happens to the firm's "old" creditors when new debt is issued or when a shift in investment strategy takes the firm into a riskier business. We ignored the information problems that favor debt over equity when cash must be raised from new security issues. We ignored the incentive effects of financial leverage on management's investment and payout decisions.

Now we will put all these things back in: taxes first, then the costs of bankruptcy and financial distress. This will lead us to conflicts of interest and to information and incentive problems. In the end we will have to admit that debt policy does matter.

However, we will not throw away the MM theory we developed so carefully in Chapter 17. We're shooting for a theory combining MM's insights plus the effects of taxes, costs of bankruptcy and financial distress, and various other complications. We're not dropping back to a theory based on inefficiencies in the capital market. Instead, we want to see how well-functioning capital markets respond to taxes and the other things covered in this chapter.

18-1 Corporate Taxes

Debt financing has one important advantage under the corporate income tax system in the U.S. and many other countries. The interest that the company pays is a tax-deductible expense. Thus the return to bondholders escapes taxation at the corporate level.

Table 18.1 shows simple income statements for firm U, which has no debt, and firm L, which has borrowed $1,000 at 8%. L's tax bill is $28 less than U's. This is the *tax shield*

	Income Statement of Firm U	Income Statement of Firm L
Earnings before interest and taxes	$1,000	$1,000
Interest paid to bondholders	0	80
Pretax income	1,000	920
Tax at 35%	350	322
Net income to stockholders	$ 650	$ 598
Total income to both bondholders and stockholders	$0 + 650 = $650	$80 + 598 = $678
Interest tax shield (.35 × interest)	$0	$28

TABLE 18.1 The tax deductibility of interest increases the total income that can be paid out to bondholders and stockholders.

provided by the debt of L. In effect the government pays 35% of the interest expense of L. The total income that L can pay out to its bondholders and stockholders increases by that amount.

Tax shields can be valuable assets. Suppose that the debt of L is fixed and permanent. (That is, the company commits to refinance its present debt obligations when they mature and to keep rolling over its debt obligations indefinitely.) Then L can look forward to a permanent stream of cash flows of $28 per year. The risk of these flows is likely to be less than the risk of the operating assets of L. The tax shields depend only on the corporate tax rate[1] and on the ability of L to earn enough to cover interest payments. The corporate tax rate has been pretty stable. And the ability of L to earn its interest payments must be reasonably sure; otherwise it could not have borrowed at 8%. Therefore we should discount the interest tax shields at a relatively low rate.

But what rate? One common assumption is that the risk of the tax shields is the same as that of the interest payments generating them. Thus we discount at 8%, the expected rate of return demanded by investors who are holding the firm's debt:

$$\text{PV(tax shield)} = \frac{28}{.08} = \$350$$

In effect the government assumes 35% of the $1,000 debt obligation of L.

Under these assumptions, the present value of the tax shield is independent of the return on the debt r_D. It equals the corporate tax rate T_c times the amount borrowed D:

$$\begin{aligned}\text{Interest payment} &= \text{return on debt} \times \text{amount borrowed}\\ &= r_D \times D\end{aligned}$$

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

[1] Always use the marginal corporate tax rate, not the average rate. Average rates are often much lower than marginal rates because of accelerated depreciation and other tax adjustments. For large corporations, the marginal rate is usually taken as the statutory rate, which was 35% when this chapter was written (2009). However, effective marginal rates can be less than the statutory rate, especially for smaller, riskier companies that cannot be sure that they will earn taxable income in the future.

Of course, PV(tax shield) is less if the firm does not plan to borrow a permanent fixed amount,[2] or if it may not have enough taxable income to use the interest tax shields.[3]

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

MM's proposition 1 amounts to saying that the value of a pie does not depend on how it is sliced. The pie is the firm's assets, and the slices are the debt and equity claims. If we hold the pie constant, then a dollar more of debt means a dollar less of equity value.

But there is really a third slice, the government's. Look at Table 18.2. It 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 would still say that the value of the pie—in this case *pretax* asset value—is not changed by slicing. But anything the firm can do to reduce the size of the government's slice obviously makes stockholders better off. One thing it can do is borrow money, which reduces its tax bill and, as we saw in Table 18.1, increases the cash flows to debt and equity investors. 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 Merck's Capital Structure

Merck is a large, successful firm that uses relatively little long-term debt. Table 18.3(*a*) shows simplified book and market value balance sheets for Merck in December 2008.

Suppose that you were Merck's financial manager with complete responsibility for its capital structure. You decide to borrow an additional $1 billion on a permanent basis and use the proceeds to repurchase shares.

Table 18.3(*b*) shows the new balance sheets. The book version simply has $1,000 million more long-term debt and $1,000 million less equity. But we know that Merck's assets must be worth more because its tax bill has been reduced by 35% of the interest on the new

TABLE 18.2
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 of (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

[2] In this example, we assume that the amount of debt is fixed and stable over time. The natural alternative assumption is a fixed *ratio* of debt to firm value. If the ratio is fixed, then the level of debt and the amount of interest tax shields will fluctuate as firm value fluctuates. In that case projected interest tax shields can't be discounted at the cost of debt. We cover this point in detail in the next chapter.

[3] If the income of L does not cover interest in some future year, the tax shield is not necessarily lost. L can carry back the loss and receive a tax refund up to the amount of taxes paid in the previous two years. If L has a string of losses, and thus no prior tax payments that can be refunded, then losses can be carried forward and used to shield income in later years.

Book Values

Net working capital	$4,986.2	$3,943.3	Long-term debt
		10,175.4	Other long-term liabilities
Long-term assets	27,890.8	18,758.3	Equity
Total assets	$32,877.0	$32,877.0	Total value

Market Values

Net working capital	$4,986.2	$3,943.3	Long-term debt
PV interest tax shield	1,380.2	10,175.4	Other long-term liabilities
Long-term assets	72,680.6	64,928.3	Equity
Total assets	$79,047.0	$79,047.0	Total value

TABLE 18.3a Simplified balance sheets for Merck, December 2008 (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 December 2008. 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	$4,986.2	$4,943.3	Long-term debt
		10,175.4	Other long-term liabilities
Long-term assets	27,890.8	17,758.3	Equity
Total assets	$32,877.0	$32,877.0	Total value

Market Values

Net working capital	$4,986.2	$4,943.3	Long-term debt
PV interest tax shield	1,730.2	10,175.4	Other long-term liabilities
Long-term assets	72,680.6	64,278.3	Equity
Total assets	$79,397.0	$79,397.0	Total value

TABLE 18.3b Balance sheets for Merck with additional $1 billion of long-term debt substituted for stockholders' equity (figures in millions).

debt. In other words, Merck has an increase in PV(interest tax shield), which is worth $T_cD = .35 \times \$1{,}000$ million = $350 million. If the MM theory holds *except* for taxes, firm value must increase by $350 million to $79,397 million. Merck's equity ends up worth $64,278 million.

Now you have repurchased $1,000 million worth of shares, but Merck's equity value has dropped by only $650 million. Therefore Merck's stockholders must be $350 million ahead. Not a bad day's work.[4]

MM and Taxes

We have just developed a version of MM's proposition 1 as corrected by them to reflect corporate income taxes.[5] The new proposition is

$$\text{Value of firm} = \text{value if all-equity-financed} + \text{PV(tax shield)}$$

In the special case of permanent debt,

$$\text{Value of firm} = \text{value if all-equity-financed} + T_cD$$

[4] Notice that as long as the bonds are sold at a fair price, all the benefits from the tax shield must go to the shareholders.

[5] Interest tax shields are recognized in MM's original article, F. Modigliani and M. H. Miller, "The Cost of Capital, Corporation Finance and the Theory of Investment," *American Economic Review* 48 (June 1958), pp. 261–296. The valuation procedure used in Table 18.3(*b*) is presented in their 1963 article "Corporate Income Taxes and the Cost of Capital: A Correction," *American Economic Review* 53 (June 1963), pp. 433–443.

Our imaginary financial surgery on Merck provides the perfect illustration of the problems inherent in this "corrected" theory. That $350 million came too easily; it seems to violate the law that there is no such thing as a money machine. And if Merck's stockholders would be richer with $4,943 million of corporate debt, why not $5,943 or $15,943 million? At what debt level should Merck stop borrowing? Our formula implies that firm value and stockholders' wealth continue to go up as D increases. The optimal debt policy appears to be embarrassingly extreme. All firms should be 100% debt-financed.

MM were not that fanatical about it. No one would expect the formula to apply at extreme debt ratios. There are several reasons why our calculations overstate the value of interest tax shields. First, 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. Second, many firms face marginal tax rates less than 35%. Third, you can't use interest tax shields unless there will be future profits to shield—and no firm can be absolutely sure of that.

But none of these qualifications explains why companies like Merck survive and thrive at low debt ratios. It's hard to believe that Merck's financial managers are simply missing the boat.

A conservative debt policy can of course be great comfort when a company suffers a sudden adverse shock. For Merck, that shock came in September 2004, when it became clear that its blockbuster painkiller Vioxx increased the risk of heart attacks in some patients. When Merck withdrew Vioxx from the market, it lost billions of dollars in future revenues and had to spend or set aside nearly $5 billion for legal costs and settlements. Yet the company's credit rating was not harmed, and it retained ample cash flow to fund all its investments, including research and development, and to maintain its regular dividend. But if Merck was that strong financially *after* the loss of Vioxx, was its debt policy before the loss excessively conservative? Why did it pass up the opportunity to borrow a few billion more (as in Table 18.3[*b*]), thus substituting tax-deductible interest for taxable income to shareholders?

We seem to have argued ourselves into a blind alley. But there may be two ways out:

1. 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.
2. Perhaps firms that borrow incur other costs—bankruptcy costs, for example.

We now explore these two escape routes.

18-2 Corporate and Personal Taxes

When personal taxes are introduced, the firm's objective is no longer to minimize the *corporate* tax bill; 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 illustrates how corporate and personal taxes are affected by leverage. Depending on the firm's capital structure, a dollar of operating income will accrue to investors either as debt interest or equity income (dividends or capital gains). That is, the dollar can go down either branch of Figure 18.1.

Notice that Figure 18.1 distinguishes between T_p, the personal tax rate on interest, and T_{pE}, the effective personal tax rate on equity income. This rate can be well below T_P, depending on the mix of dividends and capital gains realized by shareholders. The top marginal rate on dividends and capital gains is now (2009) only 15% while the top rate on

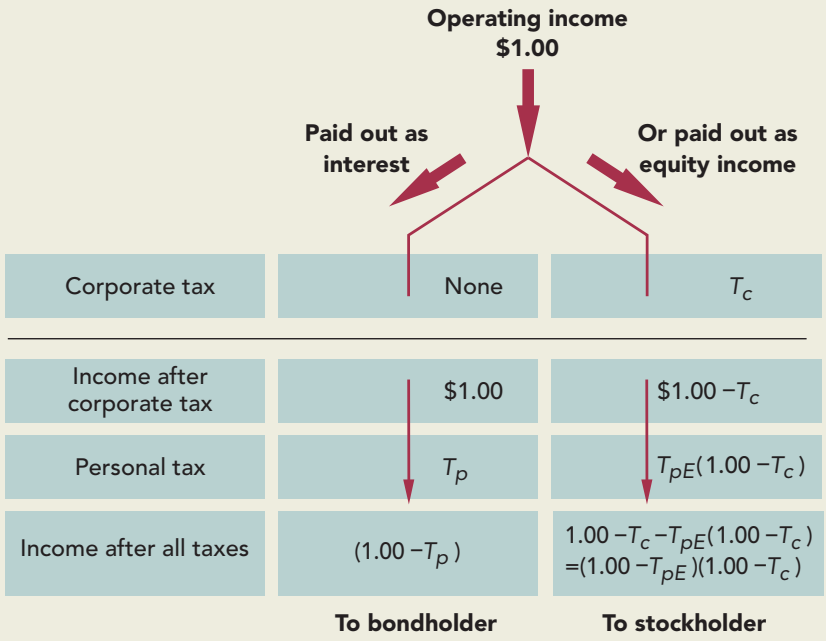

FIGURE 18.1

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.

other income, including interest income, is 35%. Also capital gains taxes can be deferred until shares are sold, so the top *effective* capital gains rate is usually less than 15%.

The firm's objective should be to arrange its capital structure to maximize after-tax income. You can see from Figure 18.1 that corporate borrowing is better if $(1 - T_p)$ is more than $(1 - T_{pE}) \times (1 - T_c)$; otherwise it is worse. The *relative tax* advantage of debt over equity is

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

This suggests two special cases. First, suppose that debt and equity income were taxed at the same effective personal rate. But with $T_{pE} = T_p$, the relative advantage depends only on the *corporate rate:*

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

In this case, we can forget about personal taxes. The tax advantage of corporate borrowing is exactly as MM calculated it.[6] They do not have to assume away personal taxes. Their theory of debt and taxes requires only that debt and equity be taxed at the same rate.

[6] Personal taxes reduce the dollar amount of corporate interest tax shields, but the appropriate discount rate for cash flows after personal tax is also lower. If investors are willing to lend at a prospective return *before* personal taxes of r_D, then they must also be willing to accept a return *after* personal taxes of $r_D(1 - T_p)$, where T_p is the marginal rate of personal tax. Thus we can compute the value after personal taxes of the tax shield on permanent debt:

$$\text{PV(tax shield)} = \frac{T_c \times r_D D \times (1 - T_p)}{r_D \times (1 - T_p)} = T_c D$$

This brings us back to our previous formula for firm value:

$$\text{Value of firm} = \text{value if all-equity-financed} + T_c D$$

The second special case occurs when corporate and personal taxes cancel to make debt policy irrelevant. This requires

$$1 - T_p = (1 - T_{pE})(1 - T_c)$$

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. Merton Miller explored this situation at a time when U.S. tax rates on interest and dividends were much higher than now, but we won't go into the details of his analysis here.[7]

In any event we seem to have a simple, practical decision rule. Arrange the firm's capital structure to shunt operating income down that branch of Figure 18.1 where the tax is least. Unfortunately that is not as simple as it sounds. What's T_{pE}, for example? The shareholder roster of any large corporation is likely to include tax-exempt investors (such as pension funds or university endowments) as well as millionaires. All possible tax brackets will be mixed together. And it's the same with T_p, the personal tax rate on interest. The large corporation's "typical" bondholder might be a tax-exempt pension fund, but many taxpaying investors also hold corporate debt.

Some investors may be much happier to buy your debt than others. For example, you should have no problems inducing pension funds to lend; they don't have to worry about personal tax. But taxpaying investors may be more reluctant to hold debt and will be prepared to do so only if they are compensated by a high rate of interest. Investors paying tax on interest at the top rate of 35% may be particularly reluctant to hold debt. They will prefer to hold common stock or tax-exempt bonds issued by states and municipalities.

To determine the net tax advantage of debt, companies would need to know the tax rates faced by the *marginal* investor—that is, an investor who is equally happy to hold debt or equity. This makes it hard to put a precise figure on the tax benefit, but we can nevertheless provide a back-of-the-envelope calculation. Let's consider a large, dividend-paying company like Merck. Merck's dividend payout ratio has averaged about 65%, so for each $1.00 of income, $.65 is received as dividends and $.35 as capital gains. Suppose the marginal investor is in the top tax bracket, paying 35% on interest and 15% on dividends and capital gains. Let's assume that deferred realization of capital gains cuts the effective capital gains rate in half, to 15/2 = 7.5%. Therefore, if the investor invests in Merck common stock, the tax on each $1.00 of equity income is $T_{pE} = (.65 \times 15) + (.35 \times 7.5) = 12.4\%$.

Now we can calculate the effect of shunting a dollar of income down each of the two branches in Figure 18.1:

	Interest	Equity Income
Income before tax	$1.00	$1.00
Less corporate tax at $T_c = .35$	0	.35
Income after corporate tax	1.00	.65
Personal tax at $T_p = .35$ and $T_{pE} = .124$	.35	.081
Income after all taxes	$ .65	$ .569
	Advantage to debt = $.081	

The advantage to debt financing appears to be about $.08 on the dollar.

We should emphasize that our back-of-the-envelope calculation is just that. But it's interesting to see how debt's tax advantage shrinks when we account for the relatively low personal tax rate on equity income.

[7] M. H. Miller, "Debt and Taxes," *Journal of Finance* 32 (May 1977), pp. 261–276.

Most financial managers believe that there is a moderate tax advantage to corporate borrowing, at least for companies that are reasonably sure they can use the corporate tax shields. For companies that cannot benefit from corporate tax shields there is probably a moderate tax disadvantage.

Do companies make full use of interest tax shields? John Graham argues that they don't. His estimates suggest that a typical tax-paying corporation could add 7.5% to firm value by levering up to a still-conservative debt ratio.[8] This is hardly spare change. Therefore it still appears that financial managers have passed by some easy tax savings. Perhaps they saw some offsetting disadvantage to increased borrowing. We now explore this second escape route.

18-3 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.

As we will see, financial distress is costly. 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. Thus, the value of the firm can be broken down into three parts:

$$\begin{array}{c}\text{Value}\\ \text{of firm}\end{array} = \begin{array}{c}\text{value if}\\ \text{all-equity-finaced}\end{array} + \text{PV(tax shield)} - \begin{array}{c}\text{PV(costs of}\\ \text{financial distress)}\end{array}$$

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

Figure 18.2 shows how the trade-off between the tax benefits and the costs of distress could determine optimal capital structure. PV(tax shield) initially increases as the firm

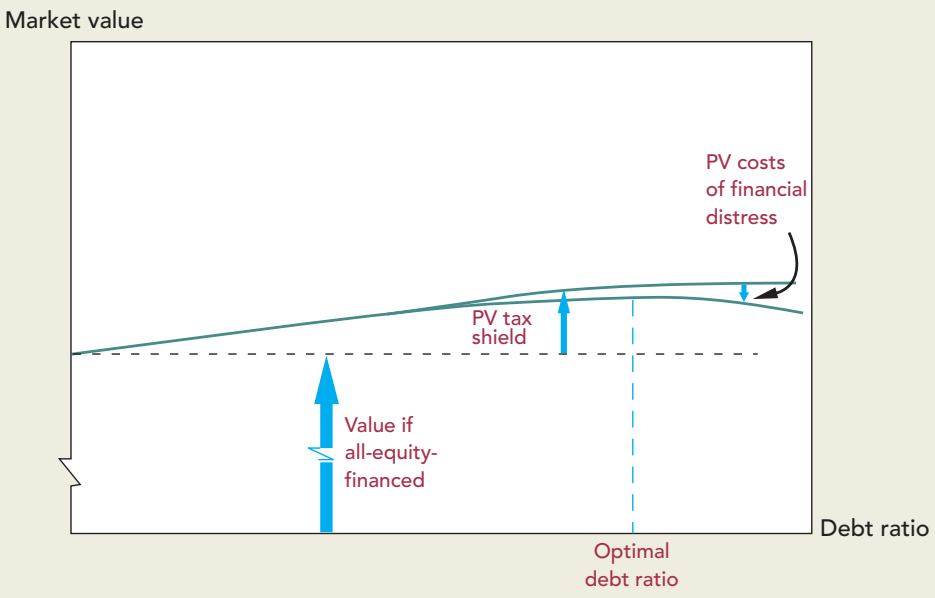

FIGURE 18.2
The value of the firm is equal to its value if all-equity-financed plus PV tax shield minus PV costs of financial distress. According to the trade-off theory of capital structure, the manager should choose the debt ratio that maximizes firm value.

[8] Graham's estimates for individual firms recognize both the uncertainty in future profits and the existence of noninterest tax shields. See J. R. Graham, "How Big Are the Tax Benefits of Debt?" *Journal of Finance* 55 (October 2000), pp. 1901–1941.

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. But 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. This is called the *trade-off theory* of capital structure.

Costs of financial distress cover several specific items. Now we identify these costs and try to understand what causes them.

Bankruptcy Costs

You rarely hear anything nice said about corporate bankruptcy. But there is some good in almost everything. Corporate bankruptcies occur when stockholders exercise their *right to default*. That right 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*. But suppose that this were not so. Suppose that there are two firms with identical assets and operations. Each firm has debt outstanding, and each has promised to repay $1,000 (principal and interest) next year. But only one of the firms, Ace Limited, enjoys limited liability. The other firm, Ace Unlimited, does not; its stockholders are personally liable for its debt.[9]

Figure 18.3 compares next year's possible payoffs to the creditors and stockholders of these two firms. The only differences occur when next year's asset value turns out to be less than $1,000. Suppose that next year the assets of each company are worth only $500. In this case Ace Limited defaults. Its stockholders walk away; their payoff is zero. Bondholders get the assets worth $500. But Ace Unlimited's stockholders can't walk away. They have to cough up $500, the difference between asset value and the bondholders' claim. The debt is paid whatever happens.

Suppose that Ace Limited does go bankrupt. Of course, its stockholders are disappointed that their firm is worth so little, but that is an operating problem having nothing to do with financing. Given poor operating performance, the right to go bankrupt—the right to default—is a valuable privilege. As Figure 18.3 shows, Ace Limited's stockholders are in better shape than Unlimited's are.

The example illuminates a mistake people often make in thinking about the costs of bankruptcy. Bankruptcies are thought of as corporate funerals. The mourners (creditors and especially shareholders) look at their firm's present sad state. They think of how valuable their securities used to be and how little is left. But they may also think of the lost value as a cost of bankruptcy. That is the mistake. The decline in the value of assets is what the mourning is really about. That has no necessary connection with financing. The bankruptcy is merely a legal mechanism for allowing creditors to take over when the decline in the value of assets triggers a default. Bankruptcy is not the *cause* of the decline in value. It is the result.

Be careful not to get cause and effect reversed. When a person dies, we do not cite the implementation of his or her will as the cause of death.

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[9] Ace Unlimited could be a partnership or sole proprietorship, which do not provide limited liability.

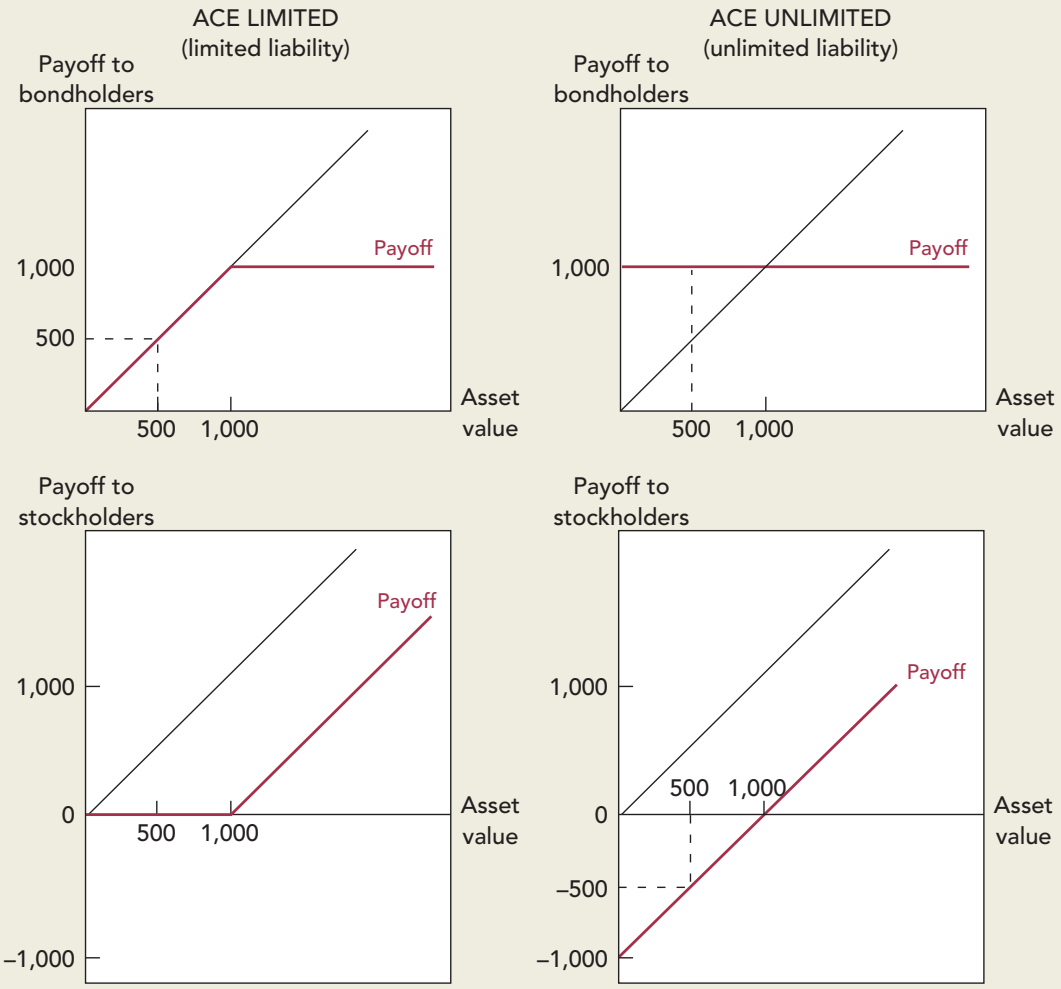


FIGURE 18.3

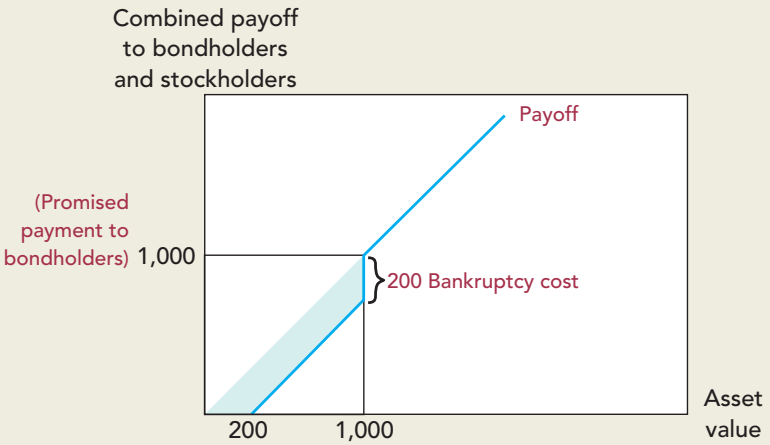
Comparison of limited and unlimited liability for two otherwise identical firms. If the two firms' asset values are less than $1,000, Ace Limited stockholders default and its bondholders take over the assets. Ace Unlimited stockholders keep the assets, but they must reach into their own pockets to pay off its bondholders. The total payoff to both stockholders and bondholders is the same for the two firms.

We said that bankruptcy is a legal mechanism allowing creditors to take over when a firm defaults. *Bankruptcy costs* are the costs of using this mechanism. There are no bankruptcy costs at all shown in Figure 18.3. Note that only Ace Limited can default and go bankrupt. But, regardless of what happens to asset value, the *combined* payoff to the bondholders and stockholders of Ace Limited is always the same as the *combined* payoff to the bondholders and stockholders of Ace Unlimited. Thus the overall market values of the two firms now (this year) must be identical. Of course, Ace Limited's stock is worth more than Ace Unlimited's stock because of Ace Limited's right to default. Ace Limited's debt is worth correspondingly less.

Our example was not intended to be strictly realistic. Anything involving courts and lawyers cannot be free. Suppose that court and legal fees are $200 if Ace Limited defaults.

FIGURE 18.4

Total payoff to Ace Limited security holders. There is a $200 bankruptcy cost in the event of default (shaded area).



The fees are paid out of the remaining value of Ace's assets. Thus if asset value turns out to be $500, creditors end up with only $300. Figure 18.4 shows next year's *total* payoff to bondholders and stockholders net of this bankruptcy cost. Ace Limited, by issuing risky debt, has given lawyers and the court system a claim on the firm if it defaults. The market value of the firm is reduced by the present value of this claim.

It is easy to see how increased leverage affects the present value of the costs of financial distress. If Ace Limited borrows more, it increases the probability of default and the value of the lawyers' claim. It increases PV (costs of financial distress) and reduces Ace's present market value.

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

Evidence on Bankruptcy Costs

Bankruptcy costs can add up fast. While United Airlines was in bankruptcy, it paid over $350 million to lawyers, accountants, and consultants.[10] Enron set a record with legal, accounting, and other professional costs of nearly $1 billion. Professional fees for another distressed energy company, Mirant Corp., were a bit more moderate. The "burn rate" of fees for the first year of Mirant's bankruptcy proceedings was $120 to $140 million.[11]

Daunting as such numbers may seem, they are not a large fraction of the companies' asset values. Lawrence Weiss, who studied 31 firms that went bankrupt between 1980 and 1986, found average costs of about 3% of total book assets and 20% of the market value of equity in the year prior to bankruptcy. A study by Andrade and Kaplan of a sample of troubled and highly leveraged firms estimated costs of financial distress amounting to 10% to 20% of predistress market value, although they found it hard to

[10] "Bankruptcy Lawyers Flying High; Airlines' Woes Mean Big Paydays for Consultants and Law Firms; Partner's $177,000 Bill for August," *The Wall Street Journal*, October 21, 2005, p. C.1.

[11] "Enron Bankruptcy Specialist to File for Additional Payment; On Top of $63.4 Million, 'Success Fee' to Be Sought of Additional $25 Million," *The Wall Street Journal*, September 3, 2004, p. A.2; and "Mirant Bankruptcy Legal Fees Seen Topping $120 Million," Reuters, January 20, 2004.

decide whether these costs were caused by financial distress or by the business setbacks that led to distress.[12]

Bankruptcy eats up a larger fraction of asset value for small companies than for large ones. There are significant economies of scale in going bankrupt. For example, a study of smaller U.K. bankruptcies by Franks and Sussman found that fees (legal and accounting) and other costs soaked up roughly 20% to 40% of the proceeds from liquidation of the companies.[13]

Direct versus Indirect Costs of Bankruptcy

So far we have discussed the *direct* (that is, legal and administrative) costs of bankruptcy. There are indirect costs too, which are nearly impossible to measure. But we have circumstantial evidence indicating their importance.

Managing a bankrupt firm is not easy. Consent of the bankruptcy court is required for many routine business decisions, such as the sale of assets or investment in new equipment. At best this involves time and effort; at worst proposals to reform and revive the firm are thwarted by impatient creditors, who stand first in line for cash from asset sales or liquidation of the entire firm.

Sometimes the problem is reversed: 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. When Eastern Airlines entered the "protection" of the bankruptcy court in 1989, it still had some valuable, profit-making routes and salable assets such as planes and terminal facilities. The creditors would have been best served by a prompt liquidation, which probably would have generated enough cash to pay off all debt and preferred stockholders. But the bankruptcy judge was keen to keep Eastern's planes flying at all costs, so he allowed the company to sell many of its assets to fund hefty operating losses. When Eastern finally closed down after two years, it was not just bankrupt, but *administratively* insolvent: There was almost nothing for creditors, and the company was running out of cash to pay legal expenses.[14]

We do not know what the sum of direct and indirect costs of bankruptcy amounts to. We suspect it is a significant number, particularly for large firms for which proceedings would be lengthy and complex. Perhaps the best evidence is the reluctance of creditors to force bankruptcy. In principle, they would be better off to end the agony and seize the assets as soon as possible. Instead, creditors often overlook defaults in the hope of nursing the firm over a difficult period. They do this in part to avoid costs of bankruptcy. There is an old financial saying, "Borrow $1,000 and you've got a banker. Borrow $10,000,000 and you've got a partner."

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. But sometimes reorganizations provide something for everyone, including consolation prizes for stockholders. Sometimes other claimants move up in the queue. For

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[12] The pioneering study of bankruptcy costs is J. B. Warner, "Bankruptcy Costs: Some Evidence," *Journal of Finance* 26 (May 1977), pp. 337–348. See also L. A. Weiss, "Bankruptcy Resolution: Direct Costs and Violation of Priority of Claims," *Journal of Financial Economics* 27 (October 1990), pp. 285–314; E. I. Altman, "A Further Investigation of the Bankruptcy Cost Question," *Journal of Finance* 39 (September 1984), pp. 1067–1089; and G. Andrade and S. N. Kaplan, "How Costly Is Financial (not Economic) Distress? Evidence from Highly Leveraged Transactions That Became Distressed," *Journal of Finance* 53 (October 1998), pp. 1443–1493.

[13] J. Franks and O. Sussman, "Financial Distress and Bank Restructuring of Small to Medium Size UK Companies," *Review of Finance* 9 (2005), pp. 65–96. Karin Thornburg found that the Swedish bankruptcy system is reasonably efficient for smaller firms, however. See "Bankruptcy Auctions: Costs, Debt Recovery and Firm Survival," *Journal of Financial Economics* 58 (December 2000), pp. 337–368.

[14] See L. A. Weiss and K. H. Wruck, "Information Problems, Conflicts of Interest, and Asset Stripping: Chapter 11's Failure in the Case of Eastern Airlines," *Journal of Financial Economics* 48 (1998), pp. 55–97.

example, after the Chrysler bankruptcy in 2009, the State of Indiana sued (unsuccessfully) on behalf of local pension funds that had invested in Chrysler bonds. The funds complained bitterly about the terms of sale of the bankrupt company's assets to Fiat, arguing that they would get only $.29 on the dollar, while other, more junior claimants fared better. The Chrysler bankruptcy was a special case, however. One of the key players in the proceedings was the U.S. government which was anxious to protect tens of thousands of jobs in the middle of a severe recession.

We cover bankruptcy procedures in more detail in Chapter 32.

Financial Distress without Bankruptcy

Not every firm that gets into trouble goes bankrupt. As long as the firm can scrape up enough cash to pay the interest on its debt, it may be able to postpone bankruptcy for many years. Eventually the firm may recover, pay off its debt, and escape bankruptcy altogether.

But the mere threat of financial distress can be costly to the threatened firm. Customers and suppliers are extra cautious about doing business with a firm that may not be around for long. Customers worry about resale value and the availability of service and replacement parts. (This was a serious drag on Chrysler's sales prebankruptcy, for example.) Suppliers are disinclined to put effort into servicing the distressed firm's account and may demand cash on the nail for their products. Potential employees are unwilling to sign on and existing staff keep slipping away from their desks for job interviews.

High debt, and thus high financial risk, also appear to reduce firms' appetites for business risk. For example, Luigi Zingales looked at the fortunes of U.S. trucking companies after the trucking industry was deregulated in the late 1970s.[15] The deregulation sparked a wave of competition and restructuring. Survival required new investment and improvements in operating efficiency. Zingales found that conservatively financed trucking companies were more likely to survive in the new competitive environment. High-debt firms were more likely to drop out of the game.

Debt and Incentives

When a firm is in trouble, both bondholders and stockholders want it to recover, but in other respects their interests may be in conflict. In times of financial distress the security holders are like many political parties—united on generalities but threatened by squabbling on any specific issue.

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. We now illustrate how such games can lead to costs of financial distress.

Here is the Circular File Company's book balance sheet:

Circular File Company (Book Values)

Net working capital	$ 20	$ 50	Bonds outstanding
Fixed assets	80	50	Common stock
Total assets	$100	$100	Total value

We will assume there is only one share and one bond outstanding. The stockholder is also the manager. The bondholder is somebody else.

[15] L. Zingales, "Survival of the Fittest or the Fattest? Exit and Financing in the Trucking Industry," *Journal of Finance* 53 (June 1998), pp. 905–938.

Here is its balance sheet in market values—a clear case of financial distress, since the face value of Circular's debt ($50) exceeds the firm's total market value ($30):

Circular File Company (Market Values)

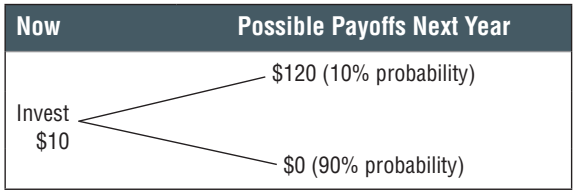
Net working capital	$20	$25	Bonds outstanding
Fixed assets	10	5	Common stock
Total assets	$30	$30	Total value

If the debt matured today, Circular's owner would default, leaving the firm bankrupt. But suppose that the bond actually matures one year hence, that there is enough cash for Circular to limp along for one year, and that the bondholder cannot "call the question" and force bankruptcy before then.

The one-year grace period explains why the Circular share still has value. Its owner is betting on a stroke of luck that will rescue the firm, allowing it to pay off the debt with something left over. The bet is a long shot—the owner wins only if firm value increases from $30 to more than $50.[16] But the owner has a secret weapon: He controls investment and operating strategy.

Risk Shifting: The First Game

Suppose that Circular has $10 cash. The following investment opportunity comes up:



This is a wild gamble and probably a lousy project. But you can see why the owner would be tempted to take it anyway. Why not go for broke? Circular will probably go under anyway, so the owner is essentially betting with the bondholder's money. But the owner gets most of the loot if the project pays off.

Suppose that the project's NPV is −$2 but that it is undertaken anyway, thus depressing firm value by $2. Circular's new balance sheet might look like this:

Circular File Company (Market Values)

Net working capital	$10	$20	Bonds outstanding
Fixed assets	18	8	Common stock
Total assets	$28	$28	Total value

Firm value falls by $2, but the owner is $3 ahead because the bond's value has fallen by $5.[17] The $10 cash that used to stand behind the bond has been replaced by a very risky asset worth only $8.

Thus a game has been played at the expense of Circular's bondholder. The game illustrates the following general point: 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.

[16] We are not concerned here with how to work out whether $5 is a fair price for stockholders to pay for the bet. We will come to that in Chapter 23 when we discuss risky debt.

[17] We are not calculating this $5 drop. We are simply using it as a plausible assumption. The tools necessary for a calculation come in Chapters 21 and 23.

This warped strategy for capital budgeting clearly is costly to the firm and to the economy as a whole. Why do we associate the costs with financial distress? Because the temptation to play is strongest when the odds of default are high. A blue-chip company like Exxon Mobil would never invest in our negative-NPV gamble. Its creditors are not vulnerable to one risky project.

Refusing to Contribute Equity Capital: The Second Game

We have seen how stockholders, acting in their immediate, narrow self-interest, may take projects that reduce the overall market value of their firm. These are errors of commission. Conflicts of interest may also lead to errors of omission.

Assume that Circular cannot scrape up any cash, and therefore cannot take that wild gamble. Instead a *good* opportunity comes up: a relatively safe asset costing $10 with a present value of $15 and NPV = +$5.

This project will not in itself rescue Circular, but it is a step in the right direction. We might therefore expect Circular to issue $10 of new stock and to go ahead with the investment. Suppose that two new shares are issued to the original owner for $10 cash. The project is taken. The new balance sheet might look like this:

Circular File Company (Market Values)

Net working capital	$20	$33	Bonds outstanding
Fixed assets	25	12	Common stock
Total assets	$45	$45	Total value

The total value of the firm goes up by $15 ($10 of new capital and $5 NPV). Notice that the Circular bond is no longer worth $25, but $33. The bondholder receives a capital gain of $8 because the firm's assets include a new, safe asset worth $15. The probability of default is less, and the payoff to the bondholder if default occurs is larger.

The stockholder loses what the bondholder gains. Equity value goes up not by $15 but by $15 − $8 = $7. The owner puts in $10 of fresh equity capital but gains only $7 in market value. Going ahead is in the firm's interest but not the owner's.

Again, our example illustrates a general point. 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

As with other games, the temptation to play the next three games is particularly strong in financial distress.

Cash In and Run 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.[18]

[18] If stockholders or managers take money out of the firm in anticipation of financial distress or bankruptcy, the bankruptcy court can treat the payout as *fraudulent conveyance* and claw back the money to the firm and its creditors.

Playing for Time 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 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.

A dramatic example of bait and switch occurred in October 1988, when the management of RJR Nabisco announced its intention to acquire the company in a *leveraged buy-out* (LBO). This put the company "in play" for a transaction in which existing shareholders would be bought out and the company would be "taken private." The cost of the buy-out would be almost entirely debt-financed. The new private company would start life with an extremely high debt ratio.

RJR Nabisco had debt outstanding with a market value of about $2.4 billion. The announcement of the coming LBO drove down this market value by $298 million.[19]

What the Games Cost

Why should anyone object to these games so long as they are played by consenting adults? Because playing them means poor decisions about investments and operations. These poor decisions are *agency costs* of borrowing.

The more the firm borrows, the greater is the temptation to play the games (assuming the financial manager acts in the stockholders' interest). The increased odds of poor decisions in the future prompt investors to mark down the present market value of the firm. 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.

EXAMPLE 18.1 ● Ms. Ketchup Faces Credit Rationing

Consider the case of Henrietta Ketchup, a budding entrepreneur with two possible investment projects that offer the following payoffs:

	Investment	Payoff	Probability of Payoff
Project 1	−12	+15	1.0
Project 2	−12	+24	.5
		0	.5

[19] We thank Paul Asquith for these figures. RJR Nabisco was finally taken private not by its management but by another LBO partnership. We discuss this LBO in Chapter 32.

Project 1 is surefire and very profitable; project 2 is risky and a rotten project. Ms. Ketchup now approaches her bank and asks to borrow the present value of $10 (she will find the remaining money out of her own purse). The bank calculates that the payoff will be split as follows:

	Expected Payoff to Bank	Expected Payoff to Ms. Ketchup
Project 1	+10	+5
Project 2	$(.5 \times 10) + (.5 \times 0) = +5$	$.5 \times (24 - 10) = +7$

If Ms. Ketchup accepts project 1, the bank's debt is certain to be paid in full; if she accepts project 2, there is only a 50% chance of payment and the expected payoff to the bank is only $5. Unfortunately, Ms. Ketchup will prefer to take project 2, for if things go well, she gets most of the profit, and if they go badly, the bank bears most of the loss. Unless Ms. Ketchup can convince the bank that she will not gamble with its money, the bank will limit the amount that it is prepared to lend.[20]

How can Ms. Ketchup in Example 18.1 reassure the bank of her intentions? The obvious answer is to give it veto power over potentially dangerous decisions. There we have the ultimate economic rationale for all that fine print backing up corporate debt. Debt contracts frequently limit dividends or equivalent transfers of wealth to stockholders; the firm may not be allowed to pay out more than it earns, for example. Additional borrowing is almost always limited. For example, many companies are prevented by existing bond indentures from issuing any additional long-term debt unless their ratio of earnings to interest charges exceeds 2.0.

Sometimes firms are restricted from selling assets or making major investment outlays except with the lenders' consent. The risks of playing for time are reduced by specifying accounting procedures and by giving lenders access to the firm's books and its financial forecasts.

Of course, fine print cannot be a complete solution for firms that insist on issuing risky debt. The fine print has its own costs; you have to spend money to save money. Obviously a complex debt contract costs more to negotiate than a simple one. Afterward it costs the lender more to monitor the firm's performance. Lenders anticipate monitoring costs and demand compensation in the form of higher interest rates; thus the monitoring costs—another agency cost of debt—are ultimately paid by stockholders.

Perhaps the most severe costs of the fine print stem from the constraints it places on operating and investment decisions. For example, an attempt to prevent the risk-shifting game may also prevent the firm from pursuing *good* investment opportunities. At the minimum there are delays in clearing major investments with lenders. In some cases lenders may veto high-risk investments even if net present value is positive. The lenders are tempted to play a game of their own, forcing the firm to stay in cash or low-risk assets even if good projects are forgone.

Debt contracts cannot cover every possible manifestation of the games we have just discussed. Any attempt to do so would be hopelessly expensive and doomed to failure in any event. Human imagination is insufficient to conceive of all the possible things that could go wrong. Therefore contracts are always *incomplete*. We will always find surprises coming at us on dimensions we never thought to think about.

[20] You might think that, if the bank suspects Ms. Ketchup will undertake project 2, it should just raise the interest rate on its loan. In this case Ms. Ketchup will not want to take on project 2 (they can't both be happy with a lousy project). But Ms. Ketchup also would not want to pay a high rate of interest if she is going to take on project 1 (she would do better to borrow less money at the risk-free rate). So simply raising the interest rate is not the answer.

We hope we have not left the impression that managers and stockholders always succumb to temptation unless restrained. Usually they refrain voluntarily, not only from a sense of fair play but also on pragmatic grounds: A firm or individual that makes a killing today at the expense of a creditor will be coldly received when the time comes to borrow again. Aggressive game playing is done only by out-and-out crooks and by firms in extreme financial distress. Firms limit borrowing precisely because they don't wish to land in distress and be exposed to the temptation to play.

Costs of Distress Vary with Type of Asset

Suppose your firm's only asset is a large downtown hotel, mortgaged to the hilt. The recession hits, occupancy rates fall, and the mortgage payments cannot be met. The lender takes over and sells the hotel to a new owner and operator. You use your firm's stock certificates for wallpaper.

What is the cost of bankruptcy? In this example, probably very little. The value of the hotel is, of course, much less than you hoped, but that is due to the lack of guests, not to the bankruptcy. Bankruptcy doesn't damage the hotel itself. 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.

Suppose we repeat the story of Heartbreak Hotel for Fledgling Electronics. Everything is the same, except for the underlying real assets—not real estate but a high-tech going concern, a growth company whose most valuable assets are technology, investment opportunities, and its employees' human capital.

If Fledgling gets into trouble, the stockholders may be reluctant to put up money to cash in on its growth opportunities. Failure to invest is likely to be much more serious for Fledgling than for the Heartbreak Hotel.

If Fledgling finally defaults on its debt, the lender will find it much more difficult to cash in by selling off the assets. Many of them are intangibles that have value only as a part of a going concern.

Could Fledgling be kept as a going concern through default and reorganization? It may not be as hopeless as putting a wedding cake through a car wash, but there are a number of serious difficulties. First, the odds of defections by key employees are higher than they would be if the firm had never gotten into financial trouble. Special guarantees may have to be given to customers who have doubts about whether the firm will be around to service its products. Aggressive investment in new products and technology will be difficult; each class of creditors will have to be convinced that it is in its interest for the firm to invest new money in risky ventures.

Some assets, like good commercial real estate, can pass through bankruptcy and reorganization largely unscathed;[21] 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. That may be why debt ratios are low in the pharmaceutical industry, where value depends on continued success in research and development, and in many service industries where value depends on human capital. We can also understand why highly profitable growth companies, such as Microsoft or Google, use mostly equity finance.

[21] In 1989 the Rockefeller family sold 80% of Rockefeller Center—several acres of extremely valuable Manhattan real estate—to Mitsubishi Estate Company for $1.4 billion. A REIT, Rockefeller Center Properties, held a $1.3 billion mortgage loan (the REIT's only asset) secured by this real estate. But rents and occupancy rates did not meet forecasts, and by 1995 Mitsubishi had incurred losses of about $600 million. Then Mitsubishi quit, and Rockefeller Center was bankrupt. That triggered a complicated series of maneuvers and negotiations. But did this damage the value of the Rockefeller Center properties? Was Radio City Music Hall, one of the properties, any less valuable because of the bankruptcy? We doubt it.

The moral of these examples is this: *Do not think only about the probability that borrowing will bring trouble. Think also of the value that may be lost if trouble comes.*

Heartbreak Hotel for Enron? Enron was one of the most glamorous, fast-growing, and (apparently) profitable companies of the 1990s. It played a lead role in the deregulation of electric power markets, both in the United States and internationally. It invested in electric power generation and distribution, gas pipelines, telecommunications networks, and various other ventures. It also built up an active energy trading business. At its peak the aggregate market value of Enron's common stock exceeded $60 billion. By the end of 2001, Enron was in bankruptcy and its shares were worthless.

With hindsight we see that Enron was playing many of the games that we described earlier in this section. It was borrowing aggressively and hiding the debt in "special purpose entities" (SPEs). The SPEs also allowed it to pump up its reported earnings, playing for time while making more and more risky investments. When the bubble burst, there was hardly any value left.

The collapse of Enron didn't really destroy $60 billion in value, because that $60 billion wasn't there in the first place. But there were genuine costs of financial distress. Let's focus on Enron's energy trading business. That business was not as profitable as it appeared, but it was nevertheless a valuable asset. It provided an important service for wholesale energy customers and suppliers who wanted to buy or sell contracts that locked in the future prices and quantities of electricity, natural gas, and other commodities.

What happened to this business when it became clear that Enron was in financial distress and probably headed for bankruptcy? It disappeared. Trading volume went to zero immediately. None of its customers were willing to make a new trade with Enron, because it was far from clear that Enron would be around to honor its side of the bargain. With no trading volume, there was no trading business. As it turned out, Enron's trading business more resembled Fledgling Electronics than a tangible asset like Heartbreak Hotel.

The value of Enron's trading business depended on Enron's creditworthiness. The value should have been protected by conservative financing. Most of the lost value can be traced back to Enron's aggressive borrowing. This loss of value was therefore a cost of financial distress.

The Trade-off Theory of Capital Structure

Financial managers often think of the firm's debt–equity decision as a trade-off between interest tax shields and the costs of financial distress. Of course, there is controversy about how valuable interest tax shields are and what kinds of financial trouble are most threatening, but these disagreements are only variations on a theme. Thus, Figure 18.2 illustrates the debt–equity trade-off.

This *trade-off theory* of capital structure recognizes that target debt ratios may vary from firm to firm. Companies with safe, tangible assets and plenty of taxable income to shield ought to have high target ratios. Unprofitable companies with risky, intangible assets ought to rely primarily on equity financing.

If there were no costs of adjusting capital structure, then each firm should always be at its target debt ratio. However, there are costs, and therefore delays, in adjusting to the optimum. Firms cannot immediately offset the random events that bump them away from their capital structure targets, so we should see random differences in actual debt ratios among firms having the same target debt ratio.

All in all, this trade-off theory of capital structure choice tells a comforting story. Unlike MM's theory, which seemed to say that firms should take on as much debt as possible, it avoids extreme predictions and rationalizes moderate debt ratios. Also, if you ask financial managers whether their firms have target debt ratios, they will usually say yes—although the target is often specified not as a debt ratio but as a debt rating. For example, the firm might

manage its capital structure to maintain a single-A bond rating. Ratio or rating, a target is consistent with the trade-off theory.[22]

But what are the facts? Can the trade-off theory of capital structure explain how companies actually behave?

The answer is "yes and no." On the "yes" side, the trade-off theory successfully explains many industry differences in capital structure. High-tech growth companies, whose assets are risky and mostly intangible, normally use relatively little debt. Airlines can and do borrow heavily because their assets are tangible and relatively safe.[23]

On the "no" side, there are some things the trade-off theory cannot explain. It cannot explain why some of the most successful companies thrive with little debt. Think of Merck, which as Table 18.3 (*a*) shows is basically all-equity-financed. Granted, Merck's most valuable assets are intangible, the fruits of its pharmaceutical research and development. We know that intangible assets and conservative capital structures go together. But Merck also has a very large corporate income tax bill (about $2 billion in 2008) and the highest possible credit rating. It could borrow enough to save tens of millions of dollars without raising a whisker of concern about possible financial distress.

Merck illustrates an odd fact about real-life capital structures: The most profitable companies commonly borrow the least.[24] Here the trade-off theory fails, for it predicts exactly the reverse. Under the trade-off theory, high profits should mean more debt-servicing capacity and more taxable income to shield and so should give a *higher* target debt ratio.[25]

In general it appears that public companies rarely make major shifts in capital structure just because of taxes,[26] and it is hard to detect the present value of interest tax shields in firms' market values.[27] Also, there are large, long-lived differences between debt ratios of firms in the same industry, even after controlling for attributes that the trade-off theory says should be important.[28]

A final point on the "no" side for the trade-off theory: Debt ratios today are no higher than they were in the early 1900s, when income tax rates were low (or zero). Debt ratios in other industrialized countries are equal to or higher than those in the U.S. Many of these countries have imputation tax systems, which should eliminate the value of the interest tax shields.[29]

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[22] See J. Graham and C. Harvey, "The Theory and Practice of Corporate Finance: Evidence from the Field," *Journal of Financial Economics* 60 (May/June 2001), pp. 187–244.

[23] We are not suggesting that all airline companies are safe; many are not. But air*craft* can support debt where air*lines* cannot. If Fly-by-Night Airlines fails, its planes retain their value in another airline's operations. There's a good secondary market in used aircraft, so a loan secured by aircraft can be well protected even if made to an airline flying on thin ice (and in the dark).

[24] For example, in an international comparison Wald found that profitability was the single largest determinant of firm capital structure. See J. K. Wald, "How Firm Characteristics Affect Capital Structure: An International Comparison," *Journal of Financial Research* 22 (Summer 1999), pp. 161–187.

[25] Here we mean debt as a fraction of the book or replacement value of the company's assets. Profitable companies might not borrow a greater fraction of their market value. Higher profits imply higher market value as well as stronger incentives to borrow.

[26] Mackie-Mason found that taxpaying companies are more likely to issue debt (vs. equity) than nontaxpaying companies. This shows that taxes do affect financing choices. However, it is not necessarily evidence for the trade-off theory. Look back to Section 18.2, and note the special case where corporate and personal taxes cancel to make debt policy irrelevant. In that case, taxpaying firms would see no net tax advantage to debt: corporate interest tax shields would be offset by the taxes paid by investors in the firm's debt. But the balance would tip in favor of equity for a firm that was losing money and reaping no benefits from interest tax shields. See J. Mackie-Mason, "Do Taxes Affect Corporate Financing Decisions?" *Journal of Finance* 45 (December 1990), pp. 1471–1493.

[27] A study by E. F. Fama and K. R. French, covering over 2,000 firms from 1965 to 1992, failed to find any evidence that interest tax shields contributed to firm value. See "Taxes, Financing Decisions and Firm Value," *Journal of Finance* 53 (June 1998), pp. 819–843.

[28] M. L. Lemmon, M. R. Roberts, and J. F. Zender, "Back to the Beginning: Persistence and the Cross-Section of Corporate Capital Structure," *Journal of Finance* 63 (August 2008), pp. 1575–1608.

[29] We described the Australian imputation tax system in Section 16.7. Look again at Table 16.3, supposing that an Australian corporation pays A$10 of interest. This reduces the corporate tax by A$3.00; it also reduces the tax credit taken by the shareholders by A$3.00. The final tax does not depend on whether the corporation or the shareholder borrows.

You can check this by redrawing Figure 18.1 for the Australian system. The corporate tax rate T_c will cancel out. Since income after all taxes depends only on investors' tax rates, there is no special advantage to corporate borrowing.

None of this disproves the trade-off theory. As George Stigler emphasized, theories are not rejected by circumstantial evidence; it takes a theory to beat a theory. So we now turn to a completely different theory of financing.

18-4 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.

Managers obviously know more than investors. We can prove that by observing stock price changes caused by announcements by managers. For example, when a company announces an increased regular dividend, stock price typically rises, because investors interpret the increase as a sign of management's confidence in future earnings. In other words, the dividend increase transfers information from managers to investors. This can happen only if managers know more in the first place.

Asymmetric information affects the choice between internal and external financing and between new issues of debt and equity securities. This leads to a *pecking order,* in which investment is financed first with internal funds, reinvested earnings primarily; then by new issues of debt; and finally 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.

We will take a closer look at the pecking order in a moment. First, you must appreciate how asymmetric information can force the financial manager to issue debt rather than common stock.

Debt and Equity Issues with Asymmetric Information

To the outside world Smith & Company and Jones, Inc., our two example companies, are identical. Each runs a successful business with good growth opportunities. The two businesses are risky, however, and investors have learned from experience that current expectations are frequently bettered or disappointed. Current expectations price each company's stock at $100 per share, but the true values could be higher or lower:

	Smith & Co.	Jones, Inc.
True value could be higher, say	$120	$120
Best current estimate	100	100
True value could be lower, say	80	80

Now suppose that both companies need to raise new money from investors to fund capital investment. They can do this either by issuing bonds or by issuing new shares of common stock. How would the choice be made? One financial manager—we will not tell you which one—might reason as follows:

> Sell stock for $100 per share? Ridiculous! It's worth at least $120. A stock issue now would hand a free gift to new investors. I just wish those skeptical shareholders would appreciate the true value of this company. Our new factories will make us the world's lowest-cost producer. We've painted a rosy picture for the press and security analysts, but it just doesn't seem to be working. Oh well, the decision is obvious: we'll issue debt, not underpriced equity. A debt issue will save underwriting fees too.

The other financial manager is in a different mood:

> Beefalo burgers were a hit for a while, but it looks like the fad is fading. The fast-food division's gotta find some good new products or it's all downhill from here. Export markets are OK for now, but how are we going to compete with those new Siberian ranches? Fortunately the stock price has held up pretty well—we've had some good short-run news

> for the press and security analysts. Now's the time to issue stock. We have major investments underway, and why add increased debt service to my other worries?

Of course, outside investors can't read the financial managers' minds. If they could, one stock might trade at $120 and the other at $80.

Why doesn't the optimistic financial manager simply educate investors? Then the company could sell stock on fair terms, and there would be no reason to favor debt over equity or vice versa.

This is not so easy. (Note that both companies are issuing upbeat press releases.) Investors can't be told what to think; they have to be convinced. That takes a detailed layout of the company's plans and prospects, including the inside scoop on new technology, product design, marketing plans, and so on. Getting this across is expensive for the company and also valuable to its competitors. Why go to the trouble? Investors will learn soon enough, as revenues and earnings evolve. In the meantime the optimistic financial manager can finance growth by issuing debt.

Now suppose there are two press releases:

> Jones, Inc., will issue $120 million of five-year senior notes.

> Smith & Co. announced plans today to issue 1.2 million new shares of common stock. The company expects to raise $120 million.

As a rational investor, you immediately learn two things. First, Jones's financial manager is optimistic and Smith's is pessimistic. Second, Smith's financial manager is also naive to think that investors would pay $100 per share. The *attempt* to sell stock shows that it must be worth less. Smith might sell stock at $80 per share, but certainly not at $100.[30]

Smart financial managers think this through ahead of time. The end result? Both Smith and Jones end up issuing debt. Jones, Inc., issues debt because its financial manager is optimistic and doesn't want to issue undervalued equity. A smart, but pessimistic, financial manager at Smith issues debt because an attempt to issue equity would force the stock price down and eliminate any advantage from doing so. (Issuing equity also reveals the manager's pessimism immediately. Most managers prefer to wait. A debt issue lets bad news come out later through other channels.)

The story of Smith and Jones illustrates how asymmetric information favors debt issues over equity issues. If managers are better informed than investors and both groups are rational, 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.

Taken literally this reasoning seems to rule out any issue of equity. That's not right, because asymmetric information is not always important and there are other forces at work. For example, if Smith had already borrowed heavily, and would risk financial distress by borrowing more, then it would have a good reason to issue common stock. In this case announcement of a stock issue would not be entirely bad news. The announcement would still depress the stock price—it would highlight managers' concerns about financial distress—but the fall in price would not necessarily make the issue unwise or infeasible.

High-tech, high-growth companies can also be credible issuers of common stock. Such companies' assets are mostly intangible, and bankruptcy or financial distress would be especially costly. This calls for conservative financing. The only way to grow rapidly and keep a conservative debt ratio is to issue equity. If investors see equity issued for these reasons, problems of the sort encountered by Smith's financial manager become much less serious.

With such exceptions noted, 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. The bulk of external financing comes from debt, even in

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[30] A Smith stock issue might not succeed even at $80. Persistence in trying to sell at $80 could convince investors that the stock is worth even less!

the United States, where equity markets are highly information-efficient. Equity issues are even more difficult in countries with less well developed stock markets.

None of this says that firms ought to strive for high debt ratios—just that it's better to raise equity by plowing back earnings than issuing stock. In fact, a firm with ample internally generated funds doesn't have to sell any kind of security and thus avoids issue costs and information problems completely.

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 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.

In this theory, there is no well-defined target debt–equity mix, because there are two kinds of equity, internal and external, one at the top of the pecking order and one at the bottom. Each firm's observed debt ratio reflects its cumulative requirements for external finance.

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.

The Trade-off Theory vs. the Pecking-Order Theory—Some Recent Tests

In 1995 Rajan and Zingales published a study of debt versus equity choices by large firms in Canada, France, Germany, Italy, Japan, the U.K., and the U.S. Rajan and Zingales found that the debt ratios of individual companies seemed to depend on four main factors:[31]

1. *Size.* Large firms tend to have higher debt ratios.
2. *Tangible assets.* Firms with high ratios of fixed assets to total assets have higher debt ratios.
3. *Profitability.* More profitable firms have lower debt ratios.
4. *Market to book.* Firms with higher ratios of market-to-book value have lower debt ratios.

[31] R. G. Rajan and L. Zingales, "What Do We Know about Capital Structure? Some Evidence from International Data," *Journal of Finance* 50 (December 1995), pp. 1421–1460. The same four factors seem to work in developing economies. See L. Booth, V. Aivazian, A. Demirguc-Kunt, and V. Maksimovic, "Capital Structure in Developing Countries," *Journal of Finance* 56 (February 2001), pp. 87–130.

These results convey good news for both the trade-off and pecking-order theories. Trade-off enthusiasts note that large companies with tangible assets are less exposed to costs of financial distress and would be expected to borrow more. They interpret the market-to-book ratio as a measure of growth opportunities and argue that growth companies could face high costs of financial distress and would be expected to borrow less. Pecking-order advocates stress the importance of profitability, arguing that profitable firms use less debt because they can rely on internal financing. They interpret the market-to-book ratio as just another measure of profitability.

It seems that we have two competing theories, and they're both right! That's not a comfortable conclusion. So recent research has tried to run horse races between the two theories in order to find the circumstances in which one or the other wins. It seems that 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.[32]

There is also some evidence that debt ratios incorporate the cumulative effects of *market timing*.[33] Market timing is an example of behavioral corporate finance. Suppose that investors are sometimes irrationally exuberant (as in the late 1990s) and sometimes irrationally despondent. 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. Thus lucky companies with a history of buoyant stock prices will issue less debt and more shares, ending up with low debt ratios. Unfortunate and unpopular companies will avoid share issues and end up with high debt ratios.

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.

There are other behavioral explanations for corporate financing policies. For example, Bertrand and Schoar tracked the careers of individual CEOs, CFOs, and other top managers. Their individual "styles" persisted as they moved from firm to firm.[34] For example, older CEOs tended to be more conservative and pushed their firms to lower debt. CEOs with MBA degrees tended to be more aggressive. In general, financial decisions depended not just on the nature of the firm and its economic environment, but also on the personalities of the firm's top management.

The Bright Side and the Dark Side of Financial Slack

Other things equal, it's better to be at the top of the pecking order than at the bottom. Firms that have worked down the pecking order and need external equity may end up living with excessive debt or passing by good investments because shares can't be sold at what managers consider a fair price.

In other words, *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. Ready access basically requires conservative financing so that potential lenders see the company's debt as a safe investment.

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[32] L. Shyam-Sunder and S. C. Myers found that the pecking-order hypothesis outperformed the trade-off hypothesis for a sample of large companies in the 1980s. See "Testing Static Trade-off against Pecking-Order Theories of Capital Structure," *Journal of Financial Economics* 51 (February 1999), pp. 219–244. M. Frank and V. Goyal found that the performance of the pecking-order hypothesis deteriorated in the 1990s, especially for small growth firms. See "Testing the Pecking Order Theory of Capital Structure," *Journal of Financial Economics* 67 (February 2003), pp. 217–248. See also E. Fama and K. French, "Testing Trade-off and Pecking Order Predictions about Dividends and Debt," *Review of Financial Studies* 15 (Spring 2002), pp. 1–33; and M. L. Lemmon and J. F. Zender, "Debt Capacity and Tests of Capital Structure Theories," *Journal of Financial and Quantitative Analysis,* forthcoming.

[33] M. Baker and J. Wurgler, "Market Timing and Capital Structure," *Journal of Finance* 57 (February 2002), pp. 1–32.

[34] M. Bertrand and A. Schoar, "Managing with Style: The Effect of Managers on Firm Policies," *Quarterly Journal of Economics* 118 (November 2003), pp. 1169–1208.

FINANCE IN PRACTICE

Ford Cashes in All of its Financial Slack

In 2006, Ford Motor Company brought in a new CEO, Alan Mulally, who launched a thorough restructuring of the company. The company had to cut costs, improve efficiency, and renew its products. This was a massive investment, but debt financing was available. The company decided to borrow as much as it could, to maximize the amount of cash on hand to pay for the restructuring.

In December 2006, Ford issued $5 billion of senior convertible notes. It also arranged a $7 billion, seven-year term loan and an $11.5 billion, five-year revolving credit facility. The total was $23.5 billion.

Ford was able to get this money by pledging almost all of its assets as collateral, including its U.S. property, plant, and equipment; its equity investments in Ford Credit and Ford's foreign subsidiaries; and its trademarks, including the Ford brand name and logo.

Why did Ford decide to use up all of its financial slack in one gigantic gulp? First, debt financing was available on relatively easy terms in 2006. Second, Mulally must have been aware of the history of restructuring programs in the U.S. auto industry. Some of these initiatives were failures, some partial successes, but none solved Ford, GM, or Chrysler's competitive problems. The companies shrank but did not improve significantly.

So Mulally was in effect sending a wake-up call to Ford's managers and employees: "We've raised all the cash that we can get. This is our last chance to reform the company. If we don't make it, Ford is gone."

As we write in 2009 Ford has *not* followed GM and Chrysler into bankruptcy. It's losing money in a severe recession, but still launching new models. It looks like Ford is a survivor.

In the long run, a company's value rests more on its capital investment and operating decisions than on financing. Therefore, you want to make sure your firm has sufficient financial slack so that financing is quickly available for good investments. Financial slack is most valuable to firms with plenty of positive-NPV growth opportunities. That is another reason why growth companies usually aspire to conservative capital structures.

Of course financial slack is only valuable if you're willing to use it. Take a look at the nearby box, which describes how Ford used up all of its financial slack in one enormous debt issue.

There is also a dark side to financial slack. Too much of it may encourage managers to take it easy, expand their perks, or empire-build with cash that should be paid back to stockholders. In other words, slack can make agency problems worse.

Michael Jensen has stressed the tendency of managers with ample free cash flow (or unnecessary financial slack) to plow too much cash into mature businesses or ill-advised acquisitions. "The problem," Jensen says, "is how to motivate managers to disgorge the cash rather than investing it below the cost of capital or wasting it in organizational inefficiencies."[35]

If that's the problem, then maybe debt is an answer. Scheduled interest and principal payments are contractual obligations of the firm. Debt forces the firm to pay out cash. Perhaps the best debt level would leave just enough cash in the bank, after debt service, to finance all positive-NPV projects, with not a penny left over.

We do not recommend this degree of fine-tuning, but the idea is valid and important. Debt can discipline managers who are tempted to invest too much. It can also provide the pressure to force improvements in operating efficiency. We pick up this theme again in Chapter 32.

[35] M. C. Jensen, "Agency Costs of Free Cash Flow, Corporate Finance and Takeovers," *American Economic Review* 26 (May 1986), pp. 323–329.

Is There a Theory of Optimal Capital Structure?

No. That is, there is no *one* theory that can capture everything that drives thousands of corporations' debt vs. equity choices. Instead there are several theories, each more or less helpful, depending on each particular corporation's assets, operations, and circumstances.

In other words, *relax:* Don't waste time searching for a magic formula for the optimal debt ratio. Remember too that most value comes from the left side of the balance sheet, that is, from the firm's operations, assets, and growth opportunities. Financing is less important. Of course, financing can subtract value rapidly if you screw it up, but you won't do that.

In practice, financing choices depend on the relative importance of the factors discussed in this chapter. In some cases, reducing taxes will be the primary objective. Thus high debt ratios are found in the lease-financing business (see Chapter 25). Long-term leases are often tax-driven transactions. High debt ratios are also found in developed commercial real estate. For example, modern downtown office buildings can be safe, cash-cow assets if the office space is rented to creditworthy tenants. Bankruptcy costs are small, so it makes sense to lever up and save taxes.

For smaller growth companies, interest tax shields are less important than preserving financial slack. Profitable growth opportunities are valuable only if financing is available when it comes time to invest. Costs of financial distress are high, so it's no surprise that growth companies try to use mostly equity financing.

Mature public corporations often end up following the pecking order. Information problems deter large equity issues, so such firms prefer to finance investment with retained earnings. They issue more debt when investments outrun retained earnings, and pay down debt when earnings outpace investment.

Sooner or later a corporation's operations age to the point where growth opportunities evaporate. In that case, the firm may issue large amounts of debt and retire equity, to constrain investment and force payout of cash to investors. The higher debt ratio may come voluntarily or be forced by a takeover.

These examples are not exhaustive, but they give some flavor of how a thoughtful CEO can set financing strategy.

SUMMARY

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

$$\text{Value if all-equity-financed} + \text{PV(tax shield)} - \text{PV(costs of financial distress)}$$

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

b. 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.

c. 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

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

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 (15% 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 overinvest 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.

FURTHER READING

The research literature on capital structure is enormous. We cite only a few of the most important and interesting articles. The following review articles give broader surveys.

M. Harris and A. Raviv, "The Theory of Capital Structure," *Journal of Finance* 46 (March 1991), pp. 297–355.