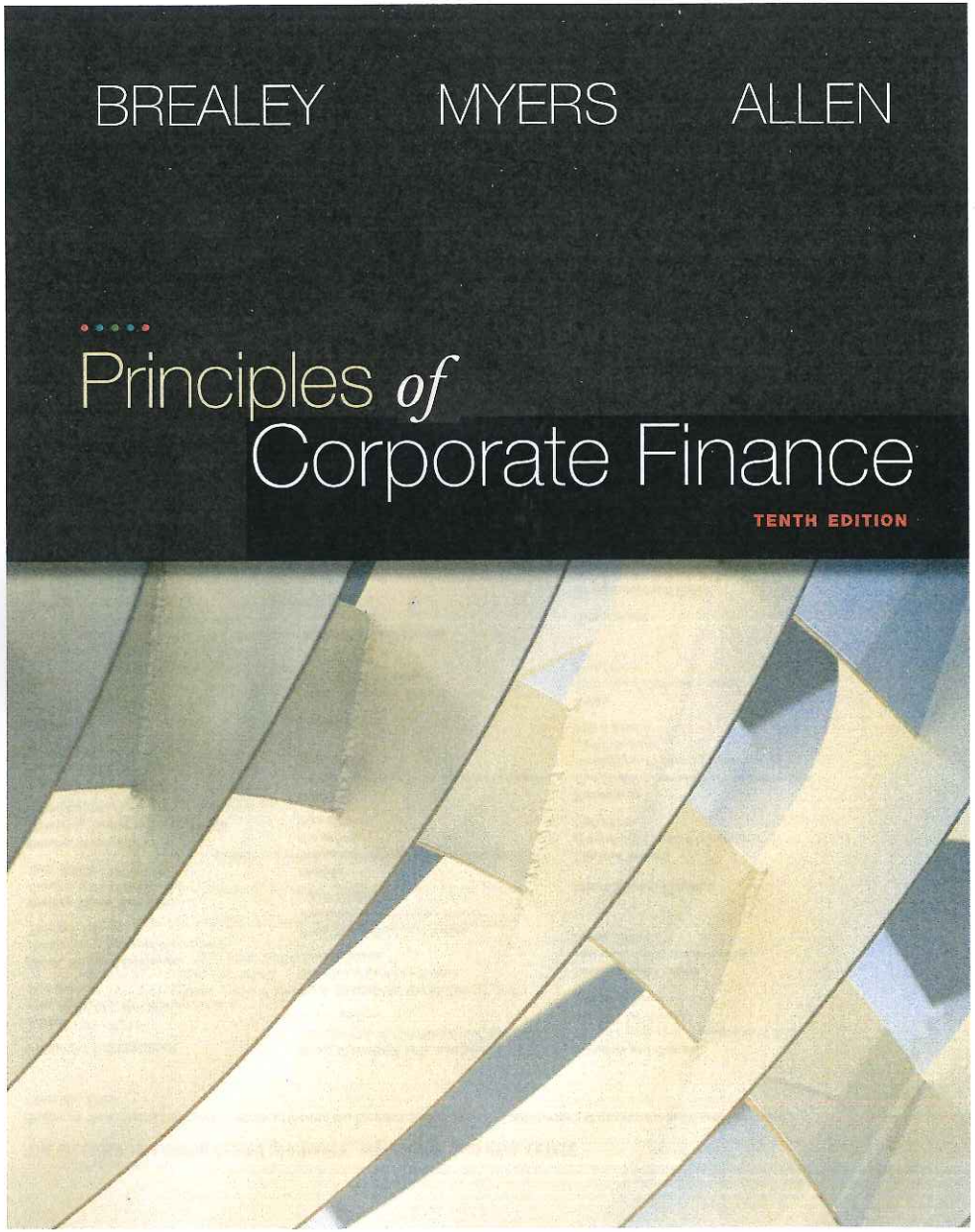

Principles of
Corporate Finance

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

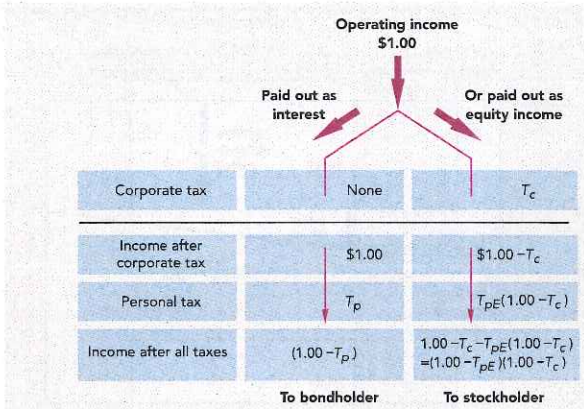

FIGURE 18.1
The firm's capital structure determines whether operating income is paid out as interest or equity income. Interest is taxed only at the personal level. Equity income is taxed at both the corporate and the personal levels. However, T_{pE}, the personal tax rate on equity income, can be less 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:

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