

## Chapter 18

18-1

- a. Annual tax savings from debt = \$ 40 million \* .09 \* .35 = \$1.26
- b. PV of Savings assuming savings are permanent = \$40 million \* .35 = \$14.00
- c. PV of Savings assuming savings occur for 10 years = \$1.26 (PVA,9%,10) = \$8.09
- d. PV of Savings will increase  
If savings are permanent =  $1.26/.07 = \$18.00$   
If savings are for 10 years =  $\$1.26 (PVA,7\%,10) = \$8.85$

18-2

- a. After-tax interest rate =  $10\% (1-.45) = 5.50\%$
- b. If only half the interest is allowed =  $10\% (1-.225) = 7.75\%$
- c. Yes. The tax savings will be much lower since the tax savings will not occur until three years from now. The after-tax interest rate will therefore be the same as the pre-tax rate (10%) for the first three years.

18-3

- a. Ignoring the net operating loss,  
PV of Tax Savings = \$5 billion (.36) = \$1.8 billion
- b. Yes. The net operating loss will mean that this tax savings will not occur for a while. For instance, if it will be 5 years before Westinghouse will have enough taxable income to claim the interest deduction, this \$ 1.8 billion should be discounted back 5 years to arrive at the present value.

18-4

- a. False. There may be non-discretionary capital expenditures/working capital needs that drain cash flows.
- b. False. Capital expenditures may be discretionary.
- c. Partially true. The commitment to pay dividends is a much weaker one than the one to pay interest expenses.
- d. True.
- e. False. This is true only if management is not concerned about wealth maximization.

18-5

- a. Moderate. The low leverage may provide an opening.

b. Moderate to High. The poor projects and the low leverage may make them susceptible; the poor earnings may act as impediment.

c. Low.

d. Low.

e. Highest.

18-6

a. Cost of Equity = 9% + 6% = 15%

Since it is an all-equity financed firm, the cost of capital is equal to the cost of equity.

b.

Value of Debt	Increase in Debt	Marginal Tax Benefits	Marginal Exp. Bankruptcy Cost
2500,000	2,500,000	1,000,000	0
5000,000	2,500,000	1,000,000	640,000
7500,000	2,500,000	1,000,000	1,000,000
8000,000	500,000	200,000	760,000
9000,000	1000,000	400,000	1,200,000
10,000,000	1000,000	400,000	600,000
12,500,000	2,500,000	1,000,000	1,400,000

Every marginal increment past \$7.5 million has expected cost > expected tax benefits!  
Optimal debt is between \$ 5 million and \$ 7.5 million.

c. Value of Firm at Optimal Capital Structure = Current Firm Value + Sum of Marginal Tax Benefits - Sum of marginal bankruptcy costs = \$13,360,000

18-7

That is not true. Due to the agency conflicts between stockholders and bondholders, bondholders charge higher interest rates or write in much stronger covenants, either of which impose real costs on the firm.

18-8

The second firm should borrow more because

1. It has lower bankruptcy costs due to more predictable cash flows.
2. It does not have as much of a need for flexibility because its future needs are known.

18-9

That is also not true. There is a cost to maintaining flexibility - opportunity costs associated with maintaining excess debt capacity and large cash balances. These costs may outweigh the benefits for some firms, especially those with mediocre investment prospects.

18-10

- a. In the Miller-Modigliani world with no taxes, the value of the firm will be \$ 100 million no matter what the debt ratio.
- b. The cost of capital will always be 11%.
- c. With taxes, the value of the firm will increase as the debt is increased (because of the tax benefits of debt) and the cost of capital will go down (due to the interest tax savings again).

18-11

Of \$1 paid to bondholders from corporate before-tax income, the bondholder gets  $(1-0.4) = 60$  cents. Of the same dollar paid to equityholders, the equity holder gets  $(1-0.3)(1-0.2) = 56$  cents. Hence debt does have a tax advantage.

If a firm with no debt and a market value of \$100 million borrowed \$50 million in this world, it would obtain a benefit of  $1-0.56/0.6 = 1/6$  of the amount issued, or  $50/6 = \$3.33$  million. Hence the firm value would be  $100 + 50 + 3 = \$153$  million.

18-12

The tax rate on equity would have to be  $t$ , where  $t$  solves  $(1-0.3)(1-t) = 1-0.4$ , i.e.  $1-t = (1-0.4)/(1-0.3) = t = 14.286\%$

18-13

- a. The past policy of not using debt can be justified by noting that returns on projects were high (increasing the need for flexibility) and that earnings in the future were likely to be volatile (because of the growth).
- b. Given that returns on projects are declining, I would argue for a greater use for debt.

18-14

When stockholders take on riskier projects than bondholders anticipated, or take on additional leverage (especially more senior debt) or increase dividends, they increase the riskiness of the firm from the perspective of bondholders. To the extent that bondholders did not protect themselves or anticipate these actions, they will lose wealth to stockholders.

18-15

Bond covenants have a real cost to firms because they reduce their flexibility. These covenants might prevent firms from taking good projects (if the covenants restrict investment policy), repurchasing stock or taking fresh debt for new projects.

18-16

- a. Financial flexibility is higher with low leverage in several ways: one, the firm can use retained earnings for whatever purposes it chooses: it is not forced to pay out funds as debt service. Also, with low leverage and high debt capacity, the firm can tap into this

debt capacity if funds are urgently needed. Finally, there are likely to be fewer covenants to restrict the firm.

b. The tradeoff is flexibility versus the tax advantages of debt and the discipline enforced by debt on wayward managers.

18-17

a. An electric utility is regulated (reducing agency costs), has stable and predictable cash flows (reducing bankruptcy needs), and knows its future investment needs with some precision (reducing the need for flexibility). All of these factors will increase its capacity to carry debt.

b. Yes. Both the regulation and the monopoly characteristics reduce the agency costs and bankruptcy costs, increasing debt capacity.

18-18

I would expect a decline in the optimal debt ratios of firms because the tax benefit of borrowing is significantly lower. If the tax deductibility of interest were removed, I would expect a similar effect.

18-19

I would expect the debt ratios of large firms to increase because governments will then bear a portion of the bankruptcy costs.

18-20

This is true if a. there are no taxes, b. markets are frictionless and there are no transactions costs, and c. if there are no direct or indirect bankruptcy costs. If debt is irrelevant, changing the debt ratio leaves the cost of capital unchanged

18-21

I would expect strong firms to issue straight debt and financially weak firms to issue preferred or convertible preferred.

18-22

Private firms are much more exposed to bankruptcy risk and have much less access to external capital (leading to an increased need for flexibility). I would therefore expect them to use debt less.

18-23

The fact that the stock price goes to zero in a bankruptcy is not caused by the bankruptcy but by the actions that the firm has taken in the years prior that reduced cash flows and value. In other words, it is not caused by the bankruptcy itself and should not be viewed as a cost occurring as a consequence of it.

18-24

The direct cost of bankruptcy usually refers to the legal and other deadweight costs that drain assets away from the legitimate claim holders in the firm. The indirect costs refer to

the costs associated with the perception that you might be in financial trouble - lost sales, employee defections, less generous supplier credit etc. These costs are likely to be largest for firms that manufacture products that have a long life span and need parts/service.

18-25

It is in the interests of incumbent managers to keep leverage low. By doing so they minimize the chances that the firm will go bankrupt (which might affect their personal value) substantially and they also reduce the oversight that might come with higher debt ratios. Thus, you would expect firms to be underlevered if stockholders do not have much power.

18-26

This is not true. While debt is always cheaper than equity, taking on more debt will make you a riskier firm - this, in turn, will push up the costs of both debt and equity. This negative effect may offset the positive effect of replacing more expensive equity with less expensive debt.

18-27

High growth cellular firms often have significant needs for funds for long term infrastructure investments. Debt is usually used for these investments. Banks are willing to lend on these investments because the cellular firms have licenses or other exclusive rights that will allow them to generate cash flows in the future.

Brand name companies value flexibility and tend to borrow less than they can afford to.

18-28

This conclusion is not necessarily justified. Steel companies in the United States tend to be mature firms, with little in terms of expected growth or need for financial flexibility. A steel company with higher growth potential and greater uncertainty about the future should borrow substantially less. In addition, firms in emerging markets can lose access to capital markets very quickly, making the need for financial flexibility even larger