

Chapter 7

7-1

Income bonds do share some characteristics with preferred stock. The primary difference is that interest paid on income bonds is tax deductible while preferred dividends are not. Income bondholders also have prior claims on the assets, if the firm goes bankrupt. In calculating cost of capital, the primary difference again will be that the cost of income bonds will be lower, because of the tax savings.

7-2

Commodity bonds are different from straight bonds because the interest payments on these bonds are not fixed but vary with the price of the commodity to which they are linked. There is more risk, therefore, to the holder of these bonds. It is different from equity since the cash flows are constrained. Even if the commodity's price does go up, the payments on the commodity bond will go up only by the defined amount, whereas equity investors have no upside limit. Commodity bondholders also have prior claims on the assets of the firm if the firm goes bankrupt. I would treat commodity bonds as debt, but recognize that it is also debt that creates less bankruptcy risk if the firm gets into trouble due to commodity price movements.

7-3

The first characteristic - a fixed dividend and a fixed life - is a characteristic of debt, as is the last one - no voting rights. The other two - no tax deductions and secondary claims on the assets - make it more like equity. In fact, this security looks a lot like preferred stock, and I would treat it as such.

7-4

Value of Straight Preferred Stock portion of Convertible = $6/.09 = \$66.67$! Perpetual Life

Value of Conversion Portion = $\$105 - \$66.67 = \$38.33$

7-5

The convertible bond is a 10-year bond with a face value of \$1000 and a coupon rate of 5%. If it yielded the same rate as the straight bond, i.e. 8%, its price would be equal to

$\frac{25}{.04} \left(1 - \frac{1}{1.04^{20}}\right) + \frac{1000}{1.04^{20}} = 796.15$, assuming semi-annual coupons. Hence, the equity

component of the convertible can be estimated as $1100 - 796.15 = 303.85$.

The total equity component of the firm's asset value = $50(1 \text{ m.}) + 303.85(20000) = \56.077m.

The debt component = $\$25\text{m.} + 796.15(20000) = 40.923\text{m.}$

Hence, the debt ratio = $40.923/(40.923 + 56.077) = 42.19\%$

7-6

Value of Equity = $50,000 * \$100 + 100,000 * \$90 = \$14,000,000$

Value of Debt = \$5 million

$$\text{Debt Ratio} = 5/(5+14) = 26.32\%$$

Since the debt was taken on recently, it is assumed that the book value of debt is equal to market value.

7-7

a. The cost of internal equity = $6.5 + 1.2(6) = 14.3\%$

b. The cost of external equity = $(100/95)(14.3) = 15.0526\%$

7-8

a. If the current owners give up 30% of the firm, they will be left with $(0.7)(120) = \$84\text{m}$. Otherwise, they have \$80m. Hence, they are better off taking the venture capital, assuming that they cannot do better.

b. The breakeven percentage would be x , where x solves $120x = 80$, or $x = 2/3$; i.e. the owners should be willing to give up no more than 33% of the firm.

7-9

We assume that Office Helpers is choosing to go public instead of using venture capital. Furthermore, we assume that the market valuation of \$120 will hold even with the IPO. Finally, let us assume that \$20 million need to be raised. Now, if the target price is \$10, which represents an underpricing of 20%, the true value of the shares would be $10/0.8 = \$12.5$ per share. At this price, the firm would have to issue $20/10$ or 2 million shares. Since the 2 million shares will represent a value of \$25 million, the total number of shares outstanding would be $2(120/25) = 9.6$ million shares. Of this, the existing shareholders would get 7.6 million shares, representing a value of $(7.6/9.6)120 = \$95\text{m}$.; the public shareholders would get $(2/9.6)120 = \$25\text{m}$. for which they would have paid $2(10) = \$20\text{m}$., or an undervaluation of $5/25$ or 20%.

7-10

a. The exit value will be $50(15) = \$750\text{m}$.

b. The discounted terminal value is $750/1.35^4 = \$225.80\text{m}$.

c. You would ask for at least $75/225.80$ or 33% of the firm.

7-11

a. The expected return using the CAPM is $6.5 + 1.1(6) = 13.1\%$

b. Venture capitalists typically have to invest a large portion of their portfolio in a single firm; hence there is a lot of diversifiable risk that they would have to hold. Furthermore, firms requiring venture capital would normally be riskier than other firms in the industry.

7-12

The loss to the existing shareholders is $50(\$18) = \900m . The main people gaining from the underpricing are the investors that are able to buy the stock at the issue price.

7-13

I am in qualified agreement with this statement. It is true that IPOs are more difficult to value, partially because they tend to be younger firms and partially because you don't have an anchor of a market assessed value. I would test it empirically by looking at the

extent of underpricing for firms at different stages in the life cycle. If this statement is true, I would expect the underpricing to be greatest in younger, more difficult to value firms.

7-14

a. Since you are a small firm, you should consider the reputation of the investment banker. A more reputable investment banker may be able to attract wary investors into the offering. If you are a high technology or biotechnology firm, where technical knowledge may be essential in the valuation process, you should pick an investment banker with some experience with similar issues.

b. If the issue is fairly priced, 40% of the firm (20/50).

c. If the investment banker underprices the issue, you will have to sell

Value of Securities Sold = $\$20/.9 = \22.22

As % of Overall Firm Value = $22.22/50 = 44.44\%$

d. You would have to sell roughly 2 million shares: ($\$50 \text{ million}/2 \text{ million} = \25)

7-15

a.

Number of shares you would need to sell in rights offering = $\$100 \text{ mil}/\$25 = 4 \text{ million}$

Number of shares outstanding = 10 million

You would need 5 rights to buy two shares.

b. Ex-rights price = $(50*10+25*4)/14 = \$42.86$

c. Value per right = Pre-rights price - Ex-rights price = $\$50 - \$42.86 = \$7.14$

d. If the price of the right were higher than \$7.14, I would sell my rights at the higher price and keep the difference as excess return. The stock price after the rights issue and the cash will yield me more than what I paid for the stock which was \$50.

7-16

a. Expected Stock Price = $(1 \text{ million} * \$15 + 500,000 * \$10)/1.5 \text{ million} = \13.33

b. Price per Right = $\$15 - \$13.33 = \$1.67$

c. No, because I will own more shares after the issue.

7-17

a. The current capital is $\$15(1 \text{ million shares}) = \15 million . Additional capital to be raised is $\$10(0.5 \text{ million shares}) = \5 million . Hence, net income after the issue will be $\$1 \text{ million}(20/15) = \1.33 million . Hence EPS would be $1.33/1.5 = 88.67 \text{ cents per share}$.

b. Earnings per share under this alternate scenario would be $1.33/1.33 = \$1 \text{ per share}$

c. No, if I have availed myself of the rights issue; in this case, I would have the same proportional ownership of the firm. Even if I had sold the right, I would have been compensated for the lost value.

7-18

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

7-19

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.

7-20

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.

7-21

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.

7-22

While there may be other motives behind acquisitions, the firm that would look most promising on the free cash flow hypothesis would be the firm with low growth, poor projects, low leverage and good earnings. It is in this firm that the discipline of borrowing money will have the greatest impact in terms of inducing managers to pick better investments.

7-23

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

7-24

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).

7-25

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.

7-26

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

$$0.4/(1-0.3) = t = 14.286\%$$

7-27

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.

7-28

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.

7-29

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.