

## Chapter 7: Capital Structure: An Overview of the Financing Decision

1. Income bonds are similar to preferred stock in several ways. Payment of interest on income bonds depends on the availability of sufficient earnings, just like preferred stock. However, income bonds would be paid ahead of preferred stock. On the other hand, both would be paid ahead of common stock. Missed payments are cumulated as with preferred stock. For purposes of analyzing debt, the major differences would be that payments on income bonds, while they can be deferred, must be paid contractually and are tax deductible. Failure to make payments can lead to default and bring on bankruptcy. This is not the case with preferred stock.

2. The contractual payments on a commodity bond depend directly on the price of a commodity. However, like a straight bond, the payments on the commodity bond are capped at some predetermined amount. The contractual payments on a straight bond do not depend on the price of the commodity. However, the ability of the company to make the payments might depend upon commodity prices. In the case of equity, there are no contractual payments at all, although the value of the equity could depend on commodity prices. From the point of view of analyzing capital structure, commodity bonds would qualify as debt, since the payments are contractual, and non-payment could bring on bankruptcy. However, since the amount that has to be paid is tied to commodity prices, the risk of bankruptcy is smaller.

3. This security resembles straight debt, except for two things: the “dividend” is not tax-deductible, and it is subordinated to all other debt. Alternatively, it could be compared to preferred stock with a finite life. I would classify this security as equity, since the payments are not contractual. Alternatively, it might be included in a special category like preferred debt.

4. If we assume that the straight preferred stock is trading at par, the return on the straight preferred = 9%.

If the convertible preferred, which has a 6% dividend rate were evaluated as a straight preferred at this yield, we would get a price of  $6/0.09 = \$66.67$ . Since it is actually trading at \$105, the equity component =  $105 - 66.67 = \$38.33$

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 =  $50(1 \text{ m.}) + 303.85(20000) = \$56.077\text{m.}$

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

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

6. Both Class A and Class B stocks are effectively equity securities, rather than debt securities. The reduced control value/voting rights in the Class B simply mean greater control value for the Class A stocks. It would be appropriate to simply treat both as equity for the purpose of the debt ratio computation. Hence the total equity value =  $50000(100) + (100000(90)) = \$14\text{m}$ . The bank debt is also debt; hence the debt ratio =  $5/(14+5) = 26.32\%$ . If the \$25m. represents the book value of the bank debt, and it were taken on recently, then that would be close to the market value as well. This is relevant, since we need to use market values in the computation of the debt ratio.

7. a. Even though the firm is successful, given the small size and inexperience in the market, the owner should make sure that he chooses a reputable investment banker, to make up for the reputation that he himself is lacking. Also, for similar reasons, the investment banker chosen should be knowledgeable about the industry that the firm is in.  
b. The required proportion =  $20\text{m.}/50\text{m.} = 40\%$ , if the offering is fairly priced.  
c. If the offering is to be underpriced by 10%, then a portion of the firm worth  $20/.9 = \$22.22\text{m}$ . would need to be given up in exchange for the \$20m. of proceeds. Hence,  $22.22/50 = 44.44\%$  of the firm would have to be given up.  
d. Since the total value of the shares, subsequent to the offering would be \$50 m., if the shares were to trade in the \$20 to \$25 range, the number of shares would be 50/20 to 50/25 million share range, i.e. 2m. to 2.5m. shares.

8. It is not true that the dependence on debt for external financing makes US firms overleveraged. We need to take internal equity into account as well to determine the actual level of leverage. In any case, US firms relative dependence on debt for external financing is comparable to other countries.

9. There are two factors. One is that small high growth companies do not have substantial current cash flows. Convertible bonds, by keeping the interest expense low, allow these companies to borrow. The second factor is that small high growth companies tend to be volatile. This volatility makes the conversion option more valuable to investors, and reduces the interest expense on the debt further.

10. The convertible debt gives bondholders an option to convert in addition to the straight debt component. I would price this option as well before concluding that the 7% yield on the convertible debt is cheaper.

11. The 200,000 warrants are generally treated as equity. Given the trading price of \$12, this amounts to \$2.4m.  
If the convertible bonds were priced at 9% (the yield on the straight debt), they would sell at  $\frac{30}{.045} \left(1 - \frac{1}{1.045^{40}}\right) + \frac{1000}{1.045^{40}} = 72398$ . Hence the debt component equals  $10000(723.98) = 7,239,800$ , while the equity component works out to  $\$10\text{m.} - 7.24\text{m.} = \$2.76\text{m}$ .  
The total equity portion adds up to  $50 + 2.4 + 2.76 = \$55.16\text{m}$ ; the total debt portion adds up to  $\$250\text{m.} + 7.24\text{m.} = 257.24\text{m}$ .  
The debt ratio works out to  $257.24/(257.24+55.16) = 82.34\%$

12. Venture capitalists take a big risk since these businesses usually are unproven. Furthermore, as long as there is competition between venture financiers, there is no reason to suspect systematic gouging.

13. Issuing bonds usually provides for a lower yield. On the other hand, with a public issue of bonds, sensitive information might have to be made public, which is not necessary with a bank loan. Also, renegotiating the loan may be easier with a bank.

14. Since preferred dividends don't have to be paid if the firm does not have sufficient earnings, preferred stock is much closer to equity. However, if preferred stock is cumulative, then they acquire more bond-like characteristics, particularly since common dividends cannot be paid before all the cumulated preferred dividends are paid.

15. Interest expenses are tax deductible, while preferred dividends are not tax deductible. Thus the cost of preferred stock should be higher than the cost of debt. If preferred stock is held by other companies, and preferred dividends are partially tax exempt, it is possible that firms might be able to overcome this tax disadvantage, by issuing preferred stock to other corporations at a much lower dividend rate.

16. a. The annual interest tax savings =  $\$40m \cdot (.09) \cdot (.35) = \$1.26m$ .

b. If the debt change is permanent, the present value =  $1.26 / .09 = \$14m$ .

c. If the debt is taken on for 10 years only, we need to discount the annual flows of \$1.26

at a rate of 9% for 10 years, i.e.  $\frac{126}{.09} \left(1 - \frac{1}{1.09^{10}}\right) = 80862 m$ .

d. In that case, we compute the present value of those tax savings at 7%:

$\frac{126}{.07} \left(1 - \frac{1}{1.07^{10}}\right) = 88497 m$ .

17.. a. The after tax interest rate is  $10(1-0.45) = 5.5\%$

b. The after tax interest rate, in this case, would be  $10(1-0.45/2) = 7.75\%$

c. If the firm does not expect to have taxable income for three years, then its marginal tax rate = 0%. However, if it does expect to eventually make money, it will be able to use these losses as loss carry-forwards. Consequently, the marginal tax rate would still be close to 45% (not taking into account the fact that the tax credit from the losses will only be available in future years when the company does make profits eventually). The after-tax interest rate would, therefore, be 5.5% or 7.75% depending on the circumstances.

18. a., b. Assuming that the accumulated operating losses can eventually be offset against income, the marginal corporate tax rate can still be considered to be close to 36%. If it is not expected that these carryforwards can be utilized for quite some time, the effective marginal tax rate would be lower. Under the assumption of a marginal tax rate of 36%, the present value of a permanent borrowing of \$5b. =  $5(0.36) = \$1.8b$ .

19. Using the definition of free cash flow as cash flow prior to discretionary capital expenditures,

a. True.

- b. True. (although this depends on whether the capital expenditures are discretionary or not.)
- c. True.
- d. True.
- e. True. (this doesn't have to be so; however, it is quite likely given the incentives of managers.)

20. a. Moderate to low. Given the low leverage and high earnings, free cash flow is probably high. On the other hand, given the high growth prospects, the firm has high capital spending. The good projects suggest good management.

b. Moderate to high. Free Cash flow may be high, in spite of low earnings - the low growth prospects suggest that capital spending is low; the low leverage implies that interest payments are low; the poor projects imply bad management.

c. It is not a good takeover target; the free cash flow is low.

d. Low to Moderate prospects of a takeover. While the poor projects may be a manifestation of poor management, the high leverage will probably reduce the likelihood of a takeover.

e. High. The low leverage and good earnings imply high cash flow, and hence acquirers may be attracted. The poor projects imply that the firm is being run inefficiently. The low growth prospects mean that capital expenditures are low, again suggesting high free cash flow..

21. a. The cost of equity =  $9\% + 1(6\%) = 15\%$ . The cost of capital is the same as the cost of equity since the firm is unlevered.

b.

Debt	Tax advantage of debt	Prob(Failure)	Expected bankruptcy cost	Firm value
2.5	1	0	0	13
5	2	0.08	0.64	13.36
7.5	3	0.205	1.64	13.36
8	3.2	0.3	2.4	12.8
9	3.6	0.45	3.6	12
10	4	0.525	4.2	11.8
12.5	5	0.7	5.6	11.4

The value of the firm is computed as the unlevered firm value plus the tax advantage of debt less the expected bankruptcy cost. The optimal amount of debt is \$5 or \$7.5m. The value of the firm at these debt levels equals \$13.36m.

22. This is not true. Agency problems lead the managers of the firm to take actions to dispossess bondholders even if the increase in equity value is less than the loss to the bondholders. Hence the cost is real. They also create covenants in debt, and may create higher monitoring costs, or lead to higher interest rates on borrowing.

23. The first firm should raise more funds in the form of equity, whereas the second firm might do well to borrow and buy back stock.

24. Maintaining flexibility is good only in an environment where good investment opportunities come unawares. Otherwise, it is bad for stockholder value, because it implies high free cash flow.

25. a. The firm value remains the same.

b. The cost of capital also remains the same.

c. If there were taxes, firm value would go up as leverage increased. The cost of capital would drop.

26. a. The high growth prospects of the firm in the past probably made debt expensive due to agency costs (due to R&D expenses). The firm would also not have had the ability to pay back debt, since it would continually need additional funds for growth.

b. However, now that the firm is more mature, and there are not many new investment opportunities, it should consider more debt.

27. By increasing the riskiness of the firm's investments, bondholders can be made less well off. By increasing the leverage of the firm, existing bond values can be reduced to the benefit of stockholders. Finally, increasing dividends reduces the asset base available to protect bondholders.

28. This is not true because covenants can be expensive, both in terms of their effect on flexibility and the cost of monitoring and providing the information required in bond covenants.

29. 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.

30. a. These firms have stable earnings and fixed assets that can be easily sold in case of bankruptcy to pay off bondholders.

b. Since returns are controlled by regulation, the variance of returns is reduced. This increases debt capacity.

31. The tax advantage of debt would be lowered. This would reduce the optimal debt-equity ratio. Removing the tax deductibility of debt would have a similar effect.

32. This would raise their debt ratios, since the probability of bankruptcy would drop for each level of debt.

33. 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.

34. We would expect strong firms to issue debt, while financially weak firms would issue equity. This is related to the lower bankruptcy probabilities of the former.

35. This could be because private firms tend to be smaller and tend to be growth firms. Furthermore, information asymmetries would tend to be higher for such firms. Finally, the owner of a private firm may weigh default risk much more than a well diversified investor in a publicly traded firm, since much or all of his or her wealth may be invested in the business.

36. The bankruptcy itself is not what causes stock prices to go to zero. It is the years of poor earnings and investments leading to bankruptcy that wipe out the value of equity. Thus, at the point of bankruptcy the costs are more the costs of liquidation.

37. The direct costs refer to the actual legal costs and reorganization incurred during bankruptcy. Indirect costs refer to negative effects on the operating cashflows of firms because they are in or close to bankruptcy. Firm, such as retailers may find that suppliers refuse to ship to them on credit if they are close to bankruptcy. Also, firms which sell durable goods and/or goods whose quality is not easily observable are subject to such costs, since their customers will prefer other firms that have a higher probability of being around when the customers need further servicing.

38. Managers left to themselves would prefer all equity financed firms, with significant cash balances, since they will be far less pressure to deliver results and be efficient. The greater the leverage, the more managers are under the ball, because debt service payments must be made on time.

39. First of all, there could be direct effects of high leverage on the operating cashflows. Secondly, the cost of capital is obtained by weighting the cost of equity and the cost of debt by their respective shares in the market value of the firm. Even though the cost of debt is always lower than that of equity, since increasing leverage also increases the share of debt in the capital structure of the firm, the net effect on the cost of capital can be to raise it.