Problems Related to Capital Structure: Limits to the Use of Debt

1. Firm Value

Janetta Corporation has an EBIT rate of $750,000 per year that is expected to continue in perpetuity. The unlevered cost of equity for the firm is 15%, and the corporate tax rate is 35%. The company also has a perpetual bond issue outstanding with a market value of $1.5 million.

     a.   What is the value of the company?

Using the M&M Proposition 1 with taxes, the value of the firm is:

$$V_L = [EBIT(1 - \text{tax rate})/K_{ul}] + [\text{tax rate}] D$$

$$V_L = [\$750,000](1-.35)/.15 + .35[\$1,500,000] = \$3,775,000$$

     b.   The CFO of the company informs the firm president that the value of the Company is $3.2 million. Is the CFO correct?

The CFO may be in the ballpark. The value calculated in part (a) does not include such things as agency or bankruptcy costs, discounts for a thinly traded market, or control premium issues.

3. Capital Structure and Growth

Edwards Construction currently has debt outstanding with a market value of $80,000, with a cost of debt equal to 12%. The company has an EBIT rate of $9,600 that is expected to continue into perpetuity. Assume there are no corporate taxes.

     a. What is the value of the company's equity? What is the debt-to-value ratio?

The interest payments each year will be: .12($80,000) = $9,600 which is exactly equal to the EBIT, so no cash is available to shareholders. Under this scenario, the value of equity will be zero, since stockholders will never receive a payment [i.e., shareholders want some type of return for their investment]. Since the market value of the company's debt is $80,000, and there is no probability of default, the total value of the firm is the market value of debt and the debt to value ratio is 1.

b. What will be the equity value, and the debt-to-value ratio if the company's growth rate is 5%?

Earnings next year = $9,600 x (1.05) = $10,800
So, there will be cash available to shareholders.

Payment to shareholders = $10,800 - $9,600 = $480

Value of Equity = $480/(.12-.05) = $6,857.14

The Debt/Value Ratio = $80,000/[$80,000 + $6,857.14] = .92

c. What will be the equity value, and the debt-to-value ratio if the company's growth rate is 10%?

Earnings next year = $9,600 x (1.10) = $10,560

Payment to shareholders = $10,560 - $9,600 = $960

Value of Equity = $960/[.12 - .10] = $48,000.

Debt-to-Value Ratio: $80,000/[$80,000 + $48,000] = .625

As the fortunes of a company improves with growing earnings, the amount of leverage will decrease all other things being equal.

6. Cost of Financial Distress

Steinberg Corporation and Dietrich Corporation are identical firms except that Dietrich is more levered. Both companies will remain in business for one more year. The companies' economists agree that the probability of the continuation of the current expansion is 80% for the next year, the probability of a recession is 20%. If the expansion continues, each firm will generate EBIT of $ 2 million. If a recession occurs each firm will generate EBIT of $800,000. Steinberg's debt obligation requires the firm to pay $750,000 at the end of the year. Dietrich's debt obligation requires the firm to pay $1 million at the end of the year. Neither firm pays taxes. Assume a discount rate of 15%.

    a.   What are the potential payoffs in one year to Steinberg's shareholders and bondholders? What about those for Dietrich's?

The total value of a firm's equity is the discounted expected cash flow to the firm's shareholders. If the expansion [in the economy] continues, each firm will generate EBIT of $2 million, but the firm is also obligated to pay interest of $750,000. If a recession occurs, Steinberg will have an EBIT of $800,000 but still have to pay $750,000 in interest to bondholders.

Therefore, assuming a discount rate of 15%, the market value of Steinberg's equity will be:

$E_{Steinberg} = [(.80)(\$2,000,000 - \$750,000) + (.2)(\$800,000 - \$750,000)]/1.15$

$E_{Steinberg} = \$878,261$

Steinberg's bondholders will receive $750,000 whether there is a recession or expansion in the economy. So, the market value of Steinberg's debt is:

$D_{Steinberg} = \{(.80)[\$750,000] + (.2)[\$750,000]\}/1.15 = \$652,174$

Since Dietrich owes its bondholders $1 million at the end of the year, its shareholders will receive $ million [i.e., $2 million - $1 million] in the event of expansion. If there is a recession, its shareholders receive nothing because the EBIT of $800,000 is less than the interest payment of $1 million. Therefore, the market value of Dietrich's equity will be:

$E_{Deitrich} = \{(.80)[\$1 \text{ million}\} + (.2)[0]\}/1.15 = \$695,652$

Dietrich's bondholders will receive $1 million if the expansion continues, but only $800,000 if there is a recession [i.e., they take a $200,000 loss].

$D_{Deitrich} = \{ (.80)[\$1 \text{ million}] + (.2)[\$800,000]\}/1.15 = \$834,783$

b.   Steinberg's CEO recently stated that Steinberg's value should be higher than Dietrich's because the firm has less debt and therefore less bankruptcy risk. Do you agree or disagree with this perspective?

The value of Steinberg is:

$$V_{Steinberg} = D + E = \$652{,}174 + \$878{,}261 = \$1{,}530{,}435$$

The value of Deitrich is:

$$V_{Deitrich} = D + E = \$834{,}783 + \$695{,}652 = \$1{,}530{,}435$$

The two firm's have the same value. The risk of bankruptcy per se does not affect a firm's value.   It is the actual costs of bankruptcy that decreases firm value. Note: this problem assumes that there are no bankruptcy costs.