Session 18: Post Class tests

1. The objective in corporate finance is to maximize the value of the business. In the standard cost of capital approach to financing, we argue that the optimal debt ratio is the one that minimizes the cost of capital. For this approach to yield the optimal, which of the following assumptions do you need to make?
   a. The bond rating of the firm will not change as the debt ratio changes
   b. The operating income of the firm will not change as the debt ratio changes
   c. The net income for the firm will not change as the debt ratio changes
   d. The beta will not change as the debt ratio changes
   e. None of the above

2. In the cost of capital approach, you estimate the cost of equity and the cost of debt at each debt ratio and the resulting cost of capital. As you increase the debt ratio, which of the following is most likely to happen?
   a. Cost of equity and cost of debt will both decrease
   b. Cost of equity and cost of debt will both increase
   c. Cost of equity will go down but the cost of debt will go up
   d. Cost of equity will go up and the cost of debt will remain unchanged
   e. Cost of equity will go up but the cost of debt will go down

3. You are trying to evaluate Farmingdale Inc., a publicly traded company, with a 20% debt to capital ratio, a marginal tax rate of 40% and a beta (levered) of 1.15, which is considering a move to a 33.33% debt to capital ratio. What will the beta of the firm be after the move to 33.33% debt?
   a. 1.15
   b. 1.20
   c. 1.30
   d. 1.495
   e. None of the above

4. Thadeus Inc. is a publicly traded chemical company with a bond rating of AA and a pre-tax cost of debt of 3.50% at its existing debt to capital ratio of 40% ($400 million debt & $600 million equity). The firm has operating income of $70 million and is considering borrowing $200 million and buying back stock. If it does so, what will the interest coverage ratio for the firm be, assuming that the firm’s rating will drop to BBB and that the interest for BBB rated bonds is 5%?
   a. 2.33
   b. 2.67
   c. 2.92
   d. 3.33
   e. None of the above

5. Morigas Inc. is a publicly traded firm that expects to earn $10 million in operating income and pay a marginal tax rate of 40%. The firm has $100 million in debt, at a 5% interest rate, and is planning to double its debt. If the expected interest rate on the debt will rise to 7.5% on all debt after the debt doubling, what will the after-tax cost of debt for the firm be after the borrowing?
   a. 3.00%
b. 3.75%
c. 4.50%
d. 5.50%
e. None of the above
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1. **b. The operating income of the firm will not change as the debt ratio changes.** For a lower cost of capital to result in higher firm value, the operating cash flow of the firm will have to remain fixed (or unchanged) as the debt ratio changes. For operating cash flow to not change, operating income has to be fixed as the debt ratio changes.

2. **Cost of equity and debt will both increase.** The latter will go up because you are borrowing more money and increasing your default risk. The cost of equity will increase because borrowing more money will create interest expenses, which, in turn, will make equity earnings more volatile.

3. **c. 1.30.** If the debt to capital ratio now is 20%, the debt to equity ratio is 25% (20/80). To get the new beta, you first have to unlever the existing beta:
   \[
   \text{Unlevered beta} = 1.15 / (1 + (1-.4)(.25)) = 1.00
   \]
   The new debt to capital ratio is 33.33%, resulting in a debt to equity ratio of 50%.
   Relever back at the new debt ratio of 50%:
   \[
   \text{Levered beta} = 1.00 (1+ (1-.4)(.50)) = 1.30
   \]

4. **c. 2.92 (mechanical answer), a. 2.33 (better answer).** To get the mechanical answer, you keep the existing debt of $400 million at the old interest rate of 3.5% and add the new debt of $200 million at the new interest rate of 5%:
   \[
   \text{Interest expenses} = .035(400) + .05 (200) = 24 \text{ million}
   \]
   Interest coverage ratio = 70/24 = 2.92
   However, it is unlikely that the old debt holders will settle for the old interest rate. As the debt gets refinanced (forcibly or with the passage of time), the interest rate on all of the debt will converge on 5%
   \[
   \text{Interest expenses} = .05 (600) = 30
   \]
   Interest coverage ratio = 70/30 = 2.33

5. **d. 5.5%.** To get to this answer, first recognize that if the firm doubles its debt and the interest rate doubles, the interest expense will be higher than the operating income:
   Interest expense on debt = 200 (.075) = 15
   Operating income = Maximum interest tax deduction = 10
   Tax savings on maximum deduction = 10 (.40) = $4 million
   Adjusted marginal tax rate on all interest expense = 4/15 = 26.67%
   After-tax cost of debt = 7.50% (1-.2667) = 5.5%