

Capital Structure Pset solutions

Question 1

The expected return on assets before the capital structure change is:

$$r_A = \frac{30}{80}(0.08) + \frac{50}{80}(0.16) = 0.13.$$

Because the MM assumptions hold, the total value of the firm is independent of its capital structure. Thus, after the capital structure change, the value of the firm remains at \$80M, while the value of equity and debt will be \$60M and \$20M, respectively. Therefore, using the formula in MM Proposition II, we have:

$$r_E = r_A + \frac{D}{E}(r_A - r_D) = 0.13 + \frac{20}{60}(0.13 - 0.08) = 0.147.$$

If the risk on debt increased, r_D would be greater than 8%, which means that r_E would be less than 14.7%, implying that the previous answer of 14.7% would overstate the effect on the expected return on the firm's stock.

Question 2

a) Initially Executive Chalk is 100% equity financed. Therefore, the value of the firm, V , is simply the value of the equity, which is $25M \times \$10 = \$250M$. By MM Proposition I, the value of the firm after the capital structure change remains \$250M.

b) The value of the debt is \$160M. By MM Proposition I, $E + D = \$250M$, implying that $E = \$90M$. The debt-to-equity ratio is therefore $160/90 = 1.78$.

c) By MM Proposition I, the stock price should not change. To see this using the argument we have used in class, assume that the firm buys back Y shares at a price of P per share. We can then set up the following two equations:

$$Y \times P = 160M.$$

$$(25 - Y) \times P = 90M$$

The first equation states that the firm uses the \$160M to buy back Y shares. The second equation states that the value of the equity after the capital structure change (number of shares outstanding times the (unchanged) stock price) is 90M. Solving the two equations gives $P = \$10$.

d) Nobody gains or loses. Debt holders pay a fair price for the debt. Equity holders initially had \$250M in stock, and after the change in capital structure their total wealth is still \$250M (\$160M in cash and 90M in stock).

Question 3

a) False. See p. 24-25 in Lecture Note 6. While reducing the debt ratio indeed reduces r_E (and possibly also r_D if the debt is risky), it also puts more weight on the relatively “more expensive” source of capital, equity, which exactly offsets the first effect.

b) False. See the picture on p. 24 in Lecture Note 6. The cost of equity r_E increases even over the range where r_D remains constant.

Question 4

a)
$$\frac{(0.08)(1,000)(0.35)}{1.08} = 25.93$$

b)
$$\sum_{t=1}^5 \frac{(0.08)(1,000)(0.35)}{(1.08)^t} = (0.08)(1,000)(0.35)(AF(5\text{ys}, 8\%)) = 111.80.$$

c)
$$\frac{(0.07)(1,000)(0.35)}{0.07} = 350.$$