FIN 521: Problem Set #3

Due on Wednesday, April 11, 2018

Wanbae Park

Question 1

a. Since the risk is idiosyncratic, discount rate of the firm is 0. Because all the possibilities of future value is equally likely, Gladstone's current equity value is equal to $0.25 \times (150 + 135 + 95 + 80) = 115$ million dollars.

b. If the firm earns \$150 or \$135 million in the future, debt holder would get 100% of face value. However, if the firm earns \$95 or \$80 million dollars in the future, debt holder would get \$95, \$80 million dollars, respectively. Since risk is diversifiable, current value of the debt is equal to $0.25 \times 100 + 100 + 95 + 80 = 93.75$.

c. Yield is a discount rate affected to "promised" payoff. Expected return, in contrast, is a discount rate affected to "expected" payoff. Therefore, yield of the debt satisfies $\frac{100}{1+y} = 93.75$. Therefore $y = \frac{100 - 93.75}{93.75} = 6.67\%$. In order to calculated expected return, it needs to calculate expected payoff of the debt, from b. it is calculated as 93.75. Therefore, in this case, expected return is equal to 0. It is because there is no systematic risk.

d. From a, expected present value of the future value is equal to 115. Since debt value is equal to 93.75, equity value is equal to 115 - 93.75 = 21.25, and firm's total value is 115, which is same as a. Therefore, Modigliani & Miller I holds here.

Question 2

a. Since the firm is unlevered, cost of capital of the firm is equal to unlevered cost of capital, which is 15%. Therefore, the firm value (present value of future free cash flow) is equal to as follows.

$$PV(FCF) = \frac{5}{1.15} + \frac{5}{(1.15)^2} + \frac{5}{(1.15)^3} + \dots$$
$$= \frac{5}{0.15} = 33.33$$

b. In this case, we can calculate firm's value by adding present value of income tax shield to unlevered firm's value. Since the debt lasts permanently, present value of interest is same as current debt value. Therefore, interest tax shield is equal to (tax rate) $\times$ (current debt value), so the firm value is equal to $33.33 + 0.35 \times 19.05 = 40$.

Question 3

a.

b.

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c.

d.

Question 4

a.

b.

c.

Question 5

a.

b.

c.

Question 6

Question 7

a.

b.

Question 8

a.

b.