Valuation Pset Solutions

Question 1

The market values of debt is D = 0.9 x 75 = $67.5 million. The market value of equity is the number of shares outstanding times the share price, that is, E = 42 x 2.5 = $105 million. Therefore total value of Federated Junkyards is $67.5 million + $105 million = $172.5 million, and the debt-to-value ratio is 67.5/172.5 = 0.39. Finally,

r_{WACC}: (0.61)(0.18) + (0.39)(0.09)(1-0.35) = 13.25%.

Question 2

a) Because the firm is all equity-financed, it must be that $r_A = r_E$ = 12.5 percent.

b) The WACC at the new capital structure is given by:

$$\begin{aligned} r_{WACC} &= \frac{E}{E+D} r_E + \frac{D}{E+D} r_D (1-T) \\ &= (0.6) r_E + (0.4)(0.08)(1-0.333) \end{aligned}$$

To get r_E, we use the following equation:

$$\begin{aligned} r_A &= \frac{E}{E+D} r_E + \frac{D}{E+D} r_D \\ 0.125 &= (0.6) r_E + (0.4)(0.08) \end{aligned}$$

Solving this equation yields r_E = 15.5%, and plugging this value into the above WACC equation yields r_{WACC} = 11.43%

Question 3

a) The firm's unlevered cash flows are (1 - 0.35)(100)(15-5) = 650. Therefore the value of the firm is 650/1.08 = 601.852

b) Suppose you borrow an amount P today. Next year you will owe (1.08)P. The total cash flows available from the firm are 650 + (0.35)(0.08)P, where the second term is the interest tax shield. Solving for P: (1.08)P=650+(0.35)(0.08)P → P=617.8707. Now, using the APV method, the value of the firm is:

$$APV = \frac{650}{1.08} + \frac{(0.35)(0.08)(617.8707)}{1.08} = 617.8707$$

Aside 1: Is it a coincidence that the value of the firm equals the value of debt? No! In this extreme case, your firm is 100% debt financed. Therefore the value of the debt equals the value of the firm.

Aside 2: The value of the firm can also be calculated using the WACC method. In this case, $r_{WACC} = 0 \times r_E + 1 \times r_D \times (1-T) = (0.08)(1-0.35) = 5.2\%$. Therefore, the value of the firm is V=650/1.052 = 617.8707.

Question 4

a) We can use ABC as a pure play and compute its asset beta. The market value of ABC's equity is 6m x \$25 = \$150M. Thus,

$$\beta_A = \frac{E}{E+D}\beta_E + \frac{D}{E+D}\beta_D = \frac{150}{150+200}(1.5) + \frac{200}{150+200}(0) = 0.643$$

Using the CAPM: $r_A = 0.08 + (0.643)(0.08) = 13.143\%$. Since ABC and B&B have the same kinds of assets, $r_A = 13.143\%$ is also the return on assets for B&B.

b) We shall use the WACC method. First we compute the return on equity for B&B:

$$r_A = \frac{E}{E+D}r_E + \frac{D}{E+D}r_D$$
$$0.13143 = (0.8)r_E + (0.2)(0.08)$$

Solving this equation yields $r_E = 14.429\%$.

Now, we use this value to compute the WACC for B&B:

$$r_{WACC} = \frac{E}{E+D}r_E + \frac{D}{E+D}r_D(1-T) = (0.8)(0.14429) + (0.2)(0.08)(1-0.5) = 12.343\%$$

Next, we compute B&B's unlevered cash flows per year as (1-T) x EBITDA + T x depreciation – CAPEX = (1 - 0.5) x (10 - 2) +0.5 x 2 – 2 = 3million.

The value of B&B is given by

$$V = \sum_{t=1}^{\infty} \frac{C_t}{(1+r_{WACC})^t} = \frac{3}{.12343} = 24.305 \text{ million.}$$

The value of B&B's equity is then 0.8 x 24.305 = 19.444 million. The price per share is \$19.444.