Class 11

APV: $NPV_{levered}$ = value of unlevered firm + PV of tax shield

WACC: $V_{levered} = \sum_{t=0}^{\infty} \frac{C_t}{(1+r_{wacc})^t} \rightarrow r_{WACC} = \frac{E}{E+D} r_E + \frac{D}{E+D} r_D (1-T)$

Question 1

Calculate the WACC for Federated Junkyards of America, using the following information.

- Debt: $75,000,000 (book value). The debt is trading at 90 percent of par (=book) value. The return on debt is 9 percent.
- Equity: 2,500,000 shares selling at $42 per share. Assume the expected rate of return on Federated's stock is 18 percent.
- Taxes: The corporate tax rate is T = 0.35.

We need D, E, r_E, r_D and T

① D = value of debt = $0.9 \cdot 75M\$ = 67.5M\$$

② $E = 42\$ \cdot 2.5M = 105M\$$

③ $r_E = 18\%$ ④ $r_D = 9\%$ ⑤ $T = 35\%$

$r_{WACC} = \frac{E}{E+D} r_E + \frac{D}{E+D} r_D (1-T) = \dots = 13.25\%$

Question 2

Whispering Pines, Inc. is all-equity financed. The expected return on the company's shares is 12.5 percent, the risk-free rate is 5 percent, the risk premium is 10%, and the corporate tax rate is 33 1/3 percent.

a) What is the return on assets for Whispering Pines?

b) Suppose the company issues debt, repurchases shares, and moves to a 40% debt ratio (D/(D+E) = 40%). The company's cost of debt at this debt ratio is 8%. What will be the company's weighted average cost of capital at the new capital structure?

a) $r_A = \frac{E}{D+E} r_E + \frac{D}{D+E} r_D = \frac{E}{E} \cdot r_E + 0 = 12.5\%$

b) $r_{WACC} = \frac{E}{E+D} r_E + \frac{D}{E+D} r_D (1-T) = 0.6 r_E + 0.4 \cdot 0.08 \cdot (1-0.\overline{3})$

but $0.125 = r_A = \frac{E}{D+E} r_E + \frac{D}{D+E} r_D$

$= 0.6\, r_E + 0.4 \cdot 0.08$

$\rightsquigarrow$ $r_E = 15.5\%$ $\rightsquigarrow$ $r_{WACC} = 11.96\%$

Question 3

You have set up a firm to produce widgets and have landed a contract with the government, your only customer. The government agrees to buy 100 widgets at $15 each at the end of this year. The raw materials for each widget cost $5 payable at the end of the year. There are no other costs. Also, there is absolutely no uncertainty about these cash flows. The corporate tax rate is 35% and the risk free rate is 8%.

a) What is the value of your firm assuming it is 100% equity financed?
b) What is the value of your firm assuming you borrow the maximum possible against the firm's cash flows and use to proceeds to pay yourself a special dividend? [Hints: 1) Because these cash flows are risk free you should be able to borrow at the risk-free rate. 2) You can borrow up to the point where debt holders receive all of the firm's cash flows. 3) The interest tax savings are certain as well, so you should discount them at the risk-free rate]

a) $(1-0.35)(100)(15-5) = 650$

$NPV = \frac{650}{1.08}$

b) $P \rightsquigarrow 1.08 \cdot P$

. Now, at time 1 we will have $650 + 0.35 \cdot 0.08 P$

We can impose $1.08P = 650 + 0.35 \cdot 0.08P \rightsquigarrow P = 617.87$

And the value of the firm is:

$$APV = \frac{650}{1.08} + \frac{0.35 \cdot 0.08 \cdot 617.87}{1.08} = 617.87$$

Question 4

B&B is a firm in the furniture industry. Its revenues will be $10m, its costs (not including depreciation) will be $2m, depreciation will be $2m, and capital expenditures will be $2m. All of these figures (including Capex) accrue at the end of this year. Moreover, these figures are expected to remain constant each year for the foreseeable future. The firm has a 20% debt-to-value ratio and pays 8% on its debt. B&B plans to maintain this ratio of debt-to-value forever. The firm has 1m shares outstanding.

You have no further information about B&B. However, you have the following information about ABC, a firm that is also in the furniture industry:

- Number of shares outstanding = 6m
- Share price = $25
- Beta of equity = 1.5
- Marker value of debt = $200 million
- ABC plans to maintain its debt-to-value ratio forever.
- Beta of debt = 0

Assume that the risk free risk is 8% and the market risk premium is 8%. The corporate tax rate is 50%.

a) What is the return on assets for B&B?

b) What is share price for B&B?

a) The market value of Equity is $E = 25\$ \cdot 6M = 150M\$$. Therefore:

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

then we use CAPM to obtain $r_A = 0.08 + 0.643 \cdot 0.08 = 13.14\%$

We use this to estimate the one for B&B

b) We need to calculate the return on equity using

$$13.14\% = r_A = \frac{E}{E+D} r_E + \frac{D}{E+D} r_D$$

$$= 0.8\, r_E + 0.2 \cdot 0.08 \quad \text{and} \quad r_E = 14.425\%$$

$$r_{WACC} = \frac{E}{E+D} r_E + \frac{D}{E+D} r_D (1-T) = 0.8 \cdot 0.1442 + 0.2 \cdot 0.08 \cdot (1-0.5) = 12.34\%$$

The value is then obtained from the cash-flow which is: $(1-T)$ EBIT + DEPRECIATION - CAPEX

$$= (1-0.5)\cdot 6 + 2 - 2 = 3M\$$$

So $$V = \sum \frac{C_t}{1+r_{wacc}} = \frac{3}{0.1234} = 24.30M\$$$

The value of the equity is $0.8 \cdot 24.30 = 19.44$.

Therefore price per share is $19.44\$$.