

15.415 Finance Theory

Lecture 20: Valuation II

Spring 1999

Overview of this Lecture

In this and in the next lecture we will study valuation in a real-world setting. We will study Dixon's decision to purchase the Collinsville plant by American Chemical.

- Cost of capital
- Cash flows
- Net present value/Sensitivity analysis
- Strategic issues/Industry analysis
- Decision

Cost of Capital

The WACC is

$$\text{WACC} = (1 - T_c) \frac{D}{V} r_D + \frac{E}{V} r_E.$$

To compute the WACC, we need

- The corporate tax rate, T_c
- The cost of debt, r_D
- The cost of equity, r_E
- The debt and equity ratios, D/V , and E/V

Corporate Taxes and Cost of Debt

- The corporate tax rate is approximately $T_c = 48\%$. This can be inferred from Exhibit 7. For instance, in 1979,

$$T_c = \frac{3818}{3818 + 4024} = 48.7\%.$$

- The cost of debt is $r_D = 11.25\%$. This is the yield for both the bonds and the note that Dixon plans to issue.

Cost of Equity

We should use the CAPM.

- We use 8% for the market risk premium. The market risk premium may be closer to 6% in recent years.
- The short-term T-bill rate is 10.5%. The long-term T-bond rate is 9.5%. We want the “average” short rate over the life of the project. This rate is equal to the long rate minus a liquidity premium. Using a liquidity premium of 1%, we get 8.5%.

Beta

- We should not use Dixon's beta. This beta does not reflect the “pure” risk of sodium chlorate.
- We should use the beta of the pure plays. There are two pure plays in sodium chlorate, Brunswick and Southern.
- We should unlever these betas to eliminate financial risk. To unlever, we need to use the leverage of these two companies. We should then relever using Dixon's leverage.

Book vs. Market Ratios

- From Exhibit 5, the debt ratios of Brunswick and Southern are 15% and 21%. These are book ratios, i.e.

$$\frac{\text{Book value of debt}}{\text{Book value of debt and equity}}.$$

- We want the market ratios, i.e.

$$\frac{\text{Market value of debt}}{\text{Market value of debt and equity}}.$$

Market Value of Debt

We are not given the market value of debt. Therefore, we have to make some approximation. (This may be typical because debt is not traded very often.) The best approximation is the book value. The book value of debt is

Book value of debt

= Book ratio $\times$ Total (book) capitalization.

- For Brunswick we get

$$D = 15\% \times 3.2 = \$0.48M.$$

- For Southern we get

$$D = 21\% \times 3.0 = \$0.63M.$$

Market Value of Equity I

- The book value of equity is not a close approximation to the market value. If the company does well, the market value will be higher than the book value.
- To find the market value of equity, we first find the number of shares by

$$\text{Number of shares} = \frac{\text{Net income}}{EPS}.$$

We then multiply by the stock price

Market Value

$$= \text{Number of Shares} \times \text{Stock Price (Close)}.$$

Market Value of Equity II

- For Brunswick we get

$$E = \frac{0.79}{1.58} \times 11.5 = \$5.75M.$$

For Southern we get

$$E = \frac{0.73}{3.66} \times 23.0 = \$4.60M.$$

- Brunswick's debt-equity ratio is

$$\frac{D}{E} = \frac{0.48}{5.75} = 0.083,$$

and Southern's is

$$\frac{D}{E} = \frac{0.63}{4.60} = 0.137.$$

They are less than half of the book ratios.

Unlevering Betas

- Using Brunswick, we get an unlevered beta of

$$\beta^U = \beta^L \times \frac{E}{D + E} = 1.10 \times \frac{1}{0.083 + 1} = 1.02.$$

- Using Southern, we get an unlevered beta of

$$\beta^U = 1.20 \times \frac{1}{0.137 + 1} = 1.06.$$

- We will use the average, i.e. $\beta^U = 1.04$.

Levering Back

- Using the target capital structure 35%, the levered beta is

$$\beta^L = \frac{D + E}{E} \times \beta^U = \frac{1}{65\%} \times 1.04 = 1.6.$$

- Using the CAPM, the cost of equity is

$$\begin{aligned} r_E &= R_f + \beta^L (E(R_m) - R_f) \\ &= 8.5\% + 1.6 \times 8\% = 21.3\%. \end{aligned}$$

Debt and Equity Ratios

- Dixon plans to finance the acquisition with debt. This does not mean that we should use $D/V = 1$ and $E/V = 0$ in the WACC.
- Dixon's target capital structure is 35% debt. This is the number we should use.
- Dixon's capital structure after the acquisition is

$$\frac{D}{D + E} = \frac{1 + 12}{(1 + 12) + \frac{4024}{3.66} \times 40} = 23\%.$$

To get an idea of the sensitivity of WACC to the capital structure, we will also consider this capital structure.

Putting It All Together

The WACC is

$$\begin{aligned} \text{WACC} &= (1 - T_c) \frac{D}{V} r_D + \frac{E}{V} r_E \\ &= 52\% \times 35\% \times 11.25\% + 65\% \times 21.3\% = 15.9\%. \end{aligned}$$

Sensitivity Analysis

Let's check the sensitivity of the WACC to some of our assumptions

- Riskless rate

If we use $R_f=9.5\%$, we get $WACC=16.5\%$.

- Capital structure

D/V	WACC
0%	16.8%
23%	16.2%
35%	15.9%
50%	15.5%

Therefore, a WACC of 16% is reasonable.