

Discount Rate Pset Solutions

Question 1.

Overestimate. If new projects are riskier than the firm's average existing projects then the firm should use a discount rate that is higher than the company's cost of capital in evaluating new projects. If the firm uses instead the company's cost of capital it will use too low a discount rate and get an NPV that is too high.

Question 2.

(a) Expected daily production: $(0.2 \times 0) + 0.8 \times [(0.4 \times 1,000) + (0.6 \times 5,000)] = 2,720$ barrels. Expected annual cash revenues: $2,720 \times 365 \times \$100 = \$99.28\text{M}$

(b) The possibility of a dry hole is a diversifiable risk and should not affect the discount rate (i.e., the denominator in your NPV calculations). This possibility should affect forecasted expected cash flows, however (i.e., the numerator in your NPV calculations). See part (a).

Question 3.

The statement is false. It is true that the two "pure plays" that are financed with both debt and equity have an equity beta that is higher than their respective asset betas. However, we can easily compute the asset betas of these firms using the unlevering formula (see lecture notes). Hence, we can easily obtain the asset betas of all three pure plays and use the average of these three asset betas as a proxy for our project's asset beta.

Question 4.

We need pure plays in the copper industry, so we choose firms B, C and D to compute the opportunity cost of capital. To compute the asset betas of these three firms we use the

unlevering formula $\beta_A = \frac{E}{E + D} \beta_E + \frac{D}{E + D} \beta_D$.

We calculate "E" (the market value of equity) as the number of shares multiplied with the share price while "D" (the market value of debt) is approximated by its book value, which is given in the table. The equity betas are also given in the table, and the debt betas are zero per our simplifying assumption. Using the unlevering formula, we obtain asset betas of 0.85, 0.8, and 0.822 for firms B, C and D, respectively. The average of these three numbers is 0.824, which is our proxy for the asset beta of projects in the copper industry. Using the CAPM, we then get an opportunity cost of capital of $7\% + 0.824 \times 8\% = 13.592\%$.