22. A company invests 20,000 in a project. The project is expected to have cash flows of 3000 at the end of each year for 15 years, with the first cash flow expected one year after the initial investment. Using the project's after-tax weighted average cost of capital, the project has a net present value of 2496.27.

The following gives additional information about the company:

(i) The company is financed with 40% equity and 60% debt.

(ii) The company's marginal tax rate is 25%

(iii) $r_E = 2r_D$, where r_E is the cost of equity and r_D is the cost of debt.

Calculate r_E.

$$r_{wacc} = \frac{E}{E+D} r_E + \frac{D}{E+D} r_D (1 - \tau_c)$$

0.4 0.6 0.25 $\frac{r_E}{2}$

(A) 10.25%

(B) 12.40%

(C) 13.25%

(D) 14.60%

(E) 16.40%

Investment: 20,000 (money out @ time 0)

Cashflows: level annuity w/ payments of 3,000 and the term = 15

Temporarily: $y = r_{wacc}$

$$2496.27 = -20{,}000 + 3000\, a_{\overline{15}|y}$$

Q: How do you get y?

→: Use IRR on the business calculator, or uniroot in R, $y = 0.1025 = r_{wacc}$.

$$0.1025 = 0.4 \cdot r_E + 0.6(0.5) r_E (1 - 0.25)$$

$$r_E = \frac{0.1025}{0.625} = 0.164$$

43. A company has a debt-to-equity ratio of 0.4 . Its common stock is currently selling for 23 . Its next dividend is expected to be 1.20 and the expected long-term growth rate for dividends is 4% . Its bonds currently yield 6%, and it has a marginal tax rate of 35% .

What is the weighted average cost of capital for the company?

(A) 7.09%

(B) 7.20%

(C) 7.70%

(D) 8.30%

(E) 9.22%

$\frac{D}{E} = 0.4$, $S = 23$, $Div = 1.20$, $g = 0.04$, $r_D = 0.06$, $T_c = 0.35$, $r_{wacc} = ?$

$\frac{D}{E} = 0.4 = \frac{2}{5} \Rightarrow \frac{D}{D+E} = \frac{2}{7}$ and $\frac{E}{D+E} = \frac{5}{7}$ $\therefore$

Implicitly, they want us to use the DIVIDEND DISCOUNT MODEL, i.e.,

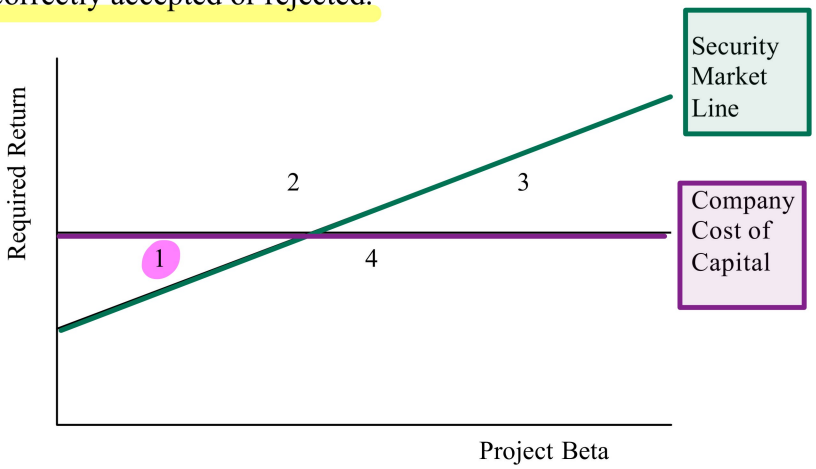
$S = PV(\text{Dividends}) = \frac{Div}{r_E - g}$ ← using r_E

$23 = \frac{1.20}{r_E - 0.04} \Rightarrow r_E = 0.04 + \frac{1.20}{23}$

$r_E = 0.092174$

$r_{wacc} = \frac{5}{7} \cdot (0.092174) + \frac{2}{7}(0.06)(1 - 0.35) = 0.07689$

53. If a firm uses the company cost of capital to determine which projects to accept, a number of projects that do not have the same beta as the average beta of the firm may be incorrectly accepted or rejected.



Which sections of the graph above would contain projects that would be incorrectly accepted or rejected using the company cost of capital?

A. 1 and 3 only
B. 1 and 4 only
C. 2 and 3 only
D. 2 and 4 only
E. 3 and 4 only

54. The value of a currently all-equity firm is 700. The firm converts some of its equity to debt at 6%, changing the debt-to-equity ratio of the firm to 0.25. The corporate income tax rate is 35%.

$\frac{D}{E} = \frac{1}{4} \Rightarrow E = 4D$

If you ignore personal taxes and any costs of financial distress, what is the new value of the firm after the conversion?

A. 741
B. 745
C. 749
D. 753
E. 757

Value (Levered) = Value (Unlevered) + PV(ITS)

Value (Unlevered) = 700

$D T_c = 0.35 \cdot D$

Value (levered) = $D + E = D + 4D = 5D$

$V = ?$

$V = 700 + 0.35 \cdot \left(\frac{1}{5}\right) \cdot V \Rightarrow 0.93V = 700$

$\Rightarrow V = \frac{700}{0.93} = 752.688$

Problem. Let the risk-free interest rate be equal to 0.02 and let the market risk-premium equals 0.04.
The current stock price is 50 per share w/ one million shares outstanding.
The company has 25 million in debt w/ the debt cost of capital of 0.05.
The equity beta is 1.2.
The weighted average cost of capital is 0.058.
What's the corporate tax rate?

⟶: CAPM: $r_E = r_f + \beta_E \left(\mathbb{E}[R_{Mkt}] - r_f \right)$

$$r_E = 0.02 + 1.2\,(0.04) = 0.068$$

$$r_{WACC} = \frac{E}{E+D} r_E + \frac{D}{E+D} r_D (1 - \tau_c)$$

$$0.058 = \frac{2}{3} \cdot (0.068) + \frac{1}{3} (0.05)(1 - \tau_c)$$

$$1 - \tau_c = \frac{0.058 - \frac{2}{3}(0.068)}{\frac{1}{3}(0.05)} = 0.76 \quad \Rightarrow \quad \boxed{\tau_c = 0.24}$$

□