

Corporate finance module 8: WACC and debt refinancing

The corporate tax rate is 35%. At a 30% debt to value ratio, the cost of debt capital is 9% *per annum* and the weighted average cost of capital is 12.26% *per annum*. At a 50% debt to value ratio, the cost of debt capital is 9.5% *per annum*.

- A. What is the cost of equity capital at a 30% debt to value ratio?
- B. What is the opportunity cost of capital with all equity financing?
- C. What is the cost of equity capital at a 50% debt to value ratio?
- D. What is the after-tax weighted average cost of capital at a 50% debt to value ratio?

Part A: $WACC = r_D (1 - T_c) (D/V) + r_E (E/V)$ or

Weighted average cost of capital = return on debt capital
× (1 – corporate tax rate)
× debt to value ratio
+ return on equity capital
× equity to value ratio

$$\Rightarrow r_E = (WACC - r_D (1 - T_c) (D/V)) / (E/V) \\ = (12.26\% - 9\% \times (1 - 35\%) \times 30\%) / 70\% = 15.01\%$$

Part B: The weighted average cost of capital is constant if the corporate tax rate is zero. The opportunity cost of capital at all equity financing equals this weighted average cost of capital at a zero tax rate.

$$\text{opportunity cost of capital} = r = r_D \times (D/V) + r_E \times (E/V) = 0.09 \times 0.30 + 0.15 \times 0.70 = 13.20\%$$

Part C: Compute the cost of equity capital r_E at a 50% debt to value ratio using the opportunity cost of capital with a zero corporate tax rate:

The cost of debt r_D at a 50% debt to value ratio is 0.095. The cost of equity is

$$r_E = r + (r - r_D) (D/E) \\ = 0.132 + (0.132 - 0.095) \times (50/50) = 16.90\%$$

Part D: Calculate the WACC at a 50% debt to value ratio:

$$WACC = r_D \times (1 - T_c) \times (D/V) + r_E \times (E/V) \\ = 0.095 \times (1 - 0.35) \times 0.50 + 0.169 \times 0.50 = 11.54\%$$