Corpfin Mod 18: Weighted average cost of capital and debt refinancing: practice exam problem

The corporate tax rate is 33%. Initially, at a 24% debt to value ratio, the cost of debt capital is 4.82% *per annum* and the weighted average cost of capital is 8.55% *per annum*. After refinancing to a 49% debt to value ratio, the cost of debt capital is 7.35% *per annum*.

Question 18.1: Initial equity to value ratio

At a 24% debt to value ratio, what is the equity to value ratio?

Answer 18.1: The equity to value ratio = 1 – the debt to value ratio = 1 – 24% = 76%.

Question 18.2: Initial cost of equity capital

What is the cost of equity capital at a 24% debt to value ratio?

At a 24% debt-to-value ratio, the firm's cost of debt capital r_D is 4.82% *per annum*, the corporate tax rate is 33%, the equity to value ratio = 1 – 24% = 76%, and the weighted average cost of capital is 8.55% *per annum*, so 24% × 4.82% × (1 – 33%) + 76% × r_E = 8.55% ⇛

$$r_E = [\ 8.55\% - 24\% \times 4.82\% \times (1 - 33\%)\ ] / 76\% = 10.23\%$$

Question 18.3: Opportunity cost of capital with all equity financing

What is the opportunity cost of capital with all equity financing?

Answer 18.3: The opportunity cost of capital with all equity financing is the weighted average cost of capital with no debt tax shield:

$$\text{opportunity cost of capital with all equity financing} = 24\% \times 4.82\% + 76\% \times 10.23\% = 8.93\%$$

Question 18.4: Refinanced cost of equity capital

What is the cost of equity capital at a 49% debt to value ratio?

Answer 18.4: After refinancing to a 49% debt to value ratio, the cost of debt capital is 7.35% *per annum*, the equity to value ratio is 1 – 49% = 51%, and the return on equity capital is r_E. The opportunity cost of capital with all equity financing is the WACC with no debt tax shield is 49% × 7.35% + 51% × r_E = 8.93%, so the return on equity capital is

$$r_E = (8.93\% - (49\% \times 7.35\%)\ ) / (51\%) = 10.45\%$$

Question 18.5: Weighted average cost of capital

What is the after-tax weighted average cost of capital at a 49% debt to value ratio?

Answer 18.5: The after-tax weighted average cost of capital at a 49% debt to value ratio is

$$49\% \times 7.35\% \times (1 - 33\%) + 51\% \times 10.45\% = 7.74\%$$