Corpfin, Mod 19: Debt tax shields and adjusted present value sample exam problem

Exercise 19.1: Debt tax shields and adjusted present value

A firm undertakes a one year project on January 1 with the following attributes:

! The initial investment is 2,016.
! The project provides an expected return of 2,244 at the end of the year (December 31).

! The opportunity cost of capital is 9.4% *per annum.*
! The return on debt r_D is 6.3% *per annum.*
! The debt to value ratio (D/V) is 34.2%.
! The corporate tax rate is 28.4%.

A. What is the base case net present value of the project?
B. What is the present value of the debt tax shield?
C. What is the adjusted present value of the project?

Part A: The base case net present value of the project is the NPV of the cash flows at the opportunity cost of capital, ignoring the debt financing:

$$- 2,016 + 2,244 / 1.094 = 35.19$$

Part B: The debt is the initial investment times the debt to value ratio:

$$2,016 \times 34.2\% = 689.47$$

The interest payment is the debt times the return on debt:

$$2,016 \times 34.2\% \times 6.3\% = 43.44$$

The nominal value of the debt tax shield is the interest payment times the corporate tax rate:

$$2,016 \times 34.2\% \times 6.3\% \times 28.4\% = 12.34$$

The present value of the debt tax shield is the nominal value discounted at the return on debt.

$$2,016 \times 34.2\% \times 6.3\% \times 28.4\% / (1.063) = 11.60$$

Part C: The adjusted present value of the project is the base case net present value plus the present value of the debt tax shield:

$$35.19 + 11.60 = 46.79$$