

BM mod 19 financing valuation APV fixed rebalanced debt practice exam question

(The attached PDF file has better formatting.)

The opportunity cost of capital with all equity financing is 11.0% *per annum*, and the corporate tax rate is 21%.

A project has an initial investment of 355 at time $t=0$ and perpetual cash inflows of 39.174 *per annum* at times $t=1, 2, 3, \dots$. The project has debt of 64.190 with an interest rate of 4.521% *per annum*.

Question 19.1: Base case NPV

What is the base case NPV of the project with all-equity financing?

Answer 19.1: the base case NPV with all-equity financing is the negative of the initial investment of 355 at time $t=0$ plus the present value of the perpetual cash inflows of 39.174 *per annum* at times $t=1, 2, 3, \dots$

$$-355 + 39.174 / (11.0\%) = 1.127$$

Question 19.2: Present value of tax shields if fixed, perpetual debt is used

What is the present value of tax shields if fixed, perpetual debt is used?

Answer 19.2: The present value of tax shields if fixed, perpetual debt is used is the tax rate times the interest payments (the interest rate times the bond value) discounted at the bond interest rate:

$$21\% \times 4.521\% \times 64.190 / (4.521\%) = 13.480$$

Question 19.3: Project's value (APV) with fixed, perpetual debt

What is the project's value if fixed, perpetual debt is used?

Answer 19.3: The project's value is the base case NPV with all-equity financing plus the present value of the tax shields with fixed, perpetual debt = $1.127 + 13.480 = 14.607$.

Question 19.4: Tax shields with re-balanced debt

If the debt is continually re-balanced to a constant debt-to-equity ratio (the debt is increased or decreased in proportion to changes in the market value of the project), what is the present value of the interest tax shields?

Answer 19.4: The present value of tax shields (if the debt is continually re-balanced to a constant debt-to-equity ratio) is the tax rate times the interest payments (the interest rate times the bond value) discounted at the opportunity cost of capital:

$$21\% \times 4.521\% \times 64.190 / (11\%) = 5.540$$

Question 19.5: Project's value with (APV) with re-balanced debt

What is the project's value if the debt is increased or decreased in proportion to changes in the market value of the project?

Answer 19.5: The project's value if the debt is increased or decreased in proportion to changes in the market value of the project is the base case NPV with all-equity financing plus the present value of the tax shields with re-balanced debt = $1.127 + 5.540 = 6.667$.