Question 1  Consider a company which uses internally generated equity to finance its capital budget. The company uses CAPM to compute its cost of capital and uses IRR method to evaluate projects. Company is considering a 10 year project which requires a date 0 outlay of $100,000 and generates $20,000 in each of the following 10 years. The risk free rate is $r_{RF} = 6\%$ and the company’s beta is $\beta = 1.5$. What is the highest value of $r_M$ (the return on the market portfolio) such that the company should undertake the project according to IRR method?

Answer: First let us find IRR:

$$20,000(PVIFA)_{10, IRR} - 100,000 = 0$$

$$\Rightarrow (PVIFA)_{10, IRR} = 5$$

$$\Rightarrow IRR = 15\%$$

To undertake the project, we need

$$IRR = 15\% \geq r_{RF} + \beta(r_m - r_{RF})$$

$$\Rightarrow 15\% \geq 6\% + 1.5(r_m - 6\%)$$

$$\Rightarrow r_m \leq 12\%.$$

Question 2  The next expected dividend of company is $D_1 = $4. The dividend growth rate is expected to be constant at $g = 6\%$. The company’s current stock price is $P_0 = 80$. The company is fully internal equity financed.

Suppose that the company is evaluating a project which costs $120,000 and will generate an income stream of $100,000 in each of the next 2 years. What is the MIRR for this project? Should the company undertake this project according to the MIRR criteria?

Answer: First let us compute the cost of capital for this company:

$$\text{cost of capital} = \frac{D_1}{P_0} + g = \frac{4}{80} + 6\% = 11\%$$
The future value of positive cash flows is then

\[ FV = 100,000 \times (FVIFA)_{11\%, 2} = 100,000 \times (2, 11) = \$211,000 \]

MIRR is given by

\[ (1 + MIRR)^2 \frac{\$211,000}{\$120,000} = 1 \implies MIRR = 33\% \]

Since \( MIRR = 33\% > 11\% \), the project should be undertaken.

**Question 3** A company finances its operations with 40 percent debt and 60 percent equity. Its net income is \( I = \$20 \) million and it has a dividend payout ratio of \( x = 25\% \). Its capital budget is \( B = \$30 \) million this year. The interest rate on company’s debt is \( r_d = 10\% \) and the company’s tax rate is \( T = 40\% \). The company’s common stock trades at \( P_0 = \$66 \) per share, and its current dividend of \( D_0 = \$4 \) per share is expected to grow at a constant rate of \( g = 10\% \) a year. The flotation cost of external equity is \( F = 5\% \) of the dollar amount issued. What is the company’s WACC?

Answer: First let us determine whether equity will be internal or external:

\[ w_e B = 0.6 \times 30M = 18M \]
\[ I(1 - x) = 20M \times (1 - .25) = 15M \]

Since \( w_e B > I(1 - x) \), the company will need external equity. The cost of external equity will be

\[ r^{ext}_e = \frac{D_1}{P_0(1 - F)} + g = \frac{4(1 + 0.10)}{66} + 10\% = 16.66\% \]

Accordingly, we will have

\[ WACC = w_d r_d (1 - T) + w_e r^{ext}_e = 0.4(10\%)(1 - 0.4) + 0.6(16.66\%) = 12.3\% \]

**Question 4:** Consider a company which uses internally generated equity to finance its capital budget. The company uses CAPM to compute its cost of capital and uses IRR method to evaluate projects. Company is considering a 2 year project which requires a date 0 outlay of \( \$65,040 \) and
generates $40,000 in each of the following 2 years (i.e. Year 1, Year 2 cash flows are both $40,000). The risk free rate is 5% and market risk premium \((r_m - r_{RF})\) is 5%. What is the highest value of beta for which the company will undertake the project?

Answer: First let us find IRR:

\[
40,000(PVIFA)_{2, IRR} - 65,040 = 0
\]
\[
\Rightarrow (PVIFA)_{2, IRR} = 1.626
\]
\[
\Rightarrow IRR = 15\%
\]

To undertake the project, we need

\[
IRR = 15\% \geq r_{RF} + \beta(r_m - r_{RF})
\]
\[
\Rightarrow 15\% \geq 5\% + \beta(5\%)
\]
\[
\Rightarrow \beta \leq 2.
\]

**QUESTION 5** Suppose a company uses only debt and internal equity to finance its capital budget and uses CAPM to compute its cost of equity. Company estimates that its WACC is 12%. The capital structure is 75% debt and 25% internal equity. Before tax cost of debt is 12.5% and tax rate is 20%. Risk free rate is \(r_{RF} = 6\%\) and market risk premium \((r_m - r_{RF}) = 8\%\). What is the beta of the company?

Answer:

\[
WACC = w_d r_d (1 - T) + w_e r_e
\]
\[
\Rightarrow 12\% = 0.75(12.5\%)(1 - 0.2) + 0.25(r_e)
\]
\[
\Rightarrow r_e = 18\%
\]

Now we can write

\[
r_e = r_{RF} + \beta(r_m - r_{RF})
\]
\[
\Rightarrow r_e = 18\% = 6\% + \beta(8\%)
\]
\[
\Rightarrow \beta = 1.5
\]