Calculating a company’s Weighted Cost of capital

WACC = (w_d × k_d × (1 + t) + (w_p × k_p) + (w_e × k_e))

In which:
- w_d = % of debt in the capital structure
- k_d = cost of issuing new debt
- w_p = % of preferred shares in the capital structure
- k_p = cost of preferred shares
- w_e = % of common equity in the capital structure
- k_e = cost of common equity
- t = tax rate

Firm’s debt structure (% of debt, preferred shares and common equity) should be based on target capital structure.

If no target capital structure use current capital structure / industry average capital structure.

How Marginal cost of capital and investment opportunity schedule are used to determine optimal capital budget

↑ capital raised → ↑ cost of raising additional capital → upward sloping marginal cost of capital curve

Downward sloping investment opportunity schedule

Marginal cost of capital curve intersects investment opportunity schedule curve → optimal capital budget

Firm should undertake all projects with IRR (Investment Opportunity schedule) > cost of fund (Marginal cost of capital)

Applying marginal COC in determining project’s NPV

Marginal COC (WACC for additional fund) should be used in determining project’s NPV

Project’s risk level might be different from firm’s risk level → Discount rate should be adjusted upward for higher-risk projects, and downward for lower-risk projects

Calculating cost of debt (Kd)

- Yield to maturity approach: assume before-tax cost of debt is the market interest rate (YTM) on new debt (not the coupon rate on existing debt)
- Debt rating approach (if YTM is not available): based on market yield for debt with same rating and same maturity as the firm’s existing debt
- Yield to maturity approach: assume before-tax cost of debt is the market interest rate (YTM) on new debt (not the coupon rate on existing debt)

Calculate cost of preferred stock

\[ k_p = \frac{D_p}{P} \]

In which:
- \( D_p \) = preferred dividends
- \( P \) = market price of preferred dividends

Calculating cost of common equity (Kce)

1. Capital asset pricing model approach

\[ k_{ce} = R_f + \beta \times (R_m - R_f) \]

In which:
- \( R_f \) = risk free rate
- \( R_m \) = expected rate of return of the market
- \( \beta \) = stock’s beta (stock’s risk measure)

2. Dividend discount model approach: Dividends are expected to grow at constant rate

\[ P_0 = \frac{D_1}{k_{ce} - g} \]

In which:
- \( D_1 \) = next year’s dividend
- \( g \) = constant growth rate
- \( a \) = retention rate × ROE = (1 - dividend payout rate) × ROE

3. Bond yield plus risk premium approach

\[ k_{ce} = \text{bond yield} + \text{risk premium} \]

Calculating Beta of project

Step 1: estimate the beta for a comparable company (group of comparable companies)

Step 2: Unlever the beta to asset beta

\[ \beta_{Asset} = \beta_{Equity} \times \frac{1}{1 + (1 - t) \times \frac{D}{E}} \]

Step 3: Relever the beta

\[ \beta_{Project} = \beta_{Asset} \times \left[ 1 + (1 - t) \times \frac{D}{E} \right] \]

Country risk premium

Increased risk associated with investing in a developing country

\[ k_{ce} = R_f + \beta \times (R_m - R_f + CRP) \]

In which:
- CRP = country risk premium

CRP = sovereign yield spread × annualized standard deviation of equity index of developing country

annualized standard deviation of sovereign bond market in terms of the developed market currency

Where:

Sovereign yield spread - yields of Gov’s bonds in developing - Treasury bonds of similar maturities

Marginal cost of capital

Definition: Cost of additional new capital raised

↑ capital raised → ↑ cost of financing, due to:
- ↑ additional financial risk → higher cost of debt
- ↑ Flotation cost (fees charged by bank when a company raised external equity capital). Flotation cost is added to the initial project cost

Marginal cost of capital schedule: show WACC for different amounts of financing

Break point: Any time when cost of one of the components of the company’s WACC changes

\[ \text{break point} = \frac{\text{amount of capital which the component's cost of capital changes}}{\text{weight of the component in the capital structure}} \]