Corporate Finance

Cost of Capital

Chapter 12

Dr Erkan Yalcin

Why Cost of Capital is Important

- We know that the return earned on assets depends on the risk of those assets.
- The return to an investor is the same as the cost to the company.
- Cost of capital provides us with an indication of how the market views the risk of our assets.
- Knowing our cost of capital can also help us determine our required return for capital budgeting projects.
- The cost of capital depends on the use of the funds, not the source.

Required Return

- The required return is the same as the appropriate discount rate and it's based on the risk of the cash flows.
- We need to know the required return for an investment before we can compute the NPV and make a decision about whether or not to take the investment.
- We need to earn at least the required return to compensate our investors for the financing they have provided.

Cost of Equity

- The return that equity investors require on their investment in the firm.
- There are two main methods for determining the cost of equity:
  - Dividend growth model approach;
  - SML (CAPM) approach.

Dividend Growth Model Approach

- Using the dividend growth model formula and rearrange to solve for R_E:

$$P_0 = \frac{D_1}{R_E - g} = \frac{D_0(1+g)}{R_E - g}$$

$$R_E = \frac{D_1}{P_0} + g = \frac{D_0(1+g)}{P_0} + g$$

Example (Dividend Growth Model)

Suppose that your company is expected to pay a dividend of \$1.50 per share next year. There has been a steady growth in dividends of 5.1% per year and the market expects that to continue. The current price is \$25. What is the cost of equity?

$$R_E = \frac{1.50}{25} + 0.051 = 0.111 = 11.1\%$$

Dividend Growth Model Approach Cont'd

Example (Estimating the Dividend Growth Rate)

One method for estimating the growth rate is to use the historical average:

Year	Dividend	Percentage Change
2014	1.10	-
2015	1.20	$(1.20 - 1.10)/1.10 = 0.090$
2016	1.35	$(1.35 - 1.20)/1.20 = 0.125$
2017	1.40	$(1.40 - 1.35)/1.35 = 0.037$
2018	1.55	$(1.55 - 1.40)/1.40 = 0.1071$

$$\bar{x} = \frac{0.090 + 0.125 + 0.037 + 0.1071}{4} = 0.08978 = 8.978\%$$

Dividend Growth Model Approach Cont'd

- Advantages and disadvantages of dividend growth model:
  - Advantage
    - Easy to understand and use.
  - Disadvantages
    - Only applicable to companies currently paying dividends.
    - Not applicable if dividends are not growing at a reasonably constant rate.
    - Extremely sensitive to the estimated growth rate.
    - Does not explicitly consider risk.

The SML Method

- Computing cost of equity using the SML approach:
  - R_f: Risk-free Rate;
  - $E(R_M) - R_f$: Market risk premium;
  - β: Systematic risk of asset.

$$R_E = R_f + \beta_E[E(R_M) - R_f]$$

Example

CSL Ltd had an estimated beta of 0.87, risk free rate is 2.5% and market risk premium is 5.42%. Calculate CSL Ltd's cost of equity.

$$R_E = 0.025 + 0.87(0.0542) = 0.07215 = 7.215\%$$

The SML Method Cont'd

- Advantages and disadvantages of SML method:
  - Advantages
    - Explicitly adjusts for systematic risk.
    - It is applicable to all companies as long as beta is available.
  - Disadvantages
    - Must estimate the expected market risk premium, which varies over time.
    - Must estimate beta, which also varies over time.
    - Uses the past to predict the future, which is not always reliable.

Cost of Equity Cont'd

Example

Suppose shares in Red Centre Air Freight have a beta of 1.2. The market risk premium is 8%, and the risk-free rate is 6%. Red Centre's last dividend was \$2 per share, and the dividend is expected to grow at 8% indefinitely. The share currently sells for \$30. What is Red Centre Air Freight's cost of equity capital?

Using SML:

$$R_E = 6\% + 1.2(8\%) = 15.6\%$$

Using DGM:

$$R_E = \left[\frac{2(1.08)}{30}\right] + 0.08 = 15.2\%$$

The two estimates are reasonably close, so we might average them to find that Red Centre Air Freight's cost of equity

$$R_E = \left(\frac{15.6\% + 15.2\%}{2}\right) = 15.4\%$$

Cost of Debt

- The cost of debt is the return that lenders require on the firm's new debt.
- We usually focus on the cost of long-term debt or bonds.
- **Method 1**: Compute the yield to maturity on existing debt.
- **Method 2**: Use estimates of current rates based on the bond rating expected on new debt

Cost of Debt Cont'd

Example

Suppose the General Tool Company issued a 30-year, 7% bond eight years ago. The bond is currently selling for 96% of its \$1000 face value, or \$960. What is General Tool Company's cost of debt?

Value of a bond:

$$B = \frac{C\left[1 - \frac{1}{(1+r)^t}\right]}{r} + \frac{F}{(1+r)^t}$$

$N = 30–8 = 22$; $PMT = 1000 \times 0.07 = 70$; $FV = 1000$; $PV = -960$; $I = 7.37\%$; $YTM = 7.37\%$. General Tool's cost of debt, R_D, is 7.37% (assuming annual coupons). Note: since the bond is selling at \$960 and the face value is \$1,000, the bond is selling at a discount, therefore, the YTM of 7.37% is greater than the coupon rate of 7%.

Cost of Preference Shares

- Preference shares generally pay a constant dividend every period.
- Dividends are expected to be paid every period forever.
- Preference share valuation is a perpetuity, so we take the perpetuity formula, rearrange and solve for R_P.

$$R_P = \frac{D}{P_0}.$$

Example

Whitefield Ltd has a preference share issue that trades on the ASX (ASX code WHFPB). The face value of the issue is \$100 and pays a dividend of 7% annually, per share. In March 2019 this preference share was selling for \$103 per preference share. What was Whitefield's cost of preference shares?

$$R_P = \frac{7}{103} = 0.068 = 6.80\%$$

Weighted Average Cost of Capital (WACC)

- The WACC is the overall return the firm must earn on its existing assets to maintain the value of the shares.

$$V = E + D$$

  - E is the market value of equity, that is, number of outstanding shares multiplied by price per share;
  - D is the market value of debt, that is, number outstanding bonds multiplied by bond price.

$$100\% = \frac{E}{V} + \frac{D}{V}$$

  - E/V is the percentage financed with equity;
  - D/V is the percentage financed with debt.

Taxes and the WACC: Classical Tax System

- The weighted average of the cost of equity and the after-tax cost of debt.
- If concerned with after-tax cash flows, we need to consider the effect of taxes on the various costs of capital.
- Interest expense reduces our tax liability:
  - This reduction in taxes reduces our cost of debt.
  - After-tax cost of debt is $R_D(1 - T_C)$
- Dividends are not tax deductible, so there is no tax impact on the cost of equity.

WACC

$$WACC = \left(\frac{E}{V}\right) R_E + \left(\frac{D}{V}\right) R_D(1 - T_C)$$

$$WACC = \left(\frac{E}{V}\right) R_E + \left(\frac{P}{V}\right) R_P + \left(\frac{D}{V}\right) R_D(1 - T_C)$$

- (E/V) is the percentage of common equity in capital structure;
- (P/V) is the percentage of preferred stock in capital structure;
- (D/V) is the percentage of debt in capital structure;
- R_E is firm's cost of equity;
- R_P is firm's cost of preferred stock;
- R_D is firm's cost of debt;
- T_C is firm's corporate tax rate.

WACC Cont'd

Example

The Brumby Forests Group has 1.4 million shares outstanding. The shares currently sell for \$20 each. The firm's debt is publicly traded and was recently quoted at 93% of face value. The debt has a total face value of \$5 million, and it is currently priced to yield 11%. The risk-free rate is 8%, and the market risk premium is 7%. You have estimated that Brumby Forests' equity has a beta of 0.74. If the corporate tax rate is 30%, what is the WACC of Brumby Forests Group?

$$R_E = 0.08 + 0.74 \times 0.07 = 13.18\%$$

$$E = \$1,400,000 \times \$20 = \$28,000,000$$

$$D = 0.93 \times \$5,000,000 = \$4,650,000$$

$$WACC = 0.8576 \times 0.1318 + 0.1424 \times 0.11 \times (1 - 0.3) = 0.1240 = 12.40\%$$

Taxes and the WACC: Imputation Tax System

- In this system shareholders (if residents) are given a tax credit for the local taxes paid.
- This will alter the cost of equity for the firm.
- Adjusting the WACC formula to take into account the tax advantage of imputation, one gets

$$WACC = \frac{\left(\frac{E}{V}\right) R_E(1 - T_C)}{(1 - T_C(1 - \gamma))} + \left(\frac{D}{V}\right) R_D(1 - T_C)$$

- This adjustment assumes all shareholders can take advantage of the tax credits.
  - γ is the percentage use of the franking credit.

Factors that Influence a Company's WACC

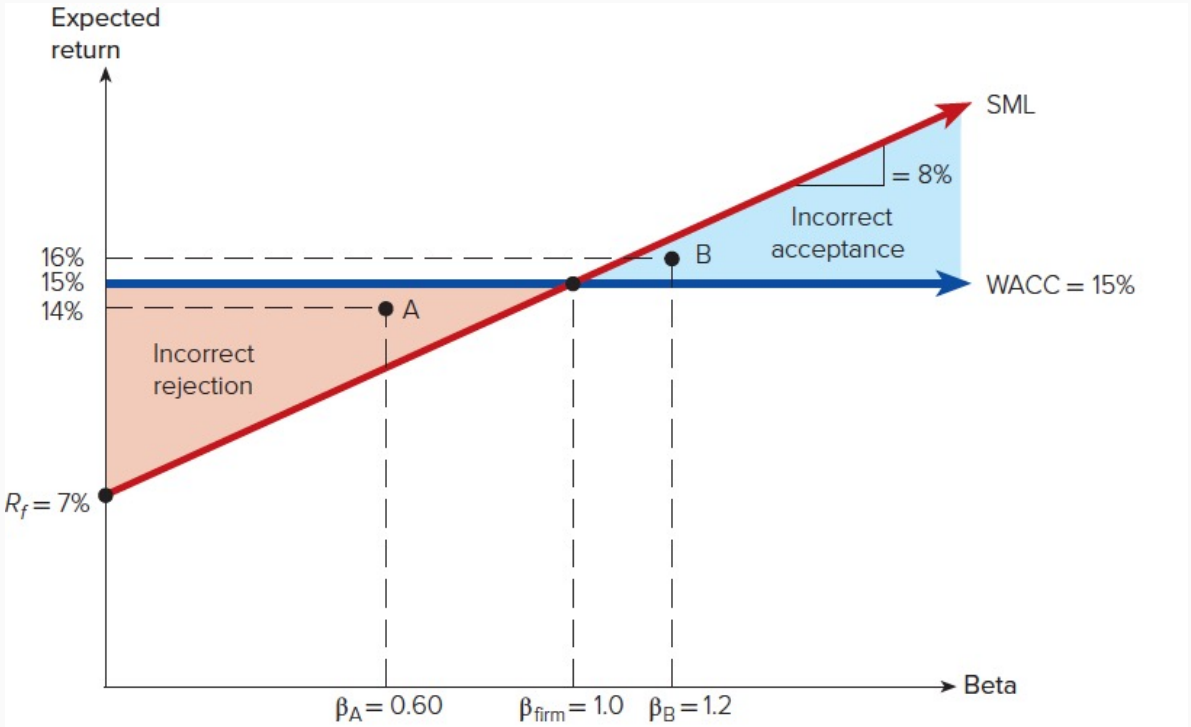
- Market conditions, especially interest rates, tax rates and the market risk premium;
- The firm's capital structure and dividend policy;
- The firm's investment policy.
    - Firms with riskier projects generally have a higher WACC.

Divisional and Project Costs of Capital

- Using the WACC as discount rate is only appropriate for projects that are the same risk level as the firm's current operations.
- If we are looking at a project that is not the same risk level as current operations, we need to determine the appropriate discount rate for that project.
- Divisions also often require separate discount rates.

Risk-adjusted WACC

- A firm's WACC reflects the risk of an average project undertaken by the firm.
  - Average risk is the firm's current operations.
- Different divisions or projects may have different risks.
  - The division's or project's WACC should be adjusted to reflect the appropriate risk and capital structure.



If a firm uses its WACC to make accept–reject decisions for all types of projects, it will have a tendency towards incorrectly accepting risky projects and incorrectly rejecting less risky projects.

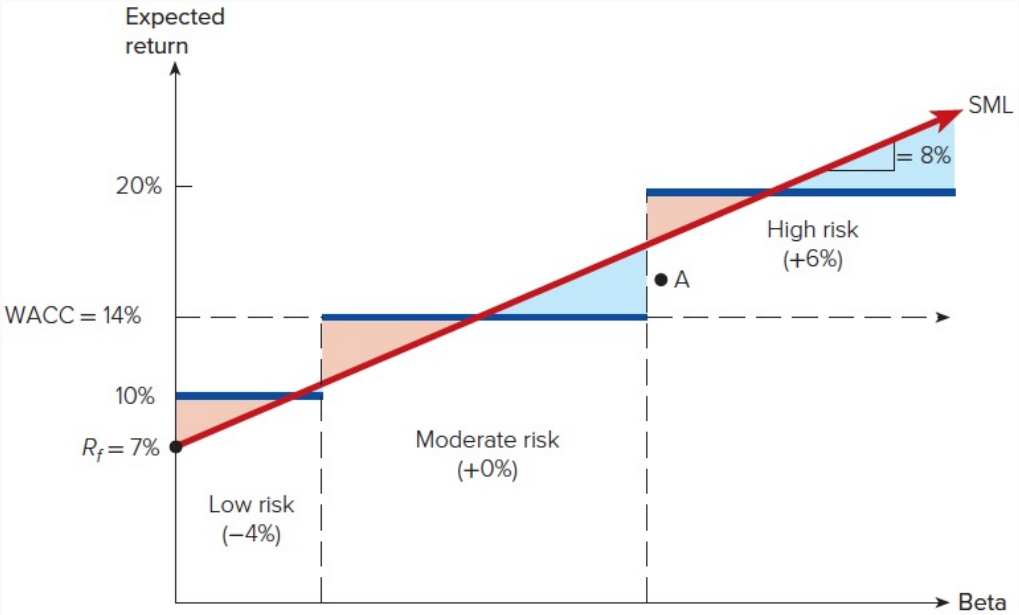
Pure Play Approach

- Use of a WACC that is unique to a particular project, based on companies in similar lines of business.
  - Find one or more companies that specialise in the product or service being considered.
  - Compute the beta for each company.
  - Take an average.
  - Use that beta along with the CAPM to find the appropriate return for a project of that risk.

Subjective Approach

- Consider the project's risk relative to the firm overall.
  - If the project is more risky than the firm, use a discount rate greater than the WACC.
  - If the project is less risky than the firm, use a discount rate less than the WACC.
- You may still accept projects that you shouldn't and reject projects that you should accept.
- However, your error rate should be lower than when not considering differential risk at all.

Subjective Approach Cont'd



With the subjective approach, the firm places projects into one of several risk classes. The discount rate used to value the project is then determined by adding (for high risk) or subtracting (for low risk) an adjustment factor to or from the firm's WACC. This results in fewer incorrect decisions than if the firm simply used the WACC to make the decisions.

CATEGORY	EXAMPLES	ADJUSTMENT FACTOR	DISCOUNT RATE
High risk	New products	+6%	20%
Moderate risk	Cost savings, expansion of existing titles	+0	14
Low risk	Replacement of existing equipment	−4	10
Mandatory	Pollution control equipment	n/a*	n/a

*n/a = not applicable

Company Valuation with the WACC

- To calculate CFA, we need to first calculate what the firm's tax bill would have been if it had not used debt financing:
  - $Taxes^* = EBIT \times T_C$;
  - $$\begin{aligned} CFA^* =& EBIT + Depreciation - Taxes^* - \Delta NWC - Capital\ Spending \\ =& EBIT + Depreciation - EBIT \times T_C - \Delta NWC \\ & - Capital\ Spending \end{aligned}$$
  - Adjusted cash flow, CFA^*, is often called 'free cash flow'

$$CFA^* = EBIT(1 - T_C) + Depreciation - \Delta NWC - Capital\ Spending$$

Company Valuation with the WACC Cont'd

- If the firm is growing steadily, we can value it using our growing perpetuity formula:

$$V_t = \frac{CFA^*_{t+1}}{WACC - \gamma}$$

- We can also consider the impact of non-constant growth, we assume that constant growth begins at time t in the future:

$$V_0 = \frac{CFA^*_1}{1 + WACC} + \frac{CFA^*_2}{(1 + WACC)^2} + ... + \frac{CFA^*_t + V_t}{(1 + WACC)^t}$$