



soleadea

LEVEL 1: CORPORATE FINANCE

Reading 30 (4th out of 6): COST OF CAPITAL

Difficulty:

hard

Benchmark Study Time:

3.5h

2022

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THIS E-BOOK:

- ❖ is a selective summary of the corresponding Reading in your CFA® Program Curriculum,
- ❖ provides place for your own notes,
- ❖ helps you structure your study and revision time!

How to use this e-book to maximize your knowledge retention:

1. **Print** the e-book in duplex and bind it to keep all important info for this Reading **in one place**.
2. **Read** this e-book, best twice, to grasp the idea of what this Reading is about.
3. **Study** the Reading from your curriculum. **Here add** your notes, examples, formulas, definitions, etc.
4. **Review** the Reading using this e-book, e.g. write your summary of key concepts or revise the formulas at the end of this e-book (if applicable).
5. **Done?** Go to [your study plan](#) and change the Reading's status to **green** :
(it will make your Chance-to-Pass-Score™ grow ☺).
6. **Come back** to this e-book from time to time to **regularly review for knowledge retention!**

NOTE: While studying or reviewing this Reading, you can use the tables at the end of this e-book and mark your study/review sessions to hold yourself accountable.



COST OF CAPITAL – INTRODUCTION

Definition

Cost of capital is the rate of return that bondholders and owners of the company require as compensation for their contribution of capital.

Sources of capital:

- equity,
- debt,
- financial instruments that share the characteristics of equity and debt.

Weighted average cost of capital (WACC)

weighted average cost of capital (WACC) = marginal cost of capital (MCC)

$$WACC = w_d \times r_d \times (1 - t) + w_p \times r_p + w_e \times r_e$$

Where:

- w_d – proportion of debt that the company uses when it raises new funds,
- r_d – before-tax marginal cost of debt,
- t – company's marginal tax rate,
- w_p – proportion of preferred stock that the company uses when it raises new funds,
- r_p – marginal cost of preferred stock,
- w_e – proportion of common equity that the company uses when it raises new funds,
- r_e – marginal cost of equity.

Target capital structure

The target capital structure can be calculated using:

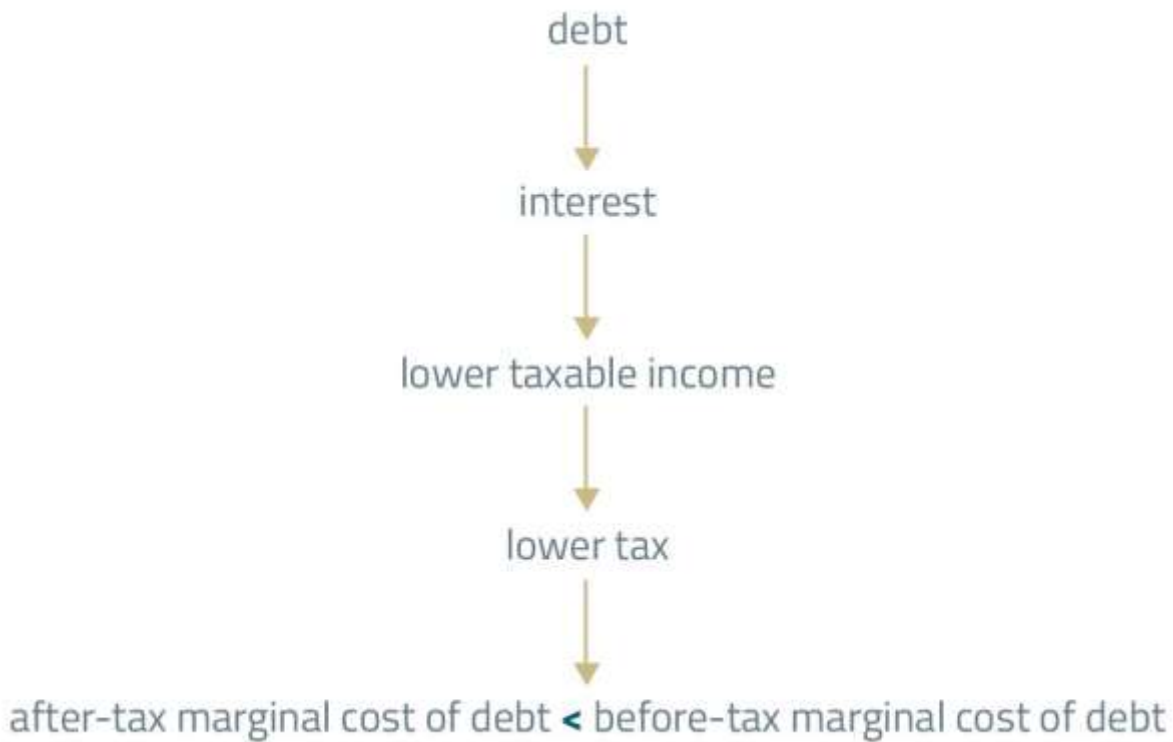
- current capital structure, based on market values.
- historical capital structure.
- arithmetic means or weighted averages of comparable companies' capital structures.



HERE KNOWLEDGE RETENTION HAPPENS | WRITE: notes, examples, formulas, definitions, relations, etc.

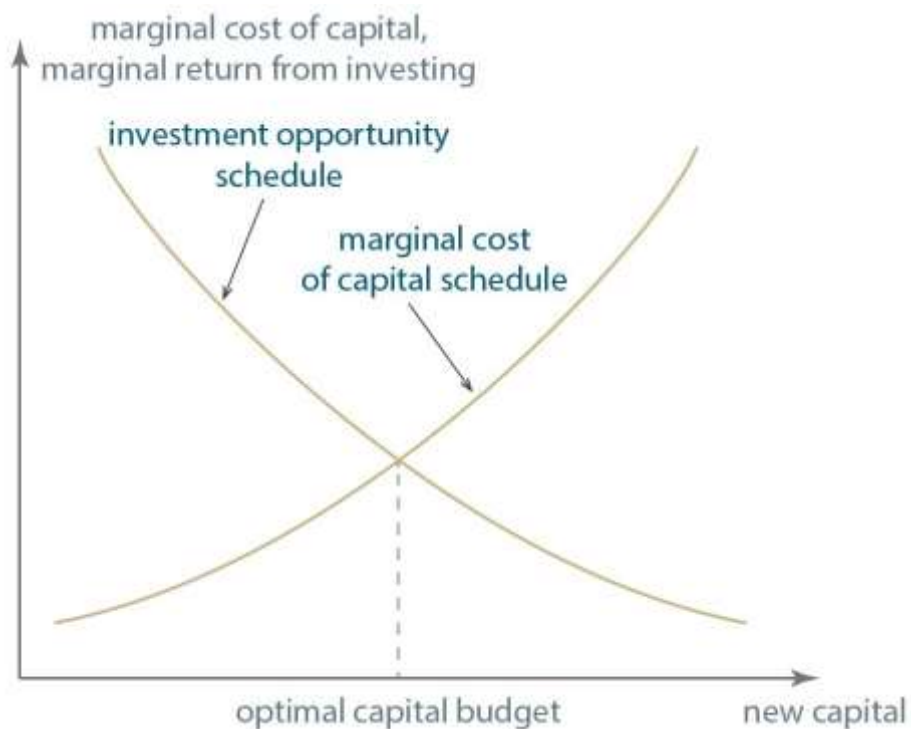


Tax shield



Optimal capital budget

The point where the upward-sloping marginal cost of capital schedule intersects with the downward-sloping investment opportunity schedule is the optimal capital budget.





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COST OF DEBT

Methods of calculating the cost of debt

cost of debt = the cost of financing the company by issuing bonds or taking out a loan or credit

Methods of calculating the cost of debt:

- ✦ the yield to maturity approach,
- ✦ the debt-rating approach.

Yield to maturity approach

yield to maturity = a rate of return earned on a bond that is hold until maturity

$$P = \frac{C_1}{1 + \frac{YTM}{2}} + \frac{C_2}{\left(1 + \frac{YTM}{2}\right)^2} + \dots + \frac{C_t}{\left(1 + \frac{YTM}{2}\right)^t} + \dots + \frac{C_n}{\left(1 + \frac{YTM}{2}\right)^n} + \frac{FV}{\left(1 + \frac{YTM}{2}\right)^n}$$

Where:

- ✦ P – current market price of the bond,
- ✦ C_t – semi-annual coupon payment in period t,
- ✦ YTM – yield to maturity,
- ✦ n – number of periods remaining to maturity,
- ✦ FV – maturity value of the bond.

Debt-rating approach

In the debt-rating approach, the yield on comparably rated bonds with maturities that closely match the maturity of the company's existing debt is used.



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COST OF PREFERRED STOCK

Preferred stock

The preferred stock price which pays dividends indefinitely is equal to the present value of the future dividends:

$$P_p = \frac{D_p}{r_p}$$

Where:

- ▶ P_p – the current preferred stock price,
- ▶ D_p – the preferred stock dividend,
- ▶ r_p – the rate of return on preferred stock.

Cost of preferred stock

The cost of preferred stock that has no maturity date, pays fixed dividends regularly, and has no built-in options:

$$r_p = \frac{D_p}{P_p}$$

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COST OF COMMON STOCK

Methods of calculating the cost of common equity

The cost of common equity is the rate of return earned by common shareholders.

Methods used to estimate the cost of common equity:

- ▶ the capital asset pricing model,
- ▶ the bond yield plus risk premium approach.

Capital asset pricing model (CAPM)

CAPM is based on the formula:

$$E(R) = R_f + \beta \times [E(R_M) - R_f]$$

Where:

- ▶ $E(R)$ – expected rate of return,
- ▶ R_f – risk-free rate,
- ▶ β – beta,
- ▶ $E(R_M)$ – expected return on the market,
- ▶ $[E(R_M) - R_f]$ – premium for bearing the stock's market risk.

A **risk-free rate** is determined using risk-free government debt instruments.

Expected market risk premium:

$$\text{expected market risk premium} = E(R_M) - R_f$$

Methods of determining the **expected market risk premium**:

- ▶ the survey approach,
- ▶ the historical equity risk premium approach,
- ▶ the dividend discount model.



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Survey approach

In a survey approach an analyst:

- conducts surveys among financial experts,
- asks experts questions about their predictions,
- take the average mean of predictions.

Historical equity risk premium approach

The historical equity risk premium approach is based on the assumption that the equity risk premium observed over a long period of time is a good indicator of the expected equity risk premium.

Risk premiums are different in different countries.

Dividend discount model based approach

The dividend discount models (e.g. the Gordon growth model) are used to value stocks.

A stock value is equal to the present value of future expected dividends:

$$V_0 = \sum_{t=1}^{\infty} \frac{D_t}{(1 + r_e)^t}$$

Where:

- V_0 – current value of a stock,
- D_t – dividend,
- r_e – required rate of return on a stock.

The Gordon growth model:

$$P_0 = \frac{D_1}{E(R_M) - g}$$

Where:

- P_0 – current market value of the equity market index,
- D_1 – expected dividend on the index, 1 period from now,
- $E(R_M)$ – required rate of return on the market,
- g – expected growth rate of dividends.

Required rate of return on the market:

$$E(R_M) = \frac{D_1}{P_0} + g$$



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Bond yield plus risk premium approach

Methods used to estimate the cost of common equity:

- the capital asset pricing model,
- the dividend discount model,
- the bond yield plus risk premium approach.

Risk premium is a result of an increased risk associated with an investment in the common equity of a company relative to an investment in bonds issued by this company.

$$r_e = r_d + \text{risk premium factor}$$

Where:

- r_d – before-tax cost of debt.



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BETA

Estimating beta – regression model

Beta can be estimated using a market model regression of stock returns.

Assumptions and data that significantly impact the value of beta:

- ▶ the estimation period,
- ▶ the choice of the appropriate index,
- ▶ small-capitalization vs large-capitalization companies.

Risks affecting beta

Types of risk that affect a company's beta:

- ▶ business risk,
- ▶ financial risk.

Business risk:

- ▶ is the risk associated with operating earnings which, in turn, depend on revenues.
- ▶ companies operating in the same industry have a similar level of business risk.

Financial risk:

- ▶ is the risk associated with the uncertainty of net income and cash flows.
- ▶ the greater the share of debt in the financing of the company, the greater the financial risk.

the comparable company and the company operate in the same industry



both companies have a similar level of business risk



the beta of the comparable company is suitable to determine the beta of the company



beta



companies can vary in financial leverage



adjust the beta to financial risk

Estimating beta – – pure-play method

The pure-play method is used to estimate the beta for a non-listed company.

The pure-play method involves using the beta of a comparable publicly traded company and adjusting the beta so that it takes into account the financial risk of a non-listed company.



HERE KNOWLEDGE RETENTION HAPPENS | WRITE: notes, examples, formulas, definitions, relations, etc.

**Algorithm:**

1. Select comparable companies listed on the stock exchange.
2. Calculate the beta for comparable companies.
3. Unlever the beta (remove the effect of financial leverage).
4. Lever the beta by adjusting the asset beta to the financial risk of the company for which you want to estimate the beta.

Asset beta vs Equity beta

The asset beta is the beta of a company on the assumption that the company uses only equity financing and reflects only the business risk of the assets.

The equity beta is the beta of a company on the assumption that the company uses also debt financing and reflects the business risk of the assets and financial risk.

The company:

- ▶ has one asset beta,
- ▶ can have many equity betas.

asset beta = unlevered beta

equity beta = levered beta of the company

$$\beta_A = \frac{\beta_E}{1 + (1 - t) \times \frac{D}{E}}$$

Where:

- ▶ β_A – asset beta,
- ▶ β_E – equity beta,
- ▶ t – tax rate,
- ▶ D – debt,
- ▶ E – equity.



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Country spread

Beta doesn't reflect well the country risk of developing countries.

$$\text{cost of equity (developing country)} = R_f + \beta \times [E(R_M) - R_f + \text{country spread}]$$

To estimate the country spread we use:

- ✦ the sovereign yield spread, or
- ✦ the country equity premium.

Sovereign yield spread

sovereign yield spread = government bond yield in the country, denominated in the currency of a developed country
- treasury bond yield on a similar maturity bond in the developed country

Country equity premium

$$CEP = SYS \times \frac{\sigma_{EI}}{\sigma_{SB}}$$

Where:

- ✦ CEP – country equity premium,
- ✦ SYS – sovereign yield spread,
- ✦ σ_{EI} – annualized standard deviation of equity index,
- ✦ σ_{SB} – annualized standard deviation of the sovereign bond market in the currency of a developed country.



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Flotation cost

Flotation costs can be:

- ▶ included in the cost of capital, or
- ▶ considered as a negative cash flow in the project.

Usually it is better to include the flotation costs as a negative cash flow in the project.

flotation costs = costs associated directly with the issuance of shares

Flotation costs in the cost of capital

$$r_e = \frac{D_1}{P_0 \times (1 - f)} + g = \frac{D_1}{P_0 - F} + g$$

Where:

- ▶ D_1 – next year's dividend,
- ▶ P_0 – current share price,
- ▶ F – flotation costs in nominal terms,
- ▶ f – flotation costs in percentage terms,
- ▶ g – dividend growth rate.

Include the flotation costs in the cost of capital when:

1. it is problematic to determine financing costs, or
2. you want to show and compare the cost of equity capital of a project in 2 cases:
 - ▶ when a company is financing the project using retained earnings, or
 - ▶ if the funds come from the issue of new shares.



HERE KNOWLEDGE RETENTION HAPPENS | WRITE: notes, examples, formulas, definitions, relations, etc.



Summarizing key concepts:

☐ Weighted average cost of capital (WACC)

My summary:

☐ Target capital structure

My summary:

☐ Optimal capital budget

My summary:

☐ Methods of calculating the cost of debt: the yield to maturity approach, the debt-rating approach

My summary:



☐ Cost of preferred stock

My summary:

☐ Methods of calculating the cost of common equity: the capital asset pricing model, the bond yield plus risk premium approach

My summary:

☐ Estimating beta: regression model, pure-play method

My summary:



☐ Asset beta vs Equity beta

My summary:

☐ Country spread

My summary:

☐ Flotation costs: in the cost of capital, as a negative cash flow in the project

My summary:



Reviewing formulas:

$$WACC = w_d \times r_d \times (1 - t) + w_p \times r_p + w_e \times r_e$$

Write down the formula:

$$P = \frac{C_1}{1 + \frac{YTM}{2}} + \frac{C_2}{\left(1 + \frac{YTM}{2}\right)^2} + \dots + \frac{C_t}{\left(1 + \frac{YTM}{2}\right)^t} + \dots + \frac{C_n}{\left(1 + \frac{YTM}{2}\right)^n} + \frac{FV}{\left(1 + \frac{YTM}{2}\right)^n}$$

Write down the formula:

$$P_p = \frac{D_p}{r_p}$$

Write down the formula:

$$r_p = \frac{D_p}{P_p}$$

Write down the formula:



$$E(R) = R_f + \beta \times [E(R_M) - R_f]$$

Write down the formula:

$$P_0 = \frac{D_1}{E(R_M) - g}$$

Write down the formula:

$$E(R_M) = \frac{D_1}{P_0} + g$$

Write down the formula:

$$V_0 = \sum_{t=1}^{\infty} \frac{D_t}{(1 + r_e)^t}$$

Write down the formula:



$$\beta_A = \frac{\beta_E}{1 + (1 - t) \times \frac{D}{E}}$$

Write down the formula:

$$CEP = SYS \times \frac{\sigma_{EI}}{\sigma_{SB}}$$

Write down the formula:

$$r_e = \frac{D_1}{P_0 \times (1 - f)} + g = \frac{D_1}{P_0 - F} + g$$

Write down the formula:



Keeping myself accountable:

TABLE 1 | STUDY

When you sit down to study, you may want to **try the Pomodoro Technique** to handle your study sessions: study for 25 minutes, then take a 5-minute break. Repeat this 25+5 study-break sequence all throughout your daily study session.



Tick off as you proceed.

POMODORO TIMETABLE: study-break sequences (25' + 5')													
date		date		date		date		date		date		date	
25'		25'		25'		25'		25'		25'		25'	
5'		5'		5'		5'		5'		5'		5'	
25'		25'		25'		25'		25'		25'		25'	
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5'		5'		5'		5'		5'		5'		5'	
25'		25'		25'		25'		25'		25'		25'	
5'		5'		5'		5'		5'		5'		5'	

TABLE 2 | REVIEW

Never ever neglect revision! Though it's not the most popular thing among CFA candidates, regular revision is what makes the difference. If you want to pass your exam, **schedule & do your review sessions**.

REVIEW TIMETABLE: When did I review this Reading?													
date		date		date		date		date		date		date	
date		date		date		date		date		date		date	