



IBS

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Capital Structure and Cost of Capital

Principles and Practices of Business Finance

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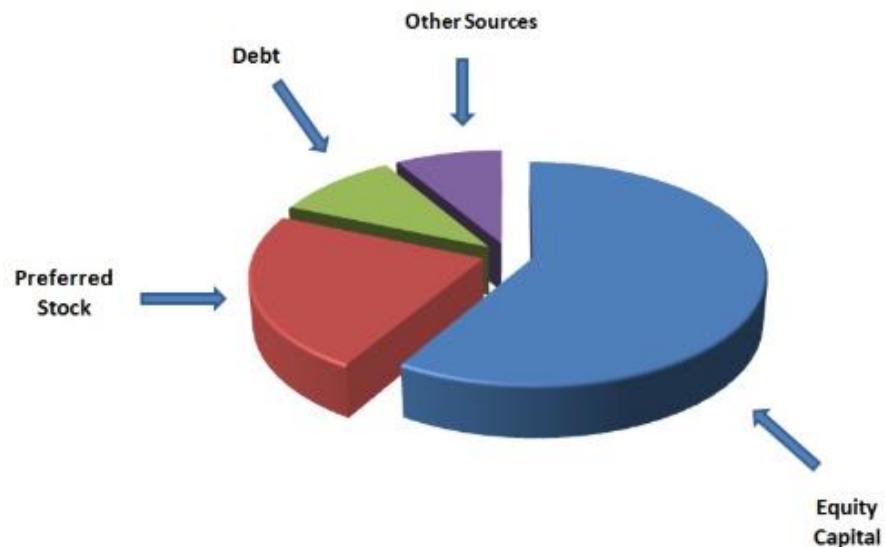
Agenda

1. Capital Structure
2. Cost of Capital Concept
3. Weighted Average Cost of Capital (WACC)
4. Book Value Vs. Market Value
5. Understanding the WACC components and calculations
6. WACC Practice

Capital Structure



- Funds come from **internal and external** sources, forming the capital structure of the company.
- The capital structure = the ratio and composition of the different long term funding forms within a company



Cost of Capital Concept

- Cost of Capital is:
 - The return the firm's investors could expect to earn if they invested in securities with comparable degrees of risk.
 - Opportunity cost of capital for investment in the firm as a whole, so it is used as the appropriate discount rate for an average-risk investment project undertaken by the firm

Cost of Capital Concept

- A simple example:

A company is financed with \$300 Debt and \$700 equity. The company pays 8% for debt and 14% for equity, what is the company cost of capital?

The total financing is \$1000, debt represents 30% and equity represents 70%. This is the capital structure of the company.

To calculate the cost of Capital

$$\text{Cost of Capital} = (.3 \times 8\%) + (.7 \times 14\%) = 12.2\%$$

- However, calculating the Capital is more complicated and advanced than this example. This to be discovered in the following slides.

Weighted Average Cost of Capital (WACC)

The Cost of Capital is calculated with WACC which is the expected rate of return on a portfolio of all the firm's securities (Bonds, Common stocks, Preferred Stocks), after adjusting the debt return for tax savings due to interest payments { by multiplying the return on debt times $(1 - T_c)$ }

$$\text{WACC} = \left[\frac{D}{V} \times (1 - T_c) r_{\text{debt}} \right] + \left[\frac{P}{V} \times r_{\text{preferred}} \right] + \left[\frac{E}{V} \times r_{\text{equity}} \right]$$

It is possible that the company may not have preferred stocks, so you disregard the part of the preferred stocks.

Weighted Average Cost of Capital (WACC)

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D: Market value of Debt

r debt: YTM

P: Market value of Preferred stock

r preferred: return on P.

E: Market value of equity

r equity: return on E

Tc: tax rate

$V=D+P+E$

Book Value Vs. Market Value

Pay attention: each security has two values:

- *Book Value is an accounting measure of the security value as recorded in the balance sheet.*
- *Market Value: is the security current price in the stock exchange.*

Market Value of Bonds - PV of all coupons and par value discounted at the current YTM

Market Value of Equity - Market price per share multiplied by the number of outstanding shares

r equity

Capital Asset Pricing Model (CAPM)

- CAPM is used to calculate the expected return on equity (r_e = CAPM)

$$r_e = r_f + \beta(r_m - r_f)$$

- r_m : market return
- r_e : return on equity
- r_f : risk free rate
- β : beta

What do these represent?
Let's see in the following slides

r_m : market return

- Market index (portfolio)
 - Measure of the investment performance of the overall market. The overall return of a market index over a certain period is called Market return r_m

Index examples:

- Standard & Poor's Composite Index (S&P 500)
 - Index of the investment performance of a portfolio of 500 large stocks
- Dow Jones Industrial Average (The Dow)
 - Index of the investment performance of a portfolio of 30 “blue-chip” stocks

β : beta

- β Beta: is a risk measure of the company.
- β is defined as the sensitivity of a stock's return to the return on the market portfolio.
- If you owned all of the S&P Composite Index stocks, you would have an average beta of 1.0
- If your company's β is > 1 , then you have a more volatile and higher risk than the market.
- If your company's β is < 1 , then you have a more volatile and higher risk than the market.

- In week 4 materials, we learnt:

Investors are willing to accept more risk if (and only if!!) that means that their investment will potentially bring a larger income.

	Beta	Expected Return (%)
U.S. Steel	1.85	16.0
Disney	1.42	12.9
Ford	1.31	12.2
General Electric	1.20	11.4
Monsanto	1.19	11.3
Boeing	1.01	10.1
Union Pacific	1.00	10.0
Alphabet	0.96	9.8
ExxonMobil	0.94	9.6
Amazon	0.93	9.5
Intel	0.91	9.4
Pfizer	0.90	9.3
Starbucks	0.79	8.5
IBM	0.59	7.1
McDonald's	0.51	6.6
Coca-Cola	0.49	6.4
Campbell Soup	0.47	6.3
Walmart	0.26	4.8
Newmont Mining	0.24	4.7
PG&E	0.23	4.6

Betas and expected returns are calculated with price data from January 2011 thru December 2015

r_f : risk free rate and Market premium

- r_f : risk-free rate, is the rate on a risky free asset. Normally, the yield of government treasury bills of a financially stable country is used as r_f .

Market risk premium = $rm - rf$

Risk premium on any asset = $r_e - rf$

In Summary

The returns needed for WACC

- Bonds: $r_d = \text{YTM}$
- Common Stock $r_e = \text{CAPM} = r_f + \beta(r_m - r_f)$
- Preferred Stock: r_p

Now we are ready to apply the WACC

WACC calculation process

- Three Steps to Calculating Cost of Capital
 1. Calculate the value of each security as a proportion of the firm's market value
 2. Determine the required rate of return on each security
 3. Calculate a weighted average of the after-tax return on the debt and the return on the equity and preferred stocks.

WACC Practice 1

Here is some information about Stokenchurch Inc.:

- Beta of common stock = 1.2
- Treasury bill rate = 4%
- Market risk premium = 7.5%
- Yield to maturity on long-term debt = 6%
- Book value of equity = \$440 million
- Market value of equity = \$880 million
- Long-term debt outstanding = \$880 million
- Corporate tax rate = 35%

What is the company's WACC?

WACC Practice 1

Here is some information about Stokenchurch Inc.:

- Beta of common stock = 1.2
- Treasury bill rate = 4%
- Market risk premium = 7.5%
- Yield to maturity on long-term debt = 6%
- Book value of equity = \$440 million
- Market value of equity = \$880 million
- Long-term debt outstanding = \$880 million
- Corporate tax rate = 35%

What is the company's WACC?

$$r_{equity} = .04 + 1.2 \times .075 = .13$$

$$r_{debt} = .06$$

$$\text{WACC} = \left[\frac{880}{880+880} \times .06 \times (1 - .35) \right] + \left[\frac{880}{880+880} \times .13 \right] = .0845$$

$$\text{WACC} = 8.45\%$$

WACC Practice 2

- Reactive Industries has the following capital structure. Its corporate tax rate is 35%.

Security	Market Value	Required Rate of Return
Debt	\$20 million	6%
Preferred stock	10 million	8
Common stock	50 million	12

- What is its WACC?

WACC Practice 2

- Reactive Industries has the following capital structure. Its corporate tax rate is 35%. What is its WACC?

Security	Market Value	Required Rate of Return
Debt	\$20 million	6%
Preferred stock	10 million	8
Common stock	50 million	12

The total value of the firm is \$80 million. The weights for each security class are as follows:

$$\text{Debt: } D/V = 20/80 = 0.250$$

$$\text{Preferred: } P/V = 10/80 = 0.125$$

$$\text{Common: } E/V = 50/80 = 0.625$$

$$\begin{aligned}\text{WACC} &= \left[\frac{D}{V} \times r_{\text{debt}} \times (1 - T_C) \right] + \left[\frac{P}{V} \times r_{\text{preferred}} \right] + \left[\frac{E}{V} \times r_{\text{equity}} \right] \\ &= [0.250 \times 6\% \times (1 - 0.35)] + [0.125 \times 8\%] + [0.625 \times 12.0\%] = 9.475\%\end{aligned}$$