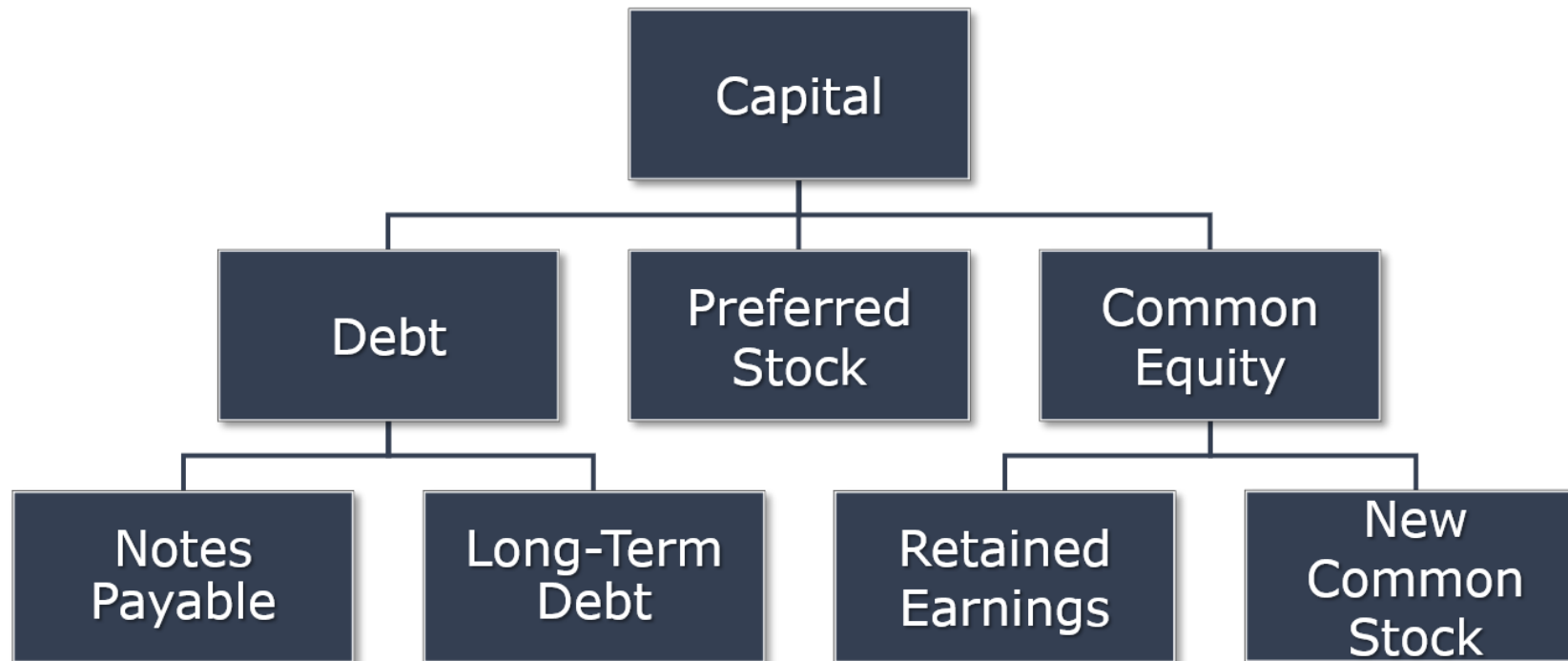# Chapter 10

The Cost of Capital

Overview

- Sources of Capital

- Component Costs

- Adjusting for Flotation Costs

- WACC

- Adjusting for Risk

What sources of capital do firms use?

Calculating the Weighted Average Cost of Capital

$$\text{WACC} = w_d r_d (1 - T) + w_p r_p + w_c r_s$$

- The w's refer to the firm's capital structure weights.

- The r's refer to the cost of each component.

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Should our analysis focus on before-tax or after-tax capital costs?

- Stockholders focus on after-tax CFs. Therefore, we should focus on after-tax capital costs; i.e., use after-tax costs of capital in WACC. Only r_d needs adjustment, because interest is tax deductible.

Should our analysis focus on historical (embedded) costs or new (marginal) costs?

- The cost of capital is used primarily to make decisions that involve raising new capital. So, focus on today's marginal costs (for WACC).

How are the weights determined?

$$\text{WACC} = w_d r_d (1 - T) + w_p r_p + w_c r_s$$

- Use accounting numbers or market value (book vs. market weights)?

- Use actual numbers or target capital structure?

Overview of Coleman Technologies Inc.

- Firm calculating cost of capital for major expansion program.

  - Tax rate = 25%.

  - 15-year, 12% coupon, semiannual payment noncallable bonds sell for $1,153.72. New bonds will be privately placed with no flotation cost.

  - 10%, $100 par value, quarterly dividend, perpetual preferred stock sells for $111.10.

  - Common stock sells for $50. D_0 = $4.19 and g = 5%.

  - b = 1.2; r_{RF} = 7%; RPM = 6%.

  - Bond-Yield Risk Premium = 4%.

  - Target capital structure: 30% debt, 10% preferred, 60% common equity.

Review of Coleman's Capital Structure

	Book Value	Market Value	Target
Debt (includes notes payable)	48%	25%	30%
Preferred stock	2	5	10
Common equity	50	70	60

Number of shares not given in problem, so actual calculations cannot be done. Analysis is meant for illustration. Typically, book value capital structure will show a higher percentage of debt because a typical firm's M/B ratio > 1.

Component Cost of Debt (1 of 2)

$$\text{WACC} = w_d r_d (1 - T) + w_p r_p + w_c r_s$$

- r_d is the marginal cost of debt capital.

- The yield to maturity on outstanding L-T debt is often used as a measure of r_d.

- Why tax-adjust; i.e., why $r_d(1 - T)$?

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A 15-year, 12% semiannual coupon bond sells for $1,153.72. What is the cost of debt (r_d)?

- Remember, the bond pays a semiannual coupon, so $r_d = 5.0\% \times 2 = 10\%$.

INPUTS	30		-1153.72	60	1000
	N	I/YR	PV	PMT	FV
OUTPUT		5			

Component Cost of Debt (2 of 2)

- Interest is tax deductible, so

    $\text{AT } r_d = \text{BT } r_d(1 - T)$

    $= 10\%(1 - 0.25) = 7.5\%$

- Use nominal rate.

- Flotation costs are small, so ignore them.

Component Cost of Preferred Stock

$$\text{WACC} = w_d r_d (1 - T) + w_p r_p + w_c r_s$$

- r_p is the marginal cost of preferred stock, which is the return investors require on a firm's preferred stock.

- Preferred dividends are not tax-deductible, so no tax adjustments necessary. Just use nominal r_p.

- Our calculation ignores possible flotation costs.

What is the cost of preferred stock?

- The cost of preferred stock can be solved by using this formula:

$$r_p = D_p/P_p$$

$$= \$10/\$111.10$$

$$= 9\%$$

Is preferred stock more or less risky to investors than debt?

- More risky; company not required to pay preferred dividend.

- However, firms try to pay preferred dividend. Otherwise, (1) cannot pay common dividend, (2) difficult to raise additional funds, (3) preferred stockholders may gain control of firm.

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Why is the yield on preferred stock lower than debt?

- Preferred stock will often have a lower BT yield than the BT yield on debt.

  - Corporations own most preferred stock, so 50% of preferred dividends are excluded from corporate taxation.

- The AT yield to an investor, and the AT cost to the issuer, are higher on preferred stock than on debt. Consistent with higher risk of preferred stock

Component Cost of Equity

$$\text{WACC} = w_d r_d (1 - T) + w_p r_p + w_c r_s$$

- r_s is the marginal cost of common equity using retained earnings.

- r_e is the marginal cost of common equity when the firm issues new common stock.

Why is there a cost for retained earnings?

- Earnings can be reinvested or paid out as dividends.

- Investors could buy other securities, earn a return.

- If earnings are retained, there is an opportunity cost (the return that stockholders could earn on alternative investments of equal risk).

  - Investors could buy similar stocks and earn r_s.

  - Firm could repurchase its own stock and earn r_s.

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Three Ways to Determine the Cost of Common Equity, r_s

- CAPM: $r_s = r_{RF} + (r_M - r_{RF})b$

- DCF: $r_s = (D_1/P_0) + g$

- Bond-Yield-Plus-Risk-Premium:

$$r_s = r_d + RP$$

Find the Cost of Common Equity Using the CAPM Approach

- The $r_{RF} = 7\%$, $RP_M = 6\%$, and the firm's beta is 1.2.

$$r_s = r_{RF} + (r_M - r_{RF})b$$

$$= 7.0\% + (6.0\%)1.2 = 14.2\%$$

Find the Cost of Common Equity Using the DCF Approach

$D_0 = \$4.19$, $P_0 = \$50$, and $g = 5\%$.

$$D_1 = D_0(1 + g)$$

$$= \$4.19(1 + 0.05)$$

$$= \$4.3995$$

$$r_s = (D_1/P_0) + g$$

$$= (\$4.3995/\$50) + 0.05$$

$$= 13.8\%$$

Can DCF methodology be applied if growth is not constant?

- Yes, nonconstant growth stocks are expected to attain constant growth at some point, generally in 5 to 10 years.

- May be complicated to calculate.

Find r_s Using the Bond-Yield-Plus-Risk-Premium Approach

r_d = 10% and RP = 4%.

- This RP is not the same as the CAPM RPM.

- This method produces a ballpark estimate of r_s, and can serve as a useful check.

$$r_s = r_d + RP$$

$$r_s = 10.0\% + 4.0\% = 14.0\%$$

What is a reasonable final estimate of r_s?

Method	Estimate
CAPM	14.2%
DCF	13.8
r_d + RP	14.0

Range = 13.8% − 14.2%, might use midpoint of range, 14%.

Why is the cost of retained earnings cheaper than the cost of issuing new common stock?

- When a company issues new common stock they also have to pay flotation costs to the underwriter.

- Issuing new common stock may send a negative signal to the capital markets, which may depress the stock price.

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If new common stock issue incurs a flotation cost of 15% of the proceeds, what is r_e?

$$r_e = \frac{D_0(1+g)}{P_0(1-F)} + g$$

$$= \frac{\$4.19(1.05)}{\$50(1-0.15)} + 5.0\%$$

$$= \frac{\$4.3995}{\$42.50} + 5.0\%$$

$$= 15.4\%$$

What is the firm's WACC (ignoring flotation costs)?

$$WACC = w_d r_d (1 - T) + w_p r_p + w_c r_s$$

$$= 0.3(10\%)(0.75) + 0.1(9\%) + 0.6(14\%)$$

$$= 2.3\% + 0.9\% + 8.4\%$$

$$= 11.6\%$$

What factors influence a company's composite WACC?

Factors the firm cannot control:

- Market conditions such as interest rates and tax rates.

Factors the firm can control:

- Firm's capital structure.

- Firm's dividend policy.

- The firm's investment policy. Firms with riskier projects generally have a higher WACC.

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Should the company use the composite WACC as the hurdle rate for each of its projects?

- NO! The composite WACC reflects the risk of an average project undertaken by the firm. Therefore, the WACC only represents the "hurdle rate" for a typical project with average risk.

- Different projects have different risks. The project's WACC should be adjusted to reflect the project's risk.

- The next slide illustrates the importance of risk-adjusting the cost of capital. Note, if the company correctly risk-adjusted the WACC, then it would select Project L and reject Project H. Alternatively, if the company didn't risk-adjust and instead used the composite WACC for all projects, it would mistakenly select Project H and reject Project L.

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Divisional Cost of Capital