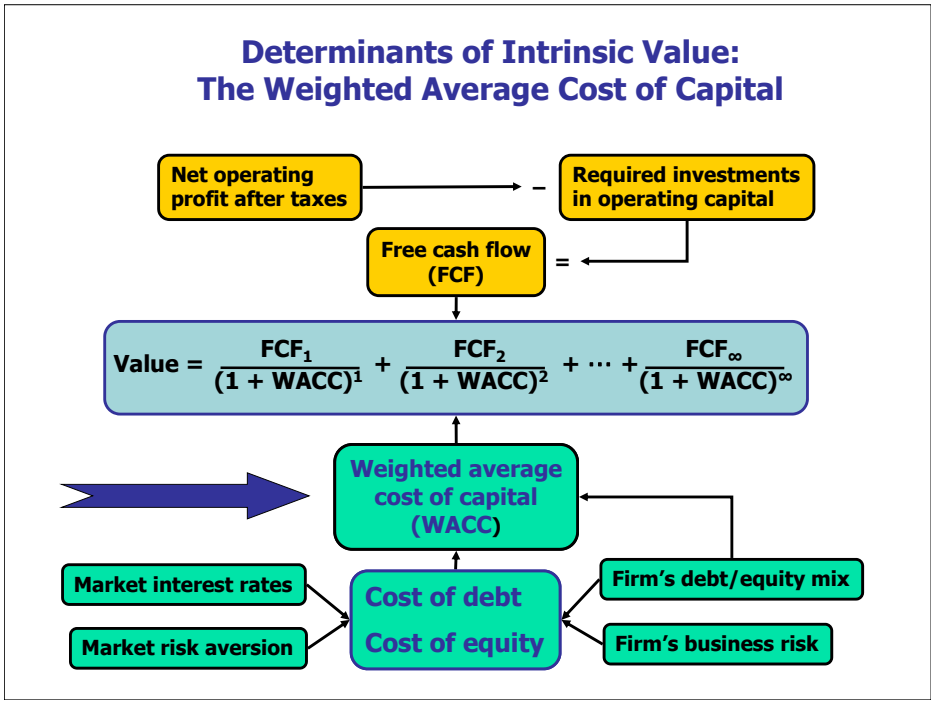
CHAPTER 9

The Cost of Capital

Topics in Chapter

- Cost of capital components
  - Debt
  - Preferred stock
  - Common equity
- WACC
- Factors that affect WACC
- Adjusting cost of capital for risk



What types of long-term capital do firms use?

- Long-term debt
- Preferred stock
- Common equity

Capital Components

- Capital components are sources of funding that come from investors.
- Accounts payable, accruals, and deferred taxes are not sources of funding that come from investors, so they are not included in the calculation of the cost of capital.
- We do adjust for these items when calculating the cash flows of a project, but not when calculating the cost of capital.

Before-tax vs. After-tax Capital Costs

- Tax effects associated with financing can be incorporated either in capital budgeting cash flows or in cost of capital.
- Most firms incorporate tax effects in the cost of capital. Therefore, focus on after-tax costs.
- Only cost of debt is affected.

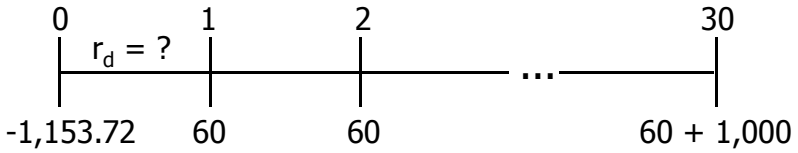
Historical (Embedded) Costs vs. New (Marginal) Costs

- The cost of capital is used primarily to make decisions which involve raising and investing new capital. So, we should focus on marginal costs.

Cost of Debt

- Method 1: Ask an investment banker what the coupon rate would be on new debt.
- Method 2: Find the bond rating for the company and use the yield on other bonds with a similar rating.
- Method 3: Find the yield on the company's debt, if it has any.

A 15-year, 12% semiannual bond sells for $1,153.72. What's r_d?



INPUTS	30		-1153.72	60	1000
	N	I/YR	PV	PMT	FV
OUTPUT		5.0% x 2 = r_d = 10%			

Component Cost of Debt

- Interest is tax deductible, so the after tax (AT) cost of debt is:
  - r_d AT = r_d BT(1 – T)
  - r_d AT = 10%(1 – 0.40) = 6%.
- Use nominal rate.
- Flotation costs small, so ignore.

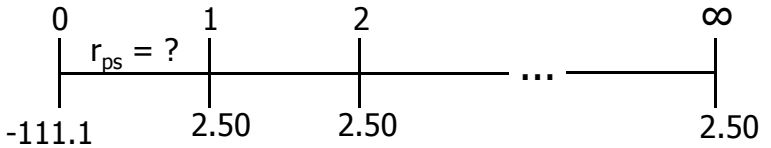
Cost of preferred stock: P_{ps} = $116.95; 10%Q; Par = $100; F = 5%

Use this formula:

$$r_{ps} = \frac{D_{ps}}{P_{ps}(1 - F)} = \frac{0.1(\$100)}{\$116.95(1 - 0.05)}$$

$$= \frac{\$10}{\$111.10} = 0.090 = 9.0\%$$

Time Line of Preferred



$$\$111.10 = \frac{D_Q}{r_{Per}} = \frac{\$2.50}{r_{Per}}$$

$$r_{Per} = \frac{\$2.50}{\$111.10} = 2.25\%;\ r_{ps(Nom)} = 2.25\%(4) = 9\%$$

Note:

- Flotation costs for preferred are significant, so are reflected. Use net price.
- Preferred dividends are not deductible, so no tax adjustment. Just r_{ps}.
- Nominal r_{ps} is used.

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

- More risky; company not required to pay preferred dividend.
- However, firms want to pay preferred dividend. Otherwise, (1) cannot pay common dividend, (2) difficult to raise additional funds, and (3) preferred stockholders may gain control of firm.

Why is yield on preferred lower than r_d?

- Corporations own most preferred stock, because 70% of preferred dividends are nontaxable to corporations.
- Therefore, preferred often has a lower B-T yield than the B-T yield on debt.
- The A-T yield to investors and A-T cost to the issuer are higher on preferred than on debt, which is consistent with the higher risk of preferred.

Example: r_{ps} = 9%, r_d = 10%, T = 40%

$$r_{ps,\,AT} = r_{ps} - r_{ps}(1 - 0.7)(T)$$

$$= 9\% - 9\%(0.3)(0.4) = 7.92\%$$

$$r_{d,\,AT} = 10\% - 10\%(0.4) = \underline{6.00}\%$$

A-T Risk Premium on Preferred = $\underline{\underline{1.92}}$%

What are the two ways that companies can raise common equity?

- Directly, by issuing new shares of common stock.
- Indirectly, by reinvesting earnings that are not paid out as dividends (i.e., retaining earnings).

Why is there a cost for reinvested earnings?

- Earnings can be reinvested or paid out as dividends.
- Investors could buy other securities, earning a return.
- Thus, there is an opportunity cost if earnings are reinvested.

Cost for Reinvested Earnings (Continued)

- Opportunity cost: The return stockholders could earn on alternative investments of equal risk.
- They could buy similar stocks and earn r_s, or company could repurchase its own stock and earn r_s. So, r_s, is the cost of reinvested earnings and it is the cost of common equity.

Three ways to determine the cost of equity, r_s:

1. CAPM: $r_s = r_{RF} + (r_M - r_{RF})b$
   $= r_{RF} + (RP_M)b$.
2. DCF: $r_s = D_1/P_0 + g$.
3. Own-Bond-Yield-Plus-Judgmental-Risk Premium: $r_s = r_d$ + Bond RP.

CAPM Cost of Equity: r_{RF} = 5.6%, RP_M = 6%, b = 1.2

$$r_s = r_{RF} + (RP_M)b$$

$$= 5.6\% + (6.0\%)1.2 = 12.8\%.$$

Issues in Using CAPM

- Most analysts use the rate on a long-term (10 to 20 years) government bond as an estimate of r_{RF}.

(More…)

Issues in Using CAPM (Continued)

- Most analysts use a rate of 3.5% to 6% for the market risk premium (RP_M)
- Estimates of beta vary, and estimates are "noisy" (they have a wide confidence interval).

DCF Cost of Equity, r_s: D_0 = \$3.26; P_0 = \$50; g = 5.8%

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

$$= \frac{\$3.12(1.058)}{\$50} + 0.058$$

$$= 6.6\% + 5.8\%$$

$$= 12.4\%$$

Estimating the Growth Rate

- Use the historical growth rate if you believe the future will be like the past.
- Obtain analysts' estimates: Value Line, Zacks, Yahoo!Finance.
- Use the earnings retention model, illustrated on next slide.

Earnings Retention Model

- Suppose the company has been earning 15% on equity (ROE = 15%) and has been paying out 62% of its earnings.
- If this situation is expected to continue, what's the expected future g?

Earnings Retention Model (Continued)

- Growth from earnings retention model:
  g = (Retention rate)(ROE)
  g = (1 – Payout rate)(ROE)
  g = (1 – 0.62)(15%) = 5.7%.

  This is close to g = 5.8% given earlier.

The Own-Bond-Yield-Plus-Judgmental-Risk-Premium Method: r_d = 10%, RP = 3.2%

- $r_s = r_d$ + Judgmental risk premium
- r_s = 10.0% + 3.2% = 13.2%

- This over-own-bond-judgmental-risk premium ≠ CAPM equity risk premium, RP_M.
- Produces ballpark estimate of r_s. Useful check.

What's a reasonable final estimate of r_s?

Method	Estimate
CAPM	12.8%
DCF	12.4%
r_d + judgment	13.2%
Average	12.8%

Determining the Weights for the WACC

- The weights are the percentages of the firm that will be financed by each component.
- If possible, always use the target weights for the percentages of the firm that will be financed with the various types of capital.

Estimating Weights for the Capital Structure

- If you don't know the targets, it is better to estimate the weights using current market values than current book values.
- If you don't know the market value of debt, then it is usually reasonable to use the book values of debt, especially if the debt is short-term.

(More…)

Estimating Weights (Continued)

- Suppose the stock price is $50, there are 3 million shares of stock, the firm has $25 million of preferred stock, and $75 million of debt.

(More…)

Estimating Weights (Continued)

- V_s = \$50(3 million) = \$150 million.
- V_{ps} = \$25 million.
- V_d = \$75 million.
- Total value = \$150 + \$25 + \$75 = \$250 million.

Estimating Weights (Continued)

- w_s = \$150/\$250 = 0.6
- w_{ps} = \$25/\$250 = 0.1
- w_d = \$75/\$250 = 0.3

- The target weights for this company are the same as these market value weights, but often market weights temporarily deviate from targets due to changes in stock prices.

What's the WACC using the target weights?

$$WACC = w_d r_d(1 - T) + w_{ps} r_{ps} + w_s r_s$$

$$WACC = 0.3(10\%)(1 - 0.4) + 0.1(9\%) + 0.6(12.8\%)$$

$$WACC = 10.38\% \approx 10.4\%$$

What factors influence a company's WACC?

- Uncontrollable factors:
  - Market conditions, especially interest rates.
  - The market risk premium.
  - Tax rates.
- Controllable factors:
  - Capital structure policy.
  - Dividend policy.
  - Investment policy. Firms with riskier projects generally have a higher cost of equity.

Costs 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 stock price.

Cost of New Common Equity: $P_0 = \$50$, $D_0 = \$3.12$, g = 5.8%, and F = 15%

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

$$= \frac{\$3.12(1.058)}{\$50(1-0.15)} + 5.8\%$$

$$= \frac{\$3.30}{\$42.50} + 5.8\% = 13.6\%$$

Cost of New 30-Year Debt: Par = \$1,000, Coupon = 10% paid annually, and F = 2%

- Using a financial calculator:
  - N = 30
  - PV = 1,000(1 – 0.02) = 980
  - PMT = -(0.10)(1,000)(1 – 0.4) = -60
  - FV = -1,000
- Solving for I/YR: 6.15%

Comments about flotation costs:

- Flotation costs depend on the risk of the firm and the type of capital being raised.
- The flotation costs are highest for common equity. However, since most firms issue equity infrequently, the per-project cost is fairly small.
- We will frequently ignore flotation costs when calculating the WACC.

Four Mistakes to Avoid

- Current vs. historical cost of debt
- Mixing current and historical measures to estimate the market risk premium
- Book weights vs. Market Weights
- Incorrect cost of capital components

- See next slides for details.

(More…)

Current vs. Historical Cost of Debt

- When estimating the cost of debt, don't use the coupon rate on existing debt, which represents the cost of past debt.
- Use the current interest rate on new debt.

(More…)

Estimating the Market Risk Premium

- When estimating the risk premium for the CAPM approach, don't subtract the current long-term government-bond rate from the historical average return on common stocks.
- For example, if the historical r_M has been about 12.2% and inflation drives the current r_{RF} up to 10%, the current market risk premium is not 12.2% – 10% = 2.2%!

(More…)

Estimating Weights

- Use the target capital structure to determine the weights.
- If you don't know the target weights, then use the current market value of equity.
- If you don't know the market value of debt, then the book value of debt often is a reasonable approximation, especially for short-term debt.

(More…)

Capital components are sources of funding that come from investors.

- Accounts payable, accruals, and deferred taxes are not sources of funding that come from investors, so they are not included in the calculation of the WACC.
- We do adjust for these items when calculating project cash flows, but not when calculating the WACC.