



## Chapter 12: The WACC and Company Valuation

### Calculate

- Cost of debt
- Cost of preferred stock
- Cost of common equity
- Weighted average cost of capital

### Calculating Weighted Average Cost of Capital ( $k_a$ )

-  Estimate the cost of the components of capital
-  Estimate the proportions of the components in the firm's capital structure

$$\text{WACC } (k_a) = w_d k_d (1-T) + w_p k_p + w_e k_e$$

- The  $w$ 's refer to the firm's capital structure weights.
- The  $k$ 's refer to the cost of each component.

## How are the weights determined?

$$WACC = w_d k_d (1-T) + w_p k_p + w_e k_e$$

- Book value weights
  - Based on the book value of the different sources of capital
- Market value weights
  - Determined from the market capitalization values of the different securities

## Which Weight is Right?

- Theoretically, the market value based proportions should be used
- The market value captures the marginal investor's opportunity cost
- Practitioners blend both approaches
- Combining book value of debt and preferred stock with market value of common stock

### Calculating weights:

$$k_a = \frac{E}{B + E + P_f} (k_e) + \frac{B}{B + E + P_f} (k_i) + \frac{P_f}{B + E + P_f} (k_p)$$

Example: with \$3 in bonds, \$6 in equity, and \$1 in preferred stock

$$k_a = \frac{6}{3+6+1} (k_e) + \frac{3}{3+6+1} (k_i) + \frac{1}{3+6+1} (k_p)$$

$$K_a = W_e (k_e) + W_d (k_i) + W_p (k_p)$$

$$K_a = 0.6 (k_e) + 0.3 (k_i) + 0.1 (k_p)$$

## Component cost of debt:

$$WACC = w_d k_d (1-T) + w_p k_p + w_e k_e$$

- $k_d$  is the marginal cost of debt capital.
- The yield to maturity on outstanding L-T debt is often used as a measure of  $k_d$ .
- Why tax-adjust, i.e. why  $k_d(1-T)$ ?

Example:

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

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

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

- Interest is tax deductible, so

$$k_i = k_d (1-T)$$
$$= 10\% (1 - 0.40) = 6\%$$

- Use nominal rate.
- Flotation costs are small, so ignore them.

## **Component cost of preferred stock**

$$WACC = w_d k_d (1-T) + w_p k_p + w_e k_e$$

- $k_p$  is the marginal cost of preferred stock. ( $D_p/P_p$ )
- The rate of return investors require on the firm's preferred stock.

$$k_p = \frac{D_p}{P_0}$$

## Cost of Common Equity Capital

$$WACC = w_d k_d (1-T) + w_p k_p + w_e k_e$$

- $k_e$  is the marginal cost of common equity using retained earnings.
- The rate of return investors require on the firm's common equity using new equity is  $k_e$ .

- Internal : Retained earnings
- External: New common stock

Retained Earnings:

- Retained Earnings = Net Income - Dividends
- Reinvested back in the firm
- Opportunity cost
  - Retained earnings is somewhat cheaper than the cost of external equity

## Calculating the cost of Common Equity

### Two Ways:

#### ● Using the dividend valuation model

$$\triangleright K_e = D_1/P_0 + g$$

### Example:

If  $D_0 = \$4.19$ ,  $P_0 = \$50$ , and  $g = 5\%$ , what's the cost of common equity based upon the Dividend growth approach?

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

$$D_1 = \$4.19 (1 + .05)$$

$$D_1 = \$4.3995$$

$$\begin{aligned} k_e &= D_1 / P_0 + g \\ &= \$4.3995 / \$50 + 0.05 \\ &= 13.8\% \end{aligned}$$

## ● Using CAPM

- Using the SML
- $k_e = r_f + \beta_j(r_m - r_f)$

### Example:

If the  $r_f = 7\%$ ,  $r_m = 13\%$ , and the firm's beta is 1.2, what's the cost of common equity based upon the CAPM?

$$\begin{aligned}k_e &= r_f + (r_m - r_f) \beta \\ &= 7.0\% + (6.0\%)1.2 = 14.2\%\end{aligned}$$

### In CAPM

- Cost of common equity is affected by
  - Systematic risk
    - ✓ Firm's beta ( )
  - Current interest rates
    - ✓ Risk free rate ( $r_f$ )
  - Market's degree of risk aversion
    - ✓ Expected market risk premium ( $r_m - r_f$ )

What is a reasonable final estimate of  $k_e$ ?

<u>Method</u>	<u>Estimate</u>
CAPM	14.2%
Div growth	13.8%



Formulas for Computing Component Costs of Capital	
Cost of Debt	$k_i = k_d (1 - T)$ where: $k_d$ = pretax cost of debt, which is equal to the yield to maturity on a new bond issued by the firm.
Cost of Preferred Stock	$k_p = \frac{D_p}{P_0}$ Where $D_p$ is the annual dividend on the preferred stock and $P_0$ is price at which the new preferred issue is sold.
Cost of Common Equity	1. Constant growth dividend capitalization model approach, used when dividends grow at a perpetual constant rate: $k_e = \frac{D_1}{P_0} + g$ Where $D_1$ is the dividend next period, $g$ is constant growth rate of dividends, and $P_0$ is the current price of the firm's common stock.  2. Capital Asset Pricing Model approach: $k_e = r_f + \beta_j (r_m - r_f)$ Where $r_f$ is the risk-free rate of return, $\beta_j$ is the beta of the stock, $r_m - r_f$ is the market risk premium

### What factors influence a company's composite WACC?

- Market conditions.
- The firm's capital structure and dividend policy.
- The firm's investment policy. Firms with riskier projects generally have a higher WACC.

## VALUING ENTIRE BUSINESSES

$$PV = \frac{FCF_1}{(1+WACC)^1} + \frac{FCF_2}{(1+WACC)^2} + \dots + \frac{FCF_n}{(1+WACC)^n} + \frac{PV_n}{(1+WACC)^n}$$

FCF = Operating cash flow *minus* investment expenditures

Cash flow for entire business is **Free Cash Flow (FCF)**

WACC = Weighted average cost of capital

PV<sub>n</sub> = The value of the business at time (N). To find it we use a

Constant Growth Model. 
$$PV_n = \frac{FCF_n (1 + g)}{WACC - g}$$