

ECO 4368

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### Cost of Capital (WACC: Weighted Average Cost of Capital)

- Most firms set target percentages for different financing sources. For example, NCC (National Computer Corporation) plans to raise 30% of its required capital as debt, 60% as common equity (stock) and 10% as preferred stock. This is the company's target capital structure.
- The required rate of return on each capital component is called its component cost and the cost of capital for the company is the weighted average of component costs.
- **Example 1:** Suppose a company's capital structure involves 40% debt and 60% internal equity. If the cost of internal equity is 12% and the cost of debt is 9%, and if the company's tax rate is  $T = 30\%$ , then its WACC (weighted average cost of capital) is

$$\begin{aligned} WACC &= w_d(1 - T)r_d + w_e r_e \\ &= (0.4)(1 - 0.3)(0.09) + (0.6)(0.12) \\ &= 9.72\% \end{aligned}$$

Note that we include  $(1 - T)$  as the tax adjustment, since the interest payments on a company's debt are tax deductible.

- In the above formulation, it is important whether the company issues new equity or finances the equity portion of its capital structure by retained earnings. This distinction is important because in case of issuing external equity, the company pays a flotation cost. We elaborate on this next.
- **Internal or External Equity:** Suppose a company has a capital budget  $\mathbf{B}$  and earnings  $\mathbf{I}$ . The company finances this capital budget with  $w_d\%$  debt and  $w_e\%$  equity. Furthermore, suppose that the company has a target dividend payout ratio of  $x\%$ , i.e., the company pays  $x\%$  of its earnings as dividends. Accordingly, the equity portion of the capital budget requires an amount

$$Bw_e\%$$

of equity financing. Note that once the dividends are paid, the company will have a retained earning of

$$I(1 - x\%).$$

The company can finance the equity portion of its capital budget by retained earnings if

$$I(1 - x\%) > Bw_e\%$$

Otherwise, i.e., if

$$I(1 - x\%) < Bw_e\%$$

then the company will need to raise external equity by issuing new stock.

- **Example 2:** Suppose a company has a capital budget  $B = \$800,000$  and earnings  $I = \$600,000$ . The company finances its capital budget with 30% debt and 70% equity. If the company has a target dividend payout ratio of 20%, will it be able to finance the equity portion of its capital budget with internal equity?

- **Answer:** Note that the company needs

$$Bw_e\% = \$800,000(70\%) = \$560,000$$

whereas it will have a retained earning of

$$\$600,000(1 - 20\%) = \$480,000$$

Accordingly, the company will have to rely on external equity.

- **How do we incorporate the flotation cost when the company relies on external equity?** Consider the weighted average cost of capital formula

$$WACC = w_d(1 - T)r_d + w_e r_e$$

If **the equity is internal**, then using the constant dividend growth valuation, we have

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

If the equity is external, then we need to adjust the above formula as

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

where  $F$  is the flotation cost.

- **Example 3:** A company just paid a \$2.00 per share dividend on its common stock. The dividend is expected to grow at a constant rate of 7 percent a year. The stock currently sells for \$42.00 a share. If the company issues additional stock, it must pay its investment banker a flotation cost **10%** a share. What is the cost of external equity?

- **Answer:**

$$\begin{aligned}
 r_e^{external} &= \frac{D_0(1+g)}{P_0(1-F)} + g \\
 \Rightarrow r_e^{external} &= \frac{2(1+7\%)}{42(1-10\%)} + 7\% \\
 \Rightarrow r_e^{external} &= 12.66\%
 \end{aligned}$$

- **Example 4:** Heavy Metal Corporation is a steel manufacturer that finances its operations with 40 percent debt and 60 percent equity. The company requires \$150 million in total capital. Its net earnings are \$100 million and it has a dividend payout ratio of 35 percent. The interest rate on company's debt is 11 percent and the tax rate is 40%. The company's common stock trades at \$30 per share, and its current dividend of \$2.00 per share is expected to grow at a constant rate of 8% a year. The flotation cost of external equity, in case it is issued, is 15 percent. What is the company's WACC?

- **Answer:** Let's note that the company has to rely on external equity:

$$\begin{aligned}
 Bw_e\% &= \$150 \text{ million}(0.60) = \$90 \text{ million} \\
 I(1-x\%) &= \$100 \text{ million} (1-35\%) = \$65 \text{ million}
 \end{aligned}$$

Therefore, we will have

$$\begin{aligned}
 r_e^{external} &= \frac{D_0(1+g)}{P_0(1-F)} + g = \frac{2(1+0.08)}{30(1-0.15)} + 0.08 \\
 \Rightarrow r_e^{external} &= 16.47\%
 \end{aligned}$$

Now we can find WACC as

$$\begin{aligned}
 WACC &= w_d(1-T)r_d + w_e r_{ee}^{external} \\
 &= (0.4)(1-0.4)(0.11) + (0.6)(0.1647) \\
 &= 12.52\%
 \end{aligned}$$