

FIN 300

Cost of Capital

Lecture 11

TOPICS COVERED

- Cost of Capital
 - - Cost of Equity
 - Dividend Discount Model
 - Security Market Line
 - - Cost of Debt
- Weighted Average Cost of Capital (WACC)
- Valuation using WACC

COST OF CAPITAL

- Financing costs
 - External Financing (explicitly face the market)
 - Internal Financing (opportunity costs)
- Investors' required to return is a cost to the firm
- Cost of equity
 - Dividend Discount Model
 - Security Market Line (CAPM)
- Cost of Debt
 - Yield to Maturity (YTM)
 - Compare interest rates of similar debt

COST OF EQUITY

DIVIDEND DISCOUNT MODEL

$$P_0 = \frac{D}{R}$$

Suppose $P_0 = 30$ and $D = \$2.25$

$$R = \frac{D}{P_0} = \frac{\$2.25}{\$30} = 0.075$$

DDM WITH GROWTH

$$P_0 = \frac{D_0 \times (1 + g)}{R - g}$$

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

EXAMPLE: DDM WITH GROWTH

$D_{-1} = \$2.22$ and $D_0 = \$2.28$. If $P_0 = \$48$, what is the cost of equity?

$$R = \frac{D_0 \times (1 + g)}{P_0} + g; \quad g = \frac{\$2.28 - \$2.22}{\$2.22} = .027$$

$$R = \frac{\$2.28 \times (1 + .027)}{\$48} + 0.027 = 0.0758$$

SECURITY MARKET LINE

$$E(R_i) = R_F + \beta_i \times [E(R_m) - R_F]$$

This topic is covered in the section on the CAPM

COST OF DEBT

- Assume the firm has bonds
 - Observe the price, the coupons and face value
 - Yield to Maturity (YTM) is the interest rate the firm pays
 - Note: coupon payments are NOT the interest rate!
- If the firm does not have traded debt, we have to compare the debt to other firms of similar risk.

WEIGHTED AVERAGE COST OF CAPITAL

- Investment decisions must consider cost of capital to the firm as a whole
- Assume that the investment does not change the capital structure
- The cost of capital to the firm is weighted according to the capital structure
- Capital structure is the mix of financing between debt, equity, and preferred stock

WACC

$$WACC = \frac{E}{E + D} \times R_E + \frac{D}{E + D} \times R_D \times (1 - \tau_C)$$

E : total value of equity in the firm

D : total value of debt in the firm

R_E : cost of equity

R_D : cost of debt

τ_C : corporate tax rate

EXAMPLE

A firm had 1,000 shares outstanding, each worth \$30. The risk free rate is 5%, the expected return on the market is 12% and the stock's beta is 1.5. The firm has debt worth \$20,000 with a yield to maturity of 8%. $\tau_C = 35\%$. What is the firm's WACC?

Finding each piece:

$$E = 1,000 \text{ shares} \times \frac{\$30}{\text{share}} = \$30,000.$$

$$D = \$20,000 \text{ face value at par} = \$20,000$$

$$R_E = R_F + \beta \times (R_m - R_f)$$

$$R_E = .05 + 1.5 \times (.12 - .05) = 0.155$$

$$R_D = YTM = 0.08$$

$$\tau_C = 0.35$$

Plugging in:

$$WACC = \frac{30,000}{30,000 + 20,000} \times 0.155$$
$$+ \frac{20,000}{30,000 + 20,000} \times 0.08 \times (1 - 0.35)$$

$$WACC = 0.1138 = 11.38\%$$

VALUATION WITH WACC

- DDM is useful, but limited
- Stocks that don't pay dividends should have value > 0
- We can use Cash Flow From Assets to value
- Appropriate discount rate is the WACC

$$\text{Firm Value} = \frac{CFA_0^* \times (1 + g)}{WACC - g}$$

$$CFA_0^* = EBIT \times (1 - \tau_c) + Depreciation - \Delta NWC - \text{Capital Spending}$$

EXAMPLE: WACC VALUATION

EBIT is \$500, depreciation is \$50; there was zero capital spending and zero change in net working capital. The tax rate is 35%. If WACC is 11.38% with a 1% growth rate, what is the value of the firm?

$$CFA_0^* = \$500 \times (1 - 0.35) + \$50 - 0 - 0 = \$375$$

$$g = 0.01, \tau_C = 0.35, \text{ and } WACC = 0.1138$$

$$\begin{aligned}\text{Firm Value} &= \frac{\$375 \times (1 + 0.01)}{0.1138 - 0.01} \\ &= \$3,602.99\end{aligned}$$

SUMMARY

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