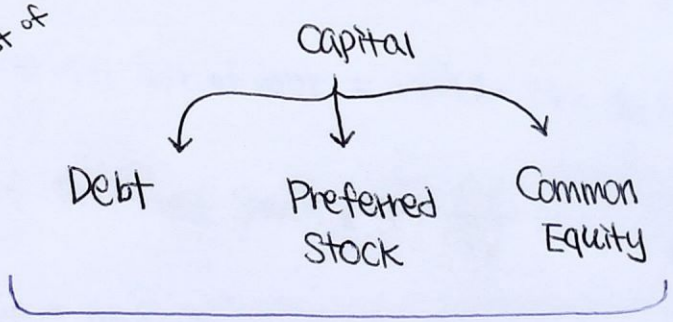
The Cost of Capital

Businesses require capital to develop new products, build factories, and distribution centers, install information technology, expand internationally, and acquire other companies. For each of these actions, a company must ① estimate the total investment required and then ② decide whether the expected rate of return exceeds the cost of the capital, or hurdle rate. * The cost of capital is also factor in choosing the firm's mixture of debt and equity and in decisions to lease rather than buy assets.

Most companies employ different types of capital due to their differences in risk. ** The cost of capital is the weighted average cost of the debt, preferred stock, and common equity that the firm uses to finance its assets, or its WACC

Weighted Average Cost of Capital



** $WACC = W_{debt} \cdot r_{debt} \cdot (1 - Tax) + W_{preferred} \cdot r_{preferred} + W_{common} \cdot r_{common}$

(w; firm's structure weights, r; cost of each component.)

$$\left[WACC = \underset{①}{W_d} \cdot \underset{②}{r_d(1-t)} + \underset{③}{W_p} \underset{④}{r_p} + \underset{⑤}{W_c} \underset{⑥}{r_c} \right]$$

① % of debt ② After-tax cost of debt
③ % of Preferred stock ④ Cost of Preferred Stock
⑤ % of Common equity ⑥ Cost of Common equity.

Again!! "Weighted Average Cost of Capital (WACC)"

$$= \underbrace{\left(W_{debt} \cdot r_{debt}(1-Tax)\right)}_{①} + \underbrace{\left(W_{preferred} \cdot r_{preferred}\right)}_{②} + \underbrace{\left(W_{common} \cdot r_{common}\right)}_{③}$$

*** we use the after-tax cost of debt in calculating the WACC because we are interested in maximizing the value of the firm's stock, and the stock price depends on after-tax cash flows

The cost of debt is the interest on new debt, not outstanding debt.

① After-tax cost of debt = interest rate on "new" debt − Tax savings
(interest is tax deductible!)

$$= r_d - r_d Tax = r_d \cdot (1-T)$$

ex) Shin's Brary borrows at an interest rate of 10%, and its marginal federal-plus-state tax rate is 32%. Its after-tax cost of debt will be...

After-tax cost of debt $= r_d \cdot (1-T) = 10\% \cdot (1-0.32) = 6.8\%$

② Cost of Preferred Stock, $r_P = \frac{D_P}{P_P}$

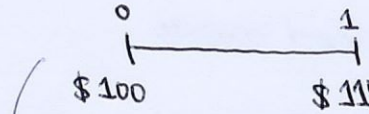
ex) P&C corporation plans to issue some(?) preferred stock in the future and therefore has included it in its target capital structure. It would sell its stock to a few hedge funds, the stock would have a $9.00 dividend/share. It would be priced at $77.7 a share. Given information P&C's preferred stock would be... $= \frac{\$9}{\$77.7} = 0.1158 = 11.58\%$

③ Cost of Common Equity, r_c ; *** Companies/firms can raise Common equity in two ways: (1) by selling newly issued shares to the public, and (2) by retaining and reinvesting earnings.

(1) Cost of New Common Stock, r_e

* - Flotation costs are the fees charged by investment bankers plus accounting and legal expenses associated with issuing new shares of Common Stock.
- Flotation costs may be treated as either a transaction dollar amount, or as a percentage cost required to sell new equity
- Three cases below;

* Case 1) Add flotation costs to a project's cost

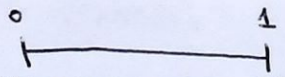


① ; 1-year project with initial cost of $100. After 1 year this project is expected to produce an inflow of $115. In this case,

Expected rate of return $= \frac{P_1 - P_0}{P_0} = \frac{115-100}{100} = 15\%$

② Now, if this project requires the company/firm to raise $100 of new capital and incur $2 of flotation costs;

with flotation costs



$= \$100 + 2$

$= \$102$

; Expected rate of return $= \frac{P_1 - P_0}{P_0}$

$= \frac{115 - (100+2)}{(100+2)} = 12.75\%$

; Without flotation costs, expected return = 15%.

With flotation costs, expected return = 12.75%. ↘ decrease by 2.25

* Case 2) Increase the cost of capital

$$\text{Cost of equity from new stock} = r_e = \frac{D_1}{P_0(1 - \text{Flotation Costs})} + g$$

** Case 3) When must external equity be used? Because of flotation costs, dollars raised by selling new stock must work harder than dollars raised by retaining earnings.

$$\text{Retained Earnings Breakpoint} = \frac{\text{Addition to retained earning for the year}}{\text{Equity fraction}}$$

ex) P&C's addition to retained earnings in 2017 is expected to be \$100 and its target capital structure consists of 40% debt, 30% preferred, and 30% equity. Its retained earnings breakpoint will be $\frac{\$100}{0.3} = \$333.33$ ↑ need to issue new stock

(2) Cost of Retained Earnings, r_s; How to measure it?

* ① CAPM Approach;

$(r_s = r_{RF} + (RP_M) \cdot b_i)$

Kindly ...

required rate of return on stock = $r_{\text{risk free}} + \left(\begin{matrix}\text{Market}\\ \text{Risk}\\ \text{Premium}\end{matrix}\right) \cdot \text{Beta}_i$

② Bond-Yield-Plus-Risk-Premium Approach;

r_s = Bond Yield + Risk Premium

* ③ DCF Approach

$$r_s = \frac{D_1}{P_0} + g$$

④ Averaging the alternative estimates.