

July 9, 2019

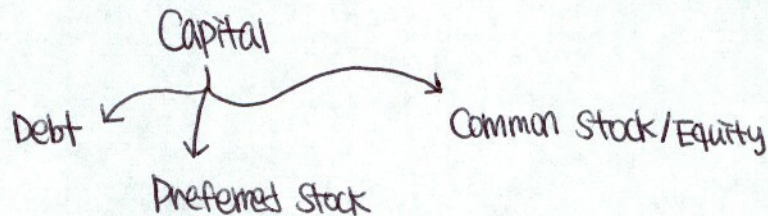
The Principles of Financial Management - Shin, Seung-ho

The Cost of Capital

All businesses require capital to develop new product/service, build factories, and distribution centers, expand internationally, and acquire other businesses. To do these actions, a corporation/firm/company must ^{*}estimate the total investment required and then ^{*}decide whether the expected rate of return exceeds the cost of capital, or hurdle rate. Most corporations/firms/companies employ different types of capital due to their differences in risk.

^{***} The cost of capital is the weighted average cost of debt, Preferred Stock and Common stock/equity that the corporation/firm/company uses to finance its assets, or its ^{*}WACC. In other words, the cost of capital is the factor in choosing the (firm/corporation/company's mixture of debt, preferred stock, and common stock/equity and in decisions to lease rather than buy assets.

(Weighted Average Cost of Capital)



^{***}

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

(W; firm's structure weights
Y; Cost of each component)

$$WACC = \underbrace{W_d}_{①} \cdot \underbrace{Y_d}_{②} \cdot (1 - t) + \underbrace{W_p}_{③} \cdot \underbrace{Y_p}_{④} + \underbrace{W_c}_{⑤} \cdot \underbrace{Y_c}_{⑥}$$

① % of debt

② After-tax cost of debt

③ % of Preferred Stock

④ cost of Preferred stock

⑤ % of common Stock/Equity

⑥ cost of common Stock/Equity

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$$WACC = \underbrace{W_d \cdot r_d(1-t)}_{(1)} + \underbrace{W_p \cdot r_p}_{(2)} + \underbrace{W_c \cdot r_c}_{(3)}$$

* 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.

→ Consider new debt, not outstanding debt

① After-tax cost of debt = Interest rate on ^{*}new debt - Tax savings
(Interest is tax deductible).
$$= r_d - r_d \cdot \text{tax} = r_d \cdot (1-t)$$

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 6.8%.
After-tax cost of debt $= r_d \cdot (1-t) = 10\% \cdot (1-32\%)$

② Cost of Preferred Stock (Similar to perpetuity annuity)

*
$$r_p = \frac{D_p}{P_p} ; P_p = \frac{D_p}{r_p} \quad \left(\begin{array}{l} D_p : \text{dividend} \\ P_p : \text{value price of preferred stock} \\ r_p : \text{cost of preferred stock} \end{array} \right)$$

ex) Anthony has some preferred stocks and he would sell his stocks to a few hedge funds. His preferred stocks would have a \$9.00 dividend per share and they would be priced at \$77.7 per share. Given information, the cost of preferred stock will be 11.58%.

$$r_p = \frac{D_p}{P_p} = \frac{9}{77.7} = 0.1158 = 11.58\%$$

③ Cost of Common Stock/Equity

Corporation/firm/company can raise common equity (common stock) in two ways.

① by selling newly issued shares to the public, and ② by retaining and reinvesting earnings.

① cost of new common equity (common stock) $\rightarrow r_e$ (① external equity)
to begin with, we consider ^{*} flotation costs (② internal equity)

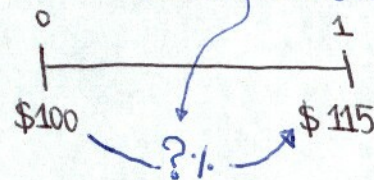
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- * flotation costs are the fees charged by investment bankers plus accounting and legal expenses associated with issuing new shares of common equity (common stock).
- * flotation costs can be treated as either a transaction dollar amount, or as a percentage cost required to sell new equity

• Three cases below :

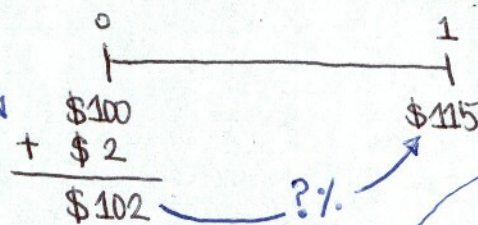
- * Case 1) 1-year project with initial cost of \$100. After 1 year, this project is expected to produce an inflow of \$115. In this case, we can calculate its expected rate of return.



$$\begin{aligned} \text{Expected rate of return} &= \frac{P_1 - P_0}{P_0} \\ &= \frac{115 - 100}{100} = 0.15 = 15\% \end{aligned}$$

with
flotation
costs

Now, if this project requires the corporation/firm/company to raise \$100 of new capital and incur \$2 of flotation costs, then we can find expected rate of return.



$$\begin{aligned} \text{Expected rate of return with flotation costs} &= \frac{P_1 - (P_0 + \text{Flotation costs})}{(P_0 + \text{Flotation costs})} \\ &= \frac{115 - 102}{102} = 0.1275 = 12.75\% \end{aligned}$$

- (Without flotation costs, expected rate of return = 15%.
- (With flotation costs, expected rate of return = 12.75%. Decrease by 2.25%.

- * Case 2) Increase cost of capital

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

Case 3) A corporation/firm/company would stick with external equity?

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- ✓ Because of flotation costs, dollars raised by selling new stock must work harder than dollars raised by retaining earnings.

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

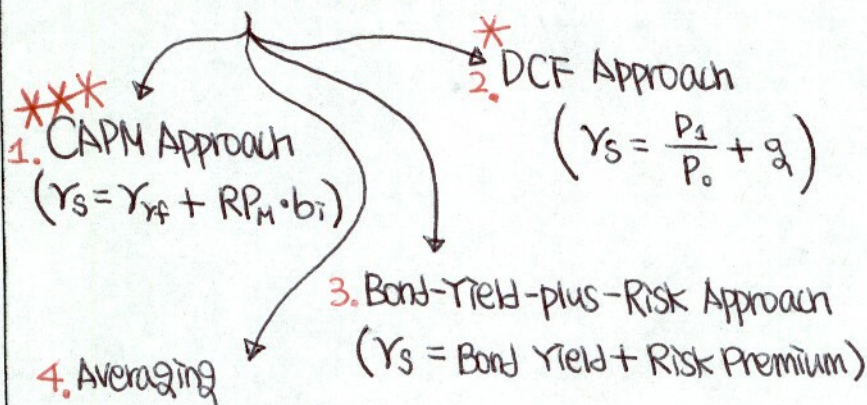
ex) Amber's addition to retained earnings in 2019 is expected to be \$100 and its target capital structure consists of 40% debt, 30% preferred stock, and 30% equity. Its retained earnings breakpoint would be \$333.33

$$\text{Retained Earnings Breakpoint} = \frac{100}{30\%} = \$333.33$$

Amber is able to raise additional capital of \$333.33 without issuing new stock!

⑥ Cost of Retained Earnings, r_s

How to measure?



the alternative estimates

* To begin with, we assume that investors like returns and hate/dislike risk. Rational people invest in relatively risky assets when they expect to receive relatively high returns. The higher the perceived risk, the higher the expected rate of return investors will demand. Simply stated, high risk, high return!!