Chapter 11
Calculating the Cost of Capital

(def) - Cost of obtaining money to fund asset purchase - use as estimate of r (discount rate)

If we can earn more than the cost of capital (r) from a project than company should undertake.

Accept Project if:
actual return > cost of capital (r)

Reject Project if:
actual return < cost of capital (r)

Therefore: cost of capital (r) is minimum return we will accept

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How do we calculate the cost of capital
- or -
cost of obtaining funds for a project.

Use the average of the sources of funds (r_a)

Sources

(1) debt (r_d)
(2) preferred stock (r_p)
(3) common stock
- retained earnings (r_s)
- new issue of common stock (r_e)

Cost of Debt (r_d)

Use after tax yield-to-maturity of bond net of issuance costs [flotation costs (f)]

Yield-to-maturity is the rate of return paid to bondholders over the life of a bond

ex. sell bond for \$1,000 (V_b=\$1,000)
flotation costs = 3% (f_d=3%)
coupon rate = 10%
n = 30 (annual coupon payments)

solve for i = r_d = 10.32%

But from a company's viewpoint their cost is net of taxes because they can deduct bond interest from tax return.

After-tax cost of debt = $r_d(1-t)$

If t = 40% then $r_d(1-t)$ = 10.32 (.60) = 6.2%

Answer the following questions based on the WSJ bond quote for Microsoft, Incorporated (assume coupons are paid on a semi-annual basis).

Company (ticker)	Coupon	Maturity	Last Price	Last Yield	Est Spread	UST	Est $ Vol (000's)
Microsoft, Inc. (MSFT	7.875	Apr 15, 2030	95.158	???	115	30	71,874

A. What is the YTM for this Microsoft, Inc. Corporate Bond? (Assume today is Apr 15, 2010)

B. If Microsoft, Inc. is subject to floatation costs of 2% on a new issue of bonds and have a marginal tax rate of 33%, what is Microsoft's after-tax cost of debt?

Cost of Preferred Stock

$$r_p = \frac{D_p}{V_p(1-f_p)}$$

Again, f_p = flotation costs

ex. $D_p = 10$
$V_p = 100$
$f_p = 2.5\%$

$$r_p = \frac{10}{100(.975)} = 10.26\%$$

after-tax cost of preferred stock
=
before-tax cost of preferred stock

Cost of Retained Earnings (r_s)

r_s = rate of return that current shareholders demand

How to calculate:

(1) CAPM approach

$$r_s = r_{RF} + ß\,(r_M - r_{RF})$$

(2) Discounted Cash Flow Method (DCF)

$$r_s = (D_1/P_0) + g$$

(3) Bond Yield Plus Risk Premium Approach

$$r_s = r_d + \text{risk premium}$$

Use the following information for Lyons Incorporated to answer parts A and B of this question. For the general marketplace the risk-free rate is 4 percent (r_{RF} = 4%) and the average rate of return on the market is 10 percent (r_m = 10%). Lyons has a beta of 1.6. The dividends of Lyons Inc. are expected to grow at 6 percent per year in the future. Lyons's common stock sells for $23.50 per share and the company just paid a dividend of $1.50 per share ($D_0$=$1.50).

A. Using the discounted cash flow (DCF) approach, what is its cost of common stock?

B. What will be the firm's cost of common stock using the CAPM approach?

Cost of Newly Issued Common Stock

$$r_e = \frac{D_1}{P_0(1-f_e)} + g$$

ex.

D_1 = $2
P_0 = $50
f_e = 7%
g = 10%

$$r_e = \frac{2}{50(1-.07)} + .10 = 14.3\%$$

Mandalay Bay's stock currently sells for $30 per share, expects to pay a dividend of $2.25 next year ($D_1$=$2.25), has a growth rate of 6% that is expected to continue, and new issues of common stock are subject to flotation costs of 7%.

A. What is Mandalay Bay's cost of retained earnings?

B. What is Mandalay Bay's cost of new common stock?

C. Why is the cost of new common stock typically higher than the cost of retained earnings?

Weighted Average Cost of Capital
(WACC = r_a)

Now we take the average of $r_d(1\text{-}t)$, r_p, r_s, and r_e to find our weighted average cost of capital (WACC) - We will use the WACC to evaluate projects.

$WACC = r_a = w_d r_d(1\text{-}t) + w_p r_p + w_s r_s$ [or r_e]

where, w_d is the percent of funds raised through debt, w_p is the percent of funds raised through preferred stock, w_s is the percent of funds raised through retained earnings or through new common stock.

Note: (1) we assume that we use all cash available from retained earnings before we issue new common stock.

(2) we assume that we raise funds from sources according to some target capital structure.

Facts: $r_d\ (1\text{-}t) = 6\%$, $r_p = 10\%$, $r_s = 14\%$, $r_e = 15\%$, Retained Earnings = \$5,000,000

Target Capital Structure: 50% debt, 10% preferred stock, 40% common stock

PROJECT	COST	IRR
(1) New Warehouse	\$7.5M	14%
(2) Auto Fleet	\$5M	12%
(3) Computers	\$6M	11%
(4) Phone System	\$4M	9%

What is WACC????

WACC will change - $WACC_1$ uses cheapest sources

$WACC_1 = k_{a1}$ = use cheapest debt, cheapest preferred stock, and cheapest common stock

$$\begin{aligned} WACC_1 &= w_d r_d(1\text{-}t) + w_p r_p + w_s r_s \\ &= .50(6\%) + .10(10\%) + .40(14\%) \\ &= 9.6\% \end{aligned}$$

When $WACC_1$ runs out we use $WACC_2$. When does $WACC_1$ run out?

Assume r_d and r_p do not change. Therefore, we only run out of r_s. When r_s is gone use r_e.

Breakpoint one = when $WACC_1$ is used up.
= RE / (% cs in capital structure)
= \$5,000,000/.40 = \$12,500,000

Therefore, first \$12.5 million costs the firm 9.6%

Money raised over \$12.5 million costs $WACC_2$.

$$\begin{aligned} WACC_2 = r_{a2} &= w_d r_d(1\text{-}t) + w_p r_p + w_s r_e \\ &= .50(6\%) + .10(10\%) + .40(15\%) \\ &= 10.0\% \end{aligned}$$

Therefore, money over \$12.5 million costs 10.0%

Which projects should the firm take?

Project	Cost	Return	WACC
(1)	$7.5M	14%	9.6%
(2)	$5M	12%	9.6%
(3)	$6M	11%	10.0%
(4)	$4M	9%	10.0%

Rank projects and accept according to -

Rule: Accept if project return > WACC

We receive a higher return from project than its cost.

PurchasePro.com desires to finance all projects with funds acquired according to their target capital structure of 25% debt, 10% preferred stock, and 65% equity. PurchasePro.com can issue debt at a before tax cost of 8.6% indefinitely, issue preferred stock at a cost of 10.21%, has $13,650,000 of retained earnings at a cost of 13.4%, and can issue new common stock at a cost of 15.7%. PurchasePro.com's marginal tax rate is 28%.

A. What is PurchasePro.com's first weighted average cost of capital (where the cheapest sources of funds are used)?

B. What is the breakpoint for PurchasePro.com's where their cheapest source of funds is exhausted?

C. What is PurchasePro.com's second weighted average cost of capital (after the cheapest sources of funds are exhausted)?

Peterson Inc. has 50,000 bonds outstanding with a market price at 78% of par. Peterson also has 1,000,000 shares of common stock outstanding at a market price of $26 and 400,000 shares of preferred stock outstanding at a market price of $22. Peterson's tax rate is 24% and they have $24,000,000 in retained earnings. What are the market value weights of debt, preferred stock, and common stock in Peterson's capital structure?

Cost of Capital

IGT Incorporated has common stock that currently sells for $20 per share. IGT expects EPS of $3 per share this year ($EPS_1$ = $3), IGT paid a dividend of $1.40 last year ($D_0$ = $1.40), and IGT has a growth rate on dividends of 7% that is expected to continue. New issues of common stock are subject to flotation costs of 20%.

IGT's corporate bonds currently sell for $1,085.44, pay a 12% **semi-annual** coupon, mature in 30 years, and a new issue of these bonds are subject to flotation costs of 3%. IGT's tax rate is 40%.

IGT's preferred stock currently sells for $32.00, dividends are paid at the rate of 10%, par value of the preferred stock is $40.00, and flotation costs on preferred stock is 8%.

IGT Inc. can obtain funds for future investments through retained earnings, new issues of common stock, issuance of debt, and issuance of preferred stock. Management base their cost of capital on the following target capital structure: 20% debt, 10% preferred stock, and 70% common stock. IGT has $35 million available in retained earnings.

(A) What is IGT's cost of retained earnings?

(B) What is IGT's cost of new common stock?

(C) What is IGT's after-tax cost of a new issue of debt?

(D) What is IGT's cost of new preferred stock?

(E) What is IGT's breakpoint, where the cheapest combination of funds is exhausted?

(F) What is IGT's $WACC_1$, based on the cheapest combination of funds?

(G) What is IGT's $WACC_2$, based on the more expensive combination of funds?