Sample Problems – Chapter 10

Title: Cost of Debt
1. Costly Corporation plans a new issue of bonds with a par value of $1,000, a maturity of 28 years, and an annual coupon rate of 16.0%. Flotation costs associated with a new debt issue would equal 9.0% of the market value of the bonds. Currently, the appropriate discount rate for bonds of firms similar to Costly is 17.0%. The firm's marginal tax rate is 30%. What will the firm's true cost of debt be for this new bond issue?
a. 20.99%
b. 18.69%
c. 17.61%
d. 12.32%
e. 13.08%

Title: Cost of preferred stock
2. Costly Corporation is also considering using a new preferred stock issue. The preferred would have a par value of $400 with an annual dividend equal to 18.0% of par. The company believes that the market value of the stock would be $968.00 per share with flotation costs of $68.00 per share. The firm's marginal tax rate is 40%. What would the firm's cost of preferred be for this new preferred stock issue?
a. 8.00%
b. 7.44%
c. 8.79%
d. 6.92%
e. 6.28%

Title: Cost of internal equity (new dividend)
3. Costly Corporation is considering using equity financing. Currently, the firm's stock is selling for $47.00 per share. The firm's dividend for next year is expected to be $3.40 with an annual growth rate of 5.0% thereafter indefinitely. If the firm issues new stock, the flotation costs would equal 14.0% of the stock's market value. The firm's marginal tax rate is 40%. What is the firm's cost of internal equity?
a. 11.53%
b. 13.41%
c. 12.60%
d. 13.83%
e. 12.23%

Title: Cost of external equity (new dividend)
4. Costly Corporation is considering using equity financing. Currently, the firm's stock is selling for $31.00 per share. The firm's dividend for next year is expected to be $5.50 with an annual growth rate of 5.0% thereafter indefinitely. If the firm issues new stock, the flotation costs would equal 15.0% of the stock's market value. The firm's marginal tax rate is 40%. What is the firm's cost of external equity?
a. 23.63%
b. 22.74%
c. 25.87%
d. 26.92%
e. 24.39%

Title: WACC using RE (before-tax debt)
5. Marginal Incorporated (MI) has determined that its before-tax cost of debt is 9.0%. Its cost of preferred stock is 15.0%. Its cost of internal equity is 17.0%, and its cost of external equity is 19.0%. Currently, the firm's capital structure has $378 million of debt, $63 million of preferred stock, and $459 million of common equity. The firm's marginal tax rate is 45%. The firm is currently making projections for next period. Its managers have determined that the firm should have $92 million available from retained earnings for investment purposes next period. What is the firm's marginal cost of capital at a total investment level of $155 million?
a. 14.52%
b. 12.82%
c. 12.31%
d. 11.80%
e. 13.50%

Title: WACC using New stock (before-tax debt)
6. Marginal Incorporated (MI) has determined that its before-tax cost of debt is 9.0%. Its cost of preferred stock is 15.0%. Its cost of internal equity is 17.0%, and its cost of external equity is 19.0%. Currently, the firm's capital structure has $378 million of debt, $63 million of preferred stock, and $459 million of common equity. The firm's marginal tax rate is 45%. The firm is currently making projections for next period. Its managers have determined that the firm should have $92 million available from retained earnings for investment purposes next period. What is the firm's marginal cost of capital at a total investment level of $247 million?
a. 12.31%
b. 11.80%
c. 12.82%
d. 14.52%
e. 13.50%

Title: WACC using RE (after-tax debt)
7. Marginal Incorporated (MI) has determined that its after-tax cost of debt is 9.0%. Its cost of preferred stock is 15.0%. Its cost of internal equity is 17.0%, and its cost of external equity is 19.0%. Currently, the firm's capital structure has $378 million of debt, $63 million of preferred stock, and $459 million of common equity. The firm's marginal tax rate is 45%. The firm is currently making projections for next period. Its managers have determined that the firm should have $92 million available from retained earnings for investment purposes next period. What is the firm's marginal cost of capital at a total investment level of $157 million?
a. 13.50%
b. 14.52%
c. 14.01%
d. 12.82%
e. 11.80%

Title: WACC using New stock (after-tax debt)
8. Marginal Incorporated (MI) has determined that its after-tax cost of debt is 9.0%. Its cost of preferred stock is 15.0%. Its cost of internal equity is 17.0%, and its cost of external equity is 19.0%. Currently, the firm's capital structure has $378 million of debt, $63 million of preferred stock, and $459 million of common equity. The firm's marginal tax rate is 45%. The firm is currently making projections for next period. Its managers have determined that the firm should have $92 million available from retained earnings for investment purposes next period. What is the firm's marginal cost of capital at a total investment level of $247 million?
a. 14.52%
b. 13.50%
c. 14.01%
d. 12.82%
e. 11.80%

Title: WACC (before-tax cost of debt)
9. Marginal Incorporated (MI) has determined that its before-tax cost of debt is 7% for the first $112 million in bonds it issues, and 8% for any bonds issued above $112 million. Its cost of preferred stock is 10%. Its cost of internal equity is 14%, and its cost of external equity is 17%. Currently, the firm's capital structure has $400 million of debt, $100 million of preferred stock, and $500 million of common equity. The firm's marginal tax rate is 30%. The firm is currently making projections for next period. Its managers have determined that the firm should have $59 million available from retained earnings for investment purposes next period. What is the firm's marginal cost of capital at each of the following total investment levels?
(A) Total investment level of $380 million?
(B) Total investment level of $199 million?
(C) Total investment level of $69 million?

Title: WACC (after-tax cost of debt)
10. Marginal Incorporated (MI) has determined that its after-tax cost of debt is 6% for the first $100 million in bonds it issues, and 8% for any bonds issued above $100 million. Its cost of preferred stock is 9%. Its cost of internal equity is 12%, and its cost of external equity is 14%. Currently, the firm's capital structure has $600 million of debt, $100 million of preferred stock, and $300 million of common equity. The firm's marginal tax rate is 30%. The firm is currently making projections for next period. Its managers have determined that the firm should have $75 million available from retained earnings for investment purposes next period. What is the firm's marginal cost of capital at each of the following total investment levels?
(A) Total investment level of $280 million?
(B) Total investment level of $200 million?
(C) Total investment level of $77 million?

Answers:
1. e
2. a
3. e
4. c
5. d
6. c
7. a
8. a

1.

N	I	***PV***	FV	PMT
28	17	941.90	1000	(0.16)(1000)

N	***I***	PV	FV	PMT
28	18.693	-[941.90 – (0.09)(941.90)]	1000	(0.16)(1000)

After-tax cost of debt = (Before-tax cost of debt)(1 – marginal tax rate)
After-tax cost of debt = (18.693%)(1 – 0.30) = 13.08%

2.

N	***I***	PV	FV	PMT
1000	**8**	**-(968 – 68)**		**(400)(0.18)**

3.

$$k_s = \frac{D_1}{P_0} + g = \frac{3.40}{47} + 0.05 = 0.1223 = 12.23\%$$

4.

$$k_e = \frac{D_1}{P_0 - F} + g = \frac{5.50}{(31 - (0.15)(31))} + 0.05 = 0.2587 = 25.87\%$$

For questions 5, 6, 7, and 8 start by calculating the capital structure weights and then calculate the retained earnings breakpoint.

Capital Structure Weights

Debt	378	/	900	=	0.42
Pref	63	/	900	=	0.07
Eq	459	/	900	=	0.51
TOTAL	900				

Retained earnings breakpoint = (RE available)/(equity fraction) = (92 million)/(0.51) = 180.39 million

5. Use the cost of retained earnings for equity since the total investment level of $155 million is less than the breakpoint for equity. Adjust for the tax effect for debt since the before-tax cost of debt is given.
WACC = (0.42)(9%)(1 – 0.45) + (0.07)(15%) + (0.51)(17%) = 11.8%

6. Use the cost of new stock for equity since the total investment level of $247 million is greater than the breakpoint for equity. Adjust for the tax effect for debt since the before-tax cost of debt is given.
WACC = (0.42)(9%)(1 – 0.45) + (0.07)(15%) + (0.51)(19%) = 12.82%

7. Use the cost of retained earnings for equity since the total investment level of $157 million is less than the breakpoint for equity. Do not adjust for the tax effect for debt since the after-tax cost of debt is given.
WACC = (0.42)(9%) + (0.07)(15%) + (0.51)(17%) = 13.50%

8. Use the cost of new stock for equity since the total investment level of $247 million is greater than the breakpoint for equity. Do not adjust for the tax effect for debt since the after-tax cost of debt is given.
WACC = (0.42)(9%) + (0.07)(15%) + (0.51)(19%) = 14.52%

9.
First, calculate the capital structure weights.

Capital Structure Weights					
Debt	400	/	1000	=	0.4
Pref	100	/	1000	=	0.1
Eq	500	/	1000	=	0.5
TOTAL	1000				

Next, calculate the breakpoints. (There are two breakpoints in this problem since the cost of debt can be either 7% or 8% and the cost of equity can be 14% or 17%.)

Breakpoint(debt) = 112/0.4 = 280 million

Breakpoint(equity) = 59/0.5 = 118 million

Now calculate the WACC for each total investment level. You must adjust the cost of debt for taxes since you are given the before-tax cost of debt.

A)
$380 million total investment level
The total investment level exceeds the breakpoint for debt (380 > 280), so you use the higher cost of debt.
The total investment level exceeds the breakpoint for equity (380 > 118), so you use the higher cost of equity.

WACC = (0.4)(**8%**)(1 – 0.30) + (0.1)(10%) + (0.5)(**17%**) = 11.74%

B)
$199 million total investment level
The total investment level is less than the breakpoint for debt (199 < 280), so you use the lower cost of debt.
The total investment level exceeds the breakpoint for equity (199 > 118), so you use the higher cost of equity.

WACC = (0.4)(**7%**)(1 – 0.30) + (0.1)(10%) + (0.5)(**17%**) = 11.46%

C)
$69 million total investment level
The total investment level is less than the breakpoint for debt (69 < 280), so you use the lower cost of debt.
The total investment level is less than the breakpoint for equity (69 < 118), so you use the lower cost of equity.

WACC = (0.4)(**7%**)(1 – 0.30) + (0.1)(10%) + (0.5)(**14%**) = 9.96%

10.

First, calculate the capital structure weights.

Capital Structure Weights					
Debt	600	/	1000	=	0.6
Pref	100	/	1000	=	0.1
Eq	300	/	1000	=	0.3
TOTAL	1000				

Next, calculate the breakpoints. (There are two breakpoints in this problem since the cost of debt can be either 6% or 8% and the cost of equity can be 12% or 14%.)

Breakpoint(debt) = 100/0.6 = 167 million

Breakpoint(equity) = 75/0.3 = 250 million

Now calculate the WACC for each total investment level. You do not adjust the cost of debt for taxes since you are given the after-tax cost of debt.

A)
$280 million total investment level
The total investment level exceeds the breakpoint for debt (280 >167), so you use the higher cost of debt.
The total investment level exceeds the breakpoint for equity (280 > 250), so you use the higher cost of equity.

WACC = (0.6)(**8%**) + (0.1)(9%) + (0.3)(**14%**) = 9.90%

B)
$200 million total investment level
The total investment level exceeds the breakpoint for debt (200 > 167), so you use the higher cost of debt.
The total investment level is less than the breakpoint for equity (200 < 250), so you use the lower cost of equity.

WACC = (0.6)(**8%**) + (0.1)(9%) + (0.3)(**12%**) = 9.30%

C)
$77 million total investment level
The total investment level is less than the breakpoint for debt (77 < 167), so you use the lower cost of debt.
The total investment level is less than the breakpoint for equity (77 < 250), so you use the lower cost of equity.

WACC = (0.6)(**6%**) + (0.1)(9%) + (0.3)(**12%**) = 8.10%