CHAPTER 15

FIRM VALUATION: COST OF CAPITAL AND APV APPROACHES

Question 1

A. False. It can be equal to the FCFE if the firm has no debt.

B. True.

C. False. It is pre-debt, but after-tax.

D. False. It is after-tax, but pre-debt.

E. False. The free cash flow to firm can be estimated directly from the earnings before interest and taxes.

Question 2

A. FCFF in 1993 = Net Income + Depreciation - Capital Expenditures - Δ Working Capital + Interest Expenses (1 - tax rate)
= $770 + $960 - $1200 - 0 + $320 (1 - 0.36) = $734.80 million

B. EBIT = Net Income/(1 - tax rate) + Interest Expenses
= 770/0.64 + 320 = $1523.125 million

Return on Capital = EBIT (1-t)/ (BV of Debt + BV of Equity)
= 974.80/9000 = 10.83%

Reinvestment Rate = (1200-960)/974.80 = 24.68%

Expected Growth Rate in FCFF = Reinvestment Rate * ROC
= 0.2468 * 10.83% = 2.67%

Cost of Equity = 7% + 1.05 * 5.5% = 12.775%

Cost of Capital = 8% (1 - 0.36) (4000/(4000 + 12000)) + 12.775%
(12000/(4000 + 12000)) = 10.86%

Value of the Firm = 734.80/(.1086 - .0267) = $8,972 millions

C. Value of Equity = Value of Firm - Market Value of Debt
= $ 8,972 - $4,000 = $ 4,972 millions

Value Per Share = $ 4,972/200 = $ 24.86

Question 3

A.

Yr	*EBITDA*	*Deprec'n*	*EBIT*	*EBIT (1-t)*	*Cap Exp.*	*∂ WC*	*FCFF*	*Term Value*

0	$1,290	$400	$890	$534	$450	$82	$402	
1	$1,413	$438	$975	$585	$493	$90	$440	
2	$1,547	$480	$1,067	$640	$540	$98	$482	
3	$1,694	$525	$1,169	$701	$591	$108	$528	
4	$1,855	$575	$1,280	$768	$647	$118	$578	
5	$2,031	$630	$1,401	$841	$708	$129	$633	$14,941

	'93-97	*After 1998*
Cost of Equity =	13.05%	11.89%
AT Cost of Debt =	4.80%	4.50%
Cost of Capital =	9.37%	9.45%

Terminal Value
= {EBIT (1-t)(1+g) - (Rev$_{1998}$ - Rev$_{1997}$) * WC as % of Rev}/(WACC-g)
= (841 * 1.04) - (13500 * 1.095^5 * 1.04 - 13500 * 1.095^5)
* 0.07 /(.0945-.04) = $14,941
Value of the Firm
= 440/1.0937 + 482/1.0937^2 + 528/1.0937^3 + 578/1.0937^4 + (633 + 14941)/1.0937^5 = $11,566

B. Value of Equity in the Firm = ($11566 - Market Value of Debt) = 11566 - 3200 = 8366
Value Per Share = $8366/62 = $134.94

Question 4

A. Beta for the Health Division = 1.15
Cost of Equity = 7% + 1.15 * 5.5% = 13.33%
Cost of Capital = 13.33% * 0.80 + (7.5% * 0.6) * 0.2 = 11.56%

B.

Year	*Deprec'n*	*EBIT*	*EBIT(1-t)*	*Cap Ex*	*FCFF*	*Term Val*
0	$350	$560	$336	$420	$266	
1	$364	$594	$356	$437	$283	
2	$379	$629	$378	$454	$302	
3	$394	$667	$400	$472	$321	
4	$409	$707	$424	$491	$342	
5	$426	$749	$450	$511	$364	$5,014

	Now	After 5 years

Cost of Equity	13.33%	13.33%
=		
Cost of Debt	4.50%	4.50%
=		
Cost of Capital	11.56%	11.56%
=		

Value of the Division = $283/1.1156 + 302/1.1156^2 + 321/1.1156^3 + 342/1.1156^4 + (364 + 5014)/1.1156^5$ = $4,062 millions

C. There might be potential for synergy, with an acquirer with related businesses. The health division at Kodak might also be mismanaged, creating the potential for additional value from better management.

Question 5

Value = FCFF /(WACC-g)

750 = 30/(WACC-.05)

Solving for WACC,

WACC = .09

Given the cost of equity of 12% and the after-tax cost of debt of 6%,

Book Value weight for Equity = 0.50

The correct weights will be as follows:

Market Value Weight of Equity = (3*50)/(3*50+50) = 0.75

Correct Cost of Capital = 12% (.75) + 6% (.25) = 10.5%

Correct Value of Firm = 30/(.105-.05) = $545.45

Question 6

A. Cost of Equity = 7% + 1.25 * 5.5% = 13.88%
Current Debt Ratio = 1340/(1340 + 18.25 * 183.1) = 28.63%
After-tax Cost of Debt = 7.43% (1 - 0.4) = 4.46%
Cost of Capital = 13.88% (0.7137) + 4.46% (0.2863) = 11.18%

B. & C. See table below.

D/(D+E)	*Cost of*	*Beta*	*Cost of*	*AT Cost of*	*Cost of*	*Firm*

	Debt		*Equity*	*Debt*	*Capital*	*Value*
0%	6.23%	1.01	12.54%	3.74%	12.54%	$2,604
10%	6.23%	1.07	12.91%	3.74%	11.99%	$2,763
20%	6.93%	1.16	13.37%	4.16%	11.53%	$2,912
30%	7.43%	1.27	13.97%	4.46%	11.11%	$3,063
40%	8.43%	1.41	14.76%	5.06%	10.88%	$3,153
50%	8.93%	1.61	15.87%	5.36%	10.61%	$3,265
60%	10.93%	1.91	17.53%	6.56%	10.95%	$3,125
70%	11.93%	2.42	20.30%	7.16%	11.10%	$3,067
80%	11.93%	3.43	25.84%	7.16%	10.89%	$3,149
90%	13.43%	6.45	42.47%	8.06%	11.50%	$2,923

Unlevered Beta = 1.25/(1 + 0.6 * (1340/(183.1 * 18.25)) = 1.01

Levered Beta at 10% D/(D+E) = 1.01 * (1 + 0.6 * (10/90)) = 1.07

FCFF to Firm Next Year = (637 - 235) * (1 - 0.4) * 1.03 = $248.43 million

Value of the Firm = 255.67 * 1.03/(WACC-.03)

Problem 7

a. Cost of capital approach

Return on capital = 200 (1 - .4)/ 1200 = 10%

Reinvestment rate = g/ ROC = 4%/10% = 40%

Cost of equity = 5% + 1.2 (5.5%) = 11.6%

Cost of capital = 11.6% (1000/1500) + 6% (1-.4)(500/1500) = 8.93%

Value of firm

= EBIT (1-t) (1- Reinvestment rate) (1+g)/ (Cost of capital – g)

= 200 (1-.4) (1-.4)(1.04)/ (.0893 - .04) = $1,519 million

b. Unlevered beta = 1.20/ (1 + (1-.4)(500/1000)) = 0.9231

Unlevered cost of equity = 5% + 0.9231 (5.5%) = 10.08%

Unlevered firm value = = 200 (1-.4) (1-.4)(1.04)/ (.1008 - .04) = $1,232 million

+ PV of tax benefits from debt = Tax rate * Debt

= 0.40 * 500 = $ 200 million

- Expected bankruptcy costs = Probability of bankruptcy * Unlevered firm value *

Cost of bankruptcy = 0.10 * 1232 * .25 = $30.8 million

APV value of firm = $ 1232 + 200 – 30.8 = $ 1401.2 million

c. The APV approach considers only the tax benefits from existing debt, whereas the cost of capital approach assumes that debt will increase over time (to keep the debt ratio stable as the firm grows) and considers the potential tax benefits from future debt issues.

Problem 8

a. Enterprise value = 1760 + 527 = $2,287 million
   Tax benefits from debt = Tax rate * Debt = .36 * 527 = $189.7
   Exp bankruptcy cost
   = Prob of default * Bankruptcy cost as percent of value * Enterprise value
   = .023* .30* 2287 = $15.8 million
   Unlevered firm value = 2287 – 189.7 +15.8 = $2113 million
b. Debt at 50% debt ratio = .50 (2287) - $1,143.50
   Tax benefits from debt = $114.50*.36 = $411.7 million
   Exp bankruptcy cost
   = Prob of default * Bankruptcy cost as percent of value * Enterprise value
   = .4661* .30* 2287 = $319..8 million
   Levered firm value
   = Unlevered firm value + Tax Benefits – Expected Bankruptcy Costs
   = 2113 + 411.7 – 319.8 = $2,204.9 million