

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

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

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

$\text{Expected Growth Rate in FCFF} = \text{Retention Ratio} * \text{ROC}$
 $= 0.6 * 10.83\% = 6.50\%$

$\text{Cost of Equity} = 7\% + 1.05 * 5.5\% = 12.775\%$

$\text{Cost of Capital} = 8\% (1 - 0.36) (4000 / (4000 + 12000)) + 12.775\%$
 $(12000 / (4000 + 12000)) = 10.86\%$

$\text{Value of the Firm} = 734.80 / (.1086 - .065) = \$16,853 \text{ millions}$

C. $\text{Value of Equity} = \text{Value of Firm} - \text{Market Value of Debt}$
 $= \$16,853 - \$4,000 = \$12,853 \text{ millions}$

$\text{Value Per Share} = \$12,853 / 200 = \$64.27$

Question 3

A.

<i>Yr</i>	<i>EBITDA</i>	<i>Deprec'n</i>	<i>EBIT</i>	<i>EBIT</i>	<i>Cap</i>	<i>∂ WC</i>	<i>FCFF</i>	<i>Term</i>
				<i>(1-t)</i>	<i>Exp.</i>			<i>Value</i>
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

'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

$$= \{EBIT(1-t)(1+g) - (Rev_{1998} - Rev_{1997}) * WC \text{ as \% of Rev}\} / (WACC-g)$$

$$= (841 * 1.04) - (13500 * 1.095^5 * 1.04 - 13500 * 1.095^5)$$

$$* 0.07 / (.0945 - .04) = \$14,941$$

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.

<i>Year</i>	<i>Deprec'n</i>	<i>EBIT</i>	<i>EBIT(1-t)</i>	<i>Cap Ex</i>	<i>FCFF</i>	<i>Term Val</i>
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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%

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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%,

$$\text{Book Value weight for Equity} = 0.50$$

The correct weights will be as follows:

$$\text{Market Value Weight of Equity} = (3 \cdot 50) / (3 \cdot 50 + 50) = 0.75$$

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.

	<i>D/(D+E)</i>	<i>Cost of Debt</i>	<i>Beta</i>	<i>Cost of Equity</i>	<i>AT Cost of Debt</i>	<i>Cost of Capital</i>	<i>Firm Value</i>
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

$$\text{Unlevered Beta} = 1.25 / (1 + 0.6 * (1340 / (183.1 * 18.25))) = 1.01$$

$$\text{Levered Beta at 10\% D/(D+E)} = 1.01 * (1 + 0.6 * (10/90)) = 1.07$$

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

$$\text{Value of the Firm} = 255.67 * 1.03 / (\text{WACC} - .03)$$

Problem 7

a. Cost of capital approach

$$\text{Return on capital} = 200 (1 - .4) / 1200 = 10\%$$

$$\text{Reinvestment rate} = g / \text{ROC} = 4\% / 10\% = 40\%$$

$$\text{Cost of equity} = 5\% + 1.2 (5.5\%) = 11.6\%$$

$$\text{Cost of capital} = 11.6\% (1000/1500) + 6\% (1-.4)(500/1500) = 8.93\%$$

Value of firm

$$= \text{EBIT} (1-t) (1 - \text{Reinvestment rate}) (1+g) / (\text{Cost of capital} - g)$$

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

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

$$\text{Unlevered cost of equity} = 5\% + 0.9231 (5.5\%) = 10.08\%$$

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

$$+ \text{PV of tax benefits from debt} = \text{Tax rate} * \text{Debt}$$

$$= 0.40 * 500 = \$ 200 \text{ million}$$

$$- \text{Expected bankruptcy costs} = \text{Probability of bankruptcy} * \text{Unlevered firm value} * \text{Cost}$$

$$\text{of bankruptcy} = 0.10 * 1232 * .25 = \$30.8 \text{ million}$$

$$\text{APV value of firm} = \$ 1232 + 200 - 30.8 = \$ 1401.2 \text{ million}$$

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.