CHAPTER 12

Problems and Questions

In the problems below, you can use a risk premium of 5.5 percent and a tax rate of 40 percent if none is specified.

1. Vernon Enterprises has current after-tax operating income of $100 million and a cost of capital of 10 percent. The firm earns a return on capital equal to its cost of capital.

    a. Assume that the firm is in stable growth, growing 5 percent a year forever; estimate the firm's reinvestment rate.

    b. Given this reinvestment rate, estimate the value of the firm.

    c. What is the value of the firm, if you assume a zero reinvestment rate and no growth?

2. Assume in the previous question with Vernon Enterprises that the firm will earn a return on capital of 15 percent in perpetuity.

    a. Assume that the firm is in stable growth, growing 5 percent a year forever; estimate the firm's reinvestment rate.

    b. Given this reinvestment rate, estimate the value of the firm.

3. Cello is a manufacturer of pianos. It earned an after-tax return on capital of 10 percent last year and expects to maintain this next year. If the current year's after-tax operating income is $100 million and the firm reinvests 50 percent of this income back, estimate the FCFF next year. (After-Tax Operating Income = EBIT $(1 - t)$].

4. Cell Phone is a cellular firm that reported net income of $50 million in the most recent financial year. The firm had $1 billion in debt, on which it reported interest expenses of $100 million in the most recent financial year. The firm had depreciation of $100 million for the year, and capital expenditures were 200 percent of depreciation. The firm has a cost of capital of 11 percent. Assuming that there is no working capital requirement, and a constant growth rate of 4 percent in perpetuity, estimate the value of the firm.

5. Netsoft is a company that manufactures networking software. In the current year, the firm reported operating earnings before interest and taxes of $200 million (operating earnings does not include interest income), and these earnings are expected to grow 4 percent a year in perpetuity. In addition, the firm has a cash balance of $250 million on which it earned interest income of $20 million. The unlevered beta for other networking software firm is 1.20, and these firms have on average cash balances of 10 percent of firm value. If Netsoft has a debt ratio of 15 percent, a tax rate of 40 percent, a return on capital of 10 percent on operating assets, and a cost of debt of 10 percent, estimate the value of the firm. (The risk-free rate is 6 percent, and you can assume a market risk premium of 5.5 percent.)

6. Gemco Jewelers earned $5 million in after-tax operating income in the most recent year. The firm also had capital expenditures of $4 million and depreciation of $2 million during the year, and the noncash working capital at the end of the year was $10 million.

a. Assuming that the firm's operating income will grow 20 percent next year, and that all other items (capital expenditures, depreciation, and noncash working capital) will grow at the same rate, estimate the FCFF next year.

b. If the firm can grow at 20 percent for the next five years, estimate the present value of the FCFF over that period. You can assume a cost of capital of 12 percent.

c. After year five, the firm's capital expenditures will decline to 125 percent of revenues, and the growth rate will drop to 5 percent (in both operating income and noncash working capital). In addition, the cost of capital will decline to 10 percent. Estimate the terminal value of the firm at the end of year five.

d. Estimate the total value of the operating assets of the firm.

7. Now assume that Gemco Jewelers has $10 million in cash and nonoperating assets and that the firm has $15 million in outstanding debt.

a. Estimate the value of equity in the firm.
b. If the firm has 5 million shares outstanding, estimate the value of equity per share.

c. How would your answer to **b** change if you learn that the firm has 1 million options outstanding, with an exercise price of $5 and five years to maturity? (The estimated value per option is $7.)

8. Union Pacific Railroad reported net income of $770 million after interest expenses of $320 million in a recent financial year. (The corporate tax rate was 36 percent.) It reported depreciation of $960 million in that year, and capital spending was $1.2 billion. The firm also had $4 billion in debt outstanding on the books, was rated AA (carrying a yield to maturity of 8 percent), and was trading at par (up from $3.8 billion at the end of the previous year). The beta of the stock is 1.05, and there were 200 million shares outstanding (trading at $60 per share), with a book value of $5 billion. Union Pacific paid 40 percent of its earnings as dividends and working capital requirements are negligible. (The Treasury bond rate is 7 percent.)

a. Estimate the FCFF for the most recent financial year.

b. Estimate the value of the firm now.

c. Estimate the value of equity and the value per share now.

9. Lockheed, one of the largest defense contractors in the United States, reported EBITDA of $1,290 million in a recent financial year, prior to interest expenses of $215 million and depreciation charges of $400 million. Capital expenditures amounted to $450 million during the year, and working capital was 7 percent of revenues (which were $13,500 million). The firm had debt outstanding of $3.068 billion (in book value terms), trading at a market value of $3.2 billion, and yielding a pretax interest rate of 8 percent. There were 62 million shares outstanding, trading at $64 per share, and the most recent beta is 1.10. The tax rate for the firm is 40 percent. (The Treasury bond rate is 7 percent.) The firm expects revenues, earnings, capital expenditures, and depreciation to grow at 9.5 percent a year for the next 5 years, after which the growth rate is expected to drop to 4 percent. (Even though this is unrealistic, you can assume that apital spending will offset depreciation in the stable-growth period.) The company also plans to lower its debt/equity ratio to 50 percent for the steady state (which will result in the pretax interest rate dropping to 7.5 percent).

a. Estimate the value of the firm.

b. Estimate the value of the equity in the firm and the value per share.

10. In the face of disappointing earnings results and increasingly assertive institutional stockholders, Eastman Kodak was considering the sale of its health division, which earned $560 million in EBIT in the most recent year on revenues of $5.285 billion. The expected growth in earnings was expected to moderate to 6 percent for the next 5 years, and to 4 percent after that. Capital expenditures in the health division amounted to $420 million in the most recent year, whereas depreciation was $350 million. Both are expected to grow 4 percent a year in the long run. Working capital requirements are negligible.

The average beta of firms competing with Eastman Kodak's health division is 1.15. Although Eastman Kodak has a debt ratio (D/[D + E]) of 50 percent, the health division can sustain a debt ratio (D/[D + E]) of only 20 percent, which is similar to the average debt ratio of firms competing in the health sector. At this level of debt, the health division can expect to pay 7.5 percent on its debt, before taxes. (The tax rate is 40 percent, and the Treasury bond rate is 7 percent.)

a. Estimate the cost of capital for the division.

b. Estimate the value of the division.

11. You have been asked to value Alcoa and have come up with the following inputs.

- The stock has a beta of 0.90, estimated over the last five years. During this period, the firm had an average debt/equity ratio of 20 percent and an average cash balance of 15 percent.
- The firm's current market value of equity is 1.6 billion and its current market value of debt is $800 million. The current cash balance is $500 million.
- The firm earned earnings before interest and taxes of $450 million, which includes the interest income on the current cash balance of $50 million. The firm's tax rate is 40 percent.
- The firm is in stable growth, and its earnings from operations are expected to grow 5 percent a year. The net capital expenditures next year are expected to be $90 million.

Estimate the value of the noncash assets of the firm, its total value, and the value of its equity.

12. You are analyzing a valuation done on a stable firm by a well-known analyst. Based on the expected FCFF next year of $30 million, and an expected growth rate of 5 percent, the analyst has estimated a value of $750 million. However, he has made the mistake of using the book values of debt and equity in his calculation. Although you do not know the book value weights he used, you know that the firm has a cost of equity of 12 percent and an after-tax cost of debt of 6 percent. You also know that the market value of equity is three times the book value of equity, and the market value of debt is equal to the book value of debt. Estimate the correct value for the firm.

13. You have been asked to value Office Help, a private firm providing office support services in the New York area.

- The firm reported pretax operating income of $10 million in its most recent financial year on revenues of $100 million. In the most recent financial year, you note that the owners of the business did not pay themselves a salary. You believe that a fair salary for their services would be $1.5 million a year.
- The cost of capital for comparable firms that are publicly traded is 9 percent. (You can assume that this firm will have similar leverage and cost of capital.)
- The firm is in stable growth and expects to grow 5 percent a year in perpetuity. The tax rate is 40 percent.

The average illiquidity discount applied to private firms is 30 percent, but you have run a regression and arrived at the following estimate for the discount:

$$\text{Illiquidity Discount} = 0.30 - 0.04\,(\ln\,[\text{Revenues in millions}])$$

Estimate the value of Office Help for sale in a private transaction (to an individual).

14. National City, a bank holding company, reported earnings per share of $2.40 and paid dividends per share of $1.06. The earnings had grown 7.5 percent a year over the prior five years, and were expected to grow 6 percent a year in the long run. The stock had a beta of 1.05 and traded for ten times earnings. The Treasury bond rate was 7 percent.

a. Estimate the P/E ratio for National City.

b. What long-term growth rate is implied in the firm’s current PE ratio?

15. The following were the P/E ratios of firms in the aerospace/defense industry at the with additional data on expected growth and risk:

Company	*P/E Ratio*	*Expected Growth*	*Beta*	*Payout*
Boeing	17.3	3.5%	1.10	28%
General Dynamics	15.5	11.5%	1.25	40%
General Motors—Hughes	16.5	13.0%	0.85	41%
Grumman	11.4	10.5%	0.80	37%
Lockheed	10.2	9.5%	0.85	37%
Logicon	12.4	14.0%	0.85	11%
Loral	13.3	16.5%	0.75	23%
Martin Marietta	11.0	8.0%	0.85	22%
McDonnell Douglas	22.6	13.0%	1.15	37%
Northrop	9.5	9.0%	1.05	47%
Raytheon	12.1	9.5%	0.75	28%
Rockwell	13.9	11.5%	1.00	38%
Thiokol	8.7	5.5%	0.95	15%
United Industrial	10.4	4.5%	0.70	50%

a. Estimate the average and median P/E ratios. What, if anything, would these averages tell you?

b. An analyst concludes that Thiokol is undervalued because its P/E ratio is lower than the industry average. Under what conditions is this statement true? Would you agree with it here?

c. Using the PEG ratio, assess whether Thiokol is undervalued. What are you assuming about the relationship between value and growth when you use PEG ratios?

d. Using a regression, control for differences across firms on risk, growth, and payout. Specify how you would use this regression to spot under- and overvalued stocks. What are the limitations of this approach?

16. NCH, which markets cleaning chemicals, insecticides, and other products, paid dividends of $2.00 per share on earnings of $4.00 per share. The book value of equity per

share was $40.00, and earnings are expected to grow 5 percent a year in the long term. The stock has a beta of 0.85, and sells for $60 per share. The Treasury bond rate is 7 percent.

a. Based on these inputs, estimate the price/book value ratio for NCH.

b. How much would the return on equity have to increase to justify the price/book value ratio at which NCH sells for currently?

17. You are trying to estimate a price per share on an IPO of a company involved in environmental waste disposal. The company has a book value per share of $20 and earned $3.50 per share in the most recent time period. Although it does not pay dividends, the capital expenditures per share were $2.50 higher than depreciation per share in the most recent period, and the firm uses no debt financing. Analysts project that earnings for the company will grow 25 percent a year for the next five years. You have data on other companies in the environment waste disposal business:

Company	*Price*	*BV/Share*	*EPS*	*DPS*	*Beta*	*Exp. Growth*
Air & Water	$9.60	$8.48	$0.40	$0.00	1.65	10.5%
Allwaste	$5.40	$3.10	$0.25	$0.00	1.10	18.5%
Browning Ferris	$29.00	$11.50	$1.45	$0.68	1.25	11.0%
Chemical Waste	$9.40	$3.75	$0.45	$0.15	1.15	2.5%
Groundwater	$15.00	$14.45	$0.65	$0.00	1.00	3.0%
Intn'l Tech.	$3.30	$3.35	$0.16	$0.00	1.10	11.0%
Ionics	$48.00	$31.00	$2.20	$0.00	1.00	14.5%
Laidlaw	$6.30	$5.85	$0.40	$0.12	1.15	8.5%
OHM	$16.00	$5.65	$0.60	$0.00	1.15	9.50%
Rollins	$5.10	$3.65	$0.05	$0.00	1.30	1.0%
Safety-Kleen	$14.00	$9.25	$0.80	$0.36	1.15	6.50%

The average debt/equity ratio of these firms is 20 percent, and the tax rate is 40 percent.

a. Estimate the average price/book value ratio for these comparable firms. Would you use this average P/BV ratio to price the IPO?

b. What subjective adjustments would you make to the price/book value ratio for this firm and why?

18. Longs Drug, a large U.S. drugstore chain operating primarily in northern California, had sales per share of $122 on which it reported earnings per share of $2.45 and paid a dividend per share of $1.12. The company is expected to grow 6 percent in the long run, and has a beta of 0.90. The current Treasury bond rate is 7 percent.

a. Estimate the appropriate price/sales multiple for Longs Drug.

b. The stock is currently trading for $34 per share. Assuming the growth rate is estimated correctly, what would the profit margin need to be to justify this price per share?

19. You have been asked to assess whether Walgreen, a drugstore chain, is correctly priced relative to its competitors in the drugstore industry. The following are the price/sales ratios, profit margins, and other relative details of the firms in the drugstore industry.

Company	*P/S Ratio*	*Profit Margin*	*Payout*	*Expected Growth*	*Beta*
Arbor Drugs	0.42	3.40%	18%	14.0%	1.05
Big B	0.30	1.90%	14%	23.5%	0.70
Drug Emporium	0.10	0.60%	0%	27.5%	0.90
Fay’s	0.15	1.30%	37%	11.5%	0.90
Genovese	0.18	1.70%	26%	10.5%	0.80
Longs Drug	0.30	2.00%	46%	6.0%	0.90
Perry Drugs	0.12	1.30%	0%	12.5%	1.10
Rite-Aid	0.33	3.20%	37%	10.5%	0.90
Walgreen	*0.60*	*2.70%*	*31%*	*13.5%*	*1.15*

Based entirely on a subjective analysis, do you think that Walgreen is overpriced because its price/sales ratio is the highest in the industry? If it is not, how would you rationalize its value?

20. Time Warner is considering a sale of its publishing division. The division had earnings EBITDA of $550 million in the most recent year (depreciation was $150 million), growing at an estimated 5 percent a year (you can assume that depreciation grows at the same rate). The return on capital in the division is 15 percent, and the

corporate tax rate is 40 percent. If the cost of capital for the division is 9 percent, estimate the following:

a. Value/FCFF multiple.

b. Value/EBIT multiple.

c. Value/EBITDA multiple.