

Practice problems

Exercise 1

Question 1 - DCF Valuation Fundamentals

Discounted cash flow valuation is based upon the notion that the value of an asset is the present value of the expected cash flows on that asset, discounted at a rate that reflects the riskiness of those cash flows. Specify whether the following statements about discounted cash flow valuation are true or false, assuming that all variables are constant except for the variable discussed below:

- A. As the discount rate increases, the value of an asset increases.
- B. As the expected growth rate in cash flows increases, the value of an asset increases.
- C. As the life of an asset is lengthened, the value of that asset increases.
- D. As the uncertainty about the expected cash flows increases, the value of an asset increases.
- E. An asset with an infinite life (i.e., it is expected to last forever) will have an infinite value.

Question 2 - Problems in DCF Valuation

Why might discounted cash flow valuation be difficult to do for the following types of firms?

- A. A private firm, where the owner is planning to sell the firm.
- B. A biotechnology firm, with no current products or sales, but with several promising product patents in the pipeline.
- C. A cyclical firm, during a recession.
- D. A troubled firm, which has made significant losses and is not expected to get out of trouble for a few years.
- E. A firm, which is in the process of restructuring, where it is selling some of its assets and changing its financial mix.
- F. A firm, which owns a lot of valuable land that is currently unutilized.

Question 3 - Valuing a Private Firm

You have been asked by the owner of a small firm that produces and sells computer software to estimate the value of his firm. The firm had revenues of \$20 million in the most recent year, on which it made earnings before interest and taxes of \$2 million. The firm had debt outstanding of \$10 million, on which pre-tax interest expenses amounted to \$1 million. The book value of equity is \$10 million. The average beta of publicly traded firms that are in the same business is 1.30, and the average debt-equity ratio is 0.2 (based upon the market value of equity). The market value of equity of these firms is, on average, three times the book value of equity. All firms face a 40% tax rate. Capital expenditures amounted to \$1 million in the most recent year, and were twice the depreciation charge in that year. Both items are expected to grow at the same rate as revenues for the next five years, and to offset each other in steady state.

The revenues of this firm are expected to grow 20% a year for the next five years, and 5% after that. Net income is expected to increase 25% a year for the next five years, and 8% after that. The treasury bond rate is 7%. Assume market risk premium is 5.5%

- A. Estimate the cost of equity for this private firm.
- B. Estimate the cost of capital for this private firm.
- C. Estimate the value of the owner's stake in this private firm with discounted FCFF valuation.

Question 4

You are trying to estimate a price per share on an initial public offering 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. While 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% a year for the next five years. You have data on other companies in the environment waste disposal business:

<i>Company</i>	<i>Price</i>	<i>BV/Share</i>	<i>EPS</i>	<i>DPS</i>	<i>Beta</i>	<i>Exp.Growth</i>
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 Inc.	\$48.00	\$31.00	\$2.20	\$0.00	1.00	14.5%
Laidlaw Inc.	\$6.30	\$5.85	\$0.40	\$0.12	1.15	8.5%
OHM Corp.	\$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%, and the tax rate is 40%.

- Estimate the average price/book value ratio for these comparable firms. Would you use this average P/BV ratio to price the initial public offering.
- What subjective adjustments would you make to the price/book value ratio for this firm and why?

Question 5 Seville Enterprises is a diversified conglomerate with holdings in multiple businesses.

You have been asked to estimate the appropriate value to assign to the equity in the firm.

The following table summarizes the firm's holdings in different businesses:

<i>Business</i>	<i>Net Income</i>	<i>Book Value of Equity</i>	<i>Sector Reg</i>
Steel	\$ 150 million	\$ 1500 million	PBV = 0.8 + 1.5 (ROE)
Financial Services	\$ 300 million	\$ 2000 million	PBV = 1.3 + 1.0 (ROE)
Technology	\$ 100 million	\$ 500 million	PBV = 3.5 + 2.5 (ROE)
Retailing	\$ 200 million	\$ 1000 million	PBV = 1.75 + 1.8 (ROE)

(The ROE is entered in decimals. Thus, a steel firm with a ROE of 5% would have a PBV ratio of $0.8+1.5(.05) = 0.875$)

There are 400 million shares outstanding.

- Estimate the value of the equity in Seville Enterprises.
- Now assume that the firm sells its technology division to another firm for \$ 2.5 billion.

What would you expect to happen to the value per share of equity in Seville Enterprises?

Question 6 A firm has an estimated value of assets worth \$2,312 mn and outstanding debt given the following table. Let STD of stock price be 41% and bond price be 17%. The correlation between stock and bond price is 0.50 and the average debt to capital ratio during the assessment period is 85%.

Debt Type	Face value of debt	Duration (years)
Short term	935	0.5
10 year	2,435	6.7
20 year	3,555	12.6
Longer	1,940	18.2

- a) Compute the firm's variance of asset value
- b) Compute the weighted duration of debt
- c) If you are to use the given information to compute the call value of equity, what is the exercise price of the option?
- d) Using $RF = 6\%$ and allowing the life of the option to be equivalent to the weighted average duration of debt, compute the call value of the firm's equity.

Question 7 UB Inc. is examining its capital structure, with the intent of arriving at an optimal debt ratio. It currently has no debt and has a beta of 1.5. The riskless interest rate is 9%. Your research indicates that the debt rating will be as follows at different debt levels:

D/(D+E)	Rating	Interest rate
0%	AAA	10%
10%	AA	10.5%
20%	A	11%
30%	BBB	12%
40%	BB	13%
50%	B	14%
60%	CCC	16%
70%	CC	18%
80%	C	20%
90%	D	25%

The firm currently has 1 million shares outstanding at \$ 20 per share (tax rate = 40%).

- What is the firm's optimal debt ratio?
- Assuming that the firm restructures by repurchasing stock with debt, what will the value of the stock be after the restructuring?

Question 8 You have used the Black-Scholes option pricing model to value the equity in a firm with negative earnings and substantial leverage - bonds with an average duration of 5 years. Inputting the numbers for the model, you have arrived at the following values for d_1 and d_2 .

$$d_1 = 0.39 \quad d_2 = 0.17$$

- Using the normal distribution table supplied, estimate the probability that the firm will go bankrupt during the next 5 years.
- Assume now that you have valued the equity (using the option pricing model) at \$ 9 million, and that the value of the firm is \$ 75 million, estimate the implied debt value from the option price model. (The riskless rate is 7%)

Question 9. A fund manager has a portfolio worth \$50 mn with a beta of 0.87. The manager is concerned about the performance of the market over the next two months and plans to use three month futures contracts on S&P500 to hedge risk. The current level of the index is 1250, one contract is worth 250 times the index, the RF = 6% per year, and assume dividend yield is negligible.

- a) What is the theoretical futures price for the three month futures contract?
- b) What position should the fund manager take to eliminate all exposure to the market over the next two months?
- c) Calculate the effect of your strategy on the fund manager's \$ payoff if the level of the market in **two** months is 1,000; 1,100; 1,250; and 1,300

Question 10. The same fund manager in problem 9 decides to hold the futures contract until maturity $t=3$ when spot and futures prices will converge. Calculate the effect of the futures short strategy on the fund manager's combined return in **three** months when the index is 1,000; 1,100; 1,250; and 1,300. What do you notice about the \$ payoff from the hedged strategy now and how it is different from question 9?