

ENTREPRENEURIAL FINANCE: *Strategy Valuation and Deal Structure*

Chapter 9 Valuation

Questions and Problems

1. You are considering purchasing shares of DeltaCad Inc. for \$40/share. Your analysis of the company and the economy produce the following one-year scenarios with equally likely outcomes:

State of the Economy	Dividend (D_1)	Price (P_1)
Boom	\$1.40	\$51.00
Average	\$0.75	\$43.00
Bust	\$0.00	\$33.00

Calculate the mean and standard deviation of the expected return.

2. Stave Four Enterprises is currently selling for \$27 per share. You have an analyst report with the following forecast:

Probability	State of the Economy	Dividend (D_1)	Price (P_1)
10%	Boom	\$2.00	\$35.00
30%	Good	\$1.25	\$31.50
40%	Likely	\$1.00	\$29.00
20%	Poor	\$0.25	\$22.25

Calculate the mean and standard deviation of the expected return. Which appears to be a better potential investment, Stave Four or DeltaCad?

3. Suppose that the risk-free rate of interest is 5 percent, the market risk premium is 6 percent, and the market standard deviation is 20 percent.
- Plot the risk-free asset and the market portfolio on coordinates with expected return on the vertical axis and total risk (standard deviation) on the horizontal axis. Plot both assets on coordinates with expected return on the axis and market risk (beta) on the horizontal axis and sketch in the security market line.
 - Suppose the CAPM is correct and that an asset with a standard deviation of holding period returns of 30 percent has an expected return of 12 percent. Plot the asset on both sets of coordinates. How much of the total risk of the asset is market risk? What is the correlation between the asset and the market portfolio.
 - Explain why another asset with a standard deviation of holding period returns of 30 percent could have an expected return of 10 percent. What would the asset's risk characteristics need to be?

4. Consider a wager that will pay either \$55 or \$20, with equal probability.
 - a. Calculate the mean and standard deviation of the expected payoff.
 - b. If the cost of the wager is \$35, calculate the expected return and the standard deviation of holding-period returns. What if the cost of the wager is \$30?
 - c. Now assume the risk-free rate is 3.0 percent, the market risk premium is 6.5 percent, the standard deviation of holding-period returns of the market portfolio is 18 percent, and the correlation between the payoff of the bet and the return you could earn by investing in the market portfolio is 0.4. Use the CEQ approach and Equation 9.8 to compute the PV of the wager.
 - d. What is the NPV of the wager if it is acquired for \$30?
 - e. What is the correct risk-adjusted discount rate for this wager?
5. You are considering the purchase of a Manhattan apartment. The unit is a one bedroom with 1.5 baths and 720 square feet and has an assessed value of \$575,000. Use the data below to estimate the market value of your potential apartment.

Comparable Transaction	Square Feet	Bedrooms	Baths	Assessed Value	Selling Price
Apartment A	900	2	1	\$750,000	\$695,000
Apartment B	675	1	2	\$576,000	\$565,000
Apartment C	1,100	2	2	887,500	865,000
Apartment D	845	1	1	\$639,000	\$605,000

How confident are you in the estimate? Are there any factors missing from your analysis?

6. Consider the financial data shown below for Priax Consumer Reliance Inc. (PCR).

PCR Financial Data					
Income Statement (000s)			Balance Sheet (000s)		
	2010 (act.)	2011 (fcst.)		2010 (act.)	2011 (fcst.)
Revenue	\$2,200	\$2,464	Cash	\$22	\$25
CGS	\$1,350	\$1,512	Accounts Receivable	\$208	\$228
Gross Profit	\$850	\$952	Inventory	\$316	\$331
Selling & Marketing	\$550	\$590	Total Current Assets	\$546	\$584
G & A	\$125	\$155	PP&E, Gross	\$250	\$290
Product Development	\$75	\$90	Less: Accumulated Depreciation	\$50	\$65
Operating Expenses	\$750	\$835	Net PPE	\$200	\$225
Operating Income (EBIT)	\$100	\$117	Total Assets	\$746	\$809
Interest Expense	\$10	\$13	Accounts Payable	\$275	\$315
EBT	\$90	\$104	Line of Credit	\$70	\$55
Taxes	\$27	\$31	Total Current Liabilities	\$345	\$370
Net Income	\$63	\$73	Long Term Debt	\$135	\$100
			Total Liabilities	\$480	\$470
Tax Rate =	30%	30%	Common Stock	\$200	\$200
			Retained Earnings	\$66	\$139
			Total Stockholders' equity	\$266	\$339
			Total Liabilities & Equity	\$746	\$809

Calculate the following for 2011:

- a. Cash flow to all investors
- b. Cash flow to creditors
- c. Cash flow to stockholders
- d. Unlevered free cash flow

What is the appropriate discount rate for calculating the PV of each cash flow?

7. You are considering investing in a new venture. Based on the business plan of the entrepreneur, *if the project is successful*, it is expected to generate the following cash flows for investors:

Year	Cash Flow
1	\$0
2	\$200,000
3	\$2,000,000
4	\$8,000,000

The cash flow in the fourth year includes cash flows that would be realized from selling the venture to a third party at that time. After conducting your own due diligence, you have concluded that you agree with the entrepreneur that if the venture is successful, the cash flow estimates are reasonable. The entrepreneur is looking for seed capital of \$1 million to undertake the venture. After the initial investment, if it is successful, the venture will be self-supporting.

Using the 50 percent to 100 percent range of hurdle rates for seed and start-up investments, estimate the present value of the venture and the fraction of the equity you would need to cover your investment. Also, determine the hurdle rate that would result in a zero NPV for a 100 percent interest in the venture.

8. Consider problem 7 again. Through your due diligence efforts, you also have concluded that the probability that the venture will be successful through year 2 is about 80 percent, through year 3 is about 60 percent, and through year 4 is about 40 percent. If the venture fails, it will not return any cash to investors. Compute the expected cash flows of the venture and find the discount rates of the expected cash flows that would yield the same ownership fractions as the 50 percent hurdle rate in problem 7. In other words, given the ownership fraction you would require if a hurdle rate of 50 percent is used in Problem 7, what discount rate of expected cash flows would yield a present value of the venture that would imply the same ownership fraction for your investment of \$1 million (Note: Finding this rate may require some experimentation.)
9. Compare the present-value estimates of each of the annual cash flows between problems 7 and 8. What problems can you see with valuing projects using optimistic cash flow forecasts and hurdle rates, as in problem 7 instead of expected cash flow estimates and required rates of return as in problem 8?
10. Suppose you can establish that for the each annual cash flow of the venture described in problem 7, the correlation between project cash flows and the market is 30 percent. You also have determined that the riskless rate of interest is 4.5 percent, the market risk premium is 6.5 percent, and the standard

deviation of market returns is 20 percent for one year, 28 percent for two years, 35 percent for three years, and 40 percent for four years.

- a. Use the CEQ form of the CAPM to find the certainty equivalent of each annual expected cash flow, the present value of each annual cash flow, and the present value of the project.
- b. How large of an ownership fraction do you need if the CAPM is the correct valuation model?

11. You can use the CEQ result to find the RADR and beta

- a. Using Eq. (9.5) and your results from problem 10, find the risk-adjusted discount rate for each of the annual expected cash flows. Note that the RADRs you compute in this way are cumulative (compounded) rates. To find the annual rate for each cash flow you need to convert the compounded rate back to its equivalent annual rate.
- b. Use Eq. (9.3) from the text to solve for the beta of each annual cash flow.

12. Usually, when people use published information to estimate beta, they assume that the beta is the same for all of the cash flows of the project they are trying to value

- a. Now that you know the present value of the project (from your work on problem 10), find the single discount rate that you can apply to the expected cash flows that yields the same present value.
- b. How does the single discount rate compare to the individual discount rates you determined in problem 11?
- c. Compare the present values of the individual annual cash flows based on the single rate with the values using rates that are specific to each period.
- d. What problems, if any, do you see with trying to value projects such as this one using a single discount rate?

13. Consider the following success-scenario income statement for the next year of operations of a privately owned small business. Figures in the statement are in thousands.

Income Statement	Success
Sales Revenue	\$ 10,000
Cost of Goods Sold	\$ 4,000
Gross Profit	\$ 6,000
Operating Expenses	\$ 4,500
Operating Profit	\$ 1,500
Interest Expense	\$ 700
Net Taxable Income	\$ 800
Income Tax	\$ 280
Net Income	\$ 520

Develop a companion failure-scenario income statement under the following assumptions:

- Sales would be \$6,000,000
- Cost of goods sold would be \$3,000,000
- Operating expenses would be \$2,500,000

- There is \$5,000,000 in debt outstanding, with an interest rate of 14 percent per year, but in the failure scenario the venture will not pay interest beyond what is available from net income.
- The income tax rate is 35 percent.

Assuming that the probability of the success scenario being realized for the next year is 60 percent, generate an expected income statement.

Based on the following assumptions, develop success-scenario, failure-scenario, and expected measures of the cash flow definitions from Table 9-1:

- Operating expenses includes \$2,200,000 in depreciation expense.
- New capital expenditures will be \$1,500,000 in the success scenario and nothing in the failure scenario.
- New investment in net working capital will be \$250,000 in the success scenario and nothing in the failure scenario.
- In the success scenario, no debt repayment would be due and the venture would borrow an additional \$1,000,000. In the failure scenario, the business assets would be liquidated and proceeds of \$2,200,000 would be paid to the creditor. The balance of their \$5,000,000 loan would be a write-off for the lender.

Discuss your findings for the various cash flow measures, keeping in mind that for the success scenario, the venture will continue in the future, but in the failure scenario, this would be the final year of operation.

14. Consider the following income statement of a venture that is expected to continue indefinitely but is not expected to grow. The numbers in the income statement are expected to be the same each year. New capital expenditures are expected to exactly offset depreciation expenses so that net income is equal to equity cash flow. The capital structure of the venture is expected to be constant.

Income Statement	Expected
Sales Revenue	\$ 85,000
Cost of Goods Sold	\$ 32,000
Gross Profit	\$ 53,000
Operating Expenses	\$ 32,000
Operating Profit	\$ 21,000
Interest Expense	\$ 7,500
Net Taxable Income	\$ 13,500
Income Tax	\$ 4,725
Net Income	\$ 8,775

Suppose the risk-free rate of interest is 5 percent, the market risk premium is 6 percent, and the corporate tax rate is 35%. The venture's equity has a beta of 1.25 and its debt has a beta of 0.25.

- Compute the cost of equity and the value of a perpetuity of the expected cash flows to equity (Refer to Tables 9.1 and 9.2 if needed).
- Compute the cost of debt and the value of a perpetuity of the expected cash flows to debt.

- c. Assuming that the value of total assets is equal to the value of debt plus the value of equity, compute the total value of the venture. Use the total value to compute the cost of capital for the assets and the asset beta.
 - d. Using total capital cash flows (cash flow to all investors) and the asset cost of capital, estimate firm value based on the perpetuity of expected earnings. How does it compare to the value you computed by adding up the debt and equity values?
 - e. Compute the venture's weighted average cost of capital (WACC). Compute its expected cash flows as if it were all-equity financed. What is the estimated value of the venture if you value the perpetuity of hypothetical cash flows (unlevered free cash flow) at the WACC?
 - f. Your value results should be consistent across all approaches. Why do you think they are? What do you think might be different if the venture were expected to grow?
15. Suppose you can acquire a 20 percent ownership interest in a venture for \$2.5 million. You anticipate that, if the venture is successful, it will be able to go public in about three years. If so, you estimate that the public-market value of the venture will be about \$75 million. However, you believe there is about a 75 percent chance that the venture will fail and your investment will be worthless.
- a. Based on your investment amount, what would be the standard deviation of holding period returns on your 20 percent interest?
 - b. How does the standard deviation of holding period returns change if you can acquire the 20 percent interest by investing \$2.0 million (assume that harvest values and probabilities are not affected by the change)?
 - c. Suppose the required rate of return for the three-year holding period is 18 percent, the market risk premium for the holding period is 30 percent, the market standard deviation is 35 percent, and the correlation between harvest cash flows and the market is 0.2. Compute the standard deviation of cash flow returns and use Equation 9.5 to search for the equilibrium value of the investment and the equilibrium standard deviation of holding period returns.