

## ENTREPRENEURIAL FINANCE: *Venture Capital, Deal Structure and Valuation*

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### Chapter 11. New Venture Valuation in Practice

#### Questions and Problems

1. CBR Inc. had cash flow of \$1.45 million in 2018. The company expects stable growth of 3% in the future and the cost of capital is 9%.
  - a. Estimate value of CBR Inc. at the end of 2018.
  - b. If you were valuing a firm comparable to CBR at the end of 2018, what cash flow multiplier would you use?
  
2. The following table contains seven years of financial projections for a new venture that is seeking capital to finance the commencement of operations. All dollar figures are in thousands. All cash flow during this period is expected to be reinvested in the venture and is reflected in the table assets total. Assuming the projections represent expected values, and given only this information, how would you suggest valuing the venture? How would you estimate continuing value and reflect it in your valuation? Explain your reasoning.

Year	1	2	3	4	5	6	7
Revenue	\$0	\$850	\$2,300	\$6,100	\$10,700	\$13,100	\$13,800
EBIT	(\$2,000)	(\$788)	(\$1,925)	(\$975)	(\$325)	\$275	\$450
Assets	\$3,000	\$1,000	\$4,500	\$3,525	\$6,200	\$6,475	\$8,925

3. You are considering investing in a venture, Mason Multimedia. Five years from now, assuming the venture is successful, Mason is projected to have revenue of \$52 million, EBIT of \$2 million, and assets of \$35 million. The three-year compound annual growth of sales as of year 5 is expected to be 20%. The venture does not anticipate paying dividends during this period.

As a basis for estimating Mason's continuing value, you have compiled information on five public companies that are in the same or closely related industries. The comparable firm information is summarized in the following table. Dollar figures are in millions. Analyze the information and use it to estimate the continuing value of Mason Multimedia. Explain your reasoning.

Comparable Firms	Age in Years	Assets:				3-Year Sales CAGR	Assets Market Value
		Book Value	Sales	EBIT	Dividends		
Firm A	4	\$40	\$25	(\$2)	\$0	85%	\$85
Firm B	6	\$120	\$65	\$2	\$0	25%	\$155
Firm C	9	\$60	\$130	\$10	\$0	3%	\$110
Firm D	15	\$45	\$70	\$4	\$1	15%	\$80
Firm E	17	\$195	\$280	\$30	\$16	6%	\$210

4. Edutainment, Inc. is a provider of courses that are delivered over the Internet. The company has developed the concept and worked out a means of controlling access and charging for its services. It expects to contract for content with professors who are recognized for "fun" teaching. These instructors intersperse their lecture material with jokes and anecdotes and use other tactics that

help keep students interested. The entrepreneur believes that by making Internet education entertaining she can attract and retain a large share of the adult education market.

The following table contains the entrepreneur's financial projections for the venture. Figures are in thousands of dollars and are designed to show the success potential of the venture. She is seeking to raise \$6 million of venture capital (in the form of an equity investment) to initiate the program, contract with content providers, and begin marketing. Successful ventures that are similar have recently gone public at valuations around 12 times trailing net income.

Assume that you like the concept and are impressed by the entrepreneur. Estimate how much of the venture's equity you would require to justify your investment. Assume that any cash generated by the venture during the forecast period shown will be retained to finance growth. (*Hint: You may want to refer back to Chapter 10 for information on the sought-for returns of venture capital investors.*)

Year (\$000s)	1	2	3	4	5
Revenue	\$0	\$1,500	\$8,000	\$35,000	\$54,000
Development expenses	\$1,200	\$800	\$600	\$1,500	\$2,500
Marketing expenses	\$400	\$2,000	\$3,000	\$7,000	\$12,000
Content expenses	\$0	\$150	\$800	\$3,500	\$9,000
Delivery expenses	\$500	\$1,800	\$3,000	\$5,000	\$8,000
Net income	(\$2,100)	(\$3,250)	\$600	\$18,000	\$22,500

5. Suppose you believe that the venture described in problem 4 can be valued by the Capital Asset Pricing Model, using data on several public companies that you regard as comparable in terms of market risk, along with some other market information. The following table contains information on the comparable firms. Use the information to estimate the beta of the venture.

Comparable Firm	Equity Beta	Share Price	Shares Outstanding	Book Value of Debt
Firm A	1.85	\$12.00	2,650,000	\$4,350,000
Firm B	1.6	\$8.50	4,750,000	\$2,800,000
Firm C	1.42	\$20.50	3,280,000	\$1,700,000

In addition, you have the following information on interest rates on U.S. government debt and stock market returns:

- The current five-year Treasury rate is 4.0%.
- The long-run historical average five-year Treasury rate is 6.64%.
- The S&P 500 historical average annual return is 11.27%
- The historical standard deviation of market returns is about 16.31% per year.

Using the above information, what is your estimate of the required return on assets for the venture? Explain your reasoning.

6. Suppose that, for the venture in problem 4, you have developed a expected scenario and a failure scenario to go along with the entrepreneur's success scenario. In the success scenario, you assume the venture is harvested in year 5. You expect to receive no cash flow before harvest. In the expected scenario, the venture has net income of \$13 million in year 5, and the expected multiple is 10 times earnings. In the failure scenario, you expect to liquidate the venture in year 5, in which

case, your preferred stock claim would be worth about \$1.5 million. You believe that the probabilities of success and failure are each 25% and that the probability of the expected scenario is 50%. Using the cost of capital you estimated in problem 5, find the present value of the venture, and determine the fraction of equity you would require (at a minimum) for investing the \$6 million.

7. Now, suppose you are comfortable with the multipliers and probabilities as stated in problem 6, but that you are uncomfortable about using the comparable firm information to value the project as of today. In other words, the beta estimate may be fine if you were trying to value the venture as of Year 5, but you are concerned that it may not be a good measure of beta risk during the early years of the venture. Consequently, instead of using the estimate of beta, you would like to base your valuation on the assumption that the correlation between success of the venture and the overall market is in the range of 0.1 to 0.2. (Your best estimate is a correlation of 0.15.) Using this information, and information from the earlier questions, what range of values would you place on the venture, and what is your best estimate of the value? How much of the equity would you require for investing?
8. You are considering investing \$750,000 in the software development of a venture that would operate an Internet based video rental business. According to the business plan, the venture will need an additional \$1.0 million from you next year (year one) to acquire the initial inventory and exhibition rights of videos it plans rent. After that, you believe that, if the venture develops according to plan, it will generate the annual cash flows shown below (in thousands).

Year	0	1	2	3	4	5	6
Investment	(\$750)	(\$1,000)					
Free Cash Flow	-	-	\$0	\$0	\$200	\$600	\$1,400

Suppose you believe there is a 30% probability that the entrepreneur will be unable to develop the necessary software and that the venture will fail before the second investment is needed. You also believe that the probability of failing before year four is 50%, the probability of failing before year five is 60%, and the probability of failing before year six is 70%. If the venture fails, you expect that free cash flow in each year after the failure will be zero.

If the venture survives to year six, you expect that it will continue and that free cash flow will grow at a rate of 6% per year. Because the year-one investment has no beta risk, you believe it should be valued at the risk-free rate of 4%. Based on comparisons to other firms, you believe the appropriate rate for valuing cash flows in other years is 11%. You wish to determine the fraction of equity that would be sufficient to justify making the first investment, assuming that you would receive no additional equity in exchange for making the year-one investment.

- a. Identify the explicit value period, determine the expected cash flows during that period, and determine their present value.
  - b. Determine the multiplier that you should use to determine continuing value and use the multiplier to find the continuing value.
  - c. Compute the total present value of the venture and determine the minimum fraction of equity you would need to justify making the initial investment.
9. The following table shows average annual returns to venture capital funds as estimated by Venture Economics and the National Venture Capital Association.

Year	1994	1995	1996	1997	1998	1999	2000	2001
Percent Return	11.10%	47.40%	33.50%	28.00%	17.80%	165.30%	37.60%	-32.40%

- Find the arithmetic mean annual return and standard deviation for this series.
  - Find the geometric mean annual return.
  - Which do you think would be better for forecasting the future performance of a venture capital fund over eight years? Why?
  - SIM** Test your answer in part (c) by setting up a simulation model where the data are used to predict the arithmetic mean return and its standard deviation. Use the simulation model to generate a large sample of cumulative eight-year returns. Is the average from the eight years better explained by geometric compounding of the annual average or by an arithmetic average?
10. The following scenario information describes the harvest cash flows per acre for a new venture that would invest in a plantation forest on public land. The expectation is that the trees can be logged and sold for lumber and paper production in 20 years. Compound annual returns for the different scenarios are based on an estimate that the costs of planting and maintaining the forest will be \$10,000 per acre.

Scenario	Probability	Return on Market Portfolio	Projected Cash Flow per Acre at Harvest	Compound Annual Return on Investment
Boom	40%	25%	\$96,000	12%
Normal Growth	30%	10%	\$67,000	10%
Bust	30%	-8%	\$32,000	6%

- Use the returns information for the different scenarios to estimate the project beta based on the present value of the expected actual investment amount.
  - Use the cash flow information for the different scenarios to estimate the project cash flow beta.
  - Assuming that the long-term risk-free rate is 5.5% and the market risk premium is 6%, estimate the RADR cost of capital based on part (a) and estimate the present value per acre of the project. Does it appear that you should make the investment?
  - Using the market information and the cash flow beta, find the CEQ present value. Should you make the investment?
  - Use the results from part (d) to determine the cost of capital implied by the CEQ analysis. Why is the CEQ cost for capital different from the cost of capital estimated by the RADR method?
11. Suppose a two-year venture will cost \$1.5 million and yield an expected cash flow of \$3.2 million. The standard deviation of the expected cash flow is \$2 million. Suppose further that the expected market is 13.5% per year, the risk-free rate is 7% per year, the market variance is 4% per year, and the correlation between the venture and the market is 0.2.
- Use the CEQ form of the CAPM to find the NPV of the venture to a diversified investor.
  - Use your answer in part (a) to find the equilibrium standard deviation of holding period returns and then use the RADR form of the CAPM to find the NPV to a diversified investor.

- c. Use the CEQ form of the CAPM-based model (Eq. 10.6) to find the NPV of the venture as a full commitment.
  - d. Use your answer in part (c) to find the equilibrium standard deviation of holding period returns and then use the RADR form of the CAPM-based model to find the NPV of the venture as a full commitment.
12. The market standard deviation is 20%; and the standard deviation of returns for a new venture is 80%. The correlation of returns is 0.4. The risk-free rate is 4%, and the market return is 10.5%. Find the portfolio standard deviation, portfolio required rate of return, and new venture required rate of return for each of the following.
- a. The entrepreneur invests 40% of wealth in the venture and 60% in the market.
  - b. The entrepreneur invests 20% of wealth in the venture and 80% in the market.
- Now suppose the correlation is 0.1. Find the portfolio standard deviation, portfolio required rate of return, and new venture required rate of return for each of the following.
- c. The entrepreneur invests 40% of wealth in the venture and 60% in the market.
  - d. The entrepreneur invests 20% of wealth in the venture and 80% in the market.