Chapter 11 APPENDIX. The Entrepreneur's Perspective on Value

Questions and Problems

1. You will soon complete your college degree and are considering two different employment offers. A commercial bank has offered $70,000 for the first year, and a private equity firm has offered $110,000, including expected bonuses. In either case you expect your compensation to grow at a rate of 5% per year and you plan to work for 40 years. The two employment offers differ in risk. The commercial bank offer is safer, with low market risk. The PE offer is risky, with a high level of market-related volatility. To help you with your analysis, you assume that the commercial bank offer would have a beta of about 0.6, and that the PE offer would have a beta of about 1.2. The current risk-free rate is 4% per year and the market rate is 10% per year. The expected rate of return on the market is 10% and the current risk-free rate is 4%. You are attracted to both offers and wonder which would be better from a financial perspective. Use Equation 11.A1 to estimate the present value of your human capital from each offer. Which has the higher present value?
2. You decided to accept the private equity offer in problem 1. But right after making that decision, you are approached by an alum who offers you an opportunity to join the founder team in a venture she is launching. She would require you to make a three-year commitment to the venture and would pay you a salary of $50,000 per year for the three years. In addition, you would have stock compensation that would vest at the end of the three years. You would not need to invest any other assets in the venture. You have savings of $500,000 but owe $150,000 in student debt. Use Valuation Template 3 to estimate your total wealth if you go forward with the PE offer and turn down the alum. And use it to estimate the fraction of your wealth that you would be committing if you were to turn down the PE offer and go forward with the alum. Assume that the risk-free rate and market rate are the same as in problem 1. If the venture does not work out, you expect that you can go back to PE without loss of compensation (i.e., the compensation in year 4 – 3 years after the start of the venture – would be $127,339).
3. You have been invited to invest $500,000 in restricted shares of a biotech company that is not publicly traded. Based on data in Table 11.3, you assume the biotech beta is 0.75, its correlation with the market is 0.149, and the annual standard deviation of returns is 104% for one year (1.47 for two years). Based on the data, you believe that in two years the expected value of your investment will be $1,000,000 and that the standard deviation of cash flows will be $1,049,000. You have estimated that the one-year standard deviation of market returns is 18%, the current risk-free rate is 4%, and the expected market risk premium is 6.5%. In addition to your investment in the venture, you will invest $1.25 million in a well-diversified market portfolio. Use equations 11A.2 through 11A.5 to find the present value of your investment in the biotech venture.
4. A venture that will cost $1 million, including $200,000 worth of the entrepreneur's time, is expected to be harvested in four years and to yield $4.5 million at that time. Based on a simulation study, the standard deviation of harvest cash flows is $3.0 million. Assume that the annual risk-free rate is 3% and that the expected market rate of return is 9% per year. The standard deviation of market returns is 14% per year. The correlation between the venture and the market is estimated to be 0.3. Download and use Table 11A.3 (Valuation Template 4) or another approach to estimate the NPV of the venture to the following individuals:
    a. A well-diversified investor who makes the entire investment, including entrepreneur compensation.

b. An entrepreneur whose total wealth is $2 million, where the balance of total wealth is maintained in a market index.

c. An entrepreneur whose total wealth is $10 million, where the balance of total wealth is maintained in a market index.

Discuss your results. In particular, discuss how the values of intangibles like self-employment and total control might affect the relative values of the different scenarios, and how the entrepreneur's risk aversion might affect the relative values of the scenarios.

5. An entrepreneur who has total wealth of $2.0 million is considering investing $200,000 of financial and human capital in a venture. The investment is expected to return $700,000 in two years. The entrepreneur would like to know if the return is high enough to justify the investment. The risk-free rate is 4% per year, the market rate is 10%, and the standard deviation of market returns is 18%. Based on comparable public firms at early stages, the venture is assumed to have a correlation with the market of 0.2, and a beta of 1.0. Use Valuation Template 5 to estimate the entrepreneur's cost of capital for investing in the venture. Based in this estimate, what is the present value of the expected $700,000 payoff in two years? What is the net present value?

6. An individual who currently earns $120,000 per year is considering a new venture. To proceed, she must resign and commit three years to the venture. For that, she expects to receive a salary of $50,000 per year. If the venture fails, she can return to her current line of work but expects that her starting salary will drop to $100,000. In either case, her earnings in alternative employment are expected to grow at a rate of 6% per year. Her remaining work life is 20 years. She believes it is appropriate to value future earnings using a discount rate of 14%. She also has $90,000 of equity in a house and will use the equity to secure a loan of that amount to invest in the venture. Finally, she has retirement savings invested in a market index of $800,000 that she is unable to use in the venture.

   a. What is the present value of the entrepreneur's human capital?

   b. What is the present value of human capital (net of expected compensation) she would need to commit to the venture?

   c. What fraction of her total wealth would she be committing?

7. A public corporation is considering developing a new software application that would enable GPS navigation systems in automobiles to "learn." With the application, the system would be able to update maps when it determined that its initial map file had become obsolete. It also would integrate a clock and calendar, so that over time, it would develop a database of true expected driving times based on day of week and time of day. This would enable the system to improve its route selections and give more accurate estimates of expected driving time. Company engineers project that it would take four years to develop and commercialize the software. With luck, the corporation would be first to market and would preempt others from entering. If so, the financial planning group estimates that "harvest-date" value of the product would be $60 million. Alternatively, the company's product might not preempt rivals. In a market where several products are competing, the product price would have to be lower. Under that scenario, the financial planning group estimates that harvest-date value would be $35 million. Finally, another entrant could preempt the company's efforts, even after most of the development costs had been incurred. In that scenario, the company would realize nothing on its investment. The annual current risk-free

rate is 3%. The financial planning group estimates that the market risk premium is 5%, the standard deviation of market returns is 14% and the venture's correlation with the market is 0.25.

a. Assuming that the probability of the success scenario is 15%, and the probability of the failure scenario is 40%, what is the present value of the opportunity to the corporation?

b. Under the same assumptions, what is the present value of the venture to an entrepreneur who would be willing to invest 30% of her $9 million total wealth in the venture, with the remainder being placed in a market index portfolio?

c. Comment on the relative values to the corporation and the entrepreneur and on who should undertake the venture.

8. For the project described in problem 7, suppose that the corporate project approval and oversight processes are the main reasons the project is likely to take four years to complete, and that an entrepreneur acting independently could complete the project in three years. Faster completion would increase the likelihood that the innovator would succeed in preempting rivals and would reduce the probability of failure. Assuming that the probability of the intermediate outcome would remain at 45%, and the scenario-contingent cash flows would not change despite the faster completion, how much would the probability of success need to increase and the probability of failure decrease to make the project as valuable for an independent entrepreneur as it is to the corporate investor in problem 7?

9. A public company has a retirement plan where employees can invest a portion of their retirement savings in company stock. Whatever the employee does not invest in company stock can be invested in a diversified portfolio. Whatever is invested in company stock must remain in company stock until the employee retires. To encourage investment in company stock, and in recognition of the resulting underdiversification, the company will match whatever the employee invests in company stock with an additional 15% investment on the employee's behalf. Suppose the annual risk-free rate is 4%, the market risk premium is 6%, and the standard deviation of market returns is 14%. Company stock has beta risk of 1.2, and a correlation with the market of 0.4. The annualized standard deviation of returns is 42%, based on the beginning investment amount including the employer's matching contribution.

   a. Suppose an employee invests $10,000 in company stock. Considering the employer's matching contribution, what is the expected value of the investment in one year? In two years?

   b. What is the standard deviation of cash flows for an employee's one-year investment of $10,000 by an employee? What is it for a two-year investment? Be sure to incorporate the employer's contribution.

   c. Suppose an employee has no other wealth. How soon would the employee need to retire to make investing $10,000 (plus the company match) in company stock equal in present value to investing $10,000 in the market (with no matching contribution)?

   d. How would the answer in part (c) be different if the employee had $90,000 of other wealth, all invested in a market index?

10. The annual risk-free rate is 5%, the expected return on the market for one year is 11%, and the standard deviation of market returns is 14%. A prospective venture that would be harvested in one

year has an expected cash flow of $2.0 million, with cash flow standard deviation of $1.2 million. The correlation between the venture and the market is 0.25. The venture would require an investment of 1.5 million, which would leave the entrepreneur with $3.5 million invested in the market. Use Equations 11A.2 through 11A.5 to find the present value of the venture. How would the present value change if the holding period were two years instead of one, with all other assumptions unchanged? Should the entrepreneur invest if the holding period is one year? Two years? Explain.

11. Suppose an entrepreneur is considering a new computer service venture. The entrepreneur believes the venture has risk characteristics similar to early-stage public computer service companies and has asked you how to value the opportunity. The first step in your analysis is to estimate the entrepreneur's opportunity cost of capital. Based on a sample of firms you found on Yahoo.com, you have concluded that computer service firms tend to have beta risk of around 1.10 and that the average correlation of returns with market returns is 0.17. The entrepreneur would plan to invest about 10% of his total wealth in the venture. The expected holding period is 1.5 years, the annual risk-free rate is 3%, the market return is 9%, and the market standard deviation is 14%. Use the template in Table 11.4 to estimate the entrepreneur's cost of capital.