- There are five possible **procedures for valuing real options**: (1) DCF analysis only, and ignore the real option; (2) DCF analysis and a qualitative assessment of the real option's value; (3) decision-tree analysis; (4) analysis with a standard model for an existing financial option; and (5) financial engineering techniques.
- Many **investment timing options** and **growth options** can be valued using the Black-Scholes call option pricing model.
- See ***Web Extension 25A*** at the textbook's Web site for an illustration of valuing the **abandonment option**.
- See ***Web Extension 25B*** at the textbook's Web site for a discussion of **risk-neutral valuation**.

Questions

(25–1) Define each of the following terms:
a. Real option; managerial option; strategic option; embedded option
b. Investment timing option; growth option; abandonment option; flexibility option
c. Decision tree

(25–2) What factors should a company consider when it decides whether to invest in a project today or to wait until more information becomes available?

(25–3) In general, do timing options make it more or less likely that a project will be accepted today?

(25–4) If a company has an option to abandon a project, would this tend to make the company more or less likely to accept the project today?

Self-Test Problem

Solution Appears in Appendix A

(ST–1) Real Options

Katie Watkins, an entrepreneur, believes that consolidation is the key to profit in the fragmented recreational equine industry. In particular, she is considering starting a business that will develop and sell franchises to other owner-operators, who will then board and train hunter-jumper horses. The initial cost to develop and implement the franchise concept is $8 million. She estimates a 25% probability of high demand for the concept, in which case she will receive cash flows of $13 million at the end of each year for the next 2 years. She estimates a 50% probability of medium demand, in which case the annual cash flows will be $7 million for 2 years, and a 25% probability of low demand with an annual cash flow of $1 million for 2 years. She estimates the appropriate cost of capital is 15%. The risk-free rate is 6%.

a. Find the NPV of each scenario, and then find the expected NPV.
b. Now assume that the expertise gained by taking on the project will lead to an opportunity at the end of Year 2 to undertake a similar venture that will have the same cost as the original project. The new project's cash flows would follow whichever branch resulted for the original project. In other words, there would be an $8 million cost at the end of Year 2 and then cash flows of $13 million, $7 million, or $1 million for Years 3 and 4. Use decision-tree analysis to estimate the combined value of the original project and the additional project (but implement the additional project only if it is optimal to do so). Assume that the $8 million cost at Year 2 is known with certainty and should be discounted at