

Answers to Back-of-Chapter Problems

Chapter 1

1. Managerial economics is the analysis of important management decisions using the tools of economics. Most business decisions are motivated by the goal of maximizing the firm's profit. The tools of managerial economics provide a guide to profit-maximizing decisions.

2. i) **Multinational Production and Pricing.** The global automobile company needs information on 1) demand (how many vehicles can be sold in each market at different prices), 2) plant capacities and production costs, and 3) trade barriers and tariffs.

- ii) **Market Entry.** Remember that Uber began as a ridesharing idea, before ultimately becoming a market disruptor with respect to the long established taxicab industry. Crucial necessary information and questions include: Would city regulators allow Uber to operate at all? What market niche (how much demand) could it carve out of the taxi and car service markets? At what prices relative to taxis? Would customers trust a rideshare service? How many drivers could rideshare firms attract and at what costs?

- iii) **Building a New Bridge.** The authority should estimate usage of the bridge over its useful life, the likely cost of building and maintaining the bridge, and other important side-effects, pro and con -- including positive effects on business activity and the impacts on air pollution and traffic congestion.

- iv) **A Regulatory Problem.** Before deciding whether to promote the oil-to-coal conversion, government regulators need information on how much oil would be saved (and the dollar value of savings) and the cost of the chain of side-effects -- not only the direct cost of electricity provision but also pollution costs and environmental damage.

- v) **Boeing and the 737 Max.** Boeing gathered extensive information on potential airline demand for a new more fuel-efficient aircraft, yet considerable uncertainty remained with respect to future orders. Would the new aircraft shift significant orders and sales from Airbus, Boeing's longtime rival? Could Boeing achieve its aggressive R&D and

production plan on budget and on schedule? Could it address and solve myriad reliability and safety problems, big and small? How severe would be ongoing regulatory oversight and how high a bar would the FAA set for certification requirements? Five or ten years from now, would the world economy continue to grow, fueling strong demand for air travel and for the new and improved aircraft?

- vi) **An R&D Decision.** The pharmaceutical company should quiz its scientists on the chances of success (and the timetable for completion) for each R&D approach. The company's marketing department would supply estimates of possible revenues from the drug; its production department would estimate possible costs.
 - vii) **David Letterman.** Dave must carefully assess what he wants from a new contract (in particular how much he values the earlier time slot). As the negotiations unfold, Dave will glean valuable information as to the current competing offers of CBS and NBC. Of course, Dave must also try to assess how far the two networks might be willing to go in sweetening their offers.
3. The six steps might lead the soft-drink firm to consider the following questions. Step 1: What is the context? Is this the firm's first such soft drink? Will it be first to the marketplace, or is it imitating a competitor? Step 2: What is the profit potential for such a drink? Would the drink achieve other objectives? Is the fruit drink complementary to the firm's other products? Would it enhance the firm's image? Step 3: Which of six versions of the drink should the firm introduce? When (now or later) and where (regionally, nationally, or internationally) should it introduce the drink? What is an appropriate advertising and promotion policy? Step 4: What are the firm's profit forecasts for the drink in its first, second, and third years? What are the chances that the drink will be a failure after 15 months? Should the firm test market the drink before launching it? Step 5: Based on the answers to the questions in Steps 1 through 4, what is the firm's most profitable course of action? Step 6: In light of expected (or unexpected) developments in the first year of the launch, how should the firm modify its course of action?

4. Decision vignettes

- a. A couple who buy the first house they view have probably sampled too few houses. Housing markets are notoriously imperfect. Houses come in various shapes, sizes, conditions, neighborhoods, and prices. Personal preferences for houses also vary enormously. The couple is likely to get a "better" house for themselves if they view a dozen, two dozen, or more houses over the course of time before buying their "most-preferred" house from the lot. Circumstances justifying the first-house purchase include: (1) the house is so good that viewing others is a waste of time, (2) the house is so good and the commitment must be made now or another buyer will claim the house, (3) the couple must buy now (a job transfer has brought them to the area and schools open tomorrow), (4) they already have full information about the types of other houses available (the wife's best friend is a real estate agent).

- b. The company seems to be launching the product to avoid "wasting" the \$6 million already spent in development. This "sunk" cost is irrelevant and should be ignored. What does matter for the reinvestment decision are the future revenues and costs of continuing. (Reinvest if the net present value of future profits is positive.) Some "close-to-home" examples of the sunk cost fallacy: i) A fellow pays \$250 for a year-long tennis membership but develops severe tennis elbow after two months. He continues to play in great pain in order to get his money's worth. ii) Ms. K has a subscription to a series of six plays for \$150. She braves a snow storm so as not to waste the \$25 cost. On reflection, she admits that she wouldn't have gone had she been given the ticket for free.

- c. It's in the individual motorist's best interest to drive on. (Stopping is risky and inconvenient). But it's in the collective interest of all the delayed motorists to have someone stop and move the mattress. Here's an example of the potential conflict between private and public interests (between private profit and social welfare). In such circumstances, there is a potential role for government intervention.

- d. Allowing the use of thalidomide had a disastrous outcome and more importantly was a bad decision (besides its potential risk, the drug was of questionable benefit in aiding sleep). The thalidomide disaster prompted a much tougher stance toward prior drug testing in the U.S. and elsewhere.

- e. The frantic couple should choose separate lines to take advantage of whichever line is quicker. Whoever gets served first should check the baggage. The lesson here: DIVERSIFY.
- f. To the extent that his actions and behavior were responsible for his marriage breakup, the CEO's mistake was to lose sight of the most important objective.
- g. The cost per life saved is $\$400,000/20 = \$20,000$ for the ambulance service. It is $\$1,200,000/40 = \$30,000$ for the highway program. Based on these *average* measures, it seems strange that the ambulance budget is being cut and the highway budget expanded. However, the real issue is the impact on lives saved from budget changes *at the margin*. Perhaps, the ambulance budget has a lot of administrative "fat" in it. It could be cut by 40% with very little impact on lives. By the same token, a modest budget increase for highways might have a large impact on additional lives saved. In short, the average cost per life may not tell the real story.
- h. FEMA's prediction of the potential hurricane risk to New Orleans was timely and prescient. However, the warning was not emphasized by the agency and certainly not heeded by federal, state, or local policy makers. The decision error was a combination of inattention, wishful thinking, and denial.
- i. Compared to these extreme outcomes (abject surrender to terrorism or being a global policeman) any option looks good. This is hardly an even-handed portrayal. The real question is whether implementing increased security measures that sacrifice civil liberties is better than numerous other *relevant* alternatives.
- j. According to the counts of pros and cons, the individual prefers: Home over Beach, Beach over Mountains, *but* Mountains over Home. We have a cycle (i.e. intransitive preferences). The individual is left going around in circles. The obvious way out of this dilemma is to "score" each alternative by weighting the individual attributes. The more important the attribute, then the greater is the weight. In addition, the individual could use a broader scale (1 to 10) for each attribute as a way of measuring relative strength of preferences between alternatives. (For a related example, see Problem 4.2 in Chapter 4.)

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CHAPTER ONE

INTRODUCTION TO ECONOMIC DECISION MAKING

OBJECTIVES

1. To introduce Managerial Economics and provide concrete examples of managerial decisions
2. To provide a framework for analyzing decisions (Six Steps to Decision Making)
4. To compare decisions of the private firm (where maximum profit is the objective) to public sector decisions (where maximum societal net benefit is the objective). (Private and Public Decisions)
5. To introduce the student to the book and its organization. (Things to Come)

TEACHING SUGGESTIONS

I. Introduction and Motivation

The chapter begins by stressing concrete applications of managerial economics (the eight examples) rather than speaking generally about topics and methods. Our practice in class is to lead a brief discussion of some of the text examples (the three we like best) augmented with additional representative examples from the current business press.

A. Additional questions on text examples:

1. **Multinational Production and Pricing** (Revisited in Chapter 3 and in Problem S2 of Chapter 6). Why might the company want to charge different prices home and abroad? (What if the company had to charge

the same price because of anti-dumping restrictions?) Why might it want to ship output overseas?

2. **Market Entry** (Revisited in Chapter 10). In a market that can support only one store, is there an advantage to being the first in? Are there strategic advantages to commitment? (Here you might tell the story of the game of chicken. Imagine that one driver racing at 90 mph toward the other vehicle were to pull off his steering wheel and throw it out the window, thereby proving his commitment. Does this crazy move make strategic sense?) How might an office supply store commit? What if both commit? (That is, both throw their steering wheels out the window.)
3. **Building a New Bridge.** (Revisited in Chapter 11). Building a bridge is usually a public responsibility (paid for out of public funds raised via taxes). Why is this the case? How might a public planner determine the need for a new bridge? How should tolls (if any) be set?
4. **A Regulatory Problem** (Revisited in Chapter 11). Does regulation put too great a cost burden on business? How should the benefits of environmental regulation be weighed against the costs?
5. **Boeing and the 737 Max Disaster** (Revisited in Chapter 13.) How did Boeing fail to identify and quantify crucial risk factors during the development of its new aircraft? What measures (and at what cost) should it now take to correct its safety failures and restore confidence?
6. **An R&D Decision** (Revisited in Chapter 13). Might the pharmaceutical company be wise to pursue both R&D methods simultaneously?
7. **Wooring David Letterman** (Revisited in Chapter 16). What bargaining strategy should Letterman adopt to get the best deal? How can a value-maximizing deal be achieved?

B. **Additional Vignettes.** A good way to spice up the discussion is to (1) preview decision examples from later chapters or (2) take examples from chapters that are not assigned. Here are some suggestions.

- Airline price discrimination (Chapter Three)
- Introducing New Coke (Chapter Four)
- The OPEC Cartel (Chapter Eight)
- Battle for Air Passengers (Chapter Ten)
- Regulating a New Drug for Hepatitis C (Chapter Eleven)
- An Oil Wildcatter (Chapter Thirteen)
- Predicting Credit Risks (Chapter Fourteen)
- Constructing an Optimal Portfolio (Chapter Seventeen)

I. Teaching the “Nuts and Bolts”

A. Issues deserving extra emphasis

1. The meaning of economic tradeoffs:
 - benefits versus costs.
 - short-term profit versus long-term profit.
 - risk versus return.
 - tradeoffs among multiple objectives (For example in auto regulation: safety vs. emission reduction vs. fuel economy)
2. The virtues of simple models (predictive models, the model of the firm)
3. Coming to grips with uncertainty

- B. **The six decision steps** mostly speak for themselves. (In our experience, students find them relatively easy to grasp.) The instructor may wish to reemphasize them by discussing some of the steps in class. Alternatively, the six steps can be applied by discussing the decision vignettes in question 4 at the end of the chapter. In each instance, did the individual make a faulty decision? If so, in what step(s) did he or she go wrong? (See answers below).
- C. **Guinea Pig Questions.** One way of previewing a number of upcoming topics in the course is to present a number of short, so-called “guinea pig” questions. Students meet these questions “cold” without any advanced background or preparation. The main idea is to challenge them to think about possible solutions. By necessity, they usually rely on their general judgment or intuition rather than on any systematic analysis. (It's a good idea for the teacher to tell the students that the questions are in some sense “unfair”; students don't have enough information find the best solution. But neither do managers in real-life business decisions.)
1. **Locating a Shopping Mall.** (Instructor's online site, Chapter Two).
 2. **Finding the Best Item** (Instructor's online site, Chapter Fourteen). Suppose that you will be shown three “prizes” in order. Ahead of time, you know absolutely nothing about how valuable the prizes might be. Only after viewing all three can you determine which you like best. You are shown the prizes in order and are allowed to select one. However, there is no “going back.” You must select a prize immediately after seeing it, and before seeing any subsequent prize.
 - a) Your sole objective is to obtain the best of the three prizes. (Second best doesn't count.) A random selection provides a one-third chance of getting the best prize. Find a strategy that provides a strictly greater chance (and compute the actual chance).

- b) What if there are a large number of prizes (say 10, 50, or 100)? Describe in general terms the kind of strategy you might use.
3. **Let's make a Deal** (Instructor's online site, Chapter Fourteen). Consider the following simplified version of the game "Let's Make a Deal." There is a grand prize behind one of three curtains. The other two curtains are empty. As the contestant, you get to choose a curtain at random. Let's say you choose curtain three. Before revealing what's behind the curtain, the game show host offers to show you what's behind one of the other curtains. Suppose he shows you that curtain two is empty. In fact, he *always* shows you an empty curtain. (You know that's how the game works, the audience knows it, everybody knows it.) Now you must decide: do you stick with your original choice, curtain three, or switch to curtain one? Which action gives you the better chance of finding the grand prize?
4. **A Competitive Decision.** Consider the following game involving two players. The players will alternate choosing the nine integers: 1, 2, 3, 4, 5, 6, 7, 8, 9. If the first player picks 4 (let's say), the second player can choose any one of the remaining digits, and so on. The first player that obtains three digits that add up to exactly 15 wins. For instance, the first player wins with the digits, 2, 3, 6, and 7 since $2 + 6 + 7 = 15$. He would *not* win with 6, 7, 8, and 9 since no three of them add up to 15.

Ask for two volunteers to play this game (with the rest of the class free to kibitz). Questions to think about: How would you play? Is it an advantage to move first? What well-known game does this number game resemble?

D. **Discussion of Guinea Pig Questions.** Though these questions are deliberately set in non-business situations, almost all have interesting business counterparts. Question 1 demonstrates marginal analysis. Questions 2 and 3 involve decisions under uncertainty. Question 4 is a competitive decision.

1. **Siting a Shopping Mall.** For discussion, see Instructor’s Manual, Chapter Two, also the Instructor’s Online Site, Chapter Two.
2. **Finding the Best Item.** For an arbitrary number of items (not only three), this is variously called the “secretary problem” (interviewing and selecting the best secretary), the “hotel problem” (deciding to stop at one of three hotels situated hours apart along a cross-country route), or the “art gallery problem” (in the gallery you are allowed to view paintings one at a time and choose only one, without going back). Your best strategy is as follows:

Observe the first item but bypass it. Then, select the second item only if it is better than the first. If it isn't, go on to the third item and select it.

This plan delivers the best item with probability 1/2, the second-best item with probability 1/3, and the worst item with probability 1/6. Here are the six equally likely orders in which the items might appear:

First Item:	best	best	2nd best	2nd best	worst	worst
Second Item:	2nd best	worst	best	worst	best	2nd best
Third Item:	worst	2nd best	worst	best	2nd best	best

The bold-faced outcomes show the result of using the “wait and see” strategy. As shown, the strategy delivers three *bests*, two *2nd bests*, and one *worst*. For more on generalizations of this example, see Chapter Thirteen of this instructor's manual.

3. **Let's make a Deal.** Almost all students (if they have not seen the problem before) believe that either curtain offers a 50-50 chance of having the prize. This is incorrect. In fact, the chance is one-third that the grand prize is behind your chosen curtain and two-thirds that its behind the other curtain. After all, choosing your original curtain at random offers a one-third winning chance. The fact that you are shown an empty curtain does *not* change this prior probability (although it does eliminate one curtain from consideration). Since your winning chances are $1/3$ if you “stick”, you should switch and gain a $2/3$ winning chance.

Many students will still be unconvinced by this argument. One response is to challenge students (in pairs) to simulate the setup for themselves. The simulation could mean shuffling 2 black playing cards and one red card (the prize), and playing 60 times. Always “sticking” with one's original card after a black card has been revealed will produce only 20 wins on average. A second argument is to imagine that there are 100 curtains and one prize. After a curtain is chosen (say, curtain 1), the host reveals 98 empty curtains (all but curtain 71). Most students will easily see that the odds are 99 to 1 in favor of curtain 71 over curtain 1.

This classic problem has been discussed among social scientists since the mid 1970s and has even made it to the front page of *The New York Times*: “Behind Monty Hall's Doors: Puzzle, Debate, and Answer,” *NYT*, July 21, 1991, p. 1. The discussion and analysis are recommended. Even in the 21st century, the riddle is still going strong.

4. **A Competitive Decision.** This is a tough game because it involves mental arithmetic and keeping track of many possibilities. The “sneaky” way to play this game is by using the following magic square:

8	1	6
3	5	7
4	9	2

In a magic square, all rows, columns, and diagonals add up to the same number (in this case 15). Using the magic square, we see that the

number game is strategically equivalent to tic tac toe. The ways you can win in the number game are identical to the ways you can win in tic tac toe. There are many ways to play either game optimally -- block your opponent whenever he has a potential winning move and never let him set up two ways to win. The result of optimal play is a draw. When students play, the first mover often wins because the second mover is apt to make the first mistake. A typical play of the game might be: 6, 9, 8, 1, 4, 3, 5, the first player wins with $6 + 4 + 5 = 15$.

You can use this game to make two points: (1) Optimal competitive strategies (see Chapter Ten) often require looking ahead to anticipate competitors' moves and counter moves. (2) Often the best way to solve a new decision problem is to see that it is similar to a problem you already know how to solve.

ADDITIONAL MATERIALS

I. Recommended Readings

D. Kahneman, *Thinking Fast and Slow*, Farrar, Straus, and Giroux Publishing, New York, 2011.

M. Bazerman and D. Moore, *Judgment in Managerial Decision Making*, John Wiley & Sons, 7th edition, 2008 (especially chapters 1, 2 and 9).

J. E. Russo, M. Hittleman, and P. J. Schoemaker. *Winning Decisions*. New York: Bantam Dell Publishers, 2001.

J. E. Russo and P. J. Schoemaker, *Decision Traps*, Fireside Publishing, New York, 1990.

G. Belsky and T. Gilovich. *Why Smart People Make Big Money Mistakes and How to Correct Them*. New York: Simon and Schuster, 2000.

N.R. Augustine, *Augustine's Laws*, Penguin Books, 1987. (A nice commentary on the foibles of managerial decision making)

II. Short Readings

R. Gold, "Firms Plan for Climate Change," *The New York Times*, January 21, 2020, p. R12.

R. Mackintosh, "The Shareholder isn't All that Matters? Don't Count on It," *The Wall Street Journal*, January 20, 2020, p. R4.

R. Mackintosh, "The CEO's Tricky Role in the New Era of Social Responsibility," *The Wall Street Journal*, December 13, 2019, p. R1.

Robert Shiller, “The Rationality Debate, Simmering in Stockholm,” *The New York Times*, January 19, 2014, p. BU6.

Gardiner Harris and Katie Thomas, “Low-Cost Drugs in Poor Nations Get a Lift in Indian Court,” *The New York Times*, April 2, 2013, p. A1.

Carolyn Preston, “Getting Back More than a Warm Feeling,” *The New York Times*, November 9, 2012, F1.

G. Mankiw, “A Course Load in the Game of Life,” *The New York Times*, September 5, 2010, p. BU5.

“Let’s Hear those Ideas,” *The Economist*, August 14, 2010, pp. 55-57.
(This article discusses “social entrepreneurs.”)

R. Frank, “Flaw in Free Markets: Humans,” *The New York Times*, September 13, 2009, p. BU4.

D. Brooks, “The Behavioral Revolution,” *The New York Times*, October 28, 2008, p. A23.

R. Trudel and J. Cotte, “Does being Ethical Pay?” *The Wall Street Journal*, May 12, 2008, p. R1.

D. A. Garvin and M. A. Roberto, “What You Don’t Know about Making Decisions,” *Harvard Business Review*, September 2001, pp. 108-116.

III. Cases

Fighting Aids and Pricing Drugs (9-502-061), Harvard Business School, 2002.

Decision Making at the Top (9-398-061), Harvard Business School, 1997.

Canonical Decision Problems (9-396-308), Harvard Business School, 1997.
Teaching Note (5-396-313)

IV. Quips and Quotes

General maxims about decision making:

There are three valid answers to making a decision: yes, no, or no decision right now. Only 20% of the answers should be an immediate yes or no.

Find two good reasons to do something. (You can always find one good reason.)

When making a decision of minor importance, I have always found it advantageous to consider all the pros and cons. In vital matters, however, such as the choice of a mate or a profession, the decisions should come from the unconscious, from somewhere within ourselves. (Sigmund Freud)

Never, never use intuition (General Omar Bradley)

When asked what he'd done during the terror of the French revolution, Abbe Sieyes replied, "I survived." (An example of satisficing?)

If you don't know where you're going, chances are you won't get there.

We never make the same mistake twice. All our blunders are different.

I'd like to rush for 1500 or 2000 yards, whichever comes first. (Former Washington Redskin running back George Rodgers)

In a choice between two evils, I make it my general rule to choose the one I haven't tried yet. (Mae West).

If the only tool you have is a hammer, you tend to see every problem as a nail.

The real objective of a committee is not to reach a decision but to avoid it.

It is better to know nothing than to know what ain't so.

A decision is always a choice among alternative perceived images of the future. (Kenneth E. Boulding)

Economic activity is rational activity . . . it consists firstly in valuation of ends, and then in the valuation of the means leading to these ends.
(Ludwig von Mises)

Here is a slightly exaggerated example from an Ann Landers column:

Dear Ann, Our marriage was once so beautiful but things have changed. My spouse treats me like a slave, never shows any affection, comes home drunk every night, slaps me around, and may be having an affair with my best friend. I alternate between loneliness and fear. I have gained weight and am severely depressed. My life is a living hell and I pray to get through the next day. Ann, what should I do?

(Ann Landers responded with a question. Are you better off with him or without him? That is, what are the outcomes associated with each alternative? Additional query: are these the only alternatives?)

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2.
 - i) **Multinational Production and Pricing.** The global automobile company needs information on demand (how many vehicles can be sold in each market at different prices) and production costs.

 - ii) **Market Entry.** Remember that Uber began as a ridesharing idea, before ultimately becoming a market disruptor with respect to the long established taxicab industry. Crucial necessary information and questions include: Would city regulators allow Uber to operate at all? What market niche (how much demand) could it carve out of the taxi and car service markets? At what prices relative to taxis? Would customers trust a rideshare service? How many drivers could rideshare firms attract and at what costs?

 - iii) **Building a New Bridge.** The authority should estimate usage of the bridge over its useful life, the likely cost of building and maintaining the bridge, and other important side-effects, pro and con -- including positive effects on business activity and the impacts on air pollution and traffic congestion.

 - iv) **A Regulatory Problem.** Before deciding whether to promote the oil-to-coal conversion, government regulators need information on how much oil would be saved (and the dollar value of savings) and the cost of the chain of side-effects -- not only the direct cost of electricity provision but also pollution costs and environmental damage.

 - v) **Boeing and the 737 Max.** Boeing gathered extensive information on potential airline demand for a new more fuel-efficient aircraft, yet

considerable uncertainty remained with respect to future orders. Would the new aircraft shift significant orders and sales from Airbus, Boeing's longtime rival? Could Boeing achieve its aggressive R&D and production plan on budget and on schedule? Could it address and solve myriad reliability and safety problems, big and small? How severe would be ongoing regulatory oversight and how high a bar would the FAA set for certification requirements? Five or ten years from now, would the world economy continue to grow, fueling strong demand for air travel and for the new and improved aircraft?

vi) **An R&D Decision.** The pharmaceutical company should quiz its scientists on the chances of success (and the timetable for completion) for each R&D approach. The company's marketing department would supply estimates of possible revenues from the drug; its production department would estimate possible costs.

vii) **David Letterman.** Dave must carefully assess what he wants from a new contract (in particular how much he values the earlier time slot). As the negotiations unfold, Dave will glean valuable information as to the current competing offers of CBS and NBC. Of course, Dave must also try to assess how far the two networks might be willing to go in sweetening their offers.

3. The six steps might lead the soft-drink firm to consider the following questions. Step 1: What is the context? Is this the firm's first such soft drink? Will it be first to the marketplace, or is it imitating a competitor? Step 2: What is the profit potential for such a drink? Would the drink achieve other objectives? Is the fruit drink complementary to the firm's other products? Would it enhance the firm's image? Step 3: Which of six versions of the drink should the firm introduce? When (now or later) and where (regionally, nationally, or internationally) should it introduce the drink? What is an appropriate advertising and promotion policy? Step 4: What are the firm's profit forecasts for the drink in its first, second, and third years? What are the chances that the drink will be a

failure after 15 months? Should the firm test market the drink before launching it? Step 5: Based on the answers to the questions in Steps 1 through 4, what is the firm's most profitable course of action? Step 6: In light of expected (or unexpected) developments in the first year of the launch, how should the firm modify its course of action?

4. Decision vignettes

- a. A couple who buy the first house they view have probably sampled too few houses. Housing markets are notoriously imperfect. Houses come in various shapes, sizes, conditions, neighborhoods, and prices. Personal preferences for houses also vary enormously. The couple is likely to get a "better" house for themselves if they view a dozen, two dozen, or more houses over the course of time before buying their "most-preferred" house from the lot. Circumstances justifying the first-house purchase include: (1) the house is so good that viewing others is a waste of time, (2) the house is so good and the commitment must be made now or another buyer will claim the house, (3) the couple must buy now (a job transfer has brought them to the area and schools open tomorrow), (4) they already have full information about the types of other houses available (the wife's best friend is a real estate agent).

- b. The company seems to be launching the product to avoid "wasting" the \$6 million already spent in development. This "sunk" cost is irrelevant and should be ignored. What does matter for the reinvestment decision are the future revenues and costs of continuing. (Reinvest if the net present value of future profits is positive.) Some "close-to-home" examples of the sunk cost fallacy: i) A fellow pays \$250 for a year-long tennis membership but develops severe tennis elbow after two months. He continues to play in great pain in order to get his money's worth. ii) Ms. K has a subscription to a series of six plays for \$150. She braves a snow storm so as not to waste the \$25 cost. On reflection, she admits that she wouldn't have gone had she been given the ticket for free.

- c. It's in the individual motorist's best interest to drive on. (Stopping is risky and inconvenient). But it's in the collective interest of all the delayed motorists to have someone stop and move the mattress. Here's an example of the potential conflict between private and public interests (between private profit and social welfare). In such circumstances, there is a potential role for government intervention.
- d. Allowing the use of thalidomide had a disastrous outcome and more importantly was a bad decision (besides its potential risk, the drug was of questionable benefit in aiding sleep). The thalidomide disaster prompted a much tougher stance toward prior drug testing in the U.S. and elsewhere.
- e. The frantic couple should choose separate lines to take advantage of whichever line is quicker. Whoever gets served first should check the baggage. The lesson here: DIVERSIFY.
- f. To the extent that his actions and behavior were responsible for his marriage breakup, the CEO's mistake was to lose sight of the most important objective.
- g. The cost per life saved is $\$400,000/20 = \$20,000$ for the ambulance service. It is $\$1,200,000/40 = \$30,000$ for the highway program. Based on these *average* measures, it seems strange that the ambulance budget is being cut and the highway budget expanded. However, the real issue is the impact on lives saved from budget changes *at the margin*. Perhaps, the ambulance budget has a lot of administrative "fat" in it. It could be cut by 40% with very little impact on lives. By the same token, a modest budget increase for highways might have a large impact on additional lives saved. In short, the average cost per life may not tell the real story.
- h. FEMA's prediction of the potential hurricane risk to New Orleans was timely and prescient. However, the warning was not emphasized by the agency and certainly not heeded by federal, state, or local policy

makers. The decision error was a combination of inattention, wishful thinking, and denial.

- i. Compared to these extreme outcomes (abject surrender to terrorism or being a global policeman) any option looks good. This is hardly an even-handed portrayal. The real question is whether the implementing increased security measures that sacrifice civil liberties is better than other *relevant* alternatives.
- j. According to the counts of pros and cons, the individual prefers: Home over Beach, Beach over Mountains, *but* Mountains over Home. We have a cycle (i.e. intransitive preferences). The individual is left going around in circles. The obvious way out of this dilemma is to "score" each alternative by weighting the individual attributes. The more important the attribute, then the greater is the weight. In addition, the individual could use a broader scale (1 to 10) for each attribute as a way of measuring relative strength of preferences between alternatives. (For a related example, see Problem 4.4. In this context, the instructor may also wish to discuss voting cycles and the Condorcet paradox).

Discussion Question

The six listed options for the Kendall School range from the status quo to the most radical option of razing the building and selling off the land. Options d, e, and f mean that the town will no longer own and control the site. The best option for the town depends both on economics and the town's particular objectives. A purely economic objective might mean maximizing the sum of money the town receives for the school and land. Whether option d, e, or f is most profitable depends on whether the site is worth more after conversion to condominiums or sold as open land. One approach is for the planning board to make its own economic assessment and act accordingly. (For this task, it would need economic data on current land values, condominium prices, construction costs, and

so on. It would also need to forecast future values, costs, and prices to decide whether it's better to sell now or later.) A different approach is to ask for competitive bids from the private sector. Presumably, the highest bid reflects the maximum-value use of the land.

The board may also have non-economic objectives in mind: promoting the arts, maintaining open land in the town, retaining the option to use the space for its own purposes. Options a, b, and c address some of these objectives. But before adopting one of these options, the town would be well-advised to assess its opportunity cost – the income it might be giving up by rejecting a more profitable alternative. Then they can decide if pursuing these non-monetary objectives is worth the cost.