

3-17

Kenneth Brown is the principal owner of Brown Oil Inc. After quitting his university teaching job, Ken has been able to increase his annual salary by a factor of over 100. At present, Ken is forced to consider purchasing some more equipment for brown oil because of competition. His alternatives are shown in the following table:

Equipment	favorable Market (\$)	Unfavorable Market (\$)
Sub 100	300,000	-200,000
Oiler J	250,000	-100,000
Texan	75,000	-18,000

For example, if Ken purchases a Sub 100 and if there is a favorable market, he will realize a profit of \$300,000. On the other hand, if the market is unfavorable, Ken will suffer a loss of \$200,000. But Ken has always been a very optimistic decision-maker.

- A. What type of decision is Ken facing?
- B. What decision criterion should he use?
- C. What alternative is best?

Solution:

a) Ken is facing a decision under uncertainty since the decision maker doesn't know the probabilities of the various outcomes.

b) Since ken is an optimistic decision-maker, he should use the MAXIMAX criterion to find the alternative that maximizes the maximum payoff for each alternative.

c)

300,000 \Rightarrow MAXIMAX

250,000

75,000

The best alternative is Sub 100

3-18

Although Ken Brown (discussed in Problem 3-17) is the principal owner of Brown Oil, his brother Bob is credited with making the company a financial success. Bob is the vice president of finance. Bob attributes his success to his pessimistic attitude about business and the oil industry. Given the information from Problems 3-17, it is likely that Bob will arrive at a different decision. What decision criterion should Bob use, and what alternative will he select?

Solution:

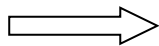
a) Since Bob is pessimistic, he should use the MAXIMIN criterion to maximize the minimum payoff.

b)

-200,000

-100,000

-18,000



MAXIMIN

He will select Texan

3-24

Today's electronics specializes in manufacturing modern electronic components. It also builds the equipment that produces the components. Phyllis Weinberger, who is responsible for advising the president of Today's Electronics on electronics manufacturing equipment, has developed the following table concerning a proposed facility.

3.24	Profit		
	Strong market	Fair market	Poor market
Large facility	550,000	110,000	-310,000
Medium sized Facility	300,000	129,000	-100,000
Small facility	200,000	100,000	-32,000
No facility	0	0	0

(a) Develop an opportunity loss table?

	550,000 Strong	129,000 Fair	0 Poor
Large facility	0	19,000	310,000
Medium sized Facility	250,000	0	100,000
Small facility	350,000	29,000	32,000
No facility	550,000	129,000	0

(b) What is the minimax regret decision?

Medium sized Facility	310,000 250,000 350,000 550,000
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3-28

Even though independent gasoline stations have been having a difficult time, Susan Solomon has been thinking about starting her own independent gasoline station. Susan's problem is to decide how large her station should be. The annual returns depend on both the size of her station and several marketing factors related to the oil industry and demand for gasoline. After a careful analysis, Susan developed the following table:

SIZE OF FIRST STATION	GOOD MARKET (\$)	FAIR MARKET (\$)	POOR MARKET (\$)
Small	50,000	20,000	-10,000
Medium	80,000	30,000	-20,000
Large	100,000	30,000	-40,000
Very large	300,000	25,000	-160,000

Solution:

(a) What is the Maximax decision?

50,000

80,000

100,000

300,000 \Rightarrow Maximax \Rightarrow Very Large

(b) What is the maximin decision?

-10,000 \Rightarrow Maximin \Rightarrow Small

-20,000

-40,000

-160,000

(c) What is the equally likely decision?

The average payoff for each alternative then selects the alternative with the highest average.

Small $\rightarrow (50,000 + 20,000 - 10,000) / 3 = 20,000$

Medium $\rightarrow (80,000 + 30,000 - 20,000) / 3 = 30,000$

Large $\rightarrow (100,000 + 30,000 - 40,000) / 3 = 30,000$

Very Large $\rightarrow (300,000 + 25,000 - 160,000) / 3 = \text{55,000} \Rightarrow$ highest avg

Very large

(d) What is the criterion of realism decision? Use an alpha value of 0.8.

$$\text{Weighted average} = \alpha (\text{maximum in row}) + (1 - \alpha) (\text{minimum in row})$$

$$\text{Weighted average for small} = (0.8)(50,000) + (1 - 0.8)(-10,000) = 40,000 - 2,000 = 38,000$$

$$\text{Weighted average for medium} = (0.8)(80,000) + (1 - 0.8)(-20,000) = 64,000 - 4,000 = 60,000$$

$$\text{Weighted average for large} = (0.8)(100,000) + (1 - 0.8)(-40,000) = 80,000 - 8,000 = 72,000$$

$$\text{Weighted average for Very large} = (0.8)(300,000) + (1 - 0.8)(-160,000) = 240,000 - 32,000 = 208,000$$

Very Large

(e) Develop an opportunity loss table.

	Good	Fair	Poor
Small	250,000	10,000	0
Medium	220,000	0	10,000
Large	200,000	0	30,000
Very large	0	5,000	150,000

(f) What is the minimax regret decision?

	Good	Fair	Poor	Minimax
Small	250,000	10,000	0	250,000
Medium	220,000	0	10,000	220,000
Large	200,000	0	30,000	200,000
Very large	0	5,000	150,000	150,000

Very Large