

Assignment 6: RISK MANAGEMENT

Due: Thursday, April 30

A. Scenarios for Investment Decisions (25 points)

Sharon and Henry Rogers are considering whether to build a new dairy facility. The total initial investment for land, buildings, equipment and cows is estimated to be \$16,000,000. This facility will allow them to have a milking herd of 3,200 cows with three times a day milking. They have developed some estimates of productivity and costs but need to consider the impact of other possible scenarios of the future. Using this information and the Excel worksheet (**S6** on the class web page), analyze the decision and decide whether they should build the new facility or not.

A1. The **base** scenario: Their expected milk produced per cow is 30,000 pounds. They expect to receive an average net milk price of \$18.00 per 100 pounds over the life of the facility. Expected costs per 100 pounds of milk are \$7.00 for feed, \$1.25 for labor, and \$5.00 for other production costs. All these costs are expected to increase 2% per year. Using a worksheet, I have already calculated the Net Present Value (NPV) at a discount rate of 7% and the Internal Rate of Return (IRR). These are entered below for this base scenario. They think this scenario has a 40% chance of occurring.

A1. NPV at 7% = \$6,295,721A1. IRR = 14.6%

A2. In their **optimistic scenario**, they think they could raise milk production to 32,000 pounds per cow, milk price would increase to \$20.00 per 100 pounds, feed costs would decrease to \$6.50 per 100 pounds, and the annual increase in operating costs drops to 1.5%. By changing these items on the worksheet calculate the NPV and IRR under this scenario. They think this scenario has a 10% chance of occurring.

A2. NPV at 7% = _____

A2. IRR = _____

A3. For their **pessimistic scenario**, they recognize that markets and weather could turn against them. To estimate these effects, they think they decide to drop milk production to 28,000 pounds, drop milk price to \$15.00, and raise feed costs to \$9.00. Other costs and variables should be as they are in the base scenario. They think this scenario has a 25% chance of occurring.

A3. NPV at 7% = _____

A3. IRR = _____

A4. They also realize that the future may contain **higher uncertainty**. When the future is viewed with more uncertainty, interest rates (and thus discount rates) typically rise to reflect the greater risk perceived in the future. For this scenario, they decide to use a higher discount rate (9%). Other costs and variables should have the same values as in the base scenario. They think this scenario has a 25% chance of occurring.

A4. NPV at 9% = _____

A4. IRR = _____

A5. Do you think they should make this investment? Why or why not?

B. Using Sparse Data to Estimate the Probability of Success (25 points)

Suppose you are deciding whether to rent some land for growing corn. You estimate your direct production costs will be \$365 per acre, cash rent will be another \$205 per acre, and overhead costs will be \$59 per acre. Plus, you'd like to receive \$35 per acre for living expenses. (Thus, the total cost including direct, rent, and overhead costs plus desired living is \$664 per acre). The expected government payment is \$25 per acre. You could contract the corn for \$3.8 right now.

Your yields in the past 6 years have been 157, 148, 163, 169, 158, and 164 bushels per acre.

B1. Using the sparse data method and the intervals listed below, estimate the interval probabilities for the corn yield.

Yield Intervals (bushels/acre)	Midpoint	Observed Yields	Preliminary Cumulative Probability	Refined Cumulative Probability	Interval Probability
140-145					
145.1-150					
150.1-155					
155.1-160					
160.1-165					
165.1-170					
170.1-175					

B2. Using both boundaries and midpoints, what is the probability of having the gross income from corn higher than your **direct production costs plus cash rent**?

Probability = _____ or _____ %

B3. Using both boundaries and midpoints, what is the probability of having the gross income from corn higher than your **total** costs (which includes your living expenses) after subtracting the expected government payment from total costs?

Probability = _____ or _____ %

B4. Would you sign the rental contract? Why or why not?

C. Estimating Probabilities using Conviction Weights (25 points)

Cindy Green has estimated her total costs of finishing beef calves to be \$84.50 per cwt for a 1250 lb. steer. She has included their variable and fixed costs as well as desired living expenses. But she has not yet adjusted for an expected 1% death loss.

She is contemplating buying another batch of calves and wants your help in deciding whether she should or should not make the purchase.

C1. Using current market information, she has formulated the following conviction weights, to help her calculate the estimated and cumulative probabilities for market prices when they will be sold.

Price intervals (\$/cwt)	Midpoint of price interval	Conviction Weights	Estimated Probability	Cumulative Probability
65.1-70	67.5	40		
70.1-75	72.5	80		
75.1-80	77.5	100		
80.1-85	82.5	90		
85.1-90	87.5	50		
	Totals =			

C2. What is the probability of success for covering all costs?

C3. Do you think she should buy the calves? Why or why not?

D. Payoff and Regret Matrices (25 points)

For many years Glenda and Paul Christianson like most of their neighbors have been growing corn and soybeans in a 50-50 rotation using a chisel plow as their primary tillage. Now they were considering switching from this conventional tillage system either to an alternative system which still used the chisel plow but added alfalfa to their rotation or to a ridge till system. The ridge till system does not include alfalfa. After talking with their neighbors who were using the other systems and researchers at the local university research center, they estimated their potential returns under the three tillage systems for each of the past 6 years. They put these estimates into a table with one row for each year and a column for each of their tillage choices. This table became their payoff matrix and is shown below.

D1. Develop the regret matrix for their decision and determine the minimum return, maximum regret, and average return and regret for each system. (Note that in this case, since the events are years, the probability for each year is 1/6 (or 16.67%) and the expected value is the same as the average value.)

Year	PAYOFF MATRIX			REGRET MATRIX		
	Conventional	Alternative	Ridge Till	Conventional	Alternative	Ridge Till
	(\$/year)			(\$/year)		
1	31,620	45,940	57,120			
2	26,010	24,700	15,530			
3	31,680	24,950	24,920			
4	-2,400	4,280	5,310			
5	25,020	18,140	22,000			
6	29,450	26,000	27,900			
Minimum return				xxx	xxx	xxx
Maximum regret	xxx	xxx	xxx			
Average return or regret						

D2. Which alternative should be chosen using each of these decision criteria:

- a. Maximin: _____
- b. Minimax: _____
- c. Maximum average or expected returns: _____
- d. Safety-first: _____
(safety rule: no more than a 10% chance of a negative payoff)

D3. Based on these results, which alternative would you choose and why?