

Quiz 7 (Answer Key)
ECNS 432
Spring 2020

_____Name

Suppose we are considering a policy as to whether a dam should be built to provide water to farmers for irrigation. The following table provides incomes associated with two possible contingencies and the probabilities associated with each contingency:

| Contingency | Policy | | Prob(contingency) |
|-------------|--------|--------|-------------------|
| | Dam | No Dam | |
| Wet Year | 14 | 12 | 0.5 |
| Dry Year | 10 | 5 | 0.5 |

a.) (5 points) What is the expected value associated with building the dam? What is the expected value associated with forgoing to build the dam? In expected value terms, what is the surplus associated with building the dam?

$$E[\text{Dam}] = (.5)(14) + (.5)(10) = 12$$

$$E[\text{No Dam}] = (.5)(12) + (.5)(5) = 8.5$$

So, the expected surplus associated with building the dam is \$3.5 (in thousands of dollars).

b.) (10 points) Suppose the typical farmer's utility is modeled as the square root of income. Given this information, what is the option price associated with building the dam? Based on this option price, should we build the dam?

$$.5U(14 - OP) + .5U(10 - OP) = .5(12)^{-.5} + .5(5)^{-.5}$$

$$\rightarrow 5(14 - OP)^{-.5} + .5(10 - OP)^{-.5} = .5(12)^{-.5} + .5(5)^{-.5}$$

$$\rightarrow (14 - OP)^{-.5} + (10 - OP)^{-.5} = 5.7$$

$$\rightarrow (14 - OP) + (10 - OP) + 2(14 - OP)^{-.5}(10 - OP)^{-.5} = 32.5$$

$$\rightarrow (14 - OP)^{-.5}(10 - OP)^{-.5} = 4.25 + OP$$

$$\rightarrow (14 - OP)(10 - OP) = OP^2 + 8.5OP + 18.06$$

$$\rightarrow 140 - 24OP + OP^2 = OP^2 + 8.5OP + 18.06$$

$$\rightarrow OP = \$3.75$$