

SECTION NOTES 9

Covering material from Lecture on February 9th

CLASS OUTLINE

1. Expected Value vs. Expected Utility
2. Preferences for Risk

1 Expected Value vs. Expected Utility

As we may know, probability is the likelihood of an event occurring. But how is it used to find an expected value. Expected value for a discrete set of events is given by

$$E(X) = \sum_i X_i \cdot \Pr(X_i).$$

This is essentially the weighted average of values of X where the weight is the probability of an even occurring. Besides finding the expected value, we could find expectations over other values, such as utilities. Expected utility is given by

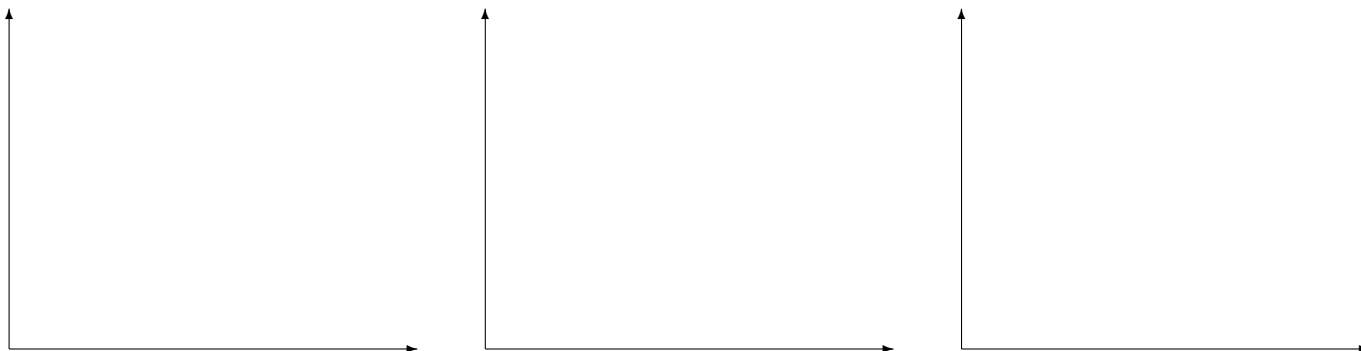
$$E(U(X)) = \sum_i U(X_i) \cdot \Pr(X_i).$$

Problem: Suppose your utility is given by $U(I) = \sqrt{I}$. For the following outcomes and probabilities of a lottery, find the expected value and the expected utility.

- ★ \$100 pay-off with probability .1
- ★ \$25 pay-off with probability .4
- ★ \$16 pay-off with probability .5

2 Preferences for Risk

To see how preferences for risk relate expected value versus expected utility, let's look at the graphs for being risk-neutral, risk-loving, and risk-averse.



What are some ways risk can be decreased? (i.e. diversification, insurance)

Risk Premium: Amount willing to pay before indifferent between guaranteed point on utility curve and expected value. (i.e. horizontal distance between EU and EX)

Value of Information: Difference between the expected value of a choice when there is complete information and the expected value when information is incomplete.

Problem: (P&R, Chapter 5, Exercise 6)

Suppose that Natasha's utility function is given by $u(I) = \sqrt{10I}$, where I represents annual income in thousands of dollars.

- a. Is Natasha risk loving, risk neutral, or risk averse?
- b. Suppose that Natasha is currently earning an income of \$40,000 ($I = 40$) and can earn that income next year with certainty. She is offered a chance to take a new job that offers a 0.6 probability of earning \$44,000 and a .4 probability of earning \$33,000. Should she take the new job?
- c. In (b), would Natasha be willing to buy insurance to protect against the variable income associated with the new job? If so, how much would she be willing to pay for that insurance? (*Hint*: what is the risk premium?)