

Risk Preferences

Econ 339 - Behavioral Econ

Fall 2026



Learning Objectives/Goals

- ◇ Identify a utility maximizer as risk-averse, risk-neutral, or risk loving.
- ◇ Graphically and algebraically determine expected value, expected utility, certainty equivalent, and risk premium from equations, graphs, or a verbal description of choices.
- ◇ Predict a purely-rational (pure-econ) person's choices based on information regarding their risk preferences.
- ◇ Predict a not-fully-rational (real-life) person's choices based on information regarding their risk preferences.

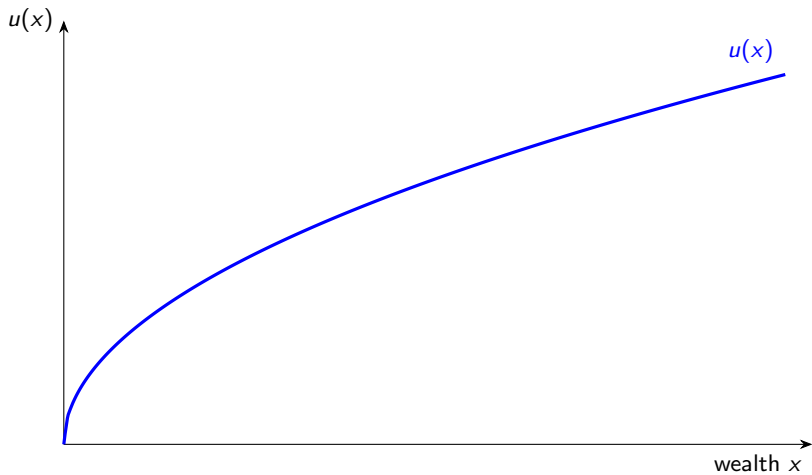
- ◇ Risk Preferences are part of the standard economic model.
 - ▶ You may or may not have been exposed to this before.
- ◇ Prospect theory/endowment theory is a main pillar of behavioral economics.
- ◇ We need to understand risk preferences to better understand prospect theory.

- ◇ **Expected Value:** Probability-weighted average outcome of a gamble/lottery.
- ◇ **Expected Utility:** Probability weighted average utility over the outcomes of a gamble/lottery.
- ◇ **Certainty Equivalent:** How much money which, if the utility maximizer received for sure, would make them indifferent between taking the for-sure money and playing the gamble.
- ◇ **Risk Premium:** The difference between the gamble's expected value and the certainty equivalent.

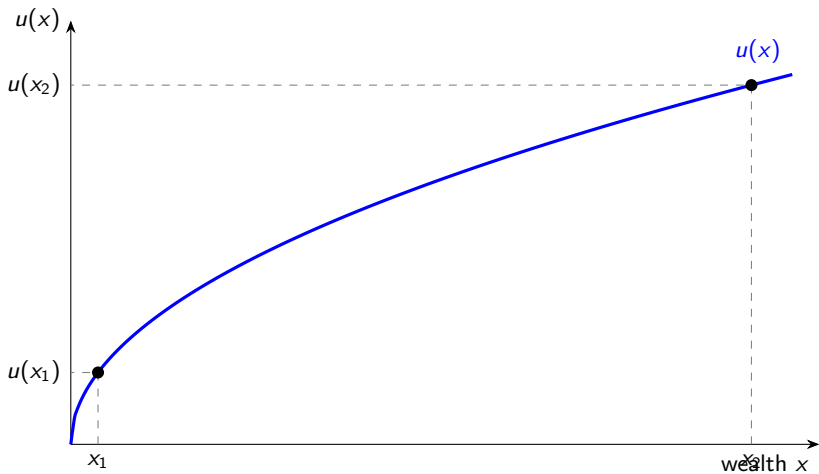
Key Terms (cont)

- ◇ **Risk Averse:** Prefers to avoid risky behavior.
 - ▶ Expected Utility of gamble $<$ Utility of Expected Value.
 - ▶ Risk Premium is positive.
 - ▶ Certainty equivalent is less than expected value.
- ◇ **Risk Neutral:** Indifferent to risk
 - ▶ Expected Utility of gamble $=$ Utility of Expected Value.
 - ▶ Risk Premium is zero.
 - ▶ Certainty equivalent is equal to expected value.
- ◇ **Risk Loving/Seeking:** Prefers to engage in risk.
 - ▶ Expected Utility of gamble $>$ Utility of Expected Value.
 - ▶ Risk Premium is negative.
 - ▶ Certainty equivalent is greater than expected value.

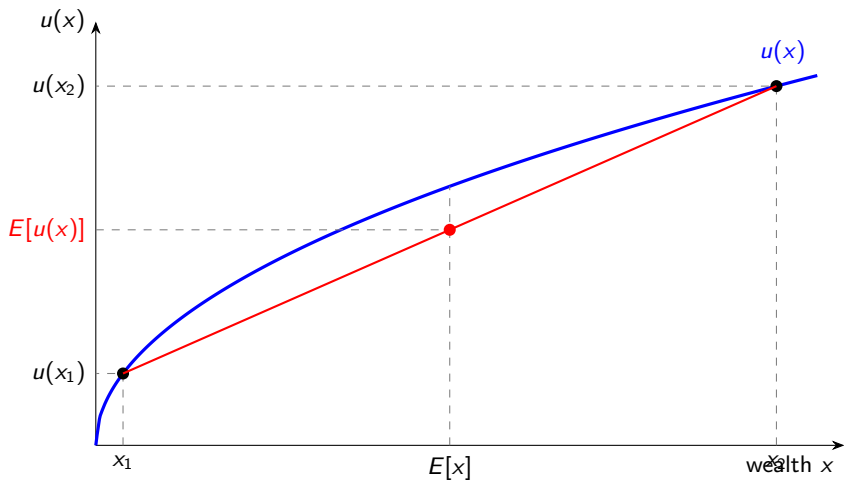
Graphing Risk Preferences



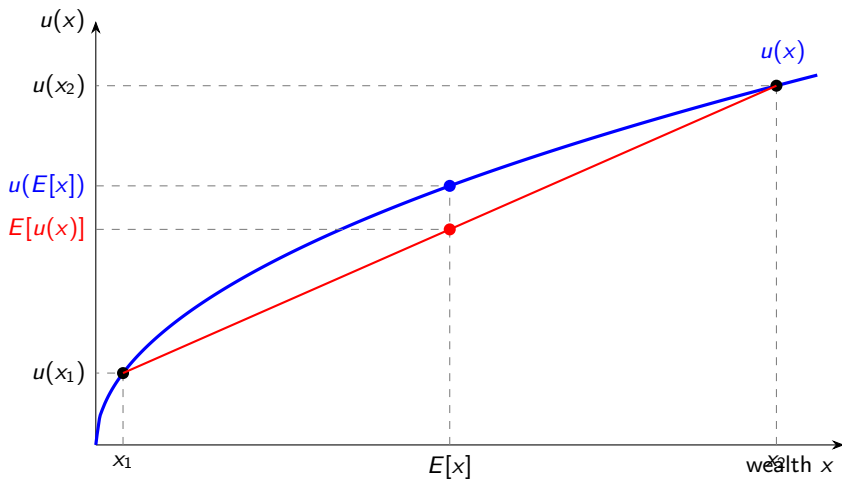
Graphing Risk Preferences



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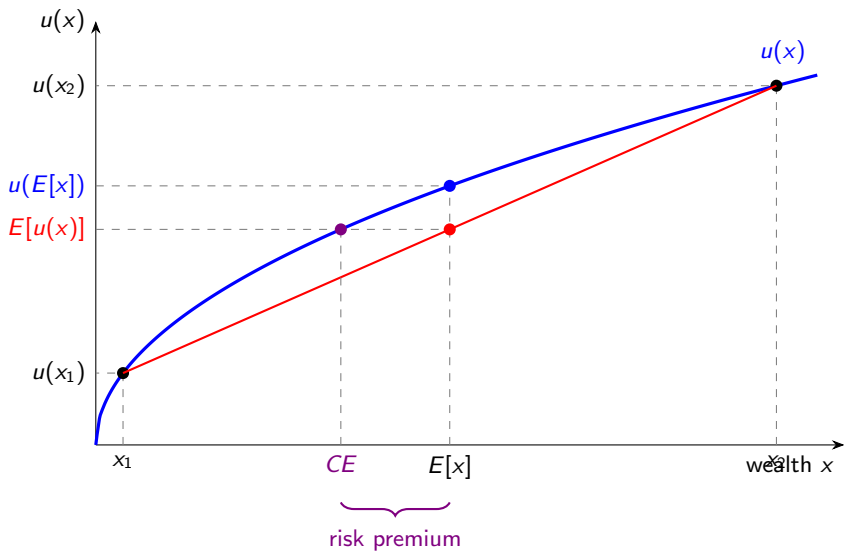


Graphing Risk Preferences



$$\text{Concavity} \Rightarrow u(E[x]) > E[u(x)]$$

Graphing Risk Preferences



$$\text{Concavity} \Rightarrow u(E[x]) > E[u(x)]$$

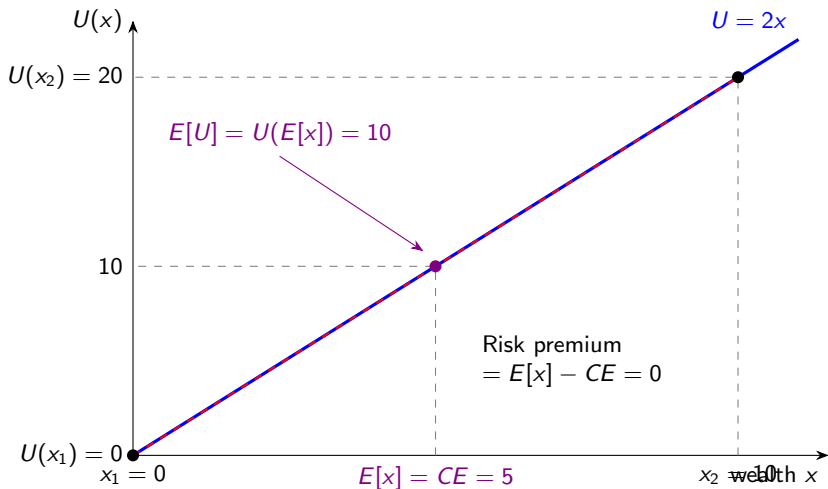
Example Together: $U = \sqrt{x}$

- ◇ Suppose gamble is a 50/50 lottery where Bill can win $x = \$1$ or $x = \$25$.
- ◇ We want to find:
 - ▶ $E[U]$ and $E[x]$
 - ▶ $U[E[x]]$
 - ▶ Certainty Equivalent
 - ▶ Risk Premium

Now You Try: Example 1

- ◇ Utility function given by $U = 2x$
- ◇ Suppose gamble is a 50/50 lottery where Bill can win $x = \$0$ or $x = \$10$.
- ◇ We want to find:
 - ▶ $E[U]$ and $E[x]$
 - ▶ $U[E[x]]$
 - ▶ Certainty Equivalent
 - ▶ Risk Premium
- ◇ Also draw the graph and label it similarly to what we did before.

Example 1: Solution

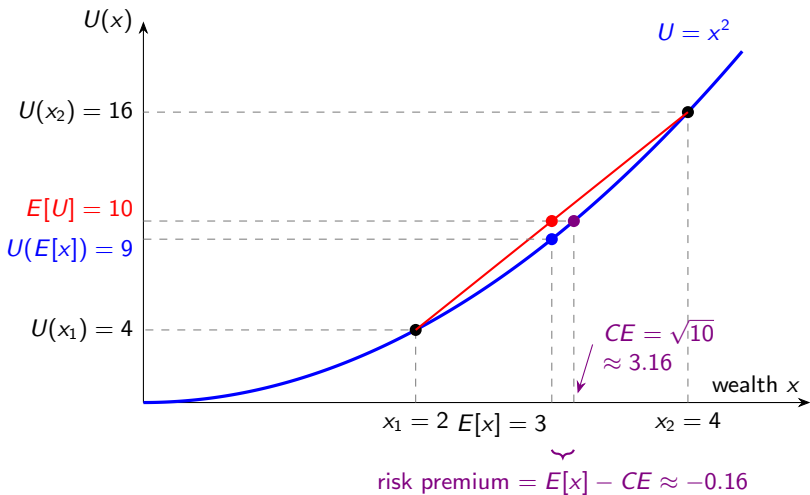


$E[x] = 5$, $E[U] = 10$, $U(E[x]) = 10$, $CE = 5$, Risk premium = 0
Linear utility $\Rightarrow$ the chord lies on $U \Rightarrow$ Bill is **risk neutral**

Now You Try: Example 2

- ◇ Utility function given by $U = x^2$
- ◇ Suppose gamble is a 50/50 lottery where Bill can win $x = \$2$ or $x = \$4$.
- ◇ We want to find:
 - ▶ $E[U]$ and $E[x]$
 - ▶ $U[E[x]]$
 - ▶ Certainty Equivalent
 - ▶ Risk Premium
- ◇ Also draw the graph and label it similarly to what we did before.

Example 2: Solution



$$E[x] = 3, \quad E[U] = 10, \quad U(E[x]) = 9$$

$$CE \approx 3.16, \quad \text{Risk premium} \approx -0.16$$

Convex utility $\Rightarrow$ chord lies above $U \Rightarrow$ Bill is **risk loving**

- ◇ For each option below, choose either A or B.
- ◇ Record your choices on a sheet of paper.
- ◇ Below is an example to ensure understanding.

1 Example Choice

- ▶ A: 50/50 chance of losing \$10 and gaining \$10.
 - ▶ B: 100% chance of gaining \$0.
- ◇ Check: What type of utility maximizer picks A? Picks B?

- ◇ For each option below, choose either A or B.
- ◇ Record your choices on a sheet of paper.

1 Choice 1

- ▶ A: 50/50 chance of losing \$10 and gaining \$10.
- ▶ B: 100% chance of gaining \$0.

2 Choice 2

- ▶ A: 50/50 chance of losing \$1,000 and gaining \$1,000.
- ▶ B: 100% chance of gaining \$0.

- 1 The size/scale of the gamble matters.

- ◇ For each option below, choose either A or B.
- ◇ Record your choices on a sheet of paper.

1 Choice 3

- ▶ A: 50/50 chance of losing \$1000 and losing \$0.
- ▶ B: 100% chance of losing \$500.

2 Choice 4

- ▶ A: 50/50 chance of gaining \$1,000 and gaining \$0.
- ▶ B: 100% chance of gaining \$500.

Running List of Standard vs Actual People

- 1 The size/scale of the gamble matters.
- 2 Losses versus gains are different.

- ◇ For each option below, choose either A or B.
- ◇ Record your choices on a sheet of paper.
- 1 Choice 5: I first hand you \$1000.
 - ▶ A: 50/50 chance of gaining \$1000 and gaining \$0.
 - ▶ B: 100% chance of gaining \$500.
- 2 Choice 6: I do not hand you \$1000.
 - ▶ A: 50/50 chance of gaining \$1000 and gaining \$0.
 - ▶ B: 100% chance of gaining \$500.

Running List of Standard vs Actual People

- 1 The size/scale of the gamble matters.
- 2 Losses versus gains are different.
- 3 Your starting wealth/income matters! (Reference Point)