Economics C34: Lecture 9

Valuing Life
Overview

• Impossibility of riskless society
  – Can your life be “saved?”

• Risk-reduction is an economic “good”
  – “Demand” based on individual preferences
  – “Supply” based on technology (“production possibilities”)

• Aggregation: from individual risks to social statistics

• Health, Safety, and Environmental regulations can promote or impede economic efficiency
  – Risk-risk analysis
  – Equating the marginal costs of risk reduction
  – Reaching the “production possibility frontier”
Impossibility of a Riskless Society

• Risks are a significant part of daily life
  – Driving to work
  – Eating at a restaurant
  – Having sex
  – Drinking alcohol
  – Smoking
  – Being struck by lightening
• Some are voluntary, some are not
• Some can be reduced
  – But, at what cost?
• Few can be eliminated
Lives “saved” versus years of life saved

- Can anyone’s life be “saved?”
  - “. . . no one here gets out alive.”
- Lives can be *prolonged*, however
- Years of life saved per life prolonged differ from case to case
  - Open heart surgery on 100 year olds
  - Open heart surgery for new borns
- Ideally, policies should be evaluated in terms of the *cost per years of life saved*
“Willingness to Pay” for risk reduction: an economic choice

• Example setting:
  – Individual with wealth W
  – Can invest S in improving his personal safety
  – Probability of death is \( p(S) \)
  – Consumption is then \( C = W - S \)
  – Preferences over \( C \) and \( p \)

• \( W \) to Pay for risk reduction
  – Marginal rate of substitution between consumption and risk
  – Slope of indifference curve
  – \( W \) to \( P \) increases with increasing risk
Costs of providing risk reduction

- Costs of reducing risk increase at an increasing rate
  - E.g., \( p'(S) < 0 \) and \( p''(S) > 0 \)
- Impossible to eliminate risk completely
- Construct Consumption-Risk “production possibility frontier” for given wealth
- Consumption-Risk ppf expands with
  - Increasing wealth
  - Improved “safety technology”
An individual’s choice of risk

- Optimal choice requires tangency between ppf and indifference curves
- Each choice provides one estimate of “value of life”
- Different “values of life” estimates result from
  - Different wealth levels
  - Different “safety technology”
Aggregation: from individual *risks* to social *statistics*

- Probability of death becomes statistical deaths
- Social PPF represents feasible tradeoffs between GNP and statistical deaths
- Choice of a point on the PPF implies a “value of life” equal to the slope there
- Resist the temptation to draw “social indifference curves”
Reaching the “production possibility frontier”

• Example of risk-risk analysis:
  – Two (independent) risks of death: A and B
  – Overall risk
    \[ p = p_A + p_B - p_A p_B \]
  – Each risk can be reduced by safety expenditures \( S_A \) and \( S_B \)
    • \( p_A = p_A(S_A) \)
    • \( p_B = p_B(S_B) \)
• Efficiently achieving risk level \( p \) for given \( S \)
  – Requires equating the marginal costs of risk reduction
Operating inside the PPF results in wasted lives

- Using different values of life for different risks puts society inside the PPF
- Points inside the PPF are economically inefficient because they imply
  - Higher risks than safety dollars
    *could* buy and/or
  - Lower consumption than necessary