Lecture 10 & 11

24 Aug 2024

- The observed health status can be written in terms of the potential outcomes as.

$$
\begin{aligned}
Y_i &= \begin{cases} Y_{1i} & \text{if } D_i = 1 \\ Y_{0i} & \text{if } D_i = 0 \end{cases} \\
&= Y_{0i} + (Y_{1i} - Y_{0i})D_i.
\end{aligned}
$$

- Since we do not observe both potential outcomes for any one person, we will have to compare the average health of those who were and those who were not hospitalized.
- A simple comparison of these averages gives us some idea about the effect of hospitalization but not the whole picture. Why?

- Given that potential outcomes have a distribution in the population, the comparison of average health conditional on hospitalization status is related to the average causal effect by the following equation:

$$\underbrace{E\left[Y_i|D_i=1\right]-E\left[Y_i|D_i=0\right]}_{\text{Observed difference in average health}} = \underbrace{E\left[Y_{1i}|D_i=1\right]-E\left[Y_{0i}|D_i=1\right]}_{\text{average treatment effect on the treated}} + \underbrace{E\left[Y_{0i}|D_i=1\right]-E\left[Y_{0i}|D_i=0\right]}_{\text{selection bias}}$$

- Here the term

$$E[Y_{1i}|D_i=1]-E[Y_{0i}|D_i=1]=E[Y_{1i}-Y_{0i}|D_i=1]$$

is the average causal effect of hospitalization on those who were hospitalized

- The selection bias is the difference between average Y_{0i} between those who were and were not hospitalized.
- Since the sick are more likely to get hospitalized, those who were hospitalized and poorer the health you have health status get a higher score, the selection bias here tends to be positive.
- There are situations when the selection bias are negative and so negative that a positive treatment effect could get masked.
- The goal of empirical economics is to overcome the selection bias, or achieve a situation where this selection bias equates to zero that we can identify the true causal effect.

OVERCOMING SELECTION BIAS

- Random assignment of treatment solves the problem because random assignment makes D_i independent of potential outcomes.

$$\begin{aligned} E[Y_i|D_i=1]-E[Y_i|D_i=0] &= E[Y_{1i}|D_i=1]-E[Y_{0i}|D_i=0] \\ &= E[Y_{1i}|D_i=1]-E[Y_{0i}|D_i=1], \end{aligned}$$

- Random assignment of treatment

$$\begin{aligned} E[Y_{1i}|D_i=1]-E[Y_{0i}|D_i=1] &= E[Y_{1i}-Y_{0i}|D_i=1] \\ &= E[Y_{1i}-Y_{0i}]. \end{aligned}$$

- These are tools to test the effects or impacts of public policies

PUBLIC POLICY AND ITS GOALS

- Promoting gains for all
- Correcting unfairness

<u>EFFICIENCY/PROMOTING GAINS FOR ALL</u>

- The problem of tragedy of commons can be averted by
  i. Private property of pasture (Joint ownership of all the cattle won't help because of free – riding problem)
  ii. If one herder was given private ownership of pasture – this solves the problem of overgrazing
  iii. However, is this a fair allocation?
- An unfair outcome might not be sustainable in the long run, even if it provided an efficient solution to the initial problem.

- The outcome of an economic interaction is called **allocation.**
- Explaining fairness and efficiency using the ULTIMATUM GAME.
- The ultimatum game involves:

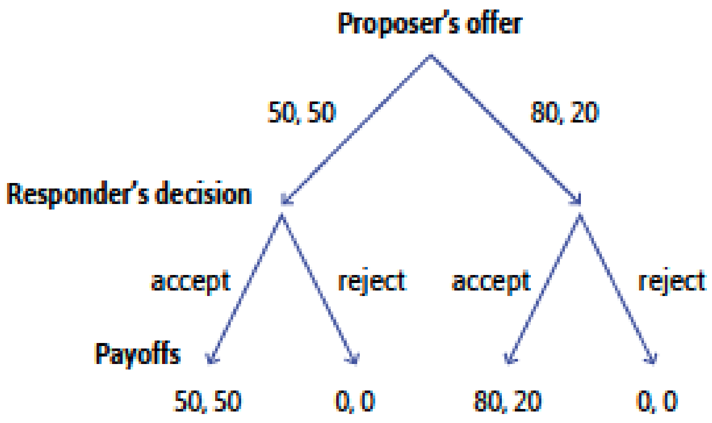
1. Two players: Proposer and Responder
2. Actions: The proposer proposes an amount of money to be offered to the responder from a pool of money (say $100).

The responder accepts or rejects the amount of money proposed by the proposer.

3. Preferences: More money is preferred to lesser amount of money.
4. Player function
5. Terminal histories

- If the offer is rejected, both individuals get nothing
- If the offer is accepted the split is implemented
- Take-it-or-leave-it-offer

- The ultimatum game is an example of a sequential game.
- Sequential games can be explained better using a game tree.



- A terminal history is each possible sequence of actions
- Player function : function that gives the player who moves at each point or node in each terminal history

- In this game what the proposer does depends on what the responder would do.
- For instance, a responder who thinks that the proposer’s offer was insultingly low might be willing to sacrifice their own payoff to punish the proposer.
- Here the social norm of the concept of fairness could affect the outcome.
- If the responder only cared about their own payoffs, they would accept any positive offer, because something is better than nothing.
- But if the responder cared about fairness too, you might decide to reject the offer if the proposer made a very low offer.
- Suppose we change the rules of the game such that responder has to accept the offer and could not reject any offer – dictator game.

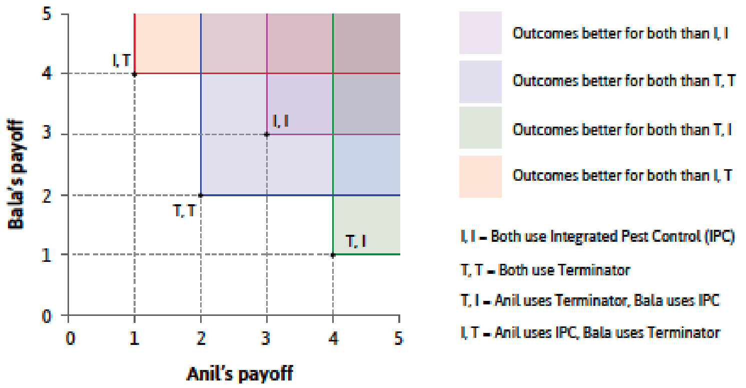
- In a world composed only of self-interested individuals, in which everyone knew for sure that everyone else was self-interested, the proposer would anticipate the responder would accept any offer greater than zero and hence would offer the minimum possible positive amount.
- This does not match the experimental data.

PARETO EFFICIENCY

- An allocation with the property that there is no alternative technically feasible allocation in which at least one person would be better off, without making anyone else worse off.
- In economics, the term efficiency means pareto efficiency.
- So, the situation where one person gets all the resources is also a pareto efficient / economically efficient allocation.
- There is no need for equality for economic efficiency.
- PARETO CRITERION: Pareto efficiency criterion to judge the efficiency of an allocation.
- Suppose there are two allocations of resources A and B for ‘n’ people.
  - If all n people prefer A to B, or some $k \leq n$ prefer to A to B and the remaining n-k people are indifferent between A and B, then by Pareto Criterion A is a more efficient allocation than B

- PARETO DOMINANT: Allocation A Pareto dominated allocation B if at least one party would be better off with A than B, and nobody would be worse off.
- Thinking of Pareto Efficiency in the following three situations of ‘tragedy of commons’:
    - Overgrazing the pasture under open access : not Pareto efficient
    - Shifting from a regime of open access to one of jointly-agreed upon restricted access would be a Pareto improvement. This Pareto Dominates the situation of open access
    - Shifting from single private ownership of pasture to joint ownership of pasture: not Pareto improvement
    - The Pareto criterion can only talk about policies that are a Pareto improvement from public policy point of view.

- Apply Pareto criterion to the pest control game. In the game two farmers decide to choose whether to apply integrated pest control (I) or the more harmful terminator (T) for pest reduction. Their payoffs resemble a prisoner's dilemma situation. Both would be better off if both used I than if both used T, but without coordination, each would be better off by choosing T, regardless of what the other does.



- Moving from (T,T) to (I,I) is a Pareto improvement.

- The Pareto criterion is not an all-cure for policy making because:
    - Few Pareto improvements: There are few changes that are truly win-win. Since there are losers from policy changes, a change in the status quo usually never is a Pareto improvement.
    - Compensation: The Pareto criterion we have used so far does not consider the case that the game played could have a second stage.
        - In the earlier Pest Control game, for instance the policy maker choses to implement the outcome (T,I) where Anil gets payoff 4 and Bala gets payoff 1.
        - The status quo of this game is the NE (T,T) which gives each player payoff of 2 each.
        - But suppose the policy maker implements (T,I) and asks Anil to pay Bala a compensation of 1.5 units, both of them now receive a payoff of 2.5 each which is better than the status quo of 2 each. This is a Pareto improvement.
    - The idea of fairness