Econ 201: Introduction to Economic Analysis

October 28 Lecture: Public Goods

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Daily dose of The Far Side

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Fish thrill rides

Preview of this class session

- Wednesday's conference on public goods will begin with another experiment: The voluntary contribution experiment
- Pure public goods have two essential characteristics: nonrivalry and nonexcludability
- Optimal price of public goods is zero because MC of use is zero
- Market will not provide incentives for private producers to supply public goods
- Demand for public goods is *vertical* aggregation of individual demands because everyone uses the same units of good
- Optimal amount to provide is where demand = marginal cost

Voluntary-Contribution Experiment

Experiment description

- We will use veconlab again for the voluntary-contribution experiment
    - You will log in at http://veconlab.econ.virginia.edu/login.htm using a "session name" (rcjp##) that I will give you at the beginning of class
- **Please be on time** or, preferably, early for Wednesday's class
    - I need to specify the number of participants in advance, so I cannot guarantee that you will be able to join the experiment if you are late
- The next few slides will sketch the instructions; we will go through these instructions again at the start of the experiment
- The experiment is quite simple

Basic setup

- **Rounds**: As with the double auction, the experiment consists of rounds, each of which is similar to, but completely separate from, the others

- **Groups**: You will be part of a group of 4 players that does not change between rounds

- **Tokens**: In each round you have 10 "tokens" to allocate between your own private use and investment in a public-good project

- Each token you retain gets you $1 of earnings; you also earn $XX (< $1) per token for each token you invest, plus all tokens invested by **all of the other members** of your group
  - You will be told $XX at the beginning of the experiment
  - Each token you invest yields 4 × $XX, divided equally between you and the others in the group

Earnings example

- If $XX is $0.50, then your earnings for the period will be
  - $1.00 for each token that you keep
  - $0.50 for each token that you invest in the public good
  - $0.50 for each token that the other 3 players in your group invest
- Suppose that everyone in your group keeps 5 and invests 5
  - You get $5.00 for the 5 tokens you keep
  - You get $2.50 for the 5 tokens you invest
  - You get $7.50 for the 15 tokens invested by the 3 others in the group
  - Your total earnings for the round are $15.00
- If you had kept all 10 tokens and the others invested 5, you would earn $10.00 + $0.00 + $7.50 = $17.50
- If everyone in the group were to keep all 10 tokens, everyone would just earn $10.00

Theory of public goods

Two characteristics of public goods

- **Nonrivalry**
  - Consumption by person X does not reduce amount available for others
  - Examples: Recipes, uncrowded roads, parks, or hiking trails, broadcast radio and television
  - Marginal cost of extending use to additional person = zero
  - Efficiency: Users must charged a zero price so they consume at MB = 0 and MB = MC

- **Nonexcludability**
  - Not feasible to exclude individuals who don't pay from consuming
  - Examples: Information, street lights, national defense, Queen of England
  - If non-payers cannot be excluded, then everyone has incentive to be **free rider**

Provision of public goods

- **Pure public goods**: Perfectly nonrival and nonexcludable
  - Firms make no revenue from free riders, so little incentive to produce nonexcludable goods
  - Efficiency requires a zero price for nonrival goods anyway

- **Market failure**: Price system does not provide signals to assure allocation of resources to producing public goods

- How do public goods get produced?
  - Usually by governments, funded by mandatory taxes
  - This allows setting zero price to match zero marginal cost, which is efficient use of public good
    - But taxes themselves introduce inefficiency in markets being taxed
  - Sometimes by contributions (public radio/TV) or advertising (private radio/TV)

Demand curve for public goods

- Think of the demand curve as one's marginal **willingness to pay** for different levels of the public good
  - Park size: How much would you value 1 acre? 2 acres? 3 acres?
- Because everyone uses the same units of the public good, we aggregate these demand curves **vertically** to get market demand curve = aggregate willingness to pay
- Efficient quantity is where market demand = marginal cost of provision

Acres	One's MWTP	Two's MWTP	Total MWTP	Marg. Cost
1	$250	$1,000	$1,250	$500
2	$200	$900	$1,100	$750
3	$150	$500	$650	$1,000
4	$100	$100	$200	$1,500
5	$50	$0	$50	$2,000

Review

- Public goods are nonrival and nonexcludable
- Nonexclusion → Free-rider problem
- Nonrivalry → Efficient provision is with price = 0, but no incentive for private production
- Aggregate willingness to pay (demand) is vertical sum of individuals' curves
- Optimal provision is where aggregate willingness to pay balances marginal cost of provision

Daily diversion

In case you haven't noticed, I love playing with words. Many words in the English language have opposites formed by adding a negative prefix or suffix, such as non-, un-, dis- or -less. Many terms have opposites indicated by prefixes, such as endogenous and exogenous.

But there are a few terms that have opposites that don't seem to be in common use. For example, even though you won't have any trouble figuring out what they mean, I've never heard anyone use (except when I use them!): reckful, gruntled, or exjoy.

Can you suggest any other good examples?

What comes next?

- Friday's class discusses the microeconomics of technological change

- Case of the Day for Friday covers some basic ideas about incentives for research and innovation

- Non-required problem set covering recent topics is available, but don't turn it in: Just use it for exam preparation