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Teaching Plan
February 13, 2017

Course: Principles of Microeconomics
Class: Public Goods, free-rider problem
Duration: 50 minutes

Learning outcomes:

1. Define excludability and rivalry in consumption
2. Understand the four types of goods (private, public, common resources, club) based on excludability and rivalry in consumption.
3. Define the free rider problem as a situation in which one person can benefit from the use of a good without paying for that good.
4. Recognize that goods that are non-excludable (public goods and common resources) suffer from the free-rider problem

Lesson design:

Lecture (25 minutes)

Discuss lecture notes (chalk and talk)

Activity (25 minutes)

Play the free-rider game for 20 minutes (see attached form)

Debrief the free-rider game 5 minutes.

Materials:

n printed free-rider record forms

n investment forms

1 prize (\$10)

Public Goods and Common Resources

We saw that in the free market prices are the signals that guide the decisions of buyers and sellers, and that these decisions lead to an efficient allocation of resources.

But what happens when goods are free (the price is not available), then the market forces that normally allocate resources in the economy are absent.

Today we'll look at the market for public goods (those goods that don't have a price attached to them). We'll see that governments can improve market outcomes when there are public goods.

When a good does not have a price attached to it the private market cannot ensure that the good is produced and consumed the the proper (efficient) amount. Thus government policy can potentially remedy the market failure and increase economic well-being.

There are two main characteristics of goods:

1. **excludability**: the property of a good whereby a person can be prevented from using it.
2. **rivalry in consumption**: the property of a good whereby one person's use diminishes other people's use.

With these two characteristics we can identify *four* types of goods.

1. **Private goods**: goods that are both excludable and rival in consumption.
 - Most of the goods we have considered in this class are private goods.
2. **Public goods**: goods that are neither excludable nor rival in consumption.
 - This means that people cannot be prevented from using a public good. It also means that one person's use doesn't affect another person's use of that good.
 - Examples include firework displays and tornado sirens
3. **Common Resources**: goods that are rival in consumption but not excludable.
 - This means that people cannot be prevented from using a good. But one person's consumption does hinder another person's consumption.
 - Examples include fishing in the ocean and overcrowded parks
4. **Club goods**: goods that are excludable but not rival in consumption.

- This means that people can be prevented from using a good. But one person's consumption does not hinder another person's consumption.
- An example is cable tv in which everyone who pays for the service receives it (excludable because you have to pay) but one person's consumption does not hinder another person's consumption because everyone can buy the same cable television and my use doesn't inhibit your use.

The boundaries between the four types of goods can be fuzzy.

In this lecture we focus our attention on public goods and common resources. Or goods that are non-excludable. When goods are non-excludable the price is essentially zero because I cannot stop anyone person from consuming the good. The analysis is closely related to the analysis of externalities.

Public Goods

Let's consider the market for fireworks-we cannot stop anyone from watching meaning the firework display is nonexcludable. Fireworks are also non-rival in consumption because one person watching the firework display does not stop another person from watching the firework display. Thus because fireworks are nonexcludable and non-rival they are a public good.

Suppose students of Ithaca College want to put on a firework display for homecoming. Each student at IC values the firework display at \$10. The cost of a firework display is \$1000. Since there are approximately 6000 students, Ithaca college values the firework display at \$6000. The entire community places a larger value on the display than the private cost of the display. That is the socially efficient allocation would be to host the firework display because the cost (\$1000) is less than the value (\$6000). However, because each person is only willing to pay \$10 no single person will put on the display. This is because the private value (\$10) is less than the private cost (\$1000).

You can see that this is similar to a positive externality where social benefit exceeds private benefit. Thus if the free market were to allocate the firework display there would be no firework display because no individual student has the incentive to put on the firework display. Even if one student decided to sell tickets to the firework display it would be unlikely that the firework display would occur. This is because the firework display is non-excludable.

Suppose one student decided to sell tickets to the firework display at \$10 per ticket. Ithaca College students being very wise would realize that the firework display will be visible from all parts of campus and to all students on campus, not just those that pay to see the firework display. Thus each student would have an incentive to **free ride**.

Free rider: a person who receives the benefit of a good but avoids paying for it.

Because people have an incentive to free ride, they won't buy tickets and thus the student who wants to put on the display will not be able to raise enough money for the show. If the student can't raise enough money for the show, then she won't put on the show. Thus the outcome will be inefficient.

One solution to this problem would be if the college “taxed” everyone at \$2 per person. This would generate \$1200 in tax revenue for the display. And each person would have consumer surplus of \$8 (because their willingness to pay or private benefit is \$10 and the tax is \$2).

note: because the public goods are not excludable, the free rider problem prevents the private market from supplying them. But government can correct the underprovision of public goods by taxing and providing the public good making everyone better off.

There are three important public goods to know.

1. National Defense: It is nonrival and nonexcludable, but too costly for a single individual to provide. Thus, it is important for the government to provide national defense to its citizens.
2. Basic Research: general knowledge is a public good. Theorems are nonexcludable and non-rival. That means they are underprovided by the private market. The government offers grants and fellowships.
3. Fighting poverty: advocates of antipoverty programs claim that fighting poverty is a public good.

Governments often rely on a cost benefit analysis to determine the optimal quantity of the public good to provide.

cost benefit analysis: a study that compares the costs and benefits to society of providing a public good.

Common Resources

Common resources are not excludable, but they are rival in consumption. One person's use reduces another person's ability to use the good. This gives rise to a problem called the tragedy of the commons.

Tragedy of the commons: a parable that illustrates why common resources are used more than the desirable amount from the standpoint of society as a whole.

The tragedy of the commons occurs because social and private incentives differ. Just like with a negative externality. In essence, the tragedy of the commons arises from an externality in which people neglect the external cost of their actions when deciding how much to consume/produce. This often results in over consumption of the common resource.

note: when one person uses a common resource, she diminishes other people's enjoyment of that good. Because of the negative externality, common resources tend to be used excessively. The government can solve the tragedy of the commons problem by using regulation or taxing consumption. Another option would be for the government to turn the common resource into a public good.

Important examples of common resources includes:

1. Clean air and water
2. Congested Roads
3. Fish in the ocean
4. Wildlife in the forest

Instructions:

You have \$10. You are required to make a decision on how to invest your \$10. There is a private account and a class account. For each dollar you invest in your private account you will receive one dollar back. Each dollar invested into the class account will yield 2 dollars for the class account. Each person in the class will receive an equal share of the money in the class account regardless of the individual contribution.

As an example, suppose I decide to invest \$5 in my personal account and \$5 in the group account. I learn that the class contributed 145 to the class account. If there are 29 students in the class then my return from the class account is $(145 * 2)/29 = 10$. Then my earnings from the round are my \$5 from my personal account and \$10 from the class account. The total earned would be \$15.

For each round make your investment decision on the decision form. The total invested in your personal account and class account must sum to 10. Do not let anyone see your decision. You are not allowed to discuss your contributions with your neighbors. Once you have filled in your decision, make sure to copy the amount you invested into your personal account on your record sheet in the first column, "Earning from Personal Account."

There will be four rounds. Do not put your name on the round forms. These should be anonymous. I will collect the investment decision forms. I will calculate the total contribution to the class account and the payoff to the class for each round.

The person with the highest total earnings at the end of 4 rounds will be declared the winner. The winner will receive a prize.

Record Sheet

Round	Earning from Personal Account	Earning from Class Account	Total Earned in Round	Cumulative Total
1				
2				
3				
4				

Decision Form

For each round write the number of the round. Then write the number of dollars you wish to invest in each account. The sum of your investment decision must be 10 dollars.

Round #:

Personal Account	Class Account

Round #:

Personal Account	Class Account

Round #:

Personal Account	Class Account

Round #:

Personal Account	Class Account