Public Goods--Definition

A public good is a good that is *non-rival* and *non-excludable*.

- **Excludable** goods are goods that people can be prevented from enjoying.
  - Someone can restrict your access to it, and so force you to pay if you want access

- **Rival** goods are goods for which one person’s use of the good diminishes another person’s enjoyment of it.
  - One person’s consumption of it, leaves less for everyone else to consume
Rivalness and Excludability

- It’s useful to think of some examples

<table>
<thead>
<tr>
<th>Types of goods</th>
<th>Rival?</th>
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<tbody>
<tr>
<td>Excludable?</td>
<td>No</td>
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<tr>
<td>No</td>
<td>Pure Public Goods (national defense, lighthouses)</td>
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<tr>
<td>Yes</td>
<td>Collective Goods (cable TV)</td>
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Rivalness and Excludability

• Note that sometimes the level of use of a good affects rivalness
  – For example, an empty road is non-rival
  – Adding one person to the road probably has no effect on your ability to use it
  – But as it becomes congested, other people’s use diminishes your ability to use it.
How Are Public Goods like Positive Externalities?

• Take healthcare: Basically a private good, but has some public good aspects
  – Healthcare makes one person healthier, but also reduces their likelihood of spreading disease
  – If you get healthcare, my reduced chance of getting sick during office hours doesn’t deprive anyone else around you from benefit of reduced risk of disease (non-rival); you also can’t deny me the benefits of your better health (non-excludable)
  – So healthcare has a public good component to it
  – aka positive externality
  – A public good is basically a good that is 100% positive externality
Negative Externalities--Public Bads

• The reverse is true as well. If global warming is a public bad, then reduction of that is a public good.
  – Pollution contributes to a public bad
  – It can also be considered a negative externality
  – So there is some overlap in the definitions.
The Problem with Public Goods

• Public goods are subject to market failure. They tend to be underprovided by private markets. Why?
  – Free-rider problem
  – Free-rider: Someone who benefits from a good without paying for it
  – We’ll return to this
Efficient Provision of Goods

• Efficient provision of any good (public or private) occurs at the quantity where marginal benefit equals marginal cost.

• The critical difference between private goods and public goods has to do with how we come up with the marginal benefit curve:
  - We know how to find market marginal benefit curve for a private good.
  - Just horizontally aggregate all individual demand curves for the good.
Efficient Provision of Goods

• How do we find market marginal benefit curve for a *public* good?
  – *Vertically* aggregate individual demand curves for the good
  – Why vertically? Because the good is non-rival, so each unit of the good gives benefits to everyone in the population, regardless of how many people use it
Efficient Provision of Private Goods

• First let’s revisit private goods. Suppose we’re trying to find the efficient allocation of pizza slices.
  – Assume 10 consumers in market; each has demand given by $q=5-(1/2)P$
  – Each extra slice of pizza costs $1 to produce (value of foregone resources); $MC=1$
  – Get market demand for pizza by horizontally aggregating demand curves $\Rightarrow Q=50-5P$
  – Inverse demand curve is $P=10-(1/5)Q$
  – Equivalent to overall MB curve: $MB=10-(1/5)Q$
Efficient Provision of Private Goods

- For efficiency, need to pick Q such that $\text{MB}=\text{MC}$
- $\text{MC}=1$
- $\text{MB}=10-(1/5)Q$
- Setting these equal, we get $10-(1/5)Q=1$ or $Q=45$. 
Efficient Provision of Public Goods

- Consider demand for monuments to famous dead Victorians
  - Spz there are 10 people in Victoria, and they all enjoy monuments
  - Monuments each cost $20 to produce (MC=20)
  - Each has demand curve for monuments given by $q=5-(1/2)p$
  - Rearranging, we can express this as $p=10-2q$. By our second interpretation of the demand curve, this is the same as (individual) $MB=10-2q$
Finding MB with Public Goods

• Suppose monuments are installed in Bastion Square, where everyone can see them
  – Monuments are a public good.
    • My viewing a monument doesn’t detract from yours; Bastion Sq can’t be roped off
  – So in calculating MB for market, we need to take into account that each monument is “consumed” 10 times
  – In other words, for each unit consumed, we need to add up every consumer’s MB from that unit to get the overall MB curve
Efficient Provision of Public Goods

• Now we’re dealing with a public good, we need to vertically aggregate individual MB curves (MB=10-2q)
  – Get (market) MB=100-20Q
  – Want MB=MC for efficiency, so to find efficient Q, set 100-20Q=20; ==> Q=4
  – The efficient number of monuments is 4
Efficient Provision of Public vs. Private Goods

• Note that while in both cases (pizza and monuments) we set MB=MC to get efficient Q, in each case we obtained MB differently (to take into account that one was private and one was public)

• So why is there a market failure with public goods?
  – Free-rider problem
Free-rider problem

• If everyone is honest about his/her marginal willingness to pay (MB) and contributes accordingly, we’ll get efficient provision

• But because PGs are non-excludable, people may decide not to pay for the PG, and just consume from other people’s contributions
  – In this case, with no coordination, each person would optimally decide to buy zero monuments (MC=$20, individual WTP for 1 monument is $9.50)
  – In equilibrium, therefore, no monuments would be provided.
Free-rider problem

• Example
  – Suppose you have one roommate
  – You both like the same TV shows, but you have no TV
  – Your willingness to pay for a TV is $100.
  – Your roommate’s WTP=100
  – A TV costs $150
  – Without coordination, neither of you will buy the TV; yet each willing to pay $100
  – Aggregate MB=WTP=200==>TV should be purchased (efficient to provide 1 TV)
  – But no TVs will be provided if it’s left up to each individual’s private decision
“Government” as a Solution

- Note that any sensible roommates will talk over this problem and solve it
  - They may agree that it’s fair for each to contribute $75.
  - One can think of this as the roommates deciding to tax themselves in order to provide a public good
  - This is a very primitive form of democratic government (at the apartment level)
  - In a similar way, larger societies decide (through some political mechanism) to tax themselves in order to provide certain public goods.
Free-rider problem

• Note that just because people free-ride doesn’t mean there will be no contributions to public goods
  – Lots of contributions to tsunami relief, Haiti, Pakistan relief
  – Some of you probably do some cleaning in shared apartments

• But in general, we will expect that contributions will be too low (i.e. inefficient)
  – This is because even if people make private contributions to the PG, they only take into account the benefit to them, not the benefit to others.
Why Isn’t there Complete Free-riding?

– Reciprocal altruism: People may expect that by contributing, they induce others to contribute
– Pure altruism: Some people may get pleasure out of other people’s pleasure
– Impure altruism: Some people get pleasure out of feeling like they’re doing the “right thing.”
– In experiments, people are less likely to free-ride if they are able to talk to each other (feelings of guilt or obligation may play a role)
– Pure selfishness: You still gain benefits from your own contribution, so the optimal contribution may be positive (pure rationality)
Government Provision of Public Goods

• If equilibrium provision of public goods is too low, government can spend money to optimally increase provision

• Note that just because government spends money on something doesn’t make it a public good
  – Education mostly a private good (arguably)
  – Healthcare is largely a private good

• And just because government doesn’t provide a good doesn’t mean it’s not a public good
Government Provision of Public Goods

- Recall that the efficient level of public goods provision is where $MB=MC$
- Due to free-riding, public goods will tend to be underprovided
- Private provision of tsunami relief
Solutions to Free-rider Problem: Government Provision of Public Goods

• Govt could push us to efficient provision, by taxing and spending taxes on extra contributions
  – Potential problems
    • Taxes used to raise extra contribs may be distortionary (cause DWL in labour mkt?)
    • Some people may not care about tsunami relief; taxation makes them worse off
    • Just as I may free-ride on your contributions to public goods, I may free-ride on the government’s contributions; Government contributions may *crowd out* private contributions.
    • If the costs of providing the public good exceeds the benefits, the government should not provide it.
Public Goods in the News—Carbon Emissions Reductions

• Reduction of carbon emissions is a pretty good example of a public good
  – Non-rival (my keeping cooler 50 years from now doesn’t prevent you from keeping cooler)
  – Non-excludable (can’t keep me from enjoying cooler temps if I don’t pay)
Public Goods in the News—Carbon Emissions Reduction

• Imagine passing the hat around BC for carbon reduction (basically what environmentalists do by convincing people to voluntarily reduce their carbon footprint)
  – Free-rider problem likely to dominate=>too few contributions
  – BC government might enforce measures (energy standards, carbon tax, etc.)

• But carbon reduction still has benefits outside of BC and outside of Canada

• Passing hat around entire world would be even more difficult; free riding even greater.
PGs in the News—Carbon Reduction

• Countries can step in to manage public goods problem for its citizens
  – But individual countries still have an incentive to free ride (Canada’s contributions to world emissions are small—why not let someone else deal with the problem and enjoy higher GDP?)
  – Canada and other countries could form coalition to reduce emissions
    • Kyoto Protocol
    • Copenhagen Summit (current treaty round)
PGs in the News—Carbon Reduction

• Note that when potential free-riding involves thousands or millions of agents, it’s problematic.
• When it just involves a few (say 3 countries) a meeting can be convened to coordinate efficient provision.
  – Good reason for regional cooperation between governments (whether local or international)
• But in any case, leaving it to markets alone will generally be insufficient to achieve efficient outcome.
Other Public Goods in the News

• Open Space in Greater Victoria
  – Parklands are arguably public goods
    • Exhibit some rivalness, and someone could put electric fences around them and charge admission, but that’s expensive

• Pacific Tsunami Warning System (marine early warning network)
  – US, Canada, Japan have contributed
  – Non-rival. Is excludable?