Public Goods, Externalities, and the Role of Government

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Outline

• Introduction: What is the role of public finance?
• Efficiency of Markets: How and When
• Reasons for Market Failures
  - Externalities
  - Public Goods
Definitions

• *Welfare economics* is the study of the determinants of well-being, or welfare, in society.

• It depends on:
  - Determinants of social efficiency, or size of the economic “pie.”
  - Distribution: who eats what part of the pie

• *Public Finance* deals with the role of the government in the economy
  - Expenditure side: What services should the government provide?
  - Taxation side: How should the government raise its money?
The Three Questions of Public Finance

• When should the government intervene in the economy?
• How might the government intervene?
• What is the effect of those interventions on economic outcomes?
When Should the Government Intervene in the Economy?

- According to the consensus competitive private markets provide “efficient” outcomes for the economy (right, Bruno?)
- It is generally hard to justify government intervention in markets. But one commonly agreed justification is Market Failures
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The Methodology of Neoclassical Economics

- Methodological individualism: The “representative agent”
- All individual choices are done by equating at the margin benefits and costs of a given action
- Choice is always constrained (no free lunch)
- Aggregation yields the “macro picture”
- In the typical (simplified) setting we have two representative agents
  - Households/consumers (max utility)
  - Firms (max profit)
Demand and supply curves (a.k.a “Grandmother Economics”)

• Demand curve is the relationship between the price of a good and the quantity demanded.
  - Derived from utility maximization
  - Downward-sloping because of the principle of substitution among goods

• Supply curve is the relationship between the price of a good and the quantity supplied.
  - Derived from profit maximization problem.
  - Upward-sloping because of the principle of increasing cost.

• Equilibrium is the intersection between Demand and Supply
Main Results: Existence and Efficiency

General equilibrium (Walras)
• It does always exist a vector of relative prices that equates demand and supply

Fundamental Welfare Theorems (Pareto)
• A perfectly competitive equilibrium is efficient.

• Conditions for Welfare Theorem to hold: No agent can extract rent from the other participants to the economy
  Ù Perfect competition
  Ù Perfect (or at least symmetric) information
• A more obscure -but useful- way to put it, is that for no agent the marginal costs or benefits are different than costs/ benefits for the society as a whole:

\[
MB_p = MB_s \\
MC_p = MC_s
\]
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• Efficiency of Markets: How and When
• **Reasons for Market Failures**
  • **Externalities**
    - Externality theory
    - Private-sector solutions
    - Public-sector solutions
    - Distinctions between price and quantity approaches to addressing externalities
• Public Goods
Externalities

- Externalities arise whenever the actions of one party make another party worse or better off, yet the first party neither bears the costs nor receives the benefits of doing so.

\[ MB_p \neq MB_s \]

or

\[ MC_p \neq MC_s \]

- This represents a market failure for which government action could be appropriate and improve welfare.
Externalities

• Externalities can be negative or positive:
  - Acid rain, global warming, pollution, a neighbor’s loud music, being late at appointments during a field trip, are all negative externalities.
  - Research and development, or asking interesting questions in class are positive externalities.

• We can have production or consumption externalities

• Example: Global Warming
  - Why is global warming an externality?
Global carbon emissions (Patz, 2007)
Mortality due to climate change  (Patz, 2007)
Global Warming

• Although the warming trend has negative effects overall, the distributional consequences vary.
  - In much of the United States, and northern Europe warmer temperatures will improve agricultural output and quality of life.
  - In Bangladesh, which is near sea-level, much of the country will be flooded by rising sea levels.

• If you’re wondering why you should care about Bangladesh, then you have identified the market failure that arises from externalities.

• From your private perspective, you shouldn’t!
To understand the case of negative production externalities, consider the following example:

A profit-maximizing steel firm, as a by-product of its production, dumps sludge into a river.

The fishermen downstream are harmed by this activity, as the fish die and their profits fall.

This is a negative production externality because:

Fishermen downstream are adversely affected.
And they are not compensated for this harm.
To sum up

• The theory shows that when a negative externality is present, the private market will produce too much of the good, creating deadweight loss.

• When a positive externality is present, the private market produces too little of the good, again creating deadweight loss.
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A Market Solution? The Coase Theorem

- The **Coase Theorem**: When there are well-defined property rights and costless bargaining, then negotiations between the parties will bring about the socially efficient level.

- Thus, the role of government intervention may be very limited—that of simply enforcing property rights.

- Consider the Coase Theorem in the context of the negative production externality example from before.

  - Give the fishermen property rights over the amount of steel production.
  - They will impose zero production unless the steel producer gives them a compensation.
  - The compensation is an internalization of the externality.
  - Through a process of bargaining, the steel firm will bribe the fishery to arrive at the socially optimal level.
  - Another implication of the Coase Theorem is that the efficient solution does not depend on which party is assigned the property rights, as long as someone is assigned them.
Problems with Coasian Solutions

- There are several problems with the Coase Theorem, however.
  - The assignment problem (how do we compute costs and attribute blame?)
  - The holdout problem (what if two parties are given the property rights?)
  - The free rider problem (the last fisherman will not benefit from bribing)
  - Transaction costs and negotiating problems
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Public Sector Remedies?

- Coasian solutions are insufficient to deal with large scale externalities. Public policy makes use of two types of remedies to address negative externalities:
  - Corrective taxation/subsidies
  - Regulation
Corrective Taxation and/or Regulation

• The government can impose a “Pigouvian” tax on the steel firm, which lowers its output and reduces deadweight loss.
  - If the per-unit tax equals the marginal damage at the socially optimal quantity, the firm will cut back to that point.
  - Similarly, when there is a positive externality, subsidies may induce firms to expand output.

• Finally, the government can impose quantity regulation, rather than relying on the price mechanism.
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• In an ideal world, Pigouvian taxation and quantity regulation give identical policy outcomes.

• In practice, there are complications that may make taxes a more effective means of addressing externalities.
  - This requires less information
  - It deals better with firm heterogeneity

• Quantity regulation ends up being necessary when the exact target has to be reached (example, nuclear leakage!)
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• **Public Goods**
  - Optimal provision of public goods
  - Private provision
  - Public provision
What is a Public Good?

- Some markets do not work very well because the good in question has public good characteristics to it

- Example: privately provided trash collection

- The key problem with private collection of garbage is the free rider problem: with market provision, each resident could simply sneak his garbage into his neighbor’s garden. Eventually, everyone would figure this out, and no one would be willing to pay trash collection voluntarily
What is a Public Good

• Pure public goods have two traits:
  ⇨ They are non-rival in consumption: The marginal cost of another person consuming the good is zero, and does not affect your opportunity to consume the good.
  ⇨ They are non-excludable: There is no way to deny someone the opportunity to consume the good.
### Defining pure public goods

<table>
<thead>
<tr>
<th>Is the good rival in consumption?</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is the good excludable?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>Ice cream (private good)</td>
<td>Cable tv</td>
</tr>
<tr>
<td>No</td>
<td>Crowded city sidewalk</td>
<td>National defense (public good)</td>
</tr>
</tbody>
</table>
Private Sector Provision of Public Goods

• In general, the private sector underprovides public goods because of the free rider problem.

• Consider two people, Ben and Jerry, and two consumption goods, ice cream and fireworks.

• Ben and Jerry benefit equally from a firework that is provided by either of them. What matters is the total amount of fireworks.

• Both Ben and Jerry will demand a smaller amount of fireworks than they desire, counting on demand by their colleague.

• The result is that the amount of fireworks bought will not be socially optimal.
There are some interesting examples of the free-rider problem in practice.

- Only 7.5% of public radio listeners in New York contribute to the stations— that is, there is a lot of free-riding. In France, the government charges an annual licensing fee (redevance) for all television owners.

- Many users of file sharing services never contribute uploaded files; they only download files. Some of p2p servers, like µtorrent, give download priority to those who contribute.
• There are some circumstances in which private market forces may solve the free rider problem:
  - Intense preferences.
  - Altruism.
  - Utility from one’s own contribution to the public good.

• Hard to count on them!!
Public Provision of Public Goods

• In principle, the government could solve the optimal public goods provision problem and then either provide the good directly or mandate individuals to provide the amount.

• In practice, three problems emerge:
  - Crowding-out.
  - Measuring costs and benefits.
  - Determining the public’s preferences.
Private Responses to Public Provision: The Problem of Crowding-Out

- In some cases, the private market may already be providing a certain (socially inefficient) level of the private good.
- In this case, public provision may crowd-out some of the private provision: as the government provides more of the public good, the private sector provides less.
Public Provision of Public Goods: Measuring the costs and benefits of public goods

• Another problem for government provision is measuring costs and benefits of the public good.
• Example: the Marseille-Paris TGV
How Can We Measure Preferences for the Public Good?

• Finally, our model of optimal public good provision assumes the government knows each person’s preferences over public and private goods.
• In practice, this runs into problems with preference revelation, preference knowledge, and preference aggregation.
• These issues are addressed in the field of political economy.