Chapter 5:
Externalities, Environmental Policy and Public Goods
Externalities, Environmental Policy and Public Goods

1. Introduction.
2. Externalities and Economic Efficiency.
3. Private Solutions to Externalities.
5. Four Categories of Goods.
1. Introduction

- Demand and supply curves show the benefits and costs to the society from trading in markets.
- Sometimes these benefits and costs are not only limited to the agents participating in the market, but also affect other agents in the society.
  - Golf club in the middle of the city.
  - Trans-fat food.
  - Billboards.
  - Noise from airports.
- Private and social benefits and costs differ.
- Results from competitive markets are not efficient.
2. Externalities and Economic Efficiency

- Externality:
  - A benefit or cost that affects someone who is not directly involved in the production or consumption of a good or service.

- Positive externality:
  - Golf club in the middle of the city.
  - College education.

- Negative externality:
  - Trans-fat food.
  - Pollution.

- An externality causes a difference between:
  - the *private* cost of production and the *social* cost of production, or
  - the *private* benefit from consumption and the *social* benefit from consumption.
Negative Externality in Production

- Reduction in economic efficiency: deadweight loss.
- Too much of the good is produced at market equilibrium.
Positive Externality in Consumption

- Too little of the good is produced at market equilibrium.
2. Externalities and Economic Efficiency

- Presence of externality may create a situation of market failure.
  - When the market fails to produce the efficient level of output.
- What causes externalities?
- Incomplete property rights.
  - Owner of the golf club does not have rights over the “view”.
- Difficulty of enforcing property rights.
  - If pollution from acid rain affects my farm, I cannot demand compensation from polluters.
3. Private Solutions to Externalities

- Even when a negative externality is undesirable, its economically efficient level is not zero.
- What is the economically efficient level of pollution reduction?
- Resources devoted to reduce pollution have an opportunity cost.
- The more pollution reduced, the higher the cost and the lower the benefit from an additional unit reduced.
- At zero, the marginal cost of reducing pollution can be much higher than the marginal benefit.
- Then, how to determine the optimal level?
Economically Efficient Level of Pollution

Here the marginal benefit from pollution reduction of $250 per ton is higher than the marginal cost of $175 per ton.

Here the marginal cost from pollution reduction of $225 per ton is higher than the marginal benefit of $150 per ton.

Here the marginal cost from pollution reduction and the marginal benefit are both $200 per ton.

Economically efficient level of pollution reduction

Reduction in sulfur dioxide emissions (in millions of tons per year)
3. Private Solutions to Externalities

- If the presence of externalities can create a market failure, can the market itself cure market failure?
- Can the free interaction of agents in the market lead to a situation where the economically efficient level of pollution reduction is produced?
- Ronald Coase (1960): yes, it can.
- Assigning clear property rights:
  - Firms have the right to pollute and consumers must pay the firms to stop doing it.
  - Firms have no right to pollute and must pay to consumers for doing it.
Firms have the right to pollute

From 7.0 to 8.5:
- Consumers can pay B to firms to reduce pollution.
- Consumers have a net benefit of A.
Firms don’t have any right to pollute

From 10 to 8.5:
- Firms can pay B to consumers to compensate for decrease in reduction.
- Firms have a net benefit of A.
3. Private Solutions to Externalities

- Regardless of who own the property rights, private negotiation will result in the efficient level of pollution reduction.
- Distribution of benefits will depend on property rights ownership.
- Then, why private bargaining does not always solve market inefficiency created by externalities?
  - **Transaction costs**: Cost in time and other resources that parties incur in the process of agreeing to and carrying out an exchange of goods or services.
  - Time and costs of negotiation, drawing up a binding contract, monitoring the agreement.
3. Private Solutions to Externalities

- When many agents (people and firms) are involved, costs of transaction can exceed the gains from the transaction, and private solution is not feasible.
- If transaction costs are low, private bargaining will result in an efficient solution to the problem of externalities.
  - Coase Theorem.
- In practice, we would also need:
  - All parties have full information about costs and benefits associated with the externality.
- Coase Theorem in the real world:
  - Farmers with fruit orchards rent beehives to pollinate their trees.
  - New York and New Jersey 1987 agreement on reduction of garbage spilling.
4. Government Policies to Deal with Externalities

- In case of negative externalities in production, government can impose a tax to make producers *internalize* the externality.
4. Government Policies to Deal with Externalities

- In case of positive externalities in consumption, government can impose a subsidy to make consumers *internalize* the externality.
Pollution regulation

- Conventional approach used by government when dealing with pollution: **command and control**.
  - Imposition of quantitative limits for pollution.
  - Ordering installation of specific devices.
  - Enforcing these orders.
- This approach is not an economically efficient solution to the problem.
- Alternative: **cap and trade**. (Sulfur dioxide)
  - Set a total allowed pollution and distribute allowances per firm.
  - Let firms trade these permits freely.
- Differences in costs of reducing pollution allows to reach the targeted level of pollution reduction at the lowest cost.
Cap and trade

Price of permits

Marginal cost of reducing pollution

Reduction in pollution emitted

Reduction in pollution emitted
Cap and trade

- Market curves are obtained from the aggregation of individuals supply and demand curves.
- Intersection determines price of permits and allowances traded.
- Costs of reduction fell from an expected $7.4 billion to $870 million.
4. Four Categories of Goods

- Two criteria can be used to classify goods.
- **Rivalry:** When one person’s consuming a unit of a good means no one else can consume it.
- **Excludability:** When anyone who does not pay for a good cannot consume it.

<table>
<thead>
<tr>
<th>Excludable</th>
<th>Nonexcludable</th>
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<tbody>
<tr>
<td><strong>Private Goods</strong></td>
<td><strong>Common Resources</strong></td>
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<tr>
<td>Examples: Big Macs, Running shoes</td>
<td>Examples: Tuna in the ocean, Public pasture land</td>
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<tr>
<td><strong>Quasi-Public Goods</strong></td>
<td><strong>Public Goods</strong></td>
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<td>Examples: Cable TV, Toll road</td>
<td>Examples: National defense, Court system</td>
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For private goods, the aggregate demand is found by adding horizontally individual demands.
For a public good, the aggregate demand is found by adding vertically the individual demands.

This way we can determine how much are the consumers willing to pay for the provision of the good.
Optimal quantity of a public good

- Consumers have a strong incentive to not reveal their real willingness to pay.
- If service is provided, since they cannot be excluded and they don’t have to pay, their consumer surplus is bigger.
- Market does not provide the economically efficient quantity of public goods.
  - Usually government supplies them.
### Optimal quantity of a public good

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Common Resources

- Free use of common resources can conduce to over-exploitation, since users do not bear all the costs.
  - Tragedy of the commons.
  - Similar effect to negative externality in production.
Common Resources

- **Origin:** Lack of clearly defined and enforced property rights.
- **How to solve this problem?**
- **Agents can self-impose restrictions: quotas.**
  - Middle Ages.
- **Government can intervene to impose restrictions: taxes, quotas and tradable permits.**
  - Fishing Individual Transferable Quotas.
ECON 202: Principles of Microeconomics

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