10. Externalities

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Introduction

- ▶ One of the Ten Principles from Chapter 1:
  - ▶ "*Markets are usually a good way to organize economy activity.*"
  - ▶ In absence of market failures, the competitive market outcome is efficient, maximizes total surplus.
- ▶ One type of market failure:
  - ▶ Externality, the uncompensated impact of one person's actions on the well-being of a bystander.
- ▶ Externalities can be negative or positive, depending on whether impact on bystander is adverse or beneficial.
- ▶ Self-interested buyers and sellers neglect the external costs or benefits of their actions, so the market outcome is not efficient.
- ▶ Another principle from Chapter 1:
  - ▶ "*Governments can sometimes improve market outcomes.*"
- ▶ In presence of externalities, public policy can improve efficiency.

Examples of Negative Externalities

- Air pollution from a factory
- The neighbor's barking dog
- Late-night stereo blasting from the dorm room next to yours
- Noise pollution from construction projects
- Health risk to others from second-hand smoke
- Talking on cell phone while driving makes the roads less safe for others

Welfare economics: a recap

- ▶ Demand curve:
  - ▶ Private value to consumers
  - ▶ Prices they are willing to pay

- ▶ Supply curve:
  - ▶ Private cost to suppliers
  - ▶ Costs directly incurred by sellers.

- ▶ Equilibrium quantity and price
  - ▶ Efficient
  - ▶ Maximizes the sum of producer and consumer surplus

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Negative externalities

- Cost to society (of producing a good)
  - Larger than the cost to the good producers

- Social cost = private cost + external cost
- Private cost: supply
- External cost
  - The costs to those bystanders affected adversely by the negative externality
  - Value of the negative impact on bystanders
- Social cost curve is above the supply curve
  - Takes into account the external costs imposed on society
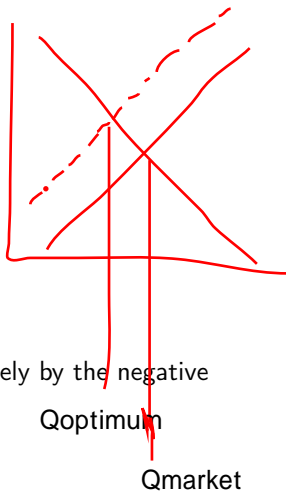
Qoptimum

Qmarket

Negative externalities

Qoptimum   !

- Therefore,

$$Q_{optimum} < Q_{market}$$

- At any $Q < Q_{optimum}$
  - Value of additional unit > Social cost of additional unit
  - Should produce more to mazximize society's well-being (TS)

- At any $Q > Q_{optimum}$ (for example at Q_{market})
  - Value of the last unit < Social cost of the last unit
  - Should produce less to mazximize society's well-being (TS)

- Only at $Q_{optimum}$ society's welfare maximized.

Negative externalities

- Government – correct market failure
    - Internalizing the externality
    - Altering incentives so that people take account of the external effects of their actions
- For example tax on producers can make

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$$\text{sellers' costs} = \text{social costs}$$

- When market participants must pay social costs,

$$\text{market equilibrium} = \text{social optimum}$$
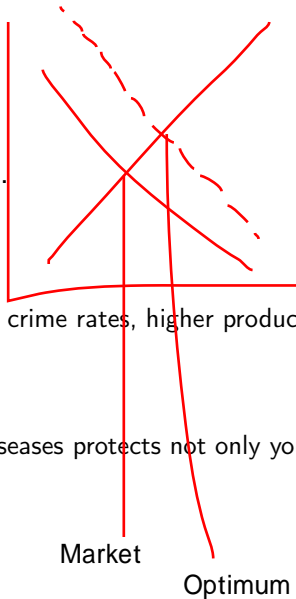
Positive externalities

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- Education
    - Benefit of education is private
    - Externalities: better government, lower crime rates, higher productivity
- Other examples:
    - R&D creates knowledge others can use
    - Being vaccinated against contagious diseases protects not only you, but other people

Market

Optimum

Positive externalities

► In the presence of a positive externality, the social value is greater than private value

  ► private value – the direct value to buyers
  ► external benefit – the value of the positive impact on bystanders

► Social value curve

  ► Above the demand curve

► Therefore

$$Q_{optimum} > Q_{market}$$

► $Q_{optimum}$ maximizes society's welfare:

  ► At any lower Q, the social value of additional units exceeds their cost.
  ► At any higher Q, the cost of the last unit exceeds its social value.

Government

- ▶ Negative externalities
  - ▶ Markets produce a larger quantity than is socially desirable
  - ▶ Government: tax

- ▶ Positive externalities
  - ▶ Markets produce a smaller quantity than is socially desirable
  - ▶ Government: subsidy

Public Policies Toward Externalities

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- ▶ Command-and-control policies
    - ▶ Regulate behavior directly
    - ▶ Regulation

- ▶ Market-based policies
    - ▶ Provide incentives so that private decision makers will choose to solve the problem on their own
    - ▶ Corrective taxes and subsidies
    - ▶ Tradable pollution permits

Command-and-control policies: Regulation

- Regulate behavior directly: making certain behaviors either required or forbidden
- Neither possible nor desirable to eradicate pollution completely
    - Weigh the costs and benefits carefully
- Government
    - Develop and enforce regulations
    - Dictates maximum level of pollution
    - Requires that firms adopt a particular technology to reduce emissions
- Caveat
    - Need to know all the relavent information

Market-based policy 1: Corrective Taxes and Subsidies

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- Corrective tax: a tax designed to induce private decision-makers to take account of the social costs that arise from a negative externality
- Internalize externality: make private decision-makers take into account the external costs and benefits of their actions
- Also called Pigovian taxes (Arthur Pigou, 1877-1959)
  - ideal corrective tax = external cost
 - ideal corrective subsidy = external benefit
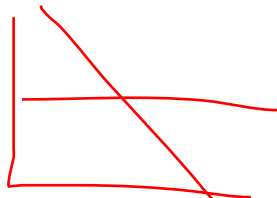
Corrective Taxes vs. Regulations

- ▶ Corrective taxes can achieve *any* level of pollution – just like regulation
  - ▶ yet more efficiently
  - ▶ raise revenue for the government
- ▶ Different firms have different costs of pollution abatement.
  - ▶ Firms with low abatement costs will reduce pollution to reduce their tax burden.
  - ▶ Firms with high abatement costs have greater willingness to pay tax.
- ▶ In contrast, a regulation requiring all firms to reduce pollution by a specific amount not efficient.
  - ▶ If all firms must reduce emissions by a fixed amount (or fixed percentage), then abatement is NOT concentrated among firms with the lowest abatement costs, and so the total cost of abatement will be higher. – not efficient!

Market-based policy 2: Tradable Pollution Permits

- Voluntary transfer of the right to pollute from one firm to another
- Both types of firms (low and high cost) are better off
    - remember it's voluntary!   !
- Social welfare is increased.
    - Market for pollution permit allocates the right to pollute efficiently.
    - The permits will end up in the hands of those firms that value them most highly.
    - The same level of pollution, yet with less costs.
        - Pollution reduction is concentrated among those firms with lowest costs.
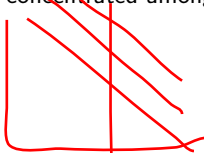
Permits and Taxes

- ▶ Tradable pollution permits and corrective taxes are similar in effect. In both cases, firms must pay for the right to pollute.
    - ▶ Corrective taxes: pay to the government
    - ▶ Pollution permits: pay to buy permits
- ▶ Tax: the government basically sets the price of pollution
- ▶ Permit: the government chooses the level of pollution
- ▶ When policymakers do not know the position of the 'demand curve,' the permits system achieves pollution reduction targets more precisely.

Tradable Pollution Permits in the Real World

- SO_2 permits traded in the U.S. since 1995.
- Nitrogen oxide permits traded in the northeastern U.S. since 1999.
- Carbon emissions permits traded in Europe since January 1, 2005.

Objections   !

- ▶ Some politicians, many environmentalists argue that no one should be able to 'buy' the right to pollute, cannot put a price on the environment.
- ▶ People face trade-offs
    - ▶ Eliminating all pollution is impossible
    - ▶ Clean water and clean air – opportunity cost
- ▶ The market-based approach reduces the cost of environmental protection, so it should increase the public's demand for a clean environment.
    - ▶ Clean environment is a normal good (Positive income elasticity)
        - ▶ Rich countries can afford a cleaner environment
        - ▶ More rigorous environmental protection
    - ▶ Clean air and clean water - law of demand
        - ▶ The lower the price of environmental protection
        - ▶ The more the public will want it

Private Solutions to Externalities

Government action is not always needed
Various ways to internalize externalities

- ▶ Moral codes and social sanctions
    - ▶ Do not litter
    - ▶ The Golden Rule
- ▶ Charities (government encourages this private solution)
- ▶ Self-interest of the relevant parties
    - ▶ Integrating different types of businesses
- ▶ Interested parties can enter into a contract

The Coase theorem

- ► How effective are private solutions?
- ► The Coase theorem
  - ► the proposition that if private parties can bargain without cost over the allocation of resources, they can solve the problem of externalities on their own.
- ► Whatever the initial distribution of rights
  - ► Interested parties can reach a bargain in which
    - ► Everyone is better off
    - ► Outcome is efficient

The Coase theorem: a simple example

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- ▶ Tom likes to bbq in his backyard on summer afternoon, listenting to 90's songs from his boombox.
- ▶ Negative externality: Jane (the neighbor) cannot stand it.
- ▶ If they can bagain costlessly, this externality problem can be solved – regardless of the legal right.
- ▶ Efficient outcome
    - ▶ maximize Tom's + Jane's well-being

A simple example: case 1

500 , 800 , 600 .

- ▶ Suppose:
  - ▶ Tom has the legal right to listen old songs
  - ▶ Benefit to Tom of playing old songs = $500
  - ▶ Cost to Jane = $800
- ▶ Socially efficient outcome: boombox goes bye-bye.
- ▶ Private outcome:
  - ▶ Jane pays Tom $600 to get rid of boombox
  - ▶ both Jane and Tom are better off.
- ▶ Private outcome = efficient outcome.

A simple example: case 2

- ▶ Suppose:
  - ▶ Tom has the legal right to listen old songs
  - ▶ Benefit to Tom of playing old songs = $1,000
  - ▶ Cost to Jane = $800   200   !
- ▶ Socially efficient outcome: boombox stay.
- ▶ Private outcome:
  - ▶ Jane not willing to pay more than $800
  - ▶ Tom not willing to accept less than $1,000
- ▶ Private outcome = efficient outcome.

A simple example: case 3

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- ▶ Suppose:
  - ▶ Jane has the legal right to peace and quiet
  - ▶ Benefit to Tom of playing old songs = $800
  - ▶ Cost to Jane = $500
- ▶ Socially efficient outcome: boombox stay.
- ▶ Private outcome:
  - ▶ Tom pays Jane $600 to put up with loud 90's songs.
  - ▶ both Jane and Tom are better off.
- ▶ Private outcome = efficient outcome.

Why Private Solutions Do Not Always Work

- Transaction costs
  - The costs parties incur in the process of agreeing to and following through on a bargain.
  - These costs may make it impossible to reach a mutually beneficial agreement.
- Stubbornness:
  - Even if a beneficial agreement is possible, each party may hold out for a better deal.
- Coordination problems:
  - If # of parties is very large, coordinating them may be costly, difficult, or impossible.

Case study: smoking

- Second-hand smoke is an example of negative externality.
- How important is it? The social cost?
    - Health effects + putting a value on the effects
    - Difficult task, but some researchers hae tried
- $0.52 per pack
    - if you don't include the costs imposed on members of smokers' families (including unborn child)
- Including the effects on family members, the number rises significantly.
    - $4.80 including the effects on pregnant women and their unborn children's future health
- Exposed to the risk of fires = $0.09 per pack