In this chapter, look for the answers to these questions:

- What is an externality?
- Why do externalities make market outcomes inefficient?
- How can people sometimes solve the problem of externalities on their own? Why do such private solutions not always work?
- What public policies aim to solve the problem of externalities?

When the market works as it should…

- Recall: Adam Smith’s “invisible hand” of the marketplace leads self-interested buyers and sellers in a market to maximize the total benefit that society can derive from a market.

But market failures can still happen.

EXTERNALITIES AND MARKET INEFFICIENCY

- An externality refers to the uncompensated impact of one person’s actions on the well-being of a bystander.
- Externalities cause markets to be inefficient, and thus fail to maximize total surplus.
- When the impact on the bystander is adverse, the externality is called a negative externality.
- When the impact on the bystander is beneficial, the externality is called a positive externality.
EXTERNALITIES AND MARKET INEFFICIENCY

• Negative Externalities
  – Automobile exhaust
  – Cigarette smoking
  – Barking dogs (loud pets)
  – Loud stereos in an apartment building

• Positive Externalities
  – Immunizations
  – Restored historic buildings
  – Research into new technologies

Welfare Economics: A Recap

• The Market for Aluminum
  • The quantity produced and consumed in the market equilibrium is efficient in the sense that it maximizes the sum of producer and consumer surplus.
  • If the aluminum factories emit pollution (a negative externality), then the cost to society of producing aluminum is larger than the cost to aluminum producers.

Figure 1 The Market for Aluminum

• Negative externalities lead markets to produce a larger quantity than is socially desirable.
• Positive externalities lead markets to produce a larger quantity than is socially desirable.
Welfare Economics: A Recap

• The Market for Aluminum
  • For each unit of aluminum produced, the social cost includes the private costs of the producers plus the cost to those bystanders adversely affected by the pollution.

Negative Externalities

• The intersection of the demand curve and the social-cost curve determines the optimal output level.
  • The socially optimal output level is less than the market equilibrium quantity.
  • *Internalizing an externality* involves altering incentives so that people take account of the external effects of their actions.
  • To achieve the socially optimal output…
    • the government can internalize an externality by imposing a tax on the producer to reduce the equilibrium quantity to the socially desirable quantity.

Pollution: A Negative Externality

• Example of negative externality: Air pollution from a factory.
  • The firm does not bear the full cost of its production, and so will produce more than the socially efficient quantity.
  • How govt may improve the market outcome:
    • Impose a tax on the firm equal to the external cost of the pollution it generates.
Other Examples of Negative Externalities

- the neighbor’s barking dog
- late-night stereo blasting from the dorm room next to yours
- noise pollution from construction projects
- talking on cell phone while driving makes the roads less safe for others
- health risk to others from second-hand smoke

Positive Externalities

- When an externality benefits the bystanders, a positive externality exists.
  - The social value of the good exceeds the private value.
  - A technology spillover is a type of positive externality that exists when a firm’s innovation or design not only benefits the firm, but enters society’s pool of technological knowledge and benefits society as a whole.

Figure 3 Education and the Social Optimum

- The intersection of the supply curve and the social-value curve determines the optimal output level.
  - The optimal output level is more than the equilibrium quantity.
  - The market produces a smaller quantity than is socially desirable.
  - The social value of the good exceeds the private value of the good.
Positive Externalities

• Internalizing Externalities:
  • Subsidies
    • Used as the primary method for attempting to internalize positive externalities.
  • Industrial Policy
    • Government intervention in the economy that aims to promote technology-enhancing industries
      • Patent laws are a form of technology policy that give the individual (or firm) with patent protection a property right over its invention.
      • The patent is then said to internalize the externality.

Other Examples of Positive Externalities

• Being vaccinated against contagious diseases protects not only you, but people who visit the salad bar or produce section after you.
• R&D creates knowledge others can use
• Renovating your house increases neighboring property values

Positive Externalities from Education

• A more educated population benefits society:
  • lower crime rates: educated people have more opportunities, so less likely to rob and steal
  • better government: educated people make better-informed voters
• People do not consider these external benefits when deciding how much education to “purchase”
• Result: market eq’nm quantity of education too low
• How govt may improve the market outcome:
  • subsidize cost of education

Effects of Externalities: Summary

If negative externality
  • market produces a larger quantity than is socially desirable
If positive externality
  • market produces a smaller quantity than is socially desirable
To remedy the problem, “internalize the externality”
  • tax goods with negative externalities
  • subsidize goods with positive externalities
PRIVATE SOLUTIONS TO EXTERNALITIES

• Government action is not always needed to solve the problem of externalities.
• Types of Private Solutions
  – Moral codes and social sanctions
  – Charitable organizations
  – Integrating different types of businesses
  – Contracting between parties

The Coase Theorem

• The Coase theorem is a proposition that if private parties can bargain without cost over the allocation of resources, they can solve the problem of externalities on their own.
• Transaction costs
  • Transaction costs are the costs that parties incur in the process of agreeing to and following through on a bargain.

Why Private Solutions Do Not Always Work

• Sometimes the private solution approach fails because transaction costs can be so high that private agreement is not possible.

The Coase Theorem: An Example

Dick owns a dog named Spot.
Negative externality:
Spot’s barking disturbs Jane, Dick’s neighbor.
The socially efficient outcome maximizes Dick’s + Jane’s well-being.
• If Dick values having Spot more than Jane values peace & quiet, the dog should stay.

Coase theorem: The private market will reach the efficient outcome on its own...
The Coase Theorem: An Example

• CASE 1:
  Dick has the right to keep Spot.
  Benefit to Dick of having Spot = $500
  Cost to Jane of Spot’s barking = $800
• Socially efficient outcome:
  Spot goes bye-bye.
• Private outcome:
  Jane pays Dick $600 to get rid of Spot,
  both Jane and Dick are better off.
• Private outcome = efficient outcome.

• CASE 2:
  Dick has the right to keep Spot.
  Benefit to Dick of having Spot = $1000
  Cost to Jane of Spot’s barking = $800
• Socially efficient outcome:
  See Spot stay.
• Private outcome:
  Jane not willing to pay more than $800,
  Dick not willing to accept less than $1000,
  so Spot stays.
• Private outcome = efficient outcome.

• CASE 3:
  Benefit to Dick of having Spot = $500
  Cost to Jane of Spot’s barking = $800
  But Jane has the legal right to peace & quiet.
• Socially efficient outcome: Dick keeps Spot.
• Private outcome:
  Dick pays Jane $600 to put up with Spot’s barking.
• Private outcome = efficient outcome.

The private market achieves the efficient outcome regardless of the initial distribution of rights.

Brainstorming

Collectively, the 1000 residents of Green Valley value swimming in Blue Lake at $100,000.
A nearby factory pollutes the lake water, and would have to pay $50,000 for non-polluting equipment.

A. Describe a Coase-like private solution.
B. Can you think of any reasons why this solution might not work in the real world?
Why Private Solutions Do Not Always Work

- **Transaction costs**: the costs that parties incur in the process of agreeing to and following through on a bargain.
- Sometimes when a beneficial agreement is possible, each party may hold out for a better deal.
- Coordination problems & costs when the number of parties is very large.

PUBLIC POLICIES TOWARD EXTERNALITIES

- When externalities are significant and private solutions are not found, government may attempt to solve the problem through . . .
  - command-and-control policies.
  - market-based policies.

Command-and-Control Policies: Regulation

- Usually take the form of regulations:
  - Forbid certain behaviors.
  - Require certain behaviors.
- Examples:
  - Requirements that all students be immunized.
  - Stipulations on pollution emission levels set by the Environmental Protection Agency (EPA).

Market-Based Policy 1: Corrective Taxes and Subsidies

- Government uses taxes and subsidies to align private incentives with social efficiency.
- **Corrective taxes** are taxes enacted to correct the effects of a negative externality.
  - Also called Pigovian taxes.
Market-Based Policy 1: Corrective Taxes and Subsidies

• Examples of Regulation versus Corrective Tax
  • If the EPA decides it wants to reduce the amount of pollution coming from a specific plant. The EPA could…
    • tell the firm to reduce its pollution by a specific amount (i.e. regulation).
    • levy a tax of a given amount for each unit of pollution the firm emits (i.e. corrective tax).

Market-Based Policy #1: Corrective Taxes & Subsidies

• Example:
  Acme, US Electric run coal-burning power plants. Each emits 40 tons of sulfur dioxide per month. SO₂ causes acid rain & other health issues.
  • Policy goal: reducing SO₂ emissions 25%
  • Policy options
    • regulation: require each plant to cut emissions by 25%
    • corrective tax: Make each plant pay a tax on each ton of SO₂ emissions. Set tax at level that achieves goal.

Market-Based Policy #1: Corrective Taxes & Subsidies

• Suppose cost of reducing emissions is lower for Acme than for US Electric.
• Socially efficient outcome: Acme reduces emissions more than US Electric.
• The corrective tax is a price on the right to pollute.
• Like other prices, the tax allocates this “good” to the firms who value it most highly (US Electric).

Discussion question

Policy goal:
  Reducing gasoline consumption
Two approaches:
  A. Enact regulations requiring automakers to produce more fuel-efficient vehicles
  B. Significantly raise the gas tax
Discuss the merits of each approach. Which do you think would achieve the goal at lower cost? Who do you think would support or oppose each approach?
Market-Based Policy 2: Tradable Pollution Permits

- Tradable pollution permits allow the voluntary transfer of the right to pollute from one firm to another.
  - A market for these permits will eventually develop.
  - A firm that can reduce pollution at a low cost may prefer to sell its permit to a firm that can reduce pollution only at a high cost.

Market-Based Policy #2: Tradable Pollution Permits

Recall: Acme, US Electric each emit 40 tons SO₂, total of 80 tons.
- Goal: reduce emissions 25% (to 60 tons/month)
- Suppose cost of reducing emissions is $100/ton for Acme, $200/ton for US Electric.
- If regulation requires each firm to reduce 10 tons, cost to Acme: (10 tons) x ($100/ton) = $1,000
cost to USE: (10 tons) x ($200/ton) = $2,000
  total cost of achieving goal = $3,000

Alternative:
- issue 60 permits, each allows its bearer one ton of SO₂ emissions (so total emissions = 60 tons)
- give 30 permits to each firm
- establish market for trading permits

Each firm can choose among these options:
- emit 30 tons of SO₂, using all its permits
- emit < 30 tons, sell unused permits
- buy additional permits so it can emit > 30 tons

Suppose market price of permit = $150
One possible equilibrium:
Acme
- spends $2,000 to cut emissions by 20 tons
- has 10 unused permits, sells them for $1,500
- net cost to Acme: $500

US Electric
- emissions remain at 400 tons
- buys 10 permits from Acme for $1,500
- net cost to USE: $1,500

Total cost of achieving goal = $2,000
Market-Based Policy #2: Tradable Pollution Permits

- A system of tradable pollution permits achieves goal at lower cost than regulation.
  - Firms with low cost of reducing pollution sell whatever permits they can.
  - Firms with high cost of reducing pollution buy permits.
- Result: Pollution reduction is concentrated among those firms with lowest costs.

Figure 4 The Equivalence of Corrective Taxes and Pollution Permits

(a) Corrective Tax

1. A corrective tax sets the price of pollution
2. ... which, together with the demand curve, determines the quantity of pollution.

(b) Pollution Permits

1. Pollution permits set the quantity of pollution
2. ... which, together with the demand curve, determines the price of pollution.

Both the Corrective Taxes and Pollution Permit approaches can yield the same result.