Market Failure

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Externalities

- **Principle 7: Governments Can Sometimes Improve Market Outcomes**
- The purpose of this section is to see why markets sometimes fail to allocate resources efficiently and how government policies can improve such allocations.
- **Externality:** The uncompensated impact of one agent's *actions* on the well-being of a bystander.

Externalities

- Externalities can have adverse effects (negative) or beneficial impacts (positive).
- Because buyers and sellers do not take into account the external effects of their actions, the market equilibrium is inefficient when there are externalities.
- In the presence of an externality, society's interest extends beyond the well-being of market participants.

Negative Externalities

- The idea behind negative externalities is that there is some external cost is not taken into account.

- There is some private cost of producing, while the cost to society is referred to as the social cost.

- The cost to society is given by private cost + external cost.

- The social-cost curve is above the supply curve because it takes into account the external costs imposed on society.
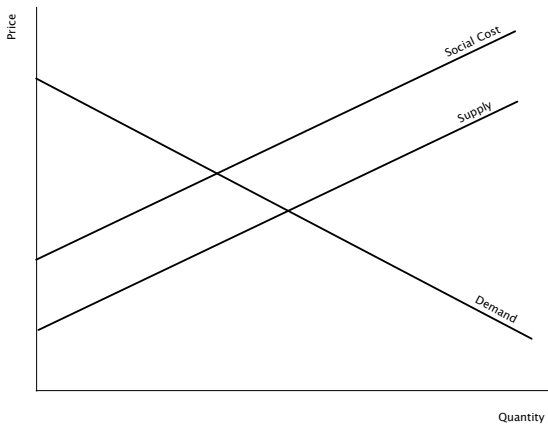
Negative Externalities

Figure: Negative Externality

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Correcting Externalities
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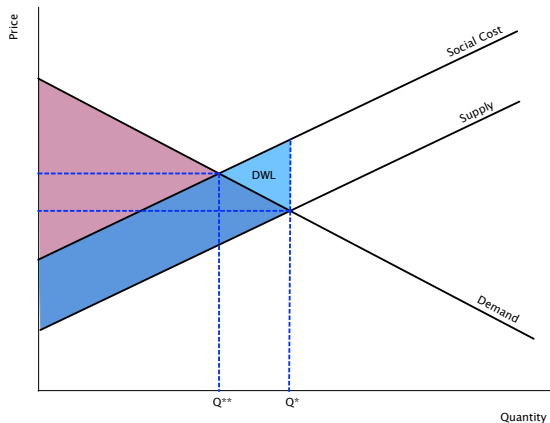○○○○○○○○○

Negative Externalities

Figure: Negative Externalities and Welfare

Negative Externalities

- We see that the optimum amount produced is given by the intersection of the social cost curve and the demand curve.
- At quantities below Q^{**}, the value to consumers is greater than the social cost
- At quantities above Q^{**} and below Q^*, the value to consumers is less than the social cost.
- Thus, with a negative externality we have that the market equilibrium quantity produced is greater than the socially optimal quantity.

Negative Externalities

Example

Refer to Figure 3. What is the per-unit external cost? The total external cost at the market equilibrium? What is total surplus at the market equilibrium? The deadweight loss? What is the efficient quantity in this market?

Figure: Market for Floor Cleaner
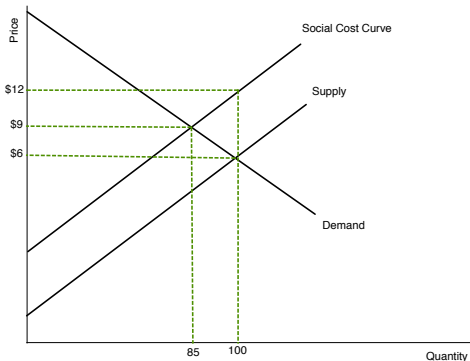
Positive Externalities

- On the other hand, some actions yield benefits to third parties. In cases such as this, we have positive externalities.
- In this case, there is some value that people partaking in an activity receive (private value).
- Society as whole, however, also gets some external benefit from this activity. The sum of these values is referred to as the social value.
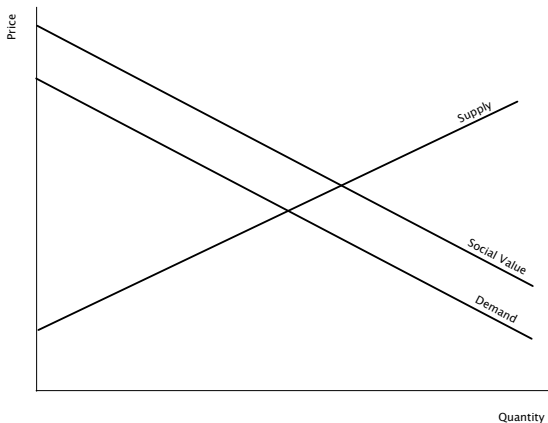
Positive Externalities

Figure: Positive Externality

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Positive Externalities
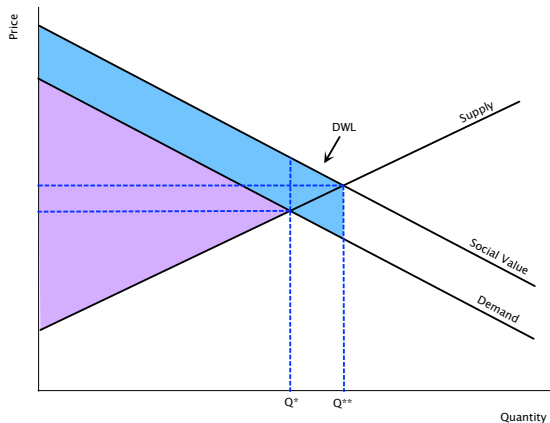
Figure: Positive Externalities and Welfare

Positive Externalities

- Just like with a negative externality, the equilibrium market quantity is <u>inefficient</u> in the presence of a positive externality.

- The optimum amount produced is given by the intersection of the <u>social value curve</u> and the <u>supply curve</u>.

- For all quantities below Q^{**}, the social value is <u>greater</u> than the private cost.

- Thus, with a positive externality we have that the market equilibrium quantity produced is <u>less</u> than the social optimal quantity.

Correcting Externalities

- If the presence of externalities distorts markets and makes them inefficient, how can the government (or private parties) correct this?

Correcting Externalities

- Public policies
    1. Solution 1: Command & control policies (i.e., regulation)
    2. Solution 2: Corrective tax or subsidy
        - To align private costs (values) with social costs (values), the per-unit tax (subsidy) must be equal to the per-unit external cost (benefit).
    3. Solution 3: Tradable permits - create markets to trade rights to engage in some activity.

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Correcting Externalities

- Private solutions:
  1. Moral codes and sanctions (e.g., littering, public nudity)
  2. Charities (e.g., alumni donations)
  3. Business integration (e.g., bar and music venue)
  4. Contracts (e.g., outdoor concert hall and bar)

Correcting Externalities

Example

There are two firms in Candyland, and each one pollutes as shown in Table 1.

Table: Pollution by Firms in Candy Land

Firm	Initial Pollution Level	Cost of Reducing Pollution (per unit)
Lolly LLC	*425 units*	*$15*
Gloppy Inc.	*300 units*	*$10*

The government wishes to reduce pollution by 400 units and mandates each firm reduce their pollution level by 200 units. How much is each firm polluting now? What is the total cost of reducing pollution in this case?

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Lolly reduces pollution by 200 units. Cost = $15 × 200 = $3,000.
Gloppy reduces pollution by 200 units. Cost = $10 × 200 = $2,000.
Total pollution = 225 + 100 = 325 units. Total cost = $5,000.
⎵ Lolly   ⎵ Gloppy

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Correcting Externalities

Example

Instead, the government gives Lolly 200 pollution permits and Gloppy 125 permits that they can trade with each other. The firms decide to set a price of $12/permit. How much would each firm pollute? What would be the total cost of reducing pollution?

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Correcting Externalities

Example

Instead, the government gives Lolly 200 pollution permits and Gloppy 125 permits that they can trade with each other. The firms decide to set a price of $12/permit. How much would each firm pollute? What would be the total cost of reducing pollution?

Lolly will buy all the permits from Gloppy (high-cost polluter buys from low-cost polluter). Lolly will have 325 permits, Gloppy will have 0.

Lolly:

Buys 125 permits. Cost of permits = $12 × 125 = $1,500.

Able to pollute 325 units, but still has to reduce pollution by 100 units.

Cost of reducing pollution = $15 × 100 = $1,500. Total cost to Lolly = $3,000.

Gloppy:

Sells 125 permits. Revenue = $12 × 125 = $1,500.

Has 0 permits, so must reduce pollution by 300 units.

Cost of reducing pollution = $10 × 300 = $3,000. Net cost to Gloppy = $3,000 - $1,500 = $1,500.

Total pollution = $\underbrace{325}_{\text{Lolly}}$ + $\underbrace{0}_{\text{Gloppy}}$ = 325 units. Total cost = $4,500.

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Correcting Externalities

- Firms with a high cost of reducing pollution will buy pollution permits from firms with a low cost of reducing pollution.

- The price of the pollution permits will be between the two firms' costs of reducing pollution.

- Regardless of the actual permit price, the total cost of reducing pollution will be lower under tradable permits than under a command and control policy.

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Correcting Externalities

- **Coase Theorem:** If private parties can bargain without costs over the allocation of resources, they can solve externality problems without government intervention.
- According to the Coase Theorem, the initial distribution of property rights does not matter.
- The efficient outcome will be reached in any case.
- However, the initial distribution of rights does the determine the distribution of economic well-being. The distribution of rights determines who pays who in the final bargain.

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Correcting Externalities

Example

Suppose that Company A's railroad cars pass through Farmer B's corn fields. The railroad causes an externality to the farmer because the railroad cars emit sparks that cause $1,500 in damage to the farmer's crops. There is a special soy-based grease that the railroad could purchase that would eliminate the damaging sparks. The grease costs $1,200. Suppose that the farmer has the right to compensation for any damage that his crops suffer. Assume that there are no transaction costs. Which of the following characterizes the efficient outcome?

(a) *The railroad will continue to operate but will pay the farmer $1,500 in damages.*

(b) *The railroad will purchase the grease for $1,200 and pay the farmer nothing because no crop damage will occur.*

(c) *The farmer will incur $1,500 in damages to his crops.*

(d) *The farmer will pay the railroad $1,200 to purchase the grease so that no crop damage will occur.*

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(c) *The farmer will incur $1,500 in damages to his crops.*

(d) *The farmer will pay the railroad $1,200 to purchase the grease so that no crop damage will occur.*

(b) The farmer has the rights, so the railroad has to pay compensation. They would rather pay $1,200 to buy grease for their cars than pay $1,500 for compensation.

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Correcting Externalities

Example

If in the example above, the railroad company had the right to emit sparks, what would the efficient outcome be?

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Correcting Externalities

Example

If in the example above, the railroad company had the right to emit sparks, what would the efficient outcome be?

(d) The farmer has to compensate the railroad in order for them not to emit sparks. He will pay \$1,200 rather than incurring \$1,500 in crop damages.

Correcting Externalities

- The Coase Theorem only applies when parties have no trouble reaching and enforcing an agreement.

- The main barrier to this is <u>transaction costs</u>.

- Additionally, the problem becomes more difficult as the number of parties involved increases.

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Public Goods and Common Resources

- **Excludability:** The property of a good whereby a person can be prevented it from using it.
- **Rivalry:** The property of a good whereby one person's use diminishes other people's use.

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Public Goods and Common Resources

- **Private goods** are those that are <u>excludable</u> and <u>rival</u>.
- **Public goods** are those that are <u>non-excludable</u> and <u>non-rival</u>.
- **Common resources** are goods that are <u>non-excludable</u> and <u>rival</u>.
- **Club goods** are those that are <u>excludable</u> and <u>non-rival</u>.
- Note that the boundaries between the categories can be fuzzy.

Public Goods and Common Resources

Example

Consider I-40. If not many people are using it, traffic flows freely. What type of good is this? As more people start using the interstate (e.g., during rush hour), the congestion slows traffic to a halt. What type of good is I-40 now?

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Public Goods and Common Resources

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Originally: public good. With congestion: common resource

Public Goods

- **Free rider:** A person who receives the benefit of a good but avoids paying for it.

- **Forced rider:** A person who pays for a good but receives less in benefits than the costs incurred.

- The <u>free-rider</u> problem prevents the private market from supplying public goods. Providing a public good confers an <u>external benefit</u> on those who enjoy the good, but don't have to pay for it.

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Public Goods

- Thus, without government intervention, public goods tend to be under provided.
- The main way the government provides public goods is through the use of subsidies and tax revenues.
- Notable Public Goods:
  1. National defense
  2. Basic research
  3. Poverty reduction

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Public Goods

Example

Four roommates are planning to spend the weekend in their dorm room watching old movies, and they are debating how many to watch. Here is their willingness to pay for each film:

	Al	Bob	Carlos	Dylan
First film	$7	$5	$3	$2
Second film	$6	$4	$2	$1
Third film	$5	$3	$1	$0
Fourth film	$4	$2	$0	$0

a. *Within the dorm room, is the showing of a movie a public good?*
b. *If the cost to rent a movie is $8, how many movies should they rent to maximize total surplus? If they split the total cost evenly, what is the surplus realized by each person?*

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Public Goods

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a. *Within the dorm room, is the showing of a movie a public good?*

b. *If the cost to rent a movie is $8, how many movies should they rent to maximize total surplus? If they split the total cost evenly, what is the surplus realized by each person?*

(a) Yes; non-excluable and non-rival (b) They should get a movie as long as P ≤ total (public) WTP ⇒ rent 3 movies. Each pays $6.
Al's surplus: 12; Bob: 6; Carlos: 0; Dylan: −3 (forced rider)
Total surplus = $15

Common Resources

- What is the cause of The Tragedy of the Commons?
- Differences in <u>social</u> and <u>private</u> incentives. Because of this misalignment, common resources tend to be <u>overused</u>.
- Solutions:
  1. Regulation
  2. Market-based policies
  3. Establishing property rights

Common Resources

- Establishing property rights can be done by turning the common resource into a private good.
- Notable Common Resources:
  1. Clean air and water
  2. Fish and other wildlife
- The driving factor behind the misallocation of resources in markets where externalities are present is the absence of clearly established property rights.

Readings and Assignments

- Today: Mankiw Ch. 10 & 11
- Next time: Mankiw Ch. 13
- Problem Set 2, section 4
- Homework 2 due on 5/26
- Exam 1 on 5/30