EE441 Economics of Public Expenditure

4. Externalities

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Outline of Topic 4

1. The Nature of Externalities
2. Graphical Analysis
   a. Implications
   b. Conclusions
3. Private Responses
   a. Bargaining and the Coase Theorem
   b. Mergers
   c. Social Conventions
4. Public responses to Externalities: Taxes and Subsidies
   a. Taxes
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Outline of Topic 4 (cont.)

5. Public Responses to Externalities: Emissions Fees and Cap-and-Trade Programs
   a. Emissions Fee
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   c. Emissions Fee vs Cap-and-Trade
   d. Command-and-Control Regulation
6. The US Response
   a. Progress with Incentive-Based Approaches
7. Implications for Income Distribution
   a. Who Benefits?
   b. Who Bears he Cost?
8. Positive Externalities
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Externalities

- **Externality** – An activity of one entity that affects the welfare of another entity in a way that is *outside* the **market mechanism**
  - A paper mill's production of the carcinogen dioxin increases society's health care costs; these costs to society are not included in the paper mill's paper **price**
  - However, when large numbers of suburbanites relocate to a city, society is affected, although the effect is captured through higher prices of city housing

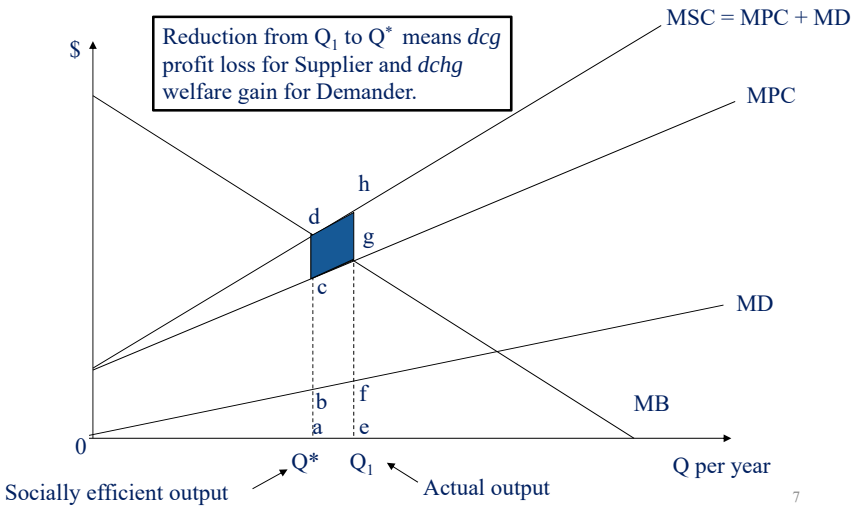
Externalities

"We make clouds, clouds make rain, and rain spoils ball games. 'That's why people don't like smokers!'" © 2000 Randy Glasbergen.

The Nature of Externalities

- *Privately*-owned vs. *commonly*-owned resources
  - A privately owned resource: its price reflects its value so used efficiently (MSC=MSB)
  - A commonly-owned resource (air, oceans): price ($0) does not reflect its value so used inefficiently (MSC>MSB)
  - Example: case of Bart and Lisa-> no property rights.
- Externalities can be produced by consumers & firms
- Externalities are *reciprocal* in nature
- Externalities can be *positive* or *negative*
  - Example: vaccination
- *Public goods* can be viewed as a special kind of externality
  - Example: electrocuting mosquitoes device

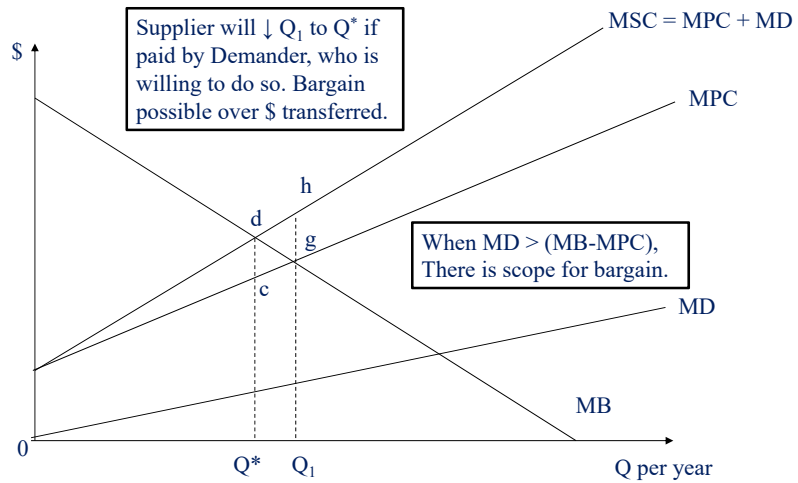
The Nature of Externalities-Graphical Analysis



What Pollutants Do Harm?

- Empirical Research on Pollution Effects on Health
  - Difficult to measure because of inability to perform randomized studies on pollution effects
  - Must rely on cross-sectional or time-series analysis
  - Studies unable to measure lifetime exposure to air pollution
- Once pollutant identified:
  - Must identify the activities that produce the pollutant
  - Must identify the value of the damage done
  - Must identify the costs of remedying the damage
- Empirical Evidence: The Effect of Air Pollution on Housing Values

Private Responses
Bargaining and the Coase Theorem



The Coase Theorem

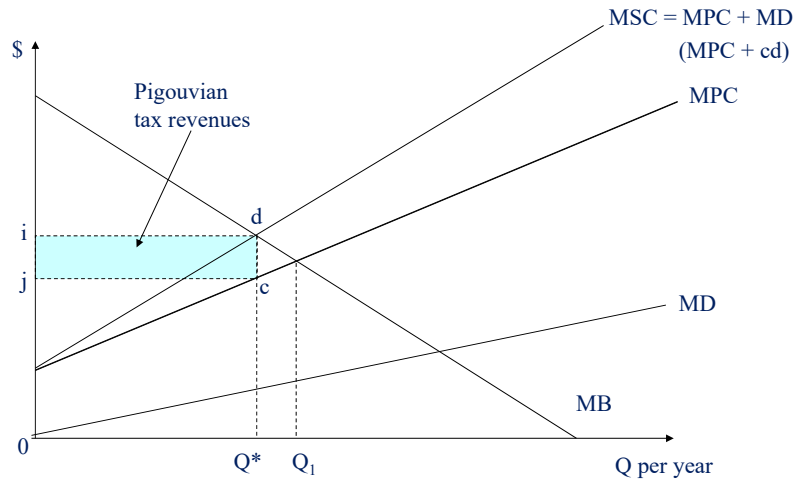
- Coase Theorem – Given:
  - Low transaction costs
  - Clear assignment of property rights

  An efficient solution to an externality problem can be achieved
- Assumptions necessary for Coase Theorem to work
  - The costs to the parties of bargaining are low
  - The owners of resources can identify the source of damages to their property and legally prevent damages

Other Private Solutions

- Mergers – way to internalize the externality
  - The externality transmitter and recipient become one company.
- Social conventions/Morals
  - For example: "Littering" is wrong.
  - "Do unto others as you would have others do unto you."

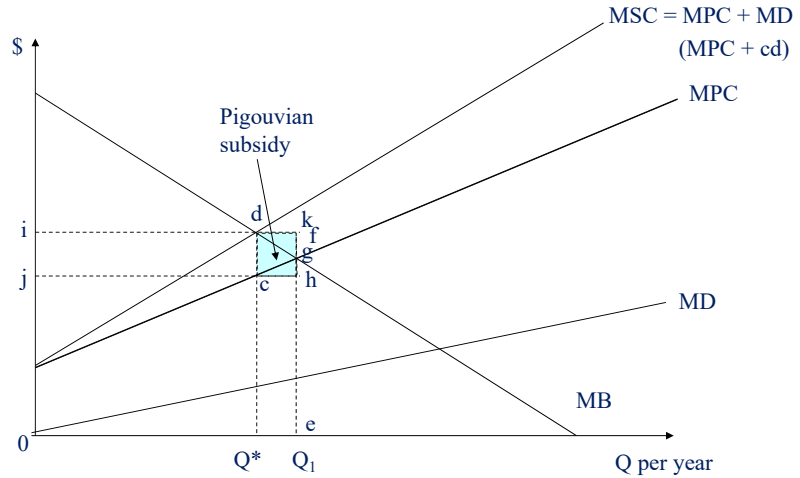
Public Responses to Externalities - Taxes



Pigovian Tax

- A tax levied on each unit of an externality-generator's output in an amount equal to the marginal damage at the efficient level of output.
- The key point is that compensation to the victim of the pollution is not necessary to achieve efficiency, and indeed will likely lead to inefficiency.
- Practical problems
  - Difficulties in estimating the marginal damage function
  - Difficulties in finding the correct tax rates
  - Some compromise. Example: a gasoline tax

Public Responses to Externalities – Subsidies that pay polluter not to pollute



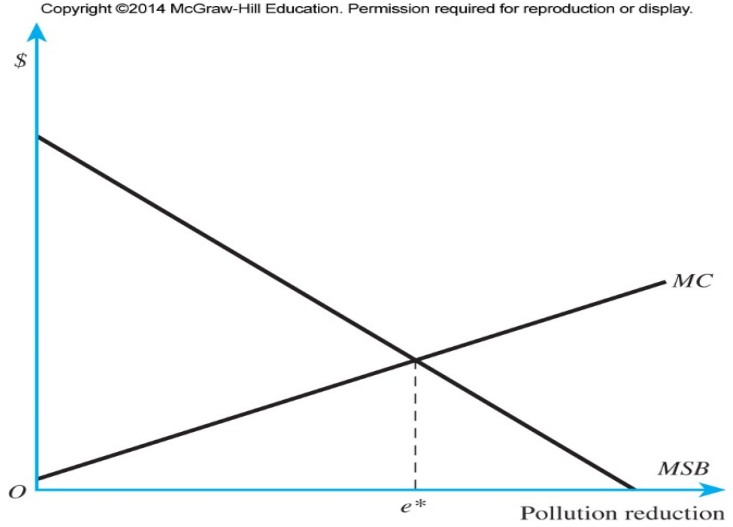
Pegouvian Subsidy

- A subsidy paying an externality-generator not to create such externality.
- The distributional consequences of the tax and subsidy schemes differ dramatically between tax and subsidy.
  - In case of tax, the polluter pays area *ijcd*.
  - In case of subsidy, the pollute gets area *dfhc*.
  - Recall Edgeworth Box in the earlier chapter, there are infinite number of efficient allocations, each of which is associated with its own distribution of real income.
- Possible problems: In the long-run, the subsidy may cause so many new firms to relocate on the river that total pollution actually increases.

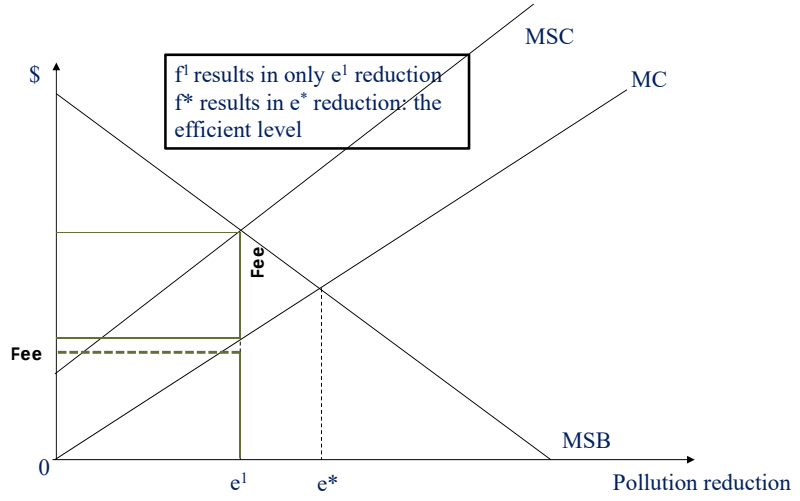
Motivations

- *Why should Bart install pollution control technology that reduces his emissions per unit of output if doing so won't change his tax bills?*

The Market for Pollution Reduction



Public Responses to Externalities-
Emissions Fee: tax on each pollution unit



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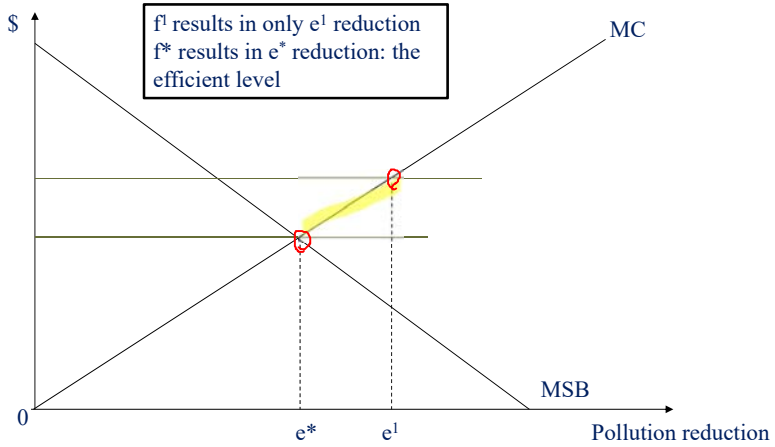
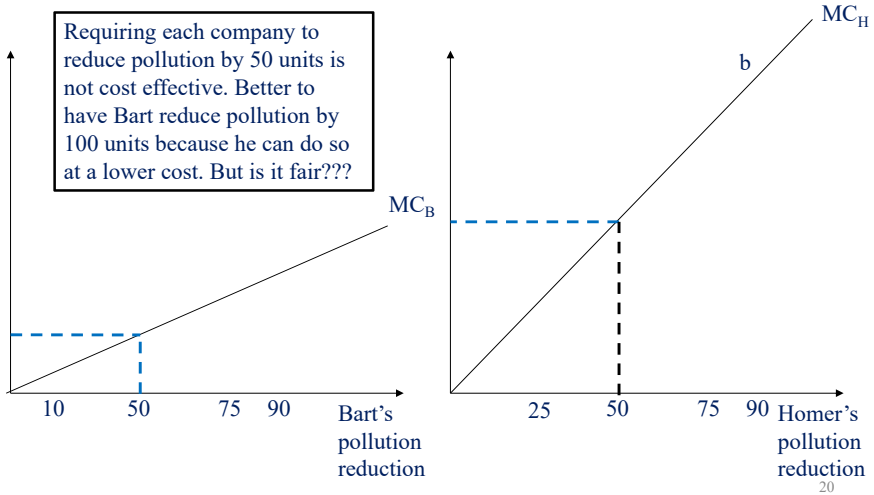


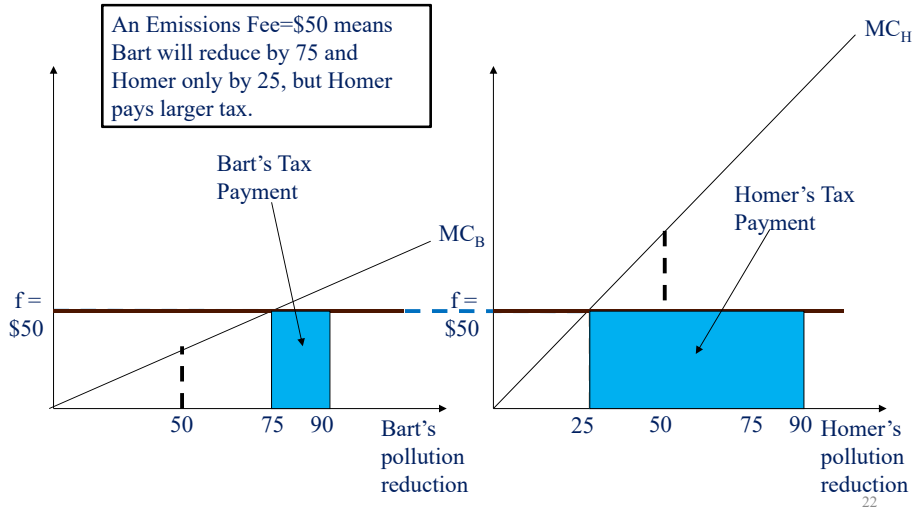
Public Responses to Externalities-
Uniform Pollution Reduction



Cost Effective

- A policy that achieves a given outcome at the lowest cost possible.
- In other words, the total cost of emissions reduction is minimized only when the marginal costs are equal across all polluters.
- Example: Bart cuts pollution by 75 units and Homer cuts by 25 units. But is this fair?

Emissions Fees achieve fairness and efficiency

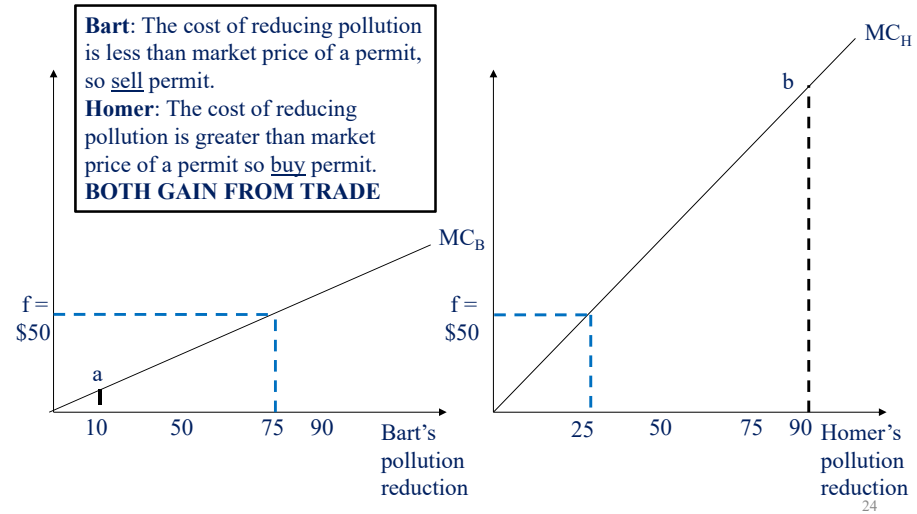


Emissions Fee

- A tax levied on each unit of pollution (rather than on each unit of output).
- The firm that cuts back pollution less isn't really getting away with anything because it has a larger tax liability than if it were to cut back more.
- The key advantage of an emissions fee is that it achieves pollution reduction at the lowest possible cost.
- Other applications: Congestion Pricing
  - Congestion pricing- a tax levied on driving equal to the marginal congestion costs imposed on other drivers.
  - Example: Congestion pricing in congestion charging zone in London Metropolitan.

Public Responses to Externalities-

Cap-and-Trade: Polluters must have a permit



Cap-and-Trade

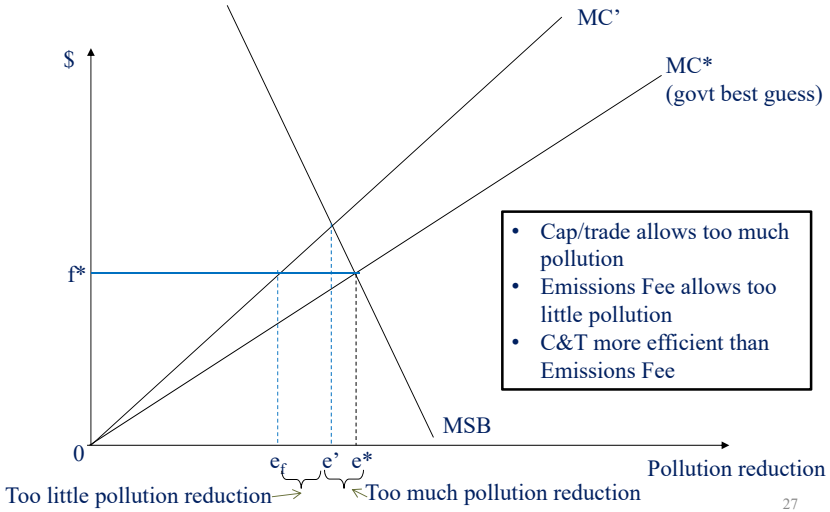
- A policy of granting permits to pollute. The number of permits is set at the desired pollution level, and polluters may trade the permits.
- For every emission fee, in theory there is a cap-and-trade system that achieves the same outcome, and vice versa.
  - However, in practice, there are some differences in how the two systems perform.

Emissions Fee vs Cap-and-Trade

- Responsiveness to Inflation
  - Inflation lowers *real* emissions fee.
  - Cap-and-trade: the annual cap (unit) of pollution remain unchanged regardless of inflation.
- Responsiveness to Cost Changes
  - With emissions fee, pollution reduction decreases as marginal costs increase
  - Cap-and-trade: does not vary as economic conditions change.
- Distributional Effects
  - With emissions fee, polluters pay taxes for each unit of pollution and the revenue goes to the government.
  - With cap-and-trade, if the permits are given directly to the polluting firms for free, then the government receives no revenue. On the other hand, it can generate government revenue if the permits are sold directly by the government to polluters rather than allocated for free.
- Responsiveness to Uncertainty of Costs of reducing pollution (cont. on next slides)

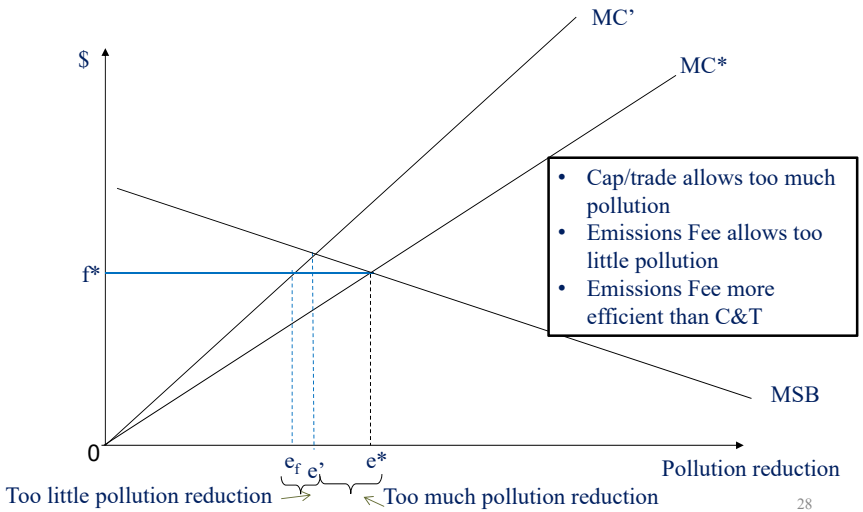
Cap-and-Trade vs. Emissions Fee

Inelastic MSB of pollution reduction



Cap-and-Trade v Emissions Fee

Elastic MSB of pollution reduction



Incentive-based regulation

- Policies that provide polluters with financial incentives to reduce pollution.
- Emissions fees and cap-and-trade systems are incentive-based regulations because they provide polluters with market incentives to reduce pollution.
- This policy approach allows polluters flexibility in how to reduce their emissions.

Command-and-Control Regulation

- *Command-and-control* regulations require a given amount of pollution reduction with limited or no flexibility on how to achieve reduction
  - Technology requirements
    - A type of command-and-control regulation that requires firms to use a particular technology to reduce their pollution.
  - Performance requirements

    A command-and-control regulation that sets an emissions goal for each individual polluter and allows *some flexibility* in meeting the goal.
- Is command-and-control ever better?
  - Yes, in case pollution is not easily monitored or detected.
  - Hot spots: Areas with relatively high concentrations of emissions

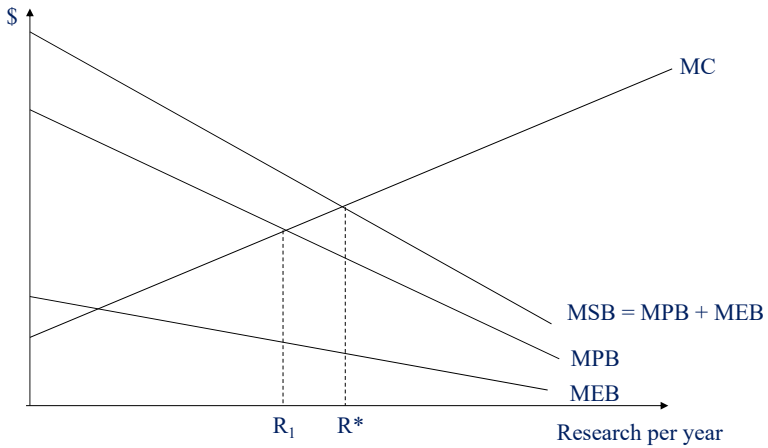
The U.S. Response

- Clean Air Act
  - 1970 amendments
  - Command-and-control in the 70s
  - How well did it work?
- Policy Perspective: Cap-and-Trade for Sulfur Dioxide

Implications for Income Distribution

- Who Benefits?
  - Low- or High-Income Individuals?
  - Example: Pollution in high/low income neighborhood. Even knowing who is affected by some externality does not tell us how much they value removing the pollution.
- Who Bears the Cost?
  - Workers of firms who must reduce output
  - Buyers of firms' output

Positive Externalities



Positive Externalities:
A Cautionary Note on Requests for Subsidies

- Subsidies must come from taxpayers
- Market does not always fail: the fact that an activity is beneficial does not always mean that a subsidy is required for efficiency
- Policy Perspective: Owner-Occupied Housing
  - Tax deduction from mortgages may be washed out completely by housing prices.
  - Preferential housing tax treatment tends to increase volatility in housing prices – macroeconomic instability.
  - Mobility of workers is important for the efficiency of the labor market.

Topic 4 Summary

- Externalities occurs when the activity of one person or firm positively or negatively affects another person/group/firm outside the market mechanism
- An inefficient allocation of resources results because the market price does not reflect the external costs or benefits
- The Coase Theorem indicates that private solutions through bargaining can achieve the efficient outcome under certain circumstances
- Public solutions to externalities designed to achieve efficiency include taxes/subsidies; emissions fees; and command-and-control regulations
- A market-based, cost-effective, public solution is cap-and-trade where pollution permits – the right to pollute – are traded

Class Exercise

1. Throughout the world, zoning laws place restrictions on construction work on private properties. It is common for the square footage and number of floors constructed on a property to be limited by the local government. Is there any economic logic behind this intervention? If there is, can you think of any other method that could accomplish the desired outcome?

Class Exercise

2. In Turkey, many shopping mall owners charge different rental rates on their tenants. The shops of local and relatively unknown brands pay higher rental rates per square meter than international and famous brand shops. Local shop owners protest this differential rental system. What motivates mall owners to use different rates?