LSU Center for Energy Studies






Environmental Economics: Background and Basics

LPSC ARRA Seminar on Clean Air Markets

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David E. Dismukes, Ph.D.
Center for Energy Studies
Louisiana State University

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- What is the most effective (efficient) method for regulating air emissions?
- Economic-based approach.
- What inferences can be provided by markets and market-based approaches?

What is a market?

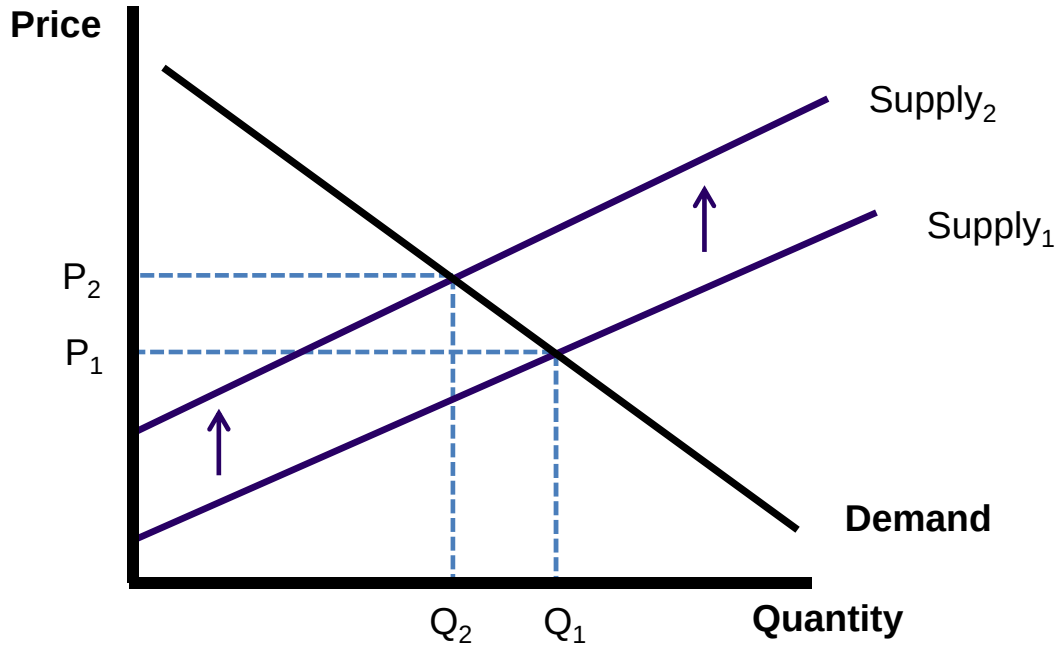
- A system of exchange

What is exchanged?

- Resources: land, labor, capital (i.e. – goods or services in some form)

How does the Market Work?

- Matching of Supply and Demand



Example: Negative supply shock

Supply and Demand -- Components

- Demand

  1. Income
  2. Tastes and preferences
  3. Prices of related goods and services
  4. Buyer's expectations about future prices
  5. Number of buyers

- Supply

  1. Production costs
  2. Technology
  3. The prices of related goods
  4. Firm's expectations about future prices
  5. Number of suppliers

Why is the Market a Preferable Allocator?

- **Optimal use of resources**: buyers force competition on suppliers; greatest return for the effort of suppliers.

- **Pareto efficiency**: "a situation where it is impossible to make one person better off without making anyone else worse off"
  - Meaning: allocation of resources to the uses that will bring the greatest overall increase in production and monetary value by matching producers with the highest bidders.

What Enables the Market to Work?

- Price or Value Setting
- Profit Motive
- Property Rights
- Government and Other Regulating Institutions

Does the Market Operate Perfectly?

General Market Failures (details on next slides)

- Monopoly;
- Information Asymmetry;
- Missing Markets;
- Transaction Costs;
- Externalities (positive and negative)

Monopolies

- One firm selling in a given market.
- Oligopolies, monopsony, oligopsony
- Sources of market power:
  - Control of inputs
  - Economies of scale
  - Patents
  - Licenses
  - Entry lags
- Profit-maximizing output of a monopoly
- Welfare cost of monopolies

General Information Asymmetry

- Firms
  - Knowledge of technological conditions of production
  - Prices of various inputs
  - The prices at which products can be sold
- Consumers
  - Knowledge of preferences and tastes

Missing Markets

- A situation where a competitive market allowing the exchange of a commodity would be Pareto-efficient, but no such market exists

- Causes:
  - Coordination failure
  - Barriers to entry
    - High transaction costs
  - Lack of trust / information asymmetry

Externalities

- An unintended cost or benefit of production or consumption that is not reflected in the price of the related transactions.
- Externalities are often borne by people who are not parties to the transactions that create them.
- Pollution as a public ‘bad’ since there are non-rival costs.

Externalities, continued

- With external costs the competitive output is too large, not Pareto efficient.
- The gain from reduced pollution to people downstream must be weighed against the cost to consumers of a reduced output (Pareto efficiency).
- Taxes associated with lowering external costs should be levied on the 'bad' itself not on the product.
- External benefits (subsidies). Output below Pareto efficient level.

Market Failures and the Environment

- Failure to value the environment:
  - Un-priced use values; option values; existence values; bequest values
- Lack of Information
- Externalities
- Common Access Resources / Sinks
- Time Value of Resources or Alternatives
- Missing Markets

Environmental Informational Asymmetries

- Limited information of how to deal with specific environmental problems (of are a or industry) and of firms' capability to deal with or hide environmental impact.

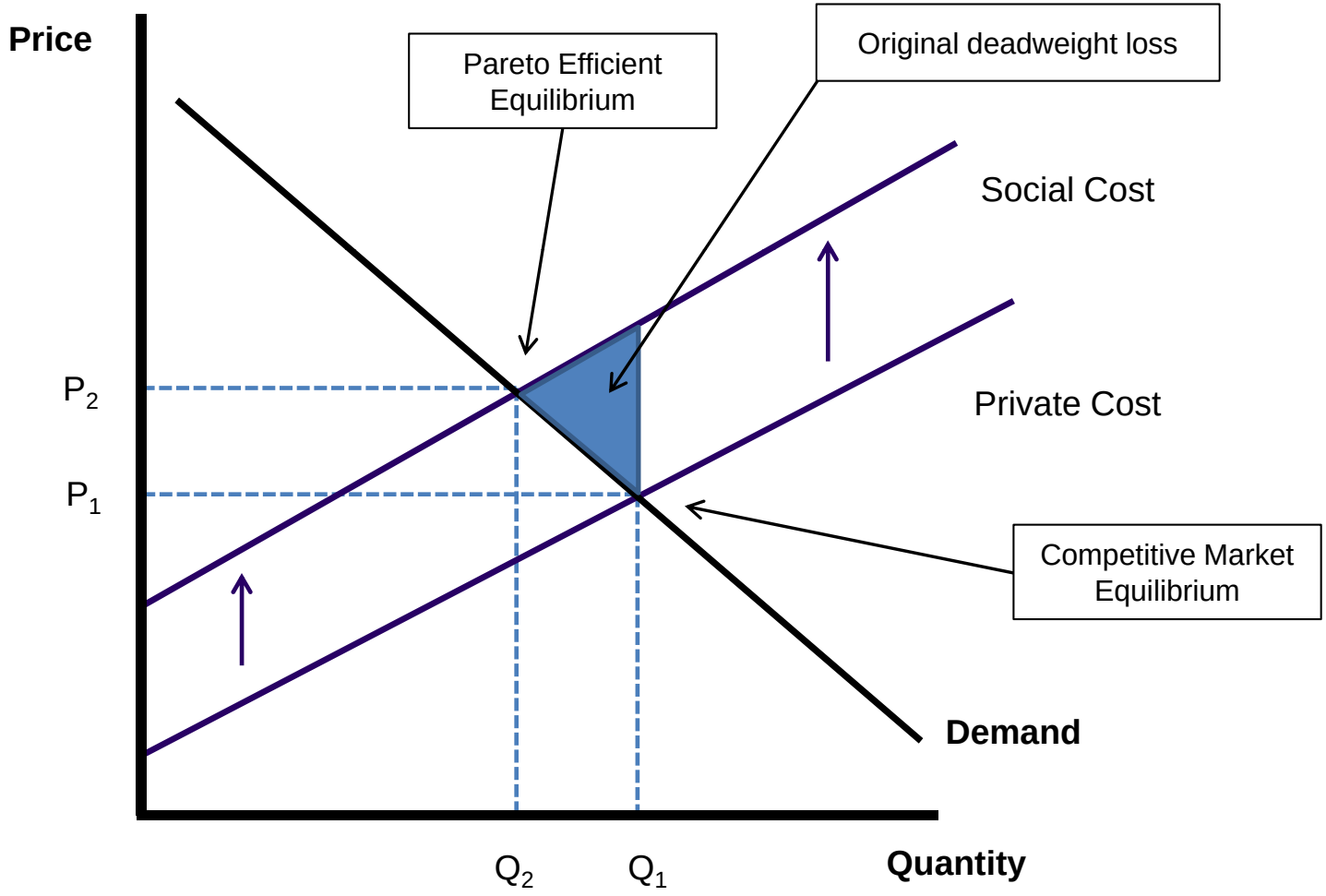
- Limited resources to regulate, monitor and enforce creates challenges for command and control regulations. (Uniform standards and technologies)

Benefits of Using the Market (as opposed to CAC)

1. Cost effectiveness: example, emissions trading credits
2. Substitution and technological advance: example, green taxes
3. Other institution/market-based schemes: deposit refund schemes, environmental bonds, transferable quotas, transfer of development rights

Environmental Economics and Ecological Economics: Weak vs. Strong Sustainability

- Efficiency standard vs. ecological standard
- Discount rate (growth) driven vs. discount rate (growth) limiting
- Resources as inputs and outputs of unlimited economic system vs. economic system as limited subsystem of ecosystem
- Substitutability vs. complementarity


Price
Pareto Efficient Equilibrium
Original deadweight loss
Social Cost
Private Cost
P_2
P_1
Competitive Market Equilibrium
Demand
Q_2
Q_1
Quantity

The Coase Theorem

- Clean air versus pollution, two mutually exclusive things.
- Who is initially assigned property rights doesn't matter as long as those rights are clearly defined and enforced *(with some restrictions, explained on next slide)*.
- Bargaining between the parties can achieve the efficient pattern of resource use.
- The distributional effects, *though*, depend on the exact definition of property rights. i.e. – Who wins and loses initially? Relatively?

The Coase Theorem, continued

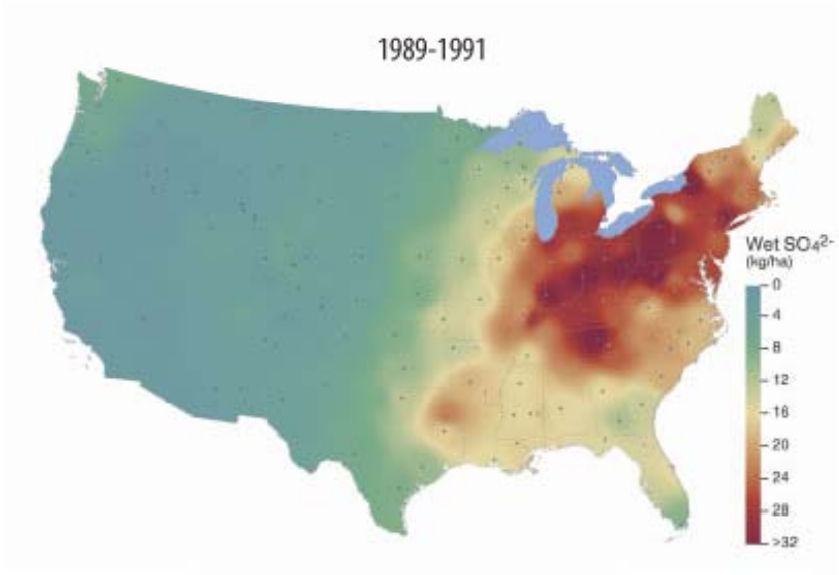
- Number of market participants makes a difference.
- Example: if a firm pollutes a river and *many* people living downstream are harmed, bargaining between the parties cannot be expected to lead to an efficient level of water pollution.
- "Assigning property rights can solve externality problems when there are small numbers of parties involved but not when there are large numbers"
- Bottom line: Government intervention is necessary to obtain economic efficiency.

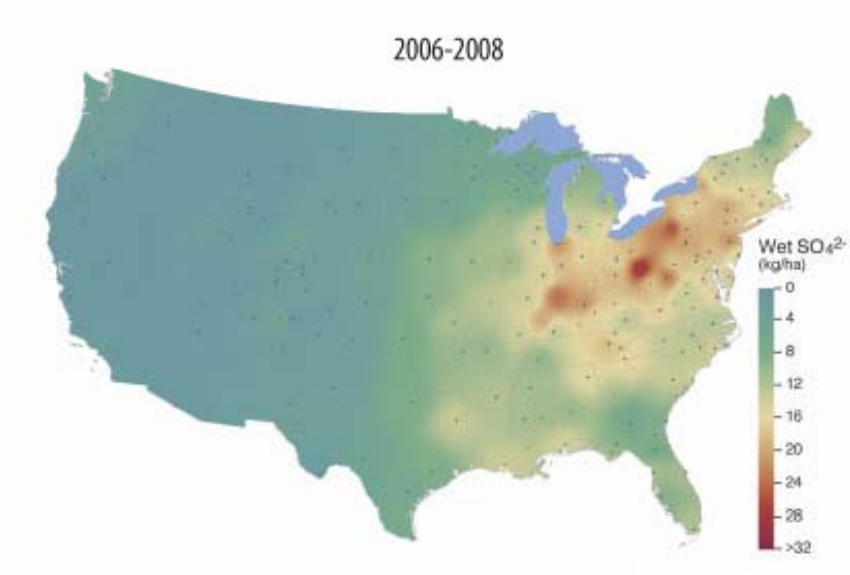
Source: Browning, Edgar K and Jacquelene M. Browning. *Microeconomic Theory and Applications.* Third Edition.

Clean Air Act Amendments of 1990

- Established an emissions trading system for SO_2
- Acid rain (SO_2 + NO_x), ozone depletion, toxic air pollution
- Set a permanent cap on the total amount of SO_2 that may be emitted by electric power plants.
- Went into effect in 1995.
- Operators trade allowances.
- Considered a universal success.

Wet Sulfate Deposition





Source: Environmental Protection Agency

Questions, Comments, & Discussion

dismukes@lsu.edu

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