光华管理学院
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Chapter 14

Natural Resources and the Environment

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Outline

1. Resource Categories
2. Environmental Economics
    1. Concepts
    2. Inefficiency in market with externalities
    3. Public policies to correct the inefficiency
        - Direct control
        - Emission fee
        - Ensure complete property rights (Coase Theorem)

1. Resource Categories

	Definition	Example	Management
Nonrenewable	Resources with fixed supply	Fossil fuels, Nonfuel mineral resources (copper, silver, stone, and sand)	Distribution of a finite quantity of the resource over time
Renewable	Resources that are regularly replenished	Solar energy, agriculture land, river water, forests, and fisheries	Sustainable usage. E.g., forest management, protection of fish breeding grounds, regulation of pollution

Outline

1. Resource Categories
2. **Environmental Economics**

2.1 Concepts

- ***Externality*** is an activity that imposes involuntary costs or benefits on others, or an activity whose effects are not completely reflected in its market price

- Negative: action by one party imposes a cost on another party
  - Plant dumps waste in a river, affecting those downstream

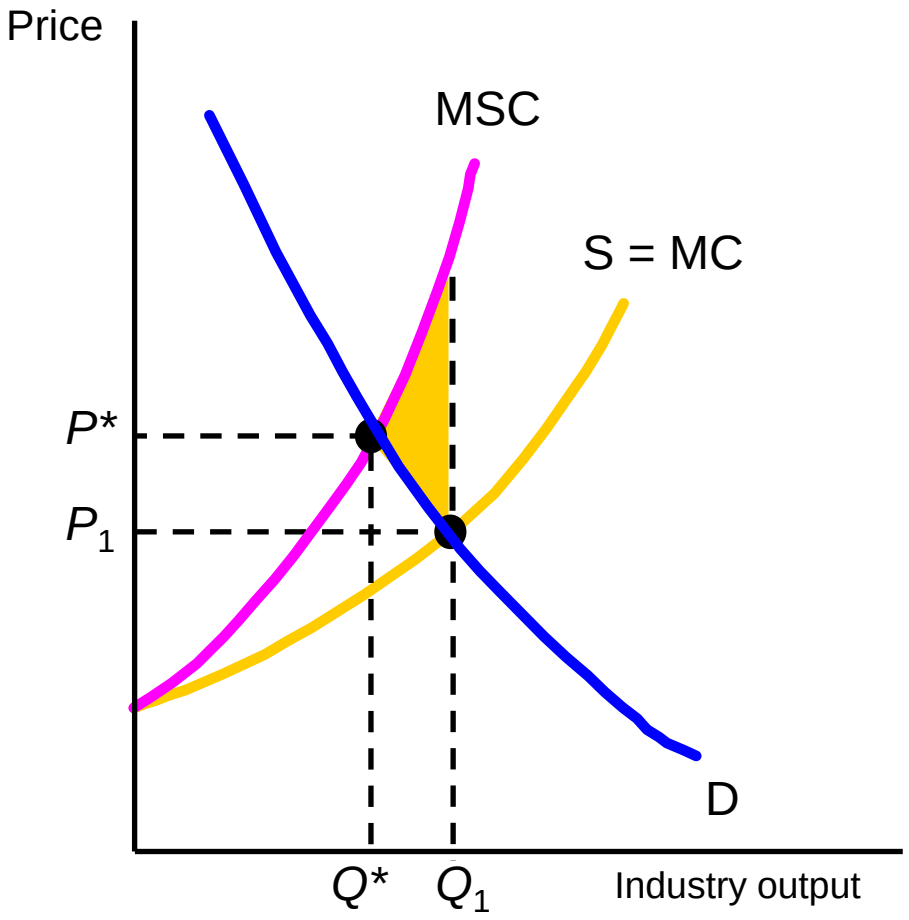
- Positive: action by one party benefits another party
  - Homeowner plants a beautiful garden where all the neighbors benefit from it

Public Goods

- ***Public goods***: ones whose benefits are indivisibly spread among the entire community, whether or not individuals desire to consume them or not
  - An extreme example of externality
  - Consumption by one individual does not affect the supply available for other individuals
  - Efficient provision requires government involvement
  - Examples: knowledge, national defense, lighthouse, public television

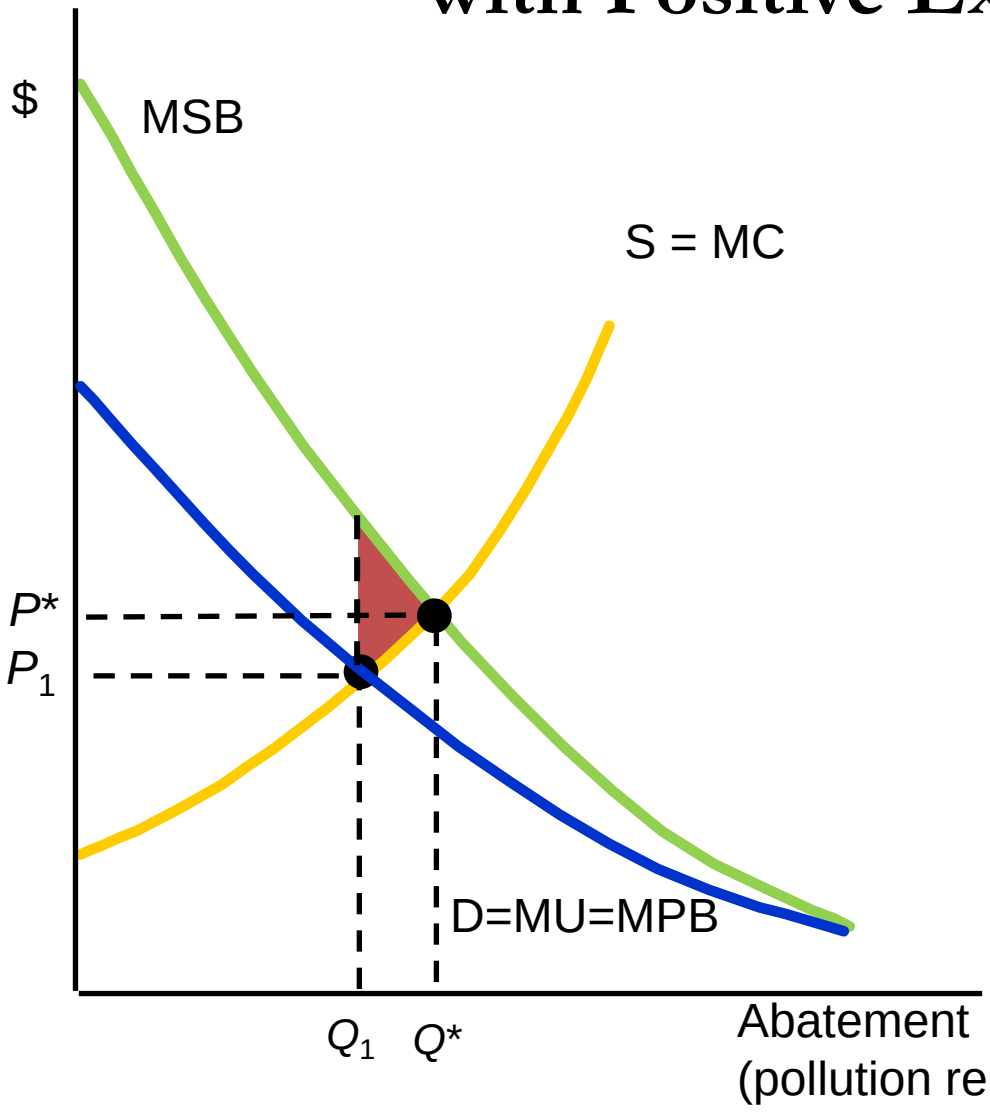
- ***Private goods***: ones that can be divided up and provided separately to different individuals , with *NO* external benefits or costs to others
  - Efficient provision can be achieved through private market mechanism

2.2 Market Provision of Goods with Negative Externalities



- ***Marginal Social Cost (MSC)***: MC incurred by producers + marginal external cost imposed on others (not taken into account by the producers)
- ***Socially Efficient Level***:
  - MSC=MC
  - Q*
- Market provision level:
  - Q1>Q*
  - To much production
- Efficiency loss

Market Provision of Goods with Positive Externalities

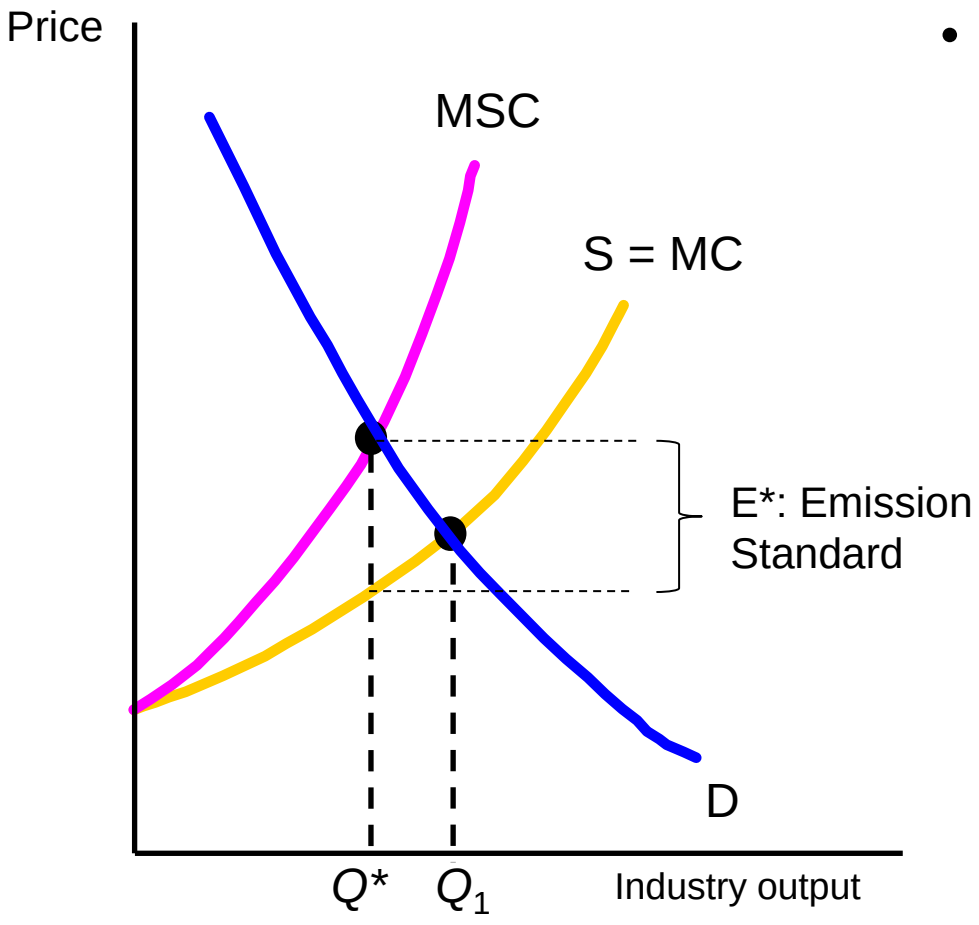


- ***Marginal Private Benefit (MPB):*** marginal benefit in pollution reduction enjoyed by the firms
- ***Marginal Social Benefit (MSB):*** MPB + external benefits enjoyed by the society
- ***Socially Efficient Level***:
  - MPB=MC
  - Q*
- Market provision level:
  - Q1<Q*
  - To little abatement
- Efficiency loss

2.3 Policies to Correct Externalities

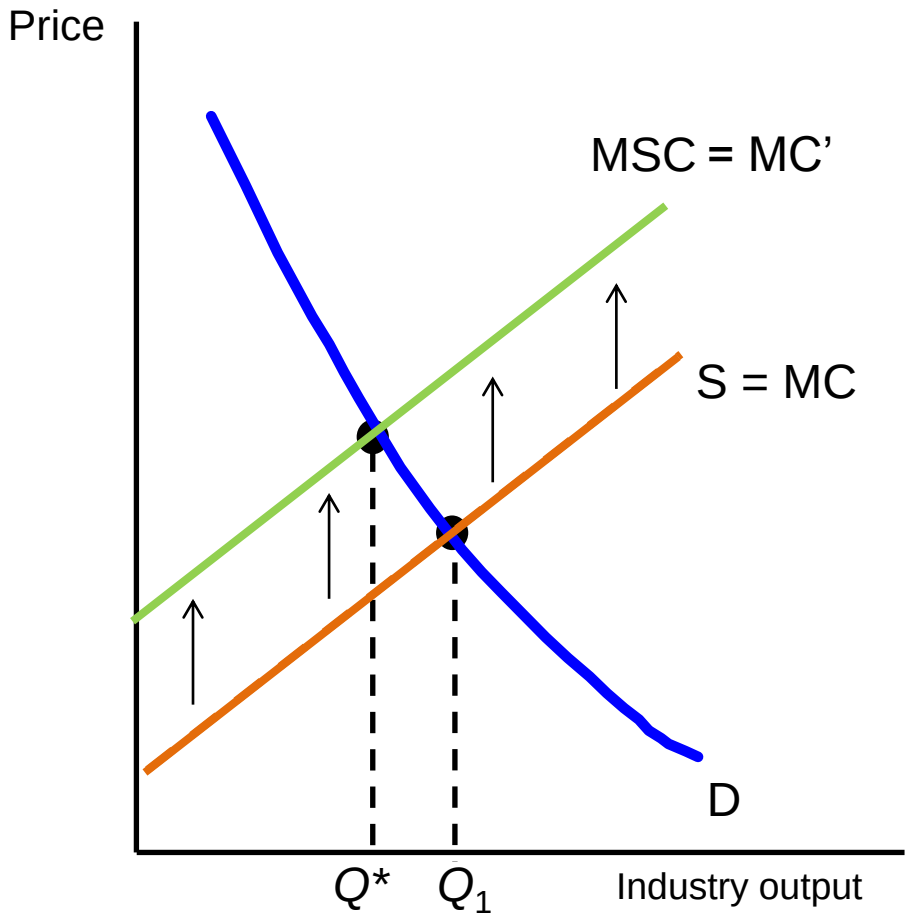
- Summary
  - Negative externalities → Over provision than optimal
  - Positive externalities → Under provision than optimal
- Government's anti-pollution policies
  - Direct control
  - Emission fee
  - Ensure complete property rights (Coase Theorem)

2.3.1 Direct control



- Emissions Standard: a legal limit on emissions at E*
  - Enforced by monetary and criminal penalties
  - Increases the cost of production and the threshold price to enter the industry

2.3.2 Emission Fee



- Suppose that MSC=MC+E, where E is the social cost of emission
- By charging a emission fee of E, we can restore efficiency
  - The new marginal cost curve of the firm (MC') is the same as MSC
  - Firm produce at the social efficient level Q*
  - Emission fee *internalizes* the externality of the pollution

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        - **Ensure complete property rights (Coase Theorem)**

An Example of Coase Theorem

- A paper mill dumps toxic waste in a nearby river
- There is a private beach resort on the shore of the river downstream from the paper mill
- Suppose that for every ton of paper produced, a barrel of toxic waste is dumped in the river, imposing a $100 cost on the downstream resort owner.
  - The MSC per ton of paper produced is thus $100 more than the MPC

Role of Private Bargaining (1)

- Suppose that the owner of the paper mill *also owns the river*
  - The mill has the "right" to pollute the river
  - In this case, the downstream resort owner would be willing to pay $100 for every ton of paper that the paper mill *did not produce*
  - Now the paper mill would gain $100 for each ton of paper not produced
  - OR, the paper mill would loss $100 for each ton of paper produced
  - Result:
  1. MPC is increased to the MSC level
  2. Pollution is reduced to the social efficient level

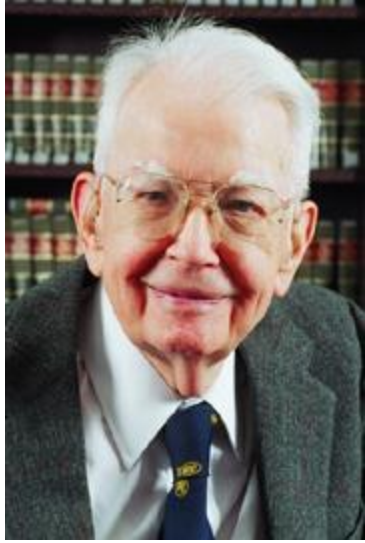
- Insight: if the owners of the two parties can easily bargain with each other, the existence of externalities may not necessarily result in inefficiency

Role of Private Bargaining (2)

- A more striking insight:
  - The efficient result is INDEPENDENT of the specific ownership

- Suppose that the beach owner also own the river
  - He could force the paper mill to pay for the right to dump toxic waste into the river
  - The resort owner can charge the paper mill $100 per barrel of waste dumped in the river
  - The paper mill would be forced to recognized the social costs that its production imposes on the rest of the society
  - Result
  1. MPC is increased to the MSC level
  2. Pollution is reduced to the social efficient level

Coase Theorem (1960)



- If trade of the externality can occur, then bargaining will lead to an efficient outcome no matter how property rights are allocated.
- *Crucial condition* for optimality: both (1) well-defined and (2) enforceable property rights.
  - If property right are not well-defined, it will be unclear whether the paper mill must gain the beach owner's permission to generate the externality.
  - If property right cannot be enforced (perhaps the level of pollution or damage cannot be measured), then paper mill may not pay the right amount which leads to efficiency

Another Caveat – Transaction Cost

- The practical application of the Coase Theorem depends largely on the number of parties being affected

- When millions of parties are affected (as the case with air pollution in urban areas), it is hard to see how effective negotiation can happen
  - Transaction costs of the negotiation would be far too high

- Government's role in pollution control:
  - Build up legal system to ensure property rights
  - When transaction costs are high, government may intervene on our behalf to deal with the negotiation