HS 200
Environmental Studies

Environmental Economics
Video 4

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Outline

- Private solutions
  - Coase theorem
- Property rights
- Public solutions
  - Command and control policies - regulations
  - Market based policies – (i) Pigovian taxes (ii) Tradable permits
  - Equivalence of Pigovian taxes and tradable permits in moving towards social optimal

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**: Morally accepted and expected norms.
  - **Charitable organizations** : Examples?
  - **Integrating different types of businesses**: Some firms are involved in multiple businesses to address the externality from one firm by another.
  - **Contracting between parties:** to mutually internalize an externality (to mutually benefit both parties). Private market can internalize externalities by relying on the self-interest of the interested parties. E.g. mergers and acquisitions; R&D.

The Coase Theorem

- Private market can be effective in dealing with externalities in some cases

- **Origin: Ronald Coase –** considered regulation of radio frequencies and posited that regulation was not needed as the radio stations with the most to gain by broadcasting on a particular frequency had an incentive to pay the other broadcasters to not interfere.

- 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 and allocate resources efficiently (*irrespective of the initial distribution of rights* – what rights?).

- Based on the bargaining that occurs during the application of the Coase Theorem, funds may be offered to compensate one party for the other's activities.

The Coase theorem (example)

- **Example**: A business (restaurant) subject to a noise complaint from neighbourhood households

- **Possible outcomes:** Shutdown/relocate the restaurant; ask the households to relocate; compensate the households for cost incurred (externality); households compensate the restaurant to relocate.
- Alternatives involve comparing the benefit to the restaurant owner with the cost the households bear.
- If the compensation offered to the households is more than the cost borne by them, then they will accept the compensation (efficient outcome).
- If the money offered by the households is more than the benefit of the restaurant to the owner, then? (efficient outcome).

Introducing property rights

- **Property rights** refer to the ability of people to exercise authority over the resources they own.
- In the example, what if the residents have a right to a peaceful environment? What if the restaurant has the right to own the business in that area?
- *According to the Coase theorem*, the initial distribution of rights does not matter for the market's ability to reach the efficient outcome. The efficient outcome remains unchanged owing to its dependence on the costs and benefits (and bargain) involved.
- Property rights help determine the distribution of economic well-being (and who would pay whom).

When and why would Coase theorem NOT work?

- ***Transaction costs***: The costs that parties incur in the process of agreeing to and following through on a bargain.
  - Bargaining does not always work even when a mutually beneficial efficient outcome is possible.
  - Sometimes the private solution approach fails because transaction costs are so high that private agreement is not possible. E.g. legal and auditor fees.
  - Breakdown of bargaining caused by failure to reach an agreement – E.g. strikes and wars.
  - Large number of parties involved.
- When bargaining among the private players breaks down, the government can play a role (**collective action**).
  - Government can act on behalf of a side who may find it impractical to act for themselves. E.g. fishermen and factory polluting the common water body.

Public policies towards externalities

- When externalities are significant and private solutions are not found, government may attempt to solve the problem through:

  - **Command-and-control policies**: to regulate behaviour directly. [Regulations]

  - **Market-based policies**: which incentivize private decision makers to address the externality on their own.

Command-and-control policies

- Usually take the form of ***regulations***: Government can remedy an externality by:
  - Forbidding certain behaviour (when the costs far outweigh the benefits)
  - Requiring certain behaviour
  - Examples:
    - Forbidding the dumping of poisonous waste into the water or land.
    - Requirement that all infants be immunized = polio
    - CNG in autorickshaws and taxis
    - Stipulations on pollution emission levels set by the Environmental Protection Act, 1986. (Environmental regulation in India was first outlined in the Environment Protection Act of 1986)

Command-and-control policies

- In most cases of pollution, it is impossible to completely prohibit the polluting activity.
- It is necessary to weigh costs and benefits to decide the types and quantities of allowable pollution.

- Regulation can be of **2 types**:
  - Imposing a maximum level of permissible pollution
  - Imposing the adoption of a particular technology to reduce emissions

  Both require government to have details of industries and alternative technologies in order to adopt the correct regulation – also a limitation.

Market-based policies

- Government can incentivize the markets to attain social efficiency.
  - Pigovian taxes and subsidies
  - Tradable pollution permits

- **Pigovian taxes:** Taxes enacted to correct the effects of a negative externality.
- Pigovian taxes are advocated to deal with pollution, compared to regulation.
  - Reason: Taxes reduce pollution at a lower cost to society; and provide the firms with an incentive to develop cleaner alternatives (which would result in a reduced tax burden).

Pigovian taxes (compared to regulation)

- Examples of regulation versus Pigovian tax
  - If the government decides it wants to reduce the amount of pollution coming from a specific plant, they 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 produces (i.e. ***Pigovian tax***).

- Regulation would dictate *level of pollution* whereas Pigovian tax would *give incentive to reduce pollution*.
- Higher the tax, larger the reduction in pollution (and need to develop cleaner alternatives – reduce tax burden) – efficient mechanism compared to regulation.
- What if tax is too high?

Pigovian taxes (compared to regulation)

- **Regulation** results in equal reduction by the same amount by all the participants.
  - Note that one firm may be able to reduce pollution at a lower cost than another.

- **Tax:** The firm with the more cost effective solution to reduce pollution will be able to substantially reduce pollution and avoid tax.
- The other firm would also reduce pollution and attempt to pay lesser tax.

- Pigovian tax places a price on the *right to pollute*
  - Pigovian tax allocates pollution to factories which face the ***highest cost*** of reducing it (similar to how market allocates goods to buyers who value the them the most highly).

Pigovian taxes (difference from usual taxes)

- Most taxes *distort* incentives and move allocation of resources away from the social optimal.

- Pigovian taxes consider social well-being of bystanders in the presence of externalities.

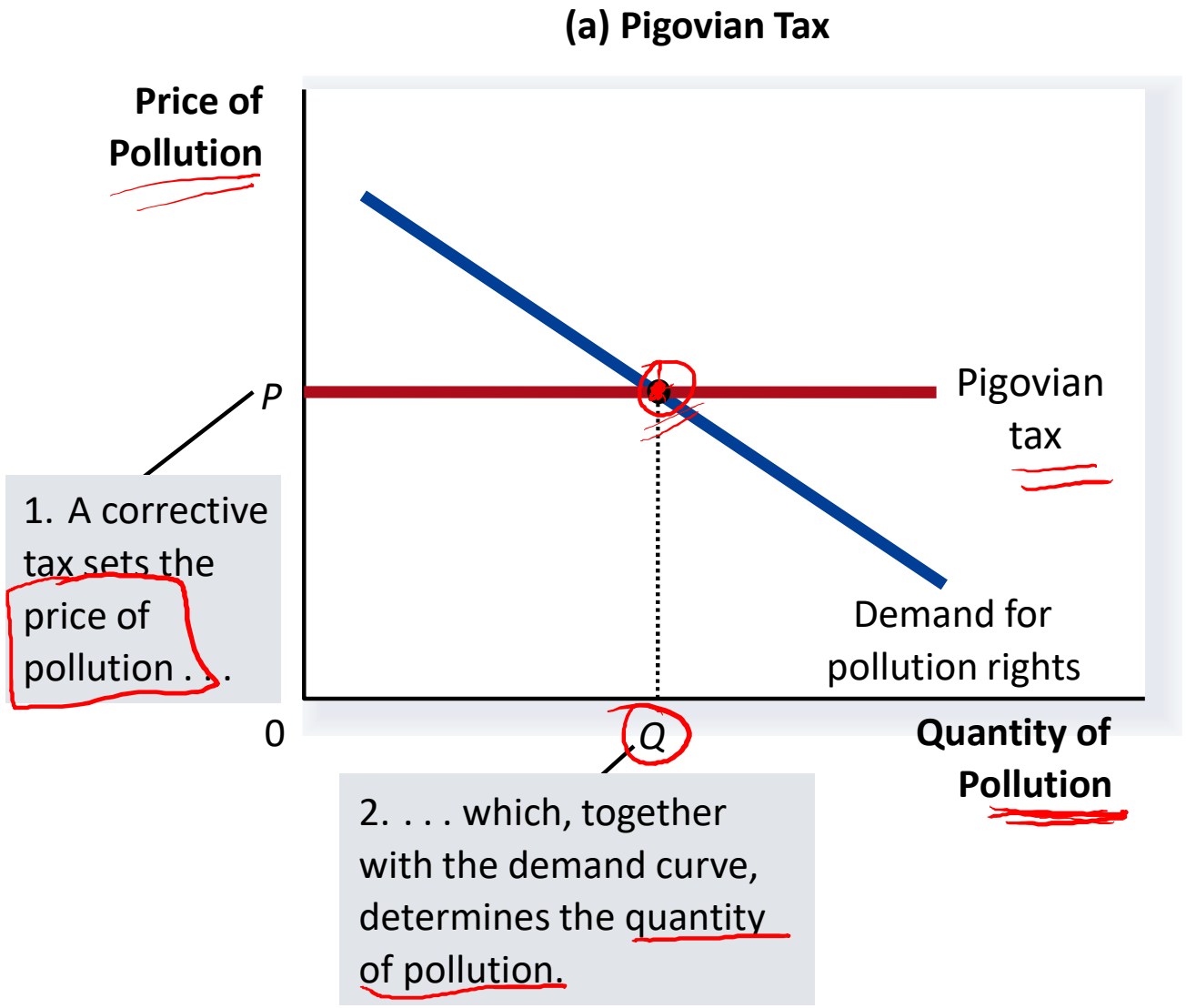
- Pigovian taxes correct incentives for presence of externalities and move allocation of resources closer to the social optimum.
  - *Increase government revenue while enhancing economic efficiency*.

Tradable Pollution Permits

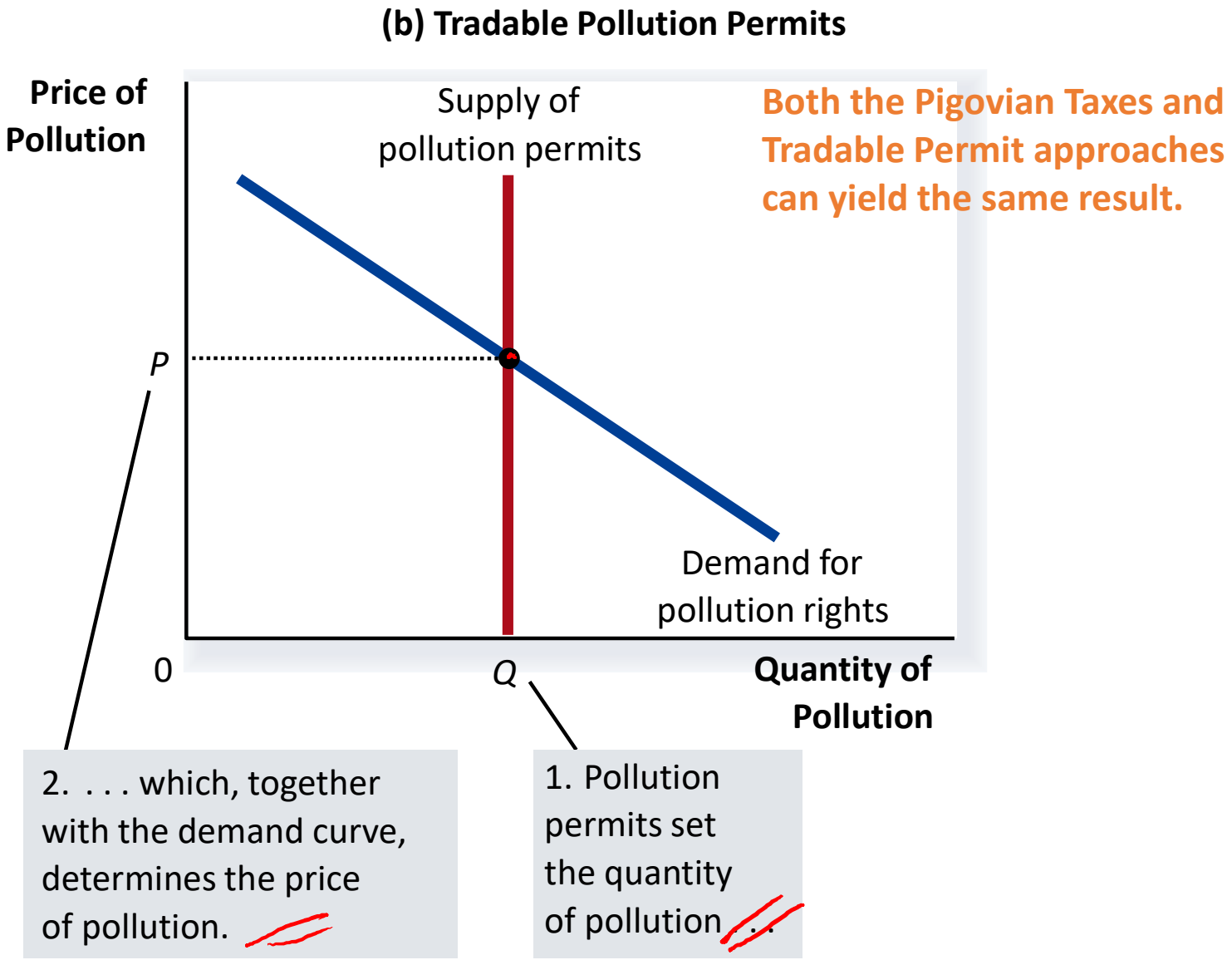
- E.g. two industries - a steel and a paper firm
  - Both mandated to reduce emissions by a fixed amount

- ***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.
  - *Enhances social welfare* (with total external effect, in this case, total pollution level remaining the same) with efficient allocation of resources
- Allowing the voluntary transfer of the right to pollute from one firm to another results in the scarce resource of tradable permits or pollution permits or "right to pollute" permits.
- Invisible hand => new market efficiently allocates the right to pollute

The Equivalence of Pigovian Taxes and Tradable Permits



The Equivalence of Pigovian Taxes and Tradable Permits



The Equivalence of Pigovian taxes and Tradable Permits

- Both do not depend on the initial allocation of the permits (similar to property rights in case of Pigovian taxes):
  - Firms which can reduce pollution at lower cost would be willing to sell their permits to firms incurring higher costs to reduce pollution.
- Both result in efficient allocation of resources, while enhancing social welfare (assuming a free market for pollution rights).
- In both cases, firms pay to pollute. With permits, the polluters pay to buy the permits; With Pigovian taxes, polluting firms pay a tax to the government.
  - **Permits:** The firms which possess the permits also pay to pollute – how? Opportunity cost of polluting is what they would have received if they had sold the permits on the open market.)
- Both internalize the externality by making it costly for the firms to pollute.

Summarizing

- **Negative externalities** cause the socially optimal quantity in a market to be less than the equilibrium quantity.
- **Positive externalities** cause the socially optimal quantity in a market to be greater than the equilibrium quantity
- Those affected by externalities can sometimes solve the problem privately.
- The **Coase theorem** states that if people can bargain without a cost, then they can always reach an agreement in which resources are allocated efficiently.
- When private parties cannot adequately deal with externalities, then the government steps in **(collective action)**.
- The government can either regulate behavior or internalize the externality by using **corrective taxes** or by **issuing pollution permits**.
- **Is complete elimination of pollution an optimal solution?**

Thank you