# EXTERNALITIES (Chapter 10)

- The market failures examined in this chapter fall under a general category called externalities.
- Externality: the uncompensated impact of one person's actions on the well-being of a bystander.
- The government responds by trying to influence this behaviour to protect the interests of bystanders

# EXTERNALITIES

- Negative externality: any negative spillover cost stemming from a production activity that is imposed on a party other than the decision maker

- Decision maker does not face the external cost

- Examples
  - a crack house operating next to a day-care centre
  - Textbook case: a pulp and paper mill upstream from a fishery

# EXTERNALITIES

- Positive externality: any positive spillover benefit stemming from a production activity that is imposed on a party other than the decision maker

- The decision maker does not reap the external benefit

- Examples
  - OC transpo and stores near the transit way
  - Construction of a new bridge may lower prices of goods for both users and non-users of the bridge.
  - External benefits of educated citizenry leads to higher productivity and lower levels of crime, poverty and social unrest.

# EXTERNALITIES

- Both positive and negative externalities cause market failure in the form of an inefficient level of output
- Reminder: efficiency means that total surplus is maximized at the level of production
- Equivalently, the marginal benefit, which is the consumer's willingness to pay for the last unit, equals the suppliers' valuation of the last unit, which is the cost of production
- The implication is that in the presence of an externality, that efficient level of output is not attained

# EXTERNALITIES

- Pollution - negative externality
  - Examples are air pollution from factories or power plants, water pollution, noise pollution (airports, urban railroads, roommates)

- What is the optimal level of output for a polluting firm?
  - Zero or not zero?
  - The optimal level is obtained by following the economic decision rule
    - equating the marginal benefit to the marginal cost.

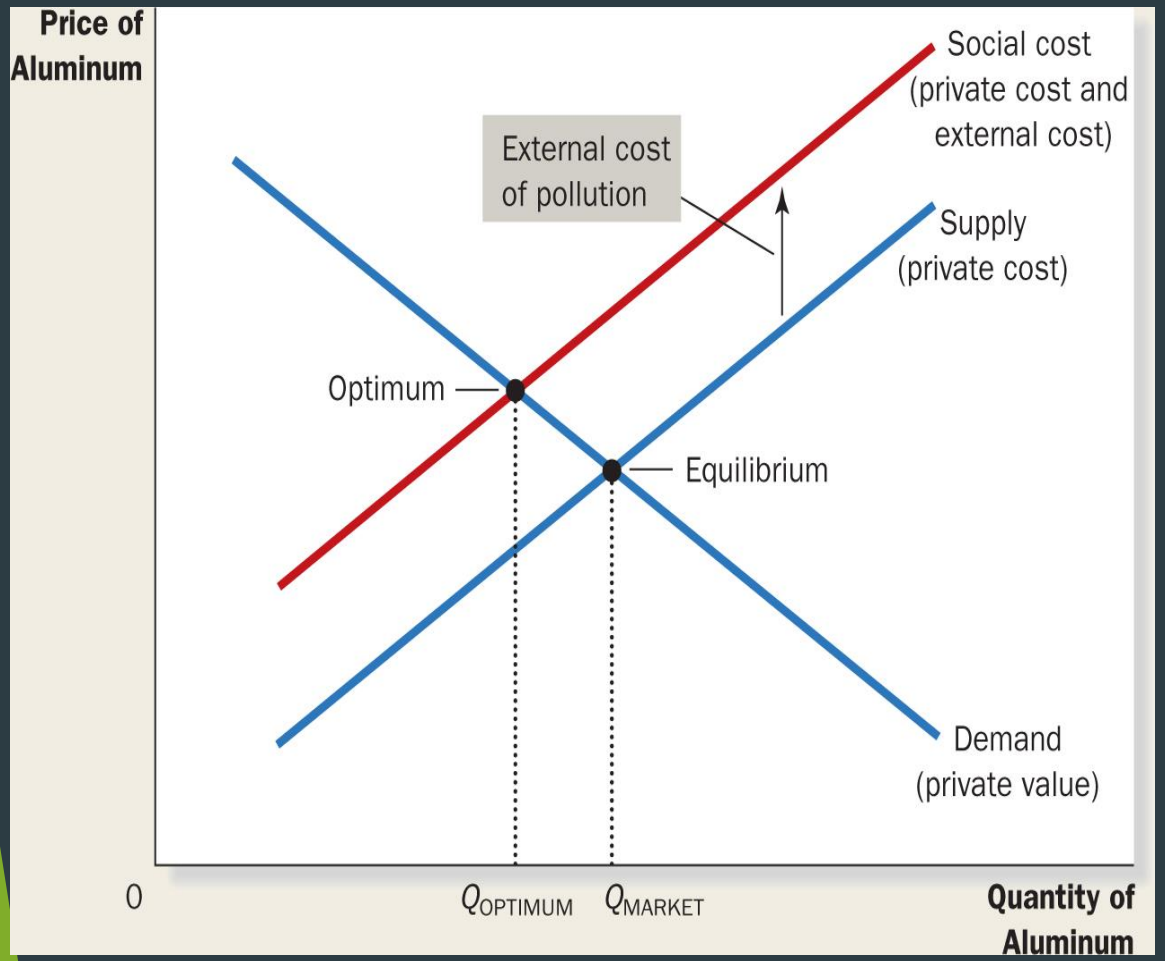
- Typically, the polluting firm produces something that is valued by consumers, so some output, and therefore some pollution as a byproduct, should be produced
  - since automobiles cause air pollution, why not immobilise all motor vehicles?

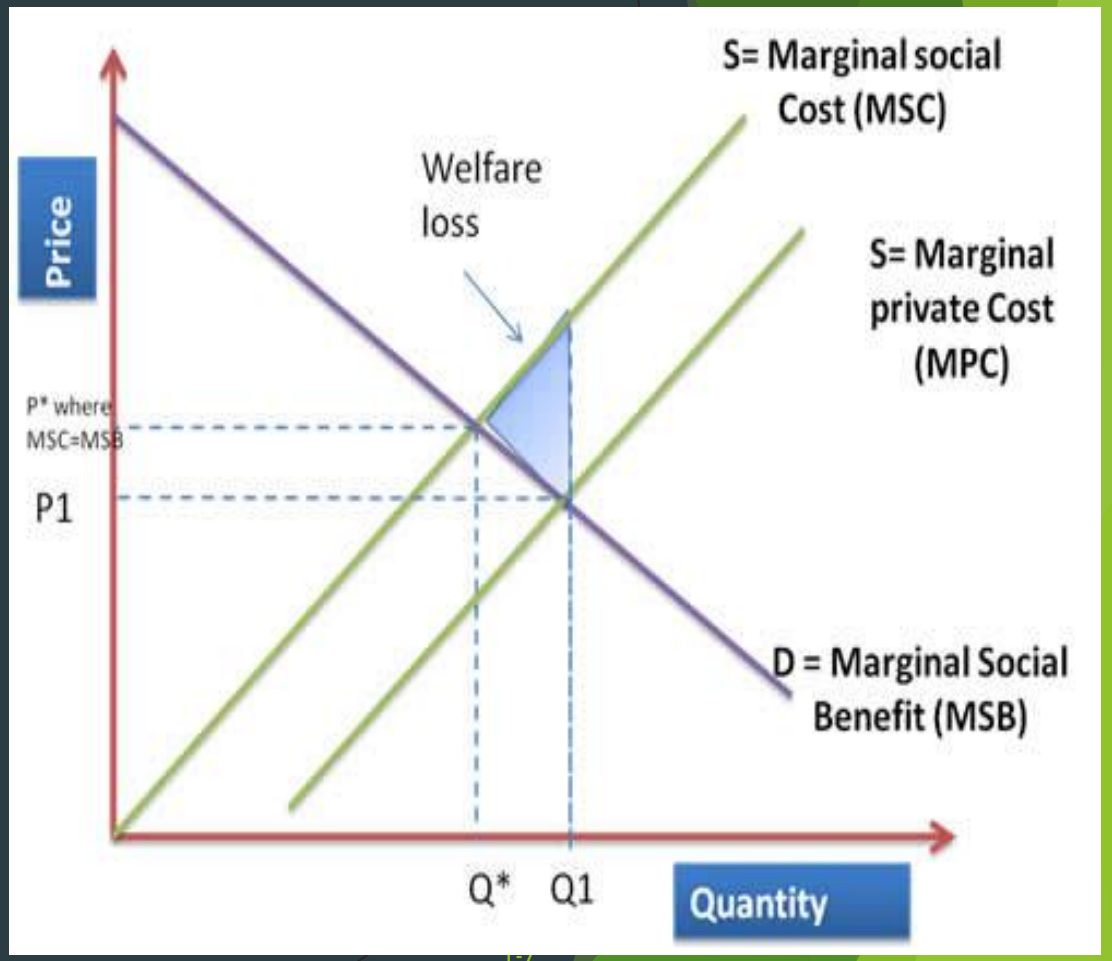
# EXTERNALITIES

- The polluting firm doesn't care about the costs that it is imposing on others, as these costs are external to its decision making process
  - it makes its choices based on its own marginal benefit (MB) and the costs that it faces
  - The costs that it imposes on others are included in the social cost (SC) of production
  - SC = private cost (PC) + damages imposed on others

# EXTERNALITIES

## Negative externality

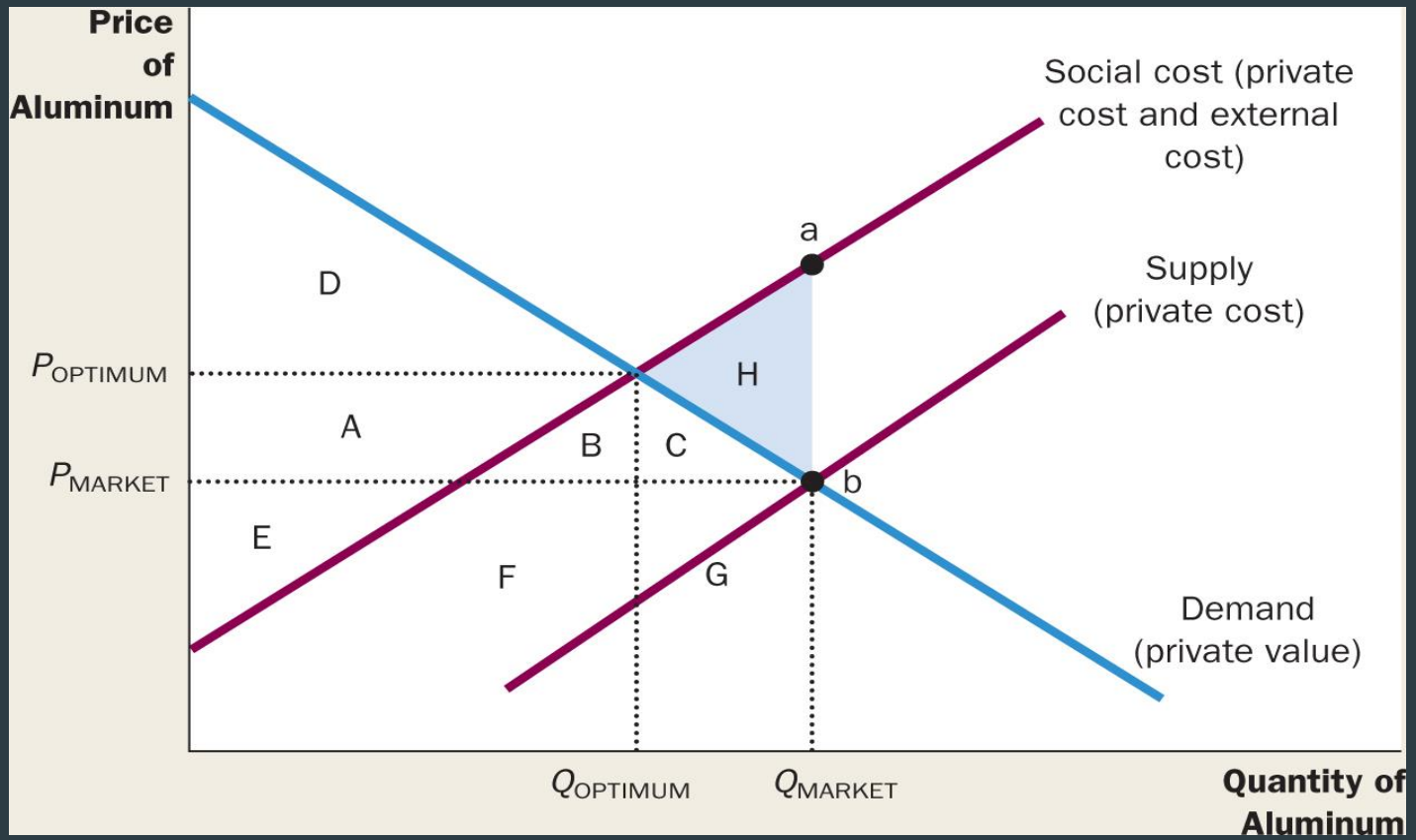


# EXTERNALITIES

- Because SC > PC (private cost) at the free-market rate of output, the polluting firm is over-producing from a social point-of-view
  - Assumes that the polluter has the (property) right to produce as it pleases, and that the affected parties do not have the (property) right to stop it.
- The intersection of the demand curve and the social-cost curve determines the optimal output level
  - The socially optimal output level is lower than the market equilibrium quantity.
  - From the point of view of society, we are over-producing at the market level of output

# EXTERNALITIES




| | At $Q_{MARKET}$ | At $Q_{OPTIMUM}$ | Change |
|---|---|---|---|
| Consumer surplus | A + B + C + D | D | −(A + B + C) |
| Producer surplus | E − (B + C + H) | A + E | A + B + C + H |
| Total surplus | D + A + E − H | D + A + E | H |

# EXTERNALITIES

- Deadweight loss is loss in total surplus stemming from the pollution
  - it arises because we are producing at the market equilibrium rather than at the socially optimal equilibrium

- At the market quantity, where we would produce without intervention, the private cost curve intersects the demand curve

  - this ensures that the consumers' willingness to pay is aligned at the margin with the producers' costs
  - so that the consumers' willingness to pay is less than the full social cost of production at the margin
  - It follows that any units greater than the socially optimal Q ought not to be produced

# EXTERNALITIES

- Over these units of excess production, the discrepancy between the total social cost of production, as represented by the height of the social cost curve, and the benefits received from consumption, as represented by the height of the demand curve, represents a net loss in total surplus, which we call deadweight loss
  - That is represented by triangle ‘H’

- How to achieve the socially Optimal Output?

1. Decree by law that the level of output cannot exceed Q optimum
   - The quota or ‘command and control’ approach
     - This approach is difficult to administer
     - It is not efficient in that both high-cost and low-cost producers have to reduce their output

# EXTERNALITIES

2. The government can internalize an externality by imposing a tax on the producer to reduce the equilibrium quantity to the socially desirable quantity.

- Make the polluting producer assume not only the private costs but also the social costs of production

- This situation can be rectified with emission charges assessed on the polluter for each unit of pollution.
  - The effluent charge will internalise the externality.
  - Now that the polluter faces these costs that it imposes on others, it will take them into account when setting its output.

# EXTERNALITIES

- If the effluent charge = the damages imposed on others, SC = PC, and the socially optimal equilibrium is reached
  - Called a Pigovian tax after British economist Arthur Pigou
  - Can be problematic to implement
    - What is the magnitude of the social cost?
    - That can be quite subjective.

3. Marketing of pollution permits.

# EXTERNALITIES

- Positive externality
- Not all externalities are harmful – on the contrary

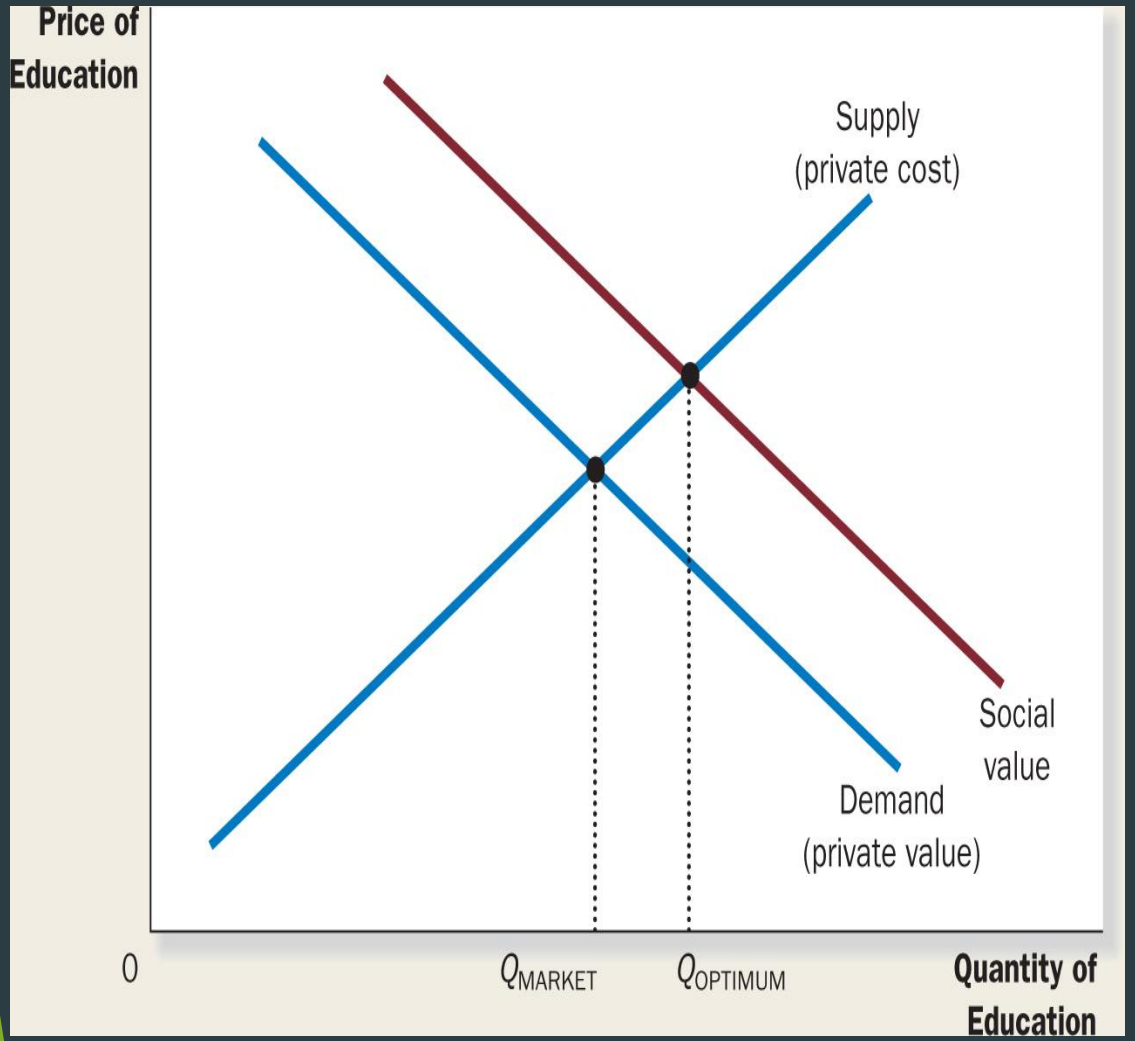
- Whenever the production by one party benefits others as a side-effect, there is a positive externality

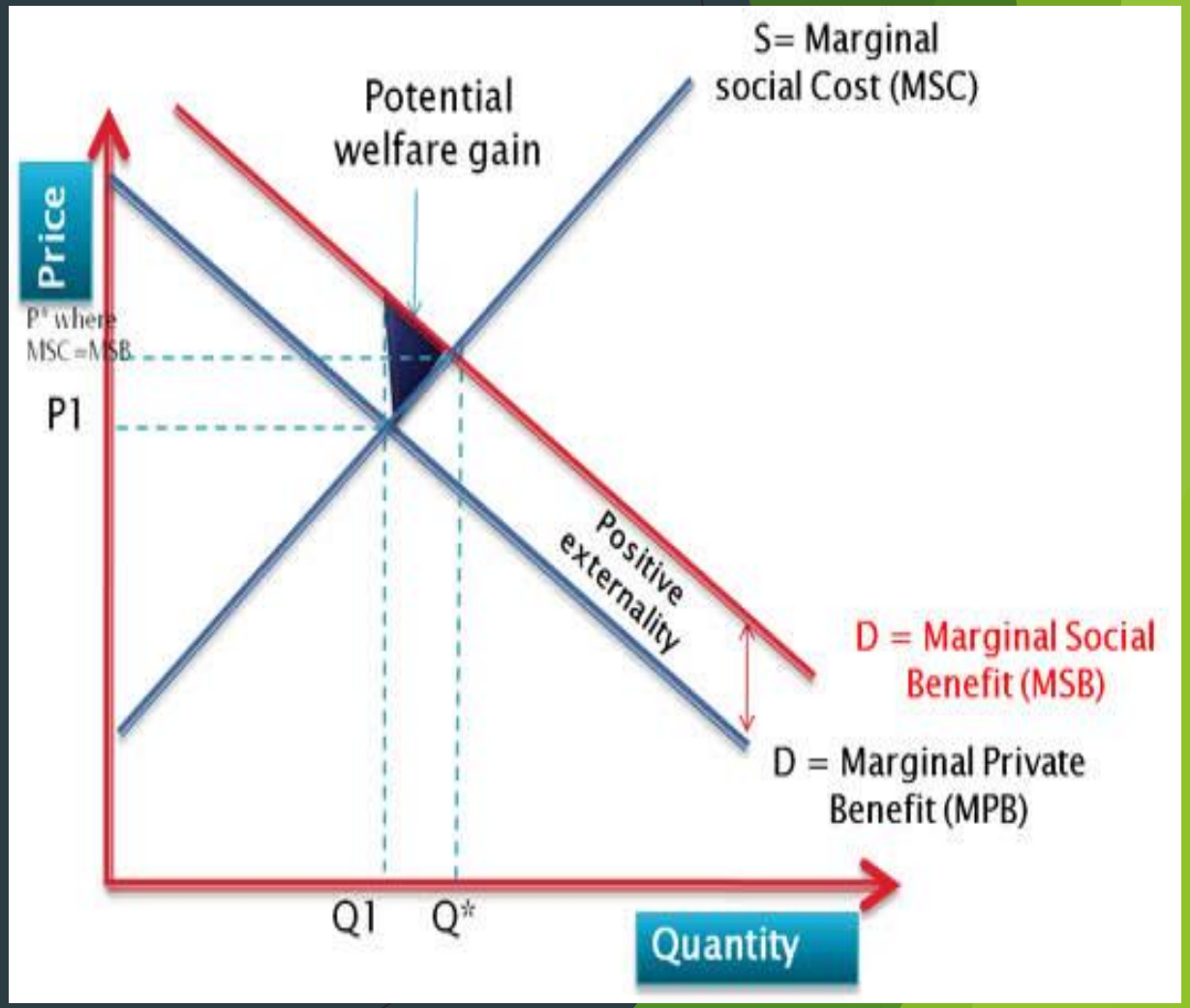
- The social value of producing the good exceeds the private value

- Examples
  - Technology spillover: a firm's innovation or design not only benefits the firm, but enters society's pool of technological knowledge and benefits society as a whole.
  - Subsidizing higher education .

# EXTERNALITIES

- Positive externality



# EXTERNALITIES

- The intersection of the supply curve and the social-value curve determines the optimal output level.
- The optimal output level is more than the equilibrium quantity.
- The market produces a smaller quantity than is socially desirable because the producer does not reap the social benefits – only the private benefits.

# EXTERNALITIES

- Rectifying a positive externality

- The opposite of a Pigovian tax is a Pigovian subsidy
  - Subsidize the producer by the amount of the social benefit

  - As such, the externality will be internalized, as the producer will consider the full benefits of production

  - The subsidy can be difficult to evaluate, as it is a subjective quantity

  - Most subsidies granted in the real-world are justified in part by a positive externality argument

# EXTERNALITIES

- Industrial Policy
  - Government intervention in the economy that aims to promote technology enhancing industries
  - And sometimes other industries, such as fishing and ‘green energy’
  - Technology Partnerships Canada is a program of this nature operated by Industry Canada

# EXTERNALITIES

- Private solutions to externalities

- Two types
  - Merger of the two enterprises
    - The fishery could take over the pulp and paper factory, and would then have the power to reduce the output level in order to cause less harm to the fish
  - Contracting between the two enterprises
    - The fishery could bribe the pulp and paper mill into not polluting as much, or the pulp and paper mill could bribe the fishery to stop complaining about the pollution

# EXTERNALITIES

- Coase theorem
  - Deals with contracting in order to reduce externalities
  - In the absence of transactions costs, externalities can be solved by bargaining between the two parties such that an efficient level of output is reached
  - The level of output that they settle on is independent of the initial allocation of property rights, meaning whose desires have priority

# EXTERNALITIES

- Illustration
- Case A:  Suppose that anyone has a right to smoke anywhere.  Then nonsmokers have to bribe smokers into refraining from smoking

- Case B:  Suppose that no one has a right to smoke anywhere.  Then smokers have to bribe non-smokers into letting them smoke

- While smokers are better off under scenario A, and non-smokers are better off under scenario B, in each case the level of smoking activity will be the same, it will be socially efficient, and both parties will be better off than they would be without the deal

# EXTERNALITIES

- Public Policies toward externalities
- Command and control policies, or direct regulation, impose quotas on the production levels of polluting firms
- Pigovian taxes and subsidies are essentially a tax on the right to pollute
  - Approach based on incentives, as the more (less) one pollutes, the more (less) one pays

# EXTERNALITIES

- Tradable pollution permits
- That is the ‘cap and trade’ approach
  - The government sets a rigid maximum amount of pollution that can be emitted
  - It then auctions these permits to pollute among firms and allows for them to be traded among the firms

- Those firms who can only reduce pollution at high cost will buy most of them and do most of the polluting
  - but they lose market share to cleaner firms low cost will sell most of them and do only a little polluting

# EXTERNALITIES

- Those firms who can reduce pollution at low cost will sell most of them and do only a little polluting
  - and they gain market share
- Both types of firms have a strong incentive to pollute as little as possible

- So why ‘tax the polluters’ instead of setting limits on their emissions?
  - With the command-and-control approach, once the pollution target has been reached, there is no incentive to reduce it even further
  - With the taxing approach, there is always an incentive to reduce pollution

# EXTERNALITIES

- With the ‘tradable permits’ approach, cleaner (dirtier) producers who can reduce emissions at lower (higher) costs will produce more (less) output.

- In this fashion, the same amount of pollution reduction can be achieved at lower cost

- It gives a great incentive to invest in green technology

# EXTERNALITIES

- Environmentalists tend to be very skeptical of the market-based incentive approach
  - ‘How can one possibly issue a right to pollute?’
  - ‘Clean air and water are non-negotiable rights’
  - The economists’ response: See principle # 1:  people face tradeoffs
  - Pollution can be managed, but not eliminated