



CHAPTER 19-20
Externalities, Public Goods,
and Common Resources

What is an externality?

- Consumers and producers are internal to a transaction. Consumers receive a benefit from the goods they purchase, while producers pay the costs of production.
- An Externality (sometimes called a spillover) is a cost or benefit that goes to someone external to a transaction.
 - Pollution is a negative (cost) externality.
 - Education and research create a positive externality.
 - Externalities can result from consumption or production.

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An Example:

- > Suppose that the costs of raising livestock are mostly borne by the rancher, but there is a spillover cost. Streams nearby get polluted, and this affects people (and other species) who use the stream as well as spinach farmers who also use the water for irrigation.
- > Ranchers will consider their own costs of production, but the costs to others could be greater than the surplus from cattle production.

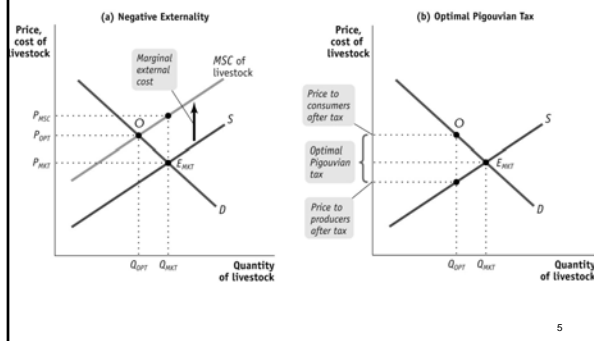
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Pigou's Taxes

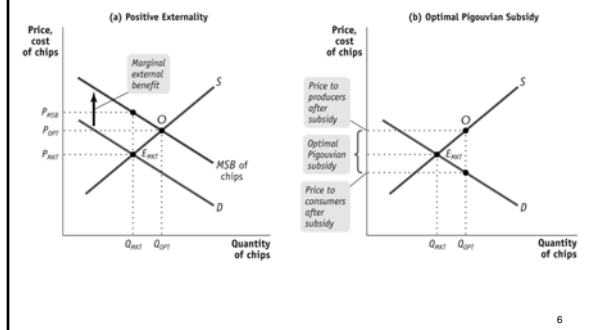
- Externalities create a market failure. Because buyers and sellers only consider their own costs and benefits, free and competitive markets will result in either too much of a good with an external cost, or too little of a good with an external benefit. Free markets will not be efficient.
- The economist Arthur Cecil Pigou advocated a corrective tax as the most efficient solution.
- Similarly, any external benefit can be corrected with a subsidy (sometimes called a tax expenditure).

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Correcting a negative externality



Correcting a positive externality (spillovers from consumption of computer chips)



What can go wrong with Pigouean Taxes?

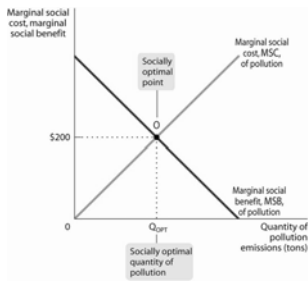
Revenue: The purpose of a Pigouean tax (or subsidy) is not to raise revenue for the government, but to alter incentives. The temptation to focus on raising revenue (perhaps to pay for abatement programs) can lead to the wrong amount of tax, or a reluctance to subsidize.

Distribution: Taxes and subsidies have distributional implications that may conflict with the externality you wish to correct.

Knowledge: Correctly measuring the amount of the externality is virtually impossible. The best you may be able to get is a rough estimate, and the externality may change over time.

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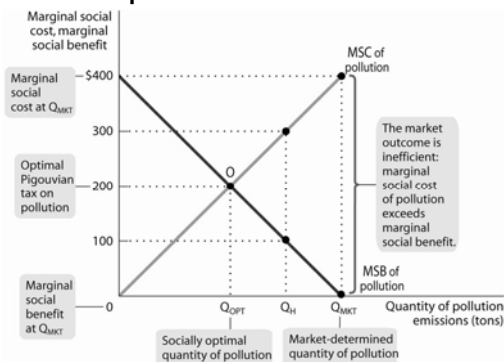
The Socially Optimal Quantity of Pollution is not zero



The socially optimal quantity of pollution is Q_{OPT} ; at that quantity, the marginal social benefit of pollution is equal to the marginal social cost, corresponding to \$200.

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Why a Market Economy Produces Too Much Pollution: no private costs



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Another Solution to Externalities

Coase theorem: When property rights are clearly defined and enforceable, and transactions costs are sufficiently low, then all externalities can be internalized. It does not matter who owns the property rights.

Even in the presence of externalities an economy can always reach an efficient solution provided that the costs of making a deal are sufficiently low.

The costs of making a deal are known as **transaction costs**.

When individuals *do* take externalities into account, economists say that they **internalize the externality**.

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Consider the case of stream pollution by livestock

- Suppose the cost of preventing stream pollution is lower than the cost to spinach producers and other users of the stream.
- If spinach farmers have the right to clean water, then ranchers will not be willing to pay spinach farmers enough, and will be forced to prevent the pollution.
- If ranchers have the right to pollute the water, then spinach farmers would be willing to pay them enough to prevent it.
- Either way, the stream will not be polluted, and this is the most efficient outcome.

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Suppose that costs are too high

- Suppose the cost of preventing stream pollution is higher than the cost to spinach producers and other users of the stream.
- If spinach farmers have the right to clean water, then ranchers will be willing to pay spinach farmers enough to allow pollution of the stream.
- If ranchers have the right to pollute the water, then spinach farmers would not be willing to pay them enough to prevent it.
- Either way, the stream will be polluted, and this is the most efficient outcome.

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What can go wrong with the Coase Theorem?

- Perhaps nobody owns a clear right to the stream. Sometimes clear rights are impossible to assign. In some countries it is due to a flawed legal system.
- The property right may be unenforceable.
- The externality may affect those unable to organize or negotiate in their interests.
- Transaction costs may be too high (i.e., the legal system is expensive, slow, or inadequate).

In these cases, the rancher will allow his cattle to pollute the stream regardless of the spillover costs.

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Government Policies Toward Pollution

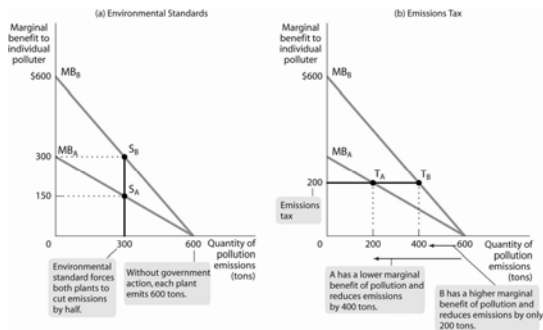
> **Environmental standards** - rules that protect the environment by specifying actions by producers and consumers. Relatively inefficient, with unexpected consequences (CAFE standards and how much we drive).

> **Emissions tax** - a form of *Pigouvian tax*, a tax designed to reduce external costs that depends on the amount of pollution a firm produces.

> **Tradable emissions permits** - licenses to emit limited quantities of pollutants that can be bought and sold by polluters. More efficient than fixed standards for every producer, and markets provide information on abatement cost.

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Environmental Standards versus Emissions Taxes



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Use of Natural Resources

● **Natural resources** – farmland, petroleum, minerals, clean water and air, scenic beauty, endangered species, healthy ecosystems, et cetera – can be either renewable or nonrenewable.

● For much of human history, many natural resources were free goods: large sustainable supply, small demand.

● Rise in human population and technological improvements increased demand for resources.

● “Free goods” will always be preferred to priced goods, and thus tend to be used first.

● Once demand crosses supply, good is no longer “free.” Failure to adapt to changing circumstances leads to overuse, fall in future supply. Converting to market prices can prevent overuse.

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Nonrenewable Resources

● **What is the efficient use?**

● Too much use now necessarily implies less available in the future, which implies higher prices.

● Efficient condition is $P_{t+1} / P_t = (1+R)$

● If owner's personal discount rate > market rate, then it pays to sell the resource. If market discount rate is higher than social optimum, then excessive use will occur.

● If demand is downward-sloping but constant over time, then use will gradually decline over time, and once price becomes high enough consumers will switch towards cheaper alternatives. If demand is expected to grow over time, then there is more incentive to conserve use now.

● Stock of resource is often not known, and discovery is a costly process. Known reserves often increase.

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Theory of Public Goods

Goods can be classified according to two attributes:

➤ **Excludability:** Can the producer reasonably prevent those who do not pay for the good from consuming it?

➤ **Rival(rous) consumption:** Does providing the good for one more person mean less for somebody else, or is the marginal cost of providing it to one more person equal to zero?

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Characteristics of Goods

There are four types of goods:

- *Private goods*
- *Public goods*
- *Common resources*
- *Artificially scarce goods*

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Characteristics of Goods

	Rival in consumption	Nonrival in consumption
Excludable	Private goods • Wheat • Bathroom fixtures	Artificially scarce goods • Pay-per-view movies • Computer software
Non-excludable	Common resources • Clean water • Biodiversity	Public goods • Public sanitation • National defense

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Why Markets Can Supply Only Private Goods Efficiently

➤ Goods that are both excludable and rivalrous in consumption are *private goods* that potentially can be efficiently produced and consumed in a competitive market (assuming perfect competition and information).

➤ When goods are *nonexcludable*, there is a *free-rider problem*. Few consumers will pay producers, so producers will not produce enough. Very inefficient.

➤ When goods are *nonrivalrous in consumption*, the efficient price for consumption ($P=MC$) is zero. But if a positive price is charged to compensate producers for the cost of production, then too few consumers will purchase the good. Inefficient.

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Public Goods

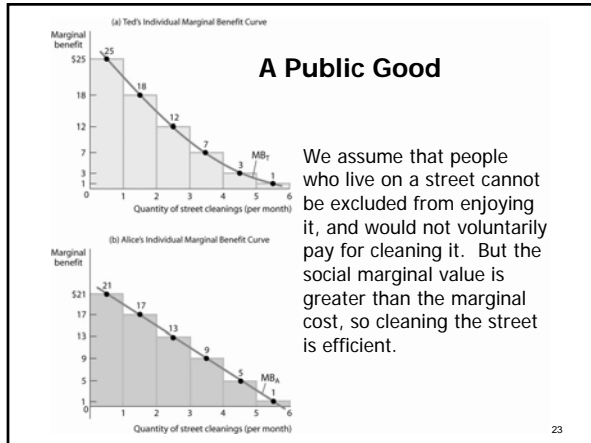
A **public good** is a good that is both nonexcludable and nonrival(rous) in consumption:

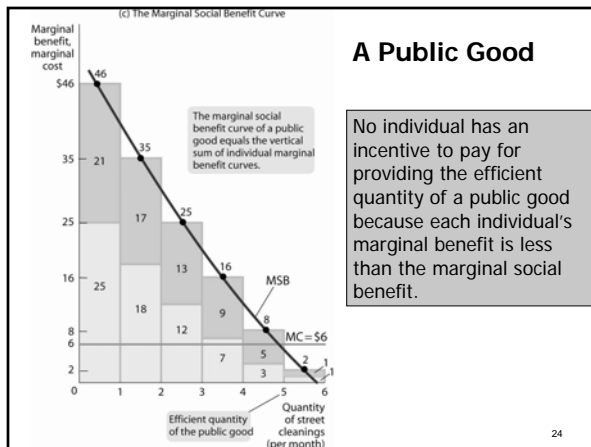
- *Disease prevention*
- *National defense*
- *Scientific research*
- *Questions and answers in a review session.*

With **quasi-public** goods, exclusion may be possible but with severe costs:

- *Police and courts*
- *Fire protection*
- *Neighborhood streets (Toll Roads?)*
- *Public education*

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Governments Providing Public Goods

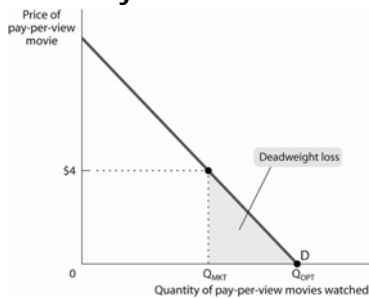
➤ Free Markets will not provide efficient amounts of public goods. Government may choose to provide the goods directly, or can pay private firms to do so.

➤ **Cost-benefit analysis** is necessary, to best estimate the social costs and social benefits of providing a public good. If the marginal cost exceeds the social marginal benefit, it is not efficient to provide more of the good.

➤ The efficient price of the good is zero, even though the average total cost is positive.

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Artificially Scarce Goods



Other examples of artificially-scarce goods include recorded music, software, electronic textbooks, and Cable TV access.

Paper textbooks have positive marginal costs, but prices (and average total costs) are much higher.

An artificially scarce good is excludable, but nonrivalrous in consumption. It is made artificially scarce because producers charge a positive price (to maximize revenue) but the marginal cost of allowing one more person to consume the good is zero. The market is not efficient. Requiring that the good be priced efficiently, however, would be even more inefficient.

Common resources

Nonexcludable, but rivalrous in consumption.

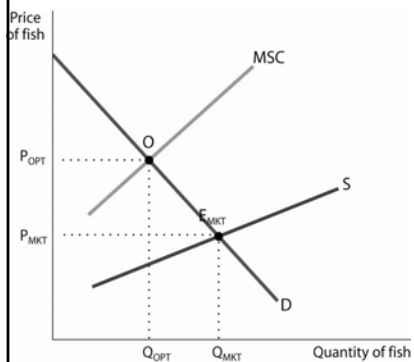
These tend to be overused because users deplete the amount of the common resource available to others but do not take this cost into account when deciding how much to use the common resource.

Consider how scenic views for people who live in rural areas are spoiled as more people move into the area.

Consider the incentive of an Alaska fishing boat to throw the net one more time.

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A Common Resource



Each fisherman's individual marginal cost does not include the cost that his or her actions impose on others: the depletion of the common resource → the marginal social cost curve, *MSC*, lies above the supply curve; in an unregulated market, the quantity of the common resource used, *Q_{MKKT}*, exceeds the efficient quantity of use, *Q_{OPT}*.

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Tragedy of the Commons

- Garrett Hardin coined the phrase "Tragedy of the Commons" to capture the fact that throughout history, commonly-owned resources tend to be overused, while privately-owned resources tend to be better managed. Cattle, fish, forests, rangeland, and more.
- Many people think it is caused by economic growth, but this is not precisely true.
- The tragedy results from a combination of common ownership and increased demand, which creates a prisoner's dilemma where the individual can benefit at society's expense.
- Economic growth increases demand, but can also improve the incentive to convert ownership from common to private, or otherwise have the society regulate overuse of the resource.

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The Efficient Use and Maintenance of a Common Resource

Find a way of getting individual users of the resource to take into account the costs they impose on other users:

- Use Pigouvian taxes and charge user fees.
- Regulate the use of the common resource.
- Make it excludable and assign property rights.
- Create of a system of tradable licenses for the right to use the common resource.

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