



# **Course: Foundations of Economics**

## **Lecture 12: Introduction to Externalities**

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# Agenda

- ▶ Market failures
- ▶ Externalities
- ▶ Consumption externalities
- ▶ Production externalities
- ▶ Public goods
- ▶ Tragedy of commons
- ▶ Dealing with externalities

# Market Efficiency

- ▶ Market efficiency means production and consumption at the point where the **marginal social benefit (MSB)** of consuming the good equals the **marginal social cost (MSC)** of producing it.
- ▶ When markets are efficient, resources are being allocated in such a way as to maximize society's well-being.

$$MBS=MSC$$

# Private vs. Social Costs and Benefits

- ▶ Externalities arise in cases where private costs or benefits differ from social costs or benefits.
- ▶ Private costs and benefits accrue to the parties to an exchange.
- ▶ Social costs and benefits include the private costs and benefits plus the additional costs and benefits incurred by third parties.

**MSC > PC**, the market allocates too many resources to the production of the good or service

**MSB > MPB**, the market allocates too few resources to the production of the good or service

# Inefficiency and externalities

- ▶ Markets generally fail to achieve social efficiency. There are various types of market failure. Market failures provide one of the major justifications for government intervention in the economy.
- ▶ Efficiency usually requires that:
  - ▶ Marginal consumer benefit (for all consumers) = marginal cost of production (for all firms)  
$$MPB = MPC$$
  - ▶ This will be achieved in a competitive market equilibrium since consumer benefit is all private and production costs are all private

# Market Failure

- ▶ Market failure refers to the situation in which a market fails to allocate resources efficiently.
- ▶ Market failure can result from noncompetitive markets or from cases in which property rights are not well defined and fully transferable.

# Externalities as a market failure

- ▶ Externalities are usually associated with action by a firm or consumer that affects the welfare of others; positively or negatively
- ▶ Also called a “spillover effect”.

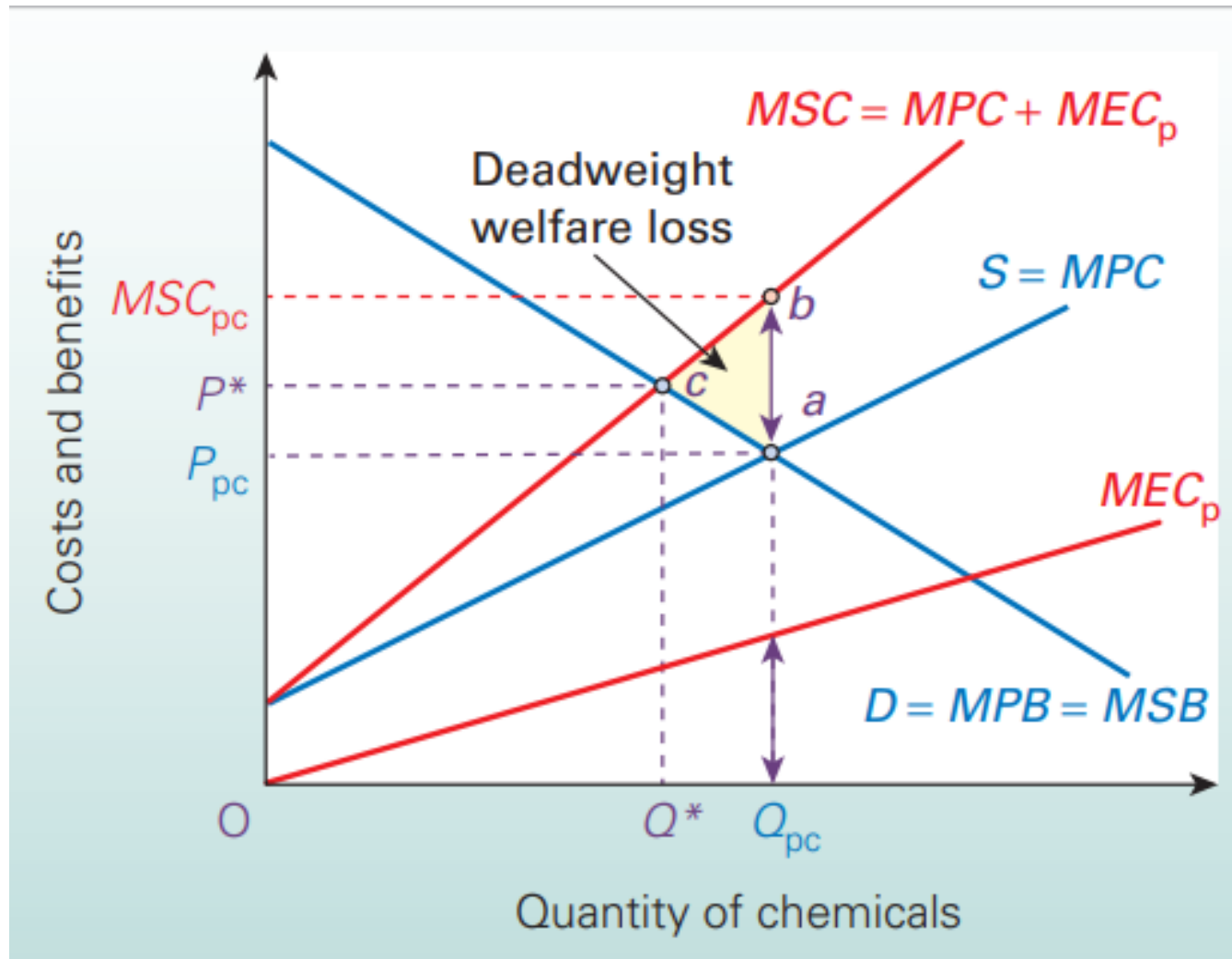
# Externalities can be positive or negative.

- ▶ A negative externality exists when the third party bears a cost because of the exchange.
- ▶ A positive externality exists when the third party benefits from the exchange.

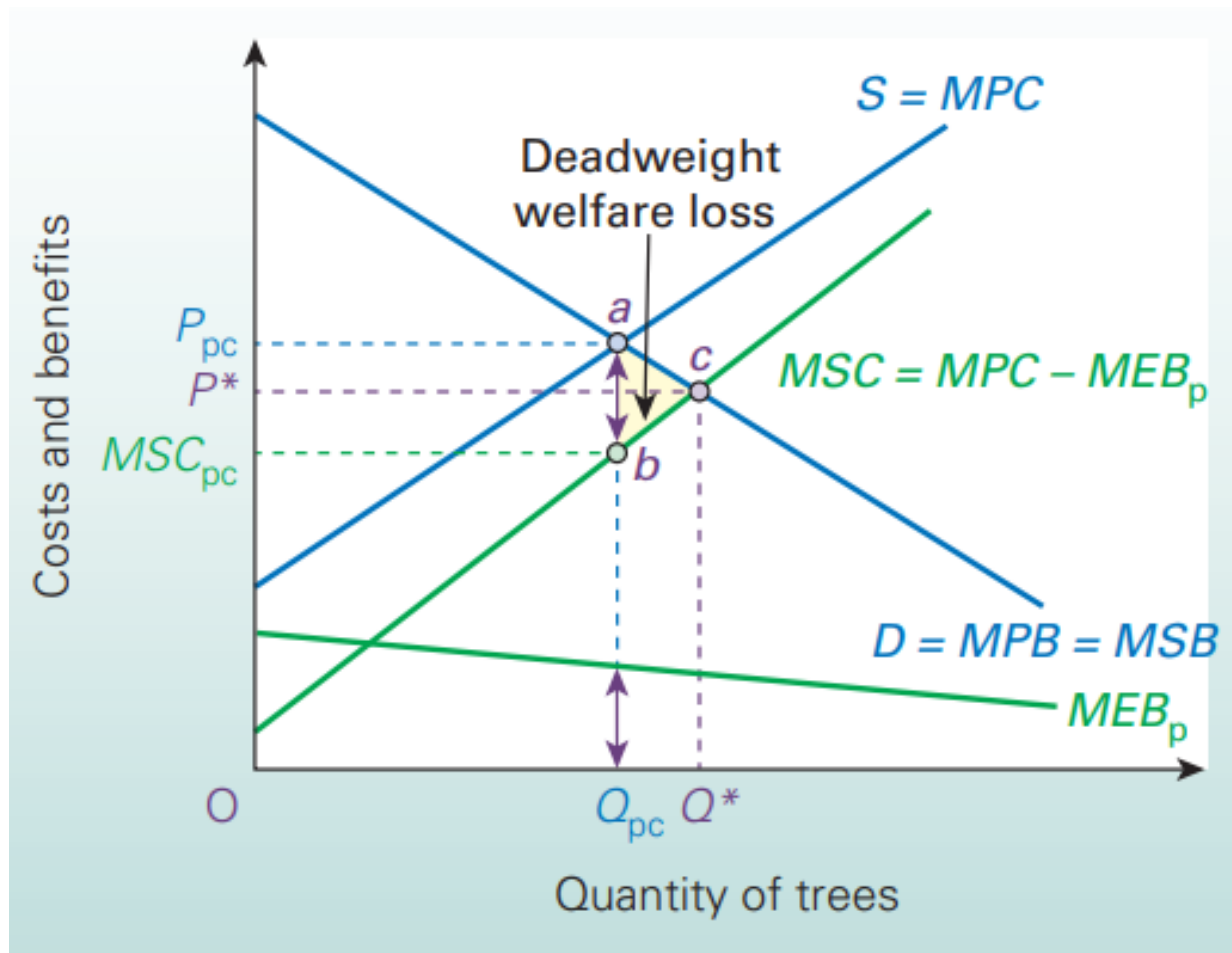
# Example: Pollution as a Negative Externality

- ▶ Pollution in the form of emissions or effluent is a cost of production that is not recognized in the private transaction but is instead borne by third parties.
- ▶ When pollution is not recognized as a cost of production of a good or service, the market will produce too much of that good or service.

# Negative externality in production: pollution ( $MSC > MC$ )



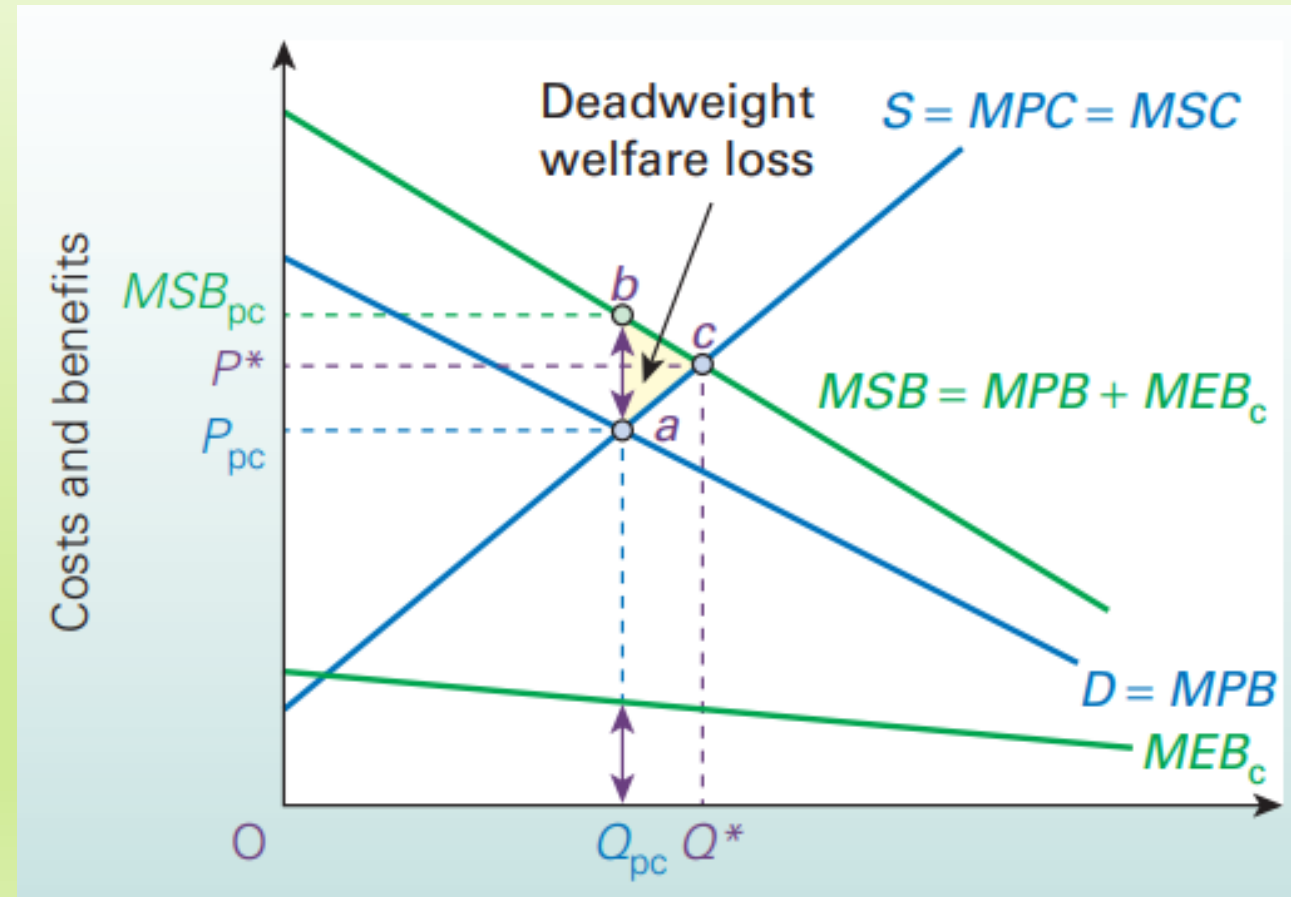
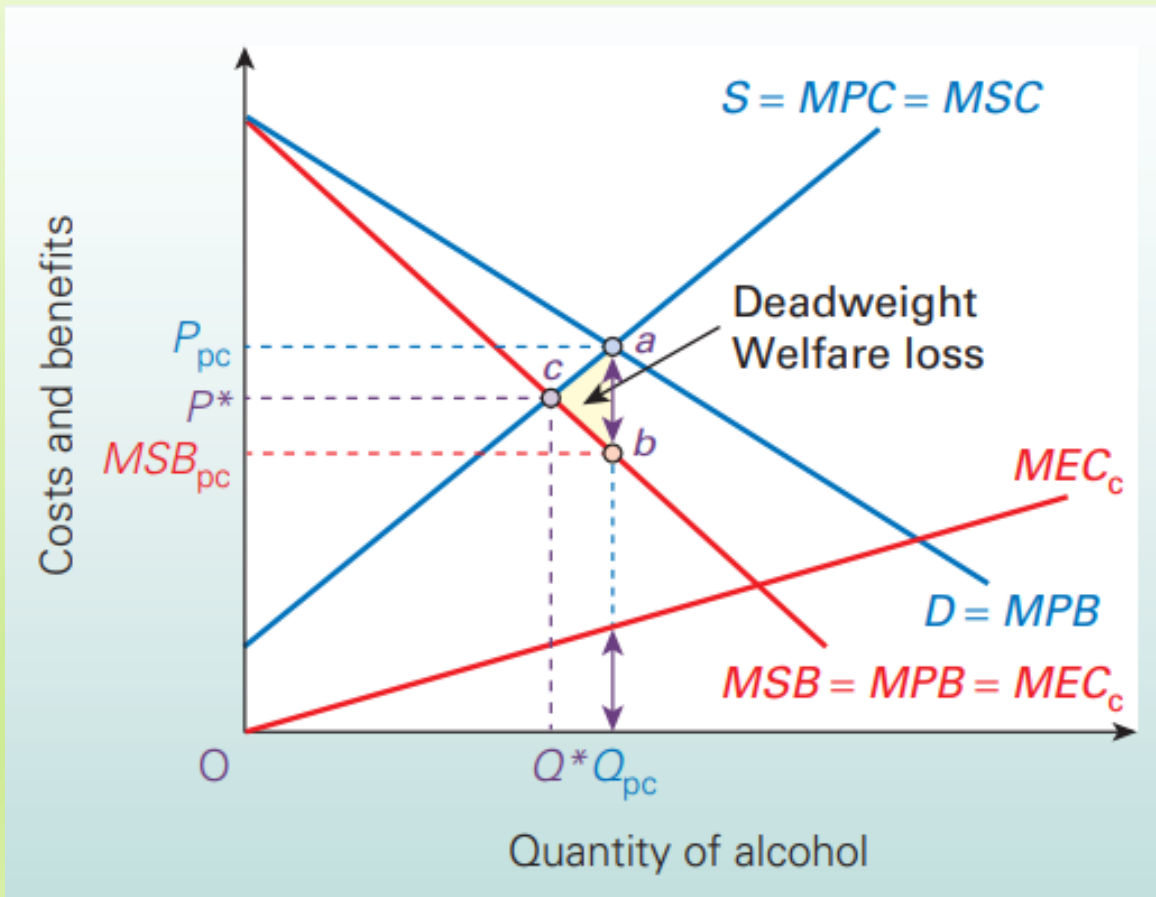
# Positive externality in production: planting trees. $MSC < MC$



# Externalities of consumption

Negative externality of consumption  
( $MSB < MB$ )

Positive externality of consumption  
( $MSB > MB$ )



# Ways of dealing with externalities

- ▶ Governments intervention and regulation e.g. supply of public goods, taxes/subsidies on externalities, standards
- ▶ Establishing property rights and bargaining; the Coase theorem
  - ▶ e.g. establishing rights to clean water and air - not easy
- ▶ Social norms: confirming to or internalisation of social pressures e.g. not dropping rubbish
- ▶ Collective action through pressure groups

# Case of environmental pollution: possible solutions

- ▶ Moral Suasion
- ▶ Command-and-control
- ▶ Market-oriented environmental tools
  - ▶ Pollution charges
  - ▶ Marketable permits
  - ▶ Better-defined property rights

# Moral Suasion

- ▶ Refers to campaigns designed to reduce pollution by encouraging voluntary change in behavior.
- ▶ Moral suasion is more effective when the costs of changing behavior are small.

# Command-and-Control

- ▶ Refers to laws that regulate the amount of pollutants that can be produced or specify a pollution-control technology.
- ▶ Compliance requires firms to either cut production or bear the additional cost of pollution control technology.

# Problems with Command-and-Control

- ▶ They offer no incentive to limit pollution more than the law specifically requires.
- ▶ They are inflexible.
- ▶ They are subject to legislative compromise which may include loopholes and exceptions, and other unforeseen consequences.

# Market-Oriented Environmental Tools - Marketable Permits

Marketable permit programs (often referred to as “cap and trade”) give firms permits that allow them to emit a certain amount of pollution.

# Market-Oriented Environmental Tools – Better-Defined Property Rights (1 of 2)

- ▶ Poorly-defined or inadequately-protected property rights are the cause of externalities.
- ▶ When property rights can be established and protected, third parties become party to the transaction.
  - ▶ They would be compensated for what would otherwise be negative externalities...
  - ▶ or required to pay for what would otherwise be positive externalities.

## Market-Oriented Environmental Tools – Better-Defined Property Rights (2 of 2)

- ▶ The **Coase Theorem** proposes that given certain conditions, private markets can achieve social efficiency regardless of the initial definition of property rights.
- ▶ These conditions include the absence of transactions costs.
  - ▶ Transactions costs to establish or enforce contracts can be significant and hinder the ability of individuals to solve the externality.

# Costs and Benefits of Environmental Laws

- ▶ The annual cost to U.S. firms of complying with environmental laws is roughly \$200 billion.
- ▶ The benefits of environmental laws include
  - ▶ Better health.
  - ▶ Higher property values.
  - ▶ Greater profitability for industries that rely on environmental amenities (farming, fishing, tourism).
  - ▶ Hard-to-value aesthetics from clearer skies and cleaner water

# The Private vs. Social Benefits of Technology

- ▶ Profit-maximizing firms in competitive markets develop new technology because it leads to the creation of new goods and services, and lowers production costs.
- ▶ However, new technology also may provide valuable “spillover effects” that the originating firm is unable to profit from.
- ▶ Therefore, from society’s point of view, firms in competitive markets will likely underinvest in new technology.

# Human Capital and Positive Externalities

- ▶ Similar to technology, the acquisition of human capital has both private and social benefits.
- ▶ The social benefits of education may include:
  - ▶ Better health outcomes.
  - ▶ A lower crime rate.
  - ▶ A cleaner environment.
  - ▶ Better-informed and more engaged citizens.

# Encouraging Innovation

- ▶ Government policies that encourage innovation include the following:
  - ▶ Guaranteeing intellectual property rights.
  - ▶ Assisting with the costs of research and development (R&D).
  - ▶ Cooperative research ventures between universities and business.

# Intellectual Property Rights

- ▶ Refers to the body of law that protects the right of inventors to produce and sell their inventions.

They include:

- ▶ Patents, which give the inventor the exclusive legal right to make, use or sell the inventions for a limited period of time.
- ▶ Copyright laws, which give the author an exclusive legal right over works of literature, music, film/video and pictures.

# Government Spending on R&D

- ▶ Government spending can fund R&D that may be deemed too risky or not sufficiently profitable for private firms to fund.
  - ▶ R&D may occur at universities, nonprofits, government labs or private firms.
- ▶ A complementary approach to direct funding of R&D is to provide tax breaks to private firms to encourage R&D.

## R&D support

- ▶ Government can also support R&D and innovation through cooperative efforts between private firms and government research agencies such as the National Institutes for Health or the Agriculture and Food Research Initiative.

# Public Goods and Private goods

- ▶ Public goods are goods that are non-excludable and non-rival in consumption and are, therefore, unprofitable for private firms to provide.
  - ▶ Non-excludable means that it is impossible or costly to exclude someone from consuming the good once it's provided.
  - ▶ Non-rival means that one person's consumption of the good doesn't prevent the simultaneous consumption by another person.

# Public and Private Goods: nonrival/rival, nonexcludable/excludable

- ▶ Considering the two characterizations, rivalry and excludability, we see we actually have four categories of goods.
- ▶ Club goods are usually provided by the private market but at higher prices and lower output than society desires.

|                | Rival  | Non-rival   |
|----------------|--|---|
| Excludable     | <b>Private Goods:</b><br>iPhones, jeans,<br>Big Macs | <b>Club Goods:</b><br>satellite TV,<br>theatres, private<br>parks       |
| Non-excludable | <b>Common Resources:</b><br>forests, fisheries       | <b>Public Goods:</b> air,<br>emergency<br>services, national<br>defense |

# Public Goods: An Example of Market Failure

- ▶ If provided by private firms, public goods are likely to be provided at less than the socially-efficient quantity.
- ▶ The government may intervene to provide the public goods itself.

# Common Resources and the “Tragedy of the Commons”

- ▶ Common property resources are resources for which no property rights have been established.
- ▶ They are non-excludable, like public goods but rivalrous, like private goods.
- ▶ Examples include forests and fisheries, and livestock grazing lands.

# Common Resources and the “Tragedy of the Commons...”

- ▶ Common property resources are unlikely to be efficiently allocated by the private market.
- ▶ They are more likely to be overused because users consider only the private benefits without considering the social costs.
- ▶ The likelihood of common property resources being used to the point of exhaustion is called the “tragedy of the commons”.

# Free Riders

- ▶ Free riders are those who benefit from the provision of public goods but do not pay for them.
- ▶ The incentive to free ride exists when consumers can avoid the costs of consuming the good.
- ▶ The existence of too many free riders will result in under-provision of the public good.

# Solving the Free Rider Problem

- ▶ The solution to free riding is to devise a way to get all consumers to pay for the good.
  - ▶ One way is to tax consumers, compelling everyone to pay.
  - ▶ In the case of traditional radio or TV broadcasts consumers “pay” by listening to or watching commercials from the private firms that support the radio or TV programming.

## Summary

- ▶ **Markets often fail because of externalities. Social efficiency condition is  $MSC=MSB$**
- ▶ **Externalities are spillover costs or benefits**
  - ▶  $MSB_p > MSC \Rightarrow$  produce more
  - ▶  $MSC_p > MSB \Rightarrow$  produce less
- ▶ **Public goods will not be provided by a free market. Public goods have large external benefits relative to private benefits. Without government intervention there is a problem of “free ride”**

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- John Sloman, (2016), Essentials of Economics, 7th ed, Prentice Hall.
- Irvin B. Tucker, (2018), Survey of Economics, 10th ed, Cengage learning.
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