

# Externalities and public goods

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# Externalities

- The typical efficient market outcome relies on the existence of a market
- There might be cases when the market either does not exist or when it is not functional
  - in such situations, the situation of the consumers and producers is not driven by the market processes
  - without market processes at work, it is impossible to attain the efficient market outcome
- Situations when the (property) rights of some of the market participants are affected by the actions of some other market participants, and these impacts are not compensated (the parties in question do not enter a market), are called *externalities*

# Existence of externalities

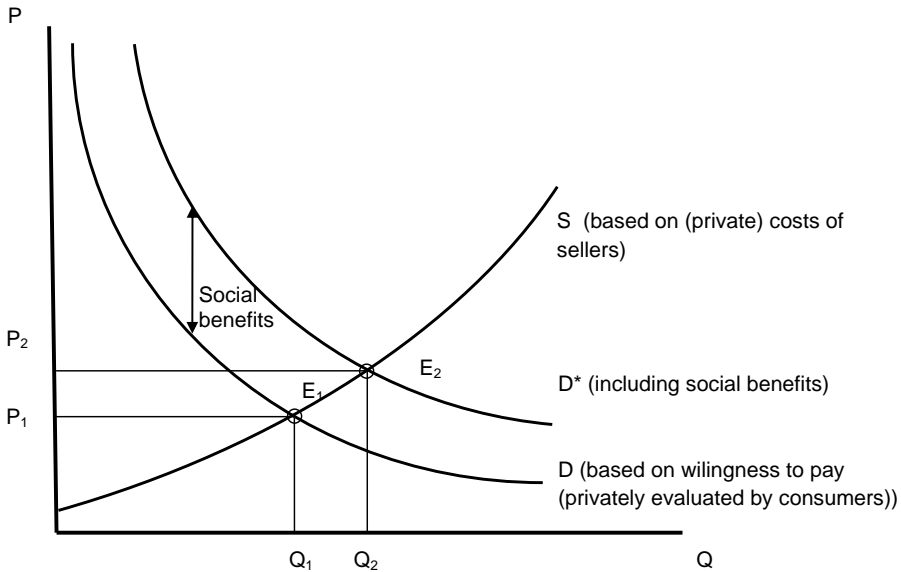
- The existence of an externality is typically labeled as "market failure"
  - a situation when markets fail to provide efficient outcome
    - the more appropriate description would be market absence
- The impacts of the action on the "bystanders" can be positive or negative
  - in theory, a government intervention can improve the situation by either providing subventions (for the originator of positive externality) or levying taxes or fines (on the originator of negative externality)
- When considering the necessity of government intervention, it is often useful to employ the logical concept called "reductio ad absurdum" (one of the most famous users of this concept was political philosopher and economist Frederic Bastiat)
  - Take the presented argument and extend its application as far as possible - see if it still makes sense (a logical argument should hold)

# Positive externalities

- Rather rare and more disputable type!
- A typical examples include:
  - "public goods" (the operation of a lighthouse, public roads, education (lower crime rates, higher productivity))
  - the beekeeper and the owner of an orchard - the pollination by the bees is a necessity for a decent crop
  - you can consider even far stretched examples: persons enjoying the smell of a bakery next door or enjoying the sight of pretty girl walking down the street etc.

# Positive externalities

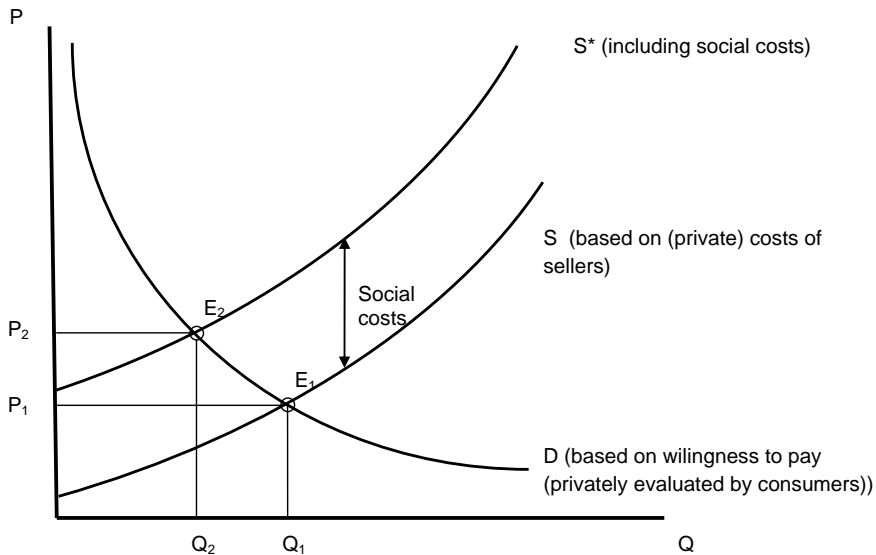
- Arguments in favor of the government intervention regarding a positive externality:
  - People do not consider the external benefits they might gain
  - The market quantity of the public roads, lighthouses, education or number of beekeepers will be too low
  - Solution: subsidize the costs of production of goods with positive externalities
- Counterarguments include the historical examples of privately funded "public goods" (e.g. lighthouses), or standard commercial practice of for-profit company regarding the typical case of "externality" (the pollination of orange plantations in California)
- Recall the fact the utility functions are strictly *individual* - subsidizing the generation of "positive externality" might not be efficient use of resources (costs vs. utility for the consumers)



# Negative externalities

- Typical example: pollution (e.g. from a private factory) deteriorating the environment in the vicinity of the factory
  - loud neighbors (or the so called "noise pollution" in general)
  - second-hand smoke
  - dislike of the smell of a bakery next door
- The argument for the government intervention:
  - To incur costs (the same amount as the social costs) on the market participants in order to change the outcome to socially optimal price and socially optimal quantity
    - These "corrective taxes" are so called Pigouvian taxes (after Arthur Pigou)





# Negative externalities

- Counterargument: what happens to the total surplus (recall  $TS = CS + PS$ )?
- Food for thought: pollution from the factory
  - 1 In the absence of the market intervention, people in the vicinity of the factory suffer loss (lower property value, health risks etc.) from the emissions in the size  $Em_1$ , assume the people in the vicinity placed a value on the loss  $L = l \cdot Em_1$
  - 2 Government levies taxes on the volume of pollution emissions
  - 3 Factory lowers (but not eliminates) its emissions,  $Em_2 < Em_1$  and pays taxes for this quantity of emissions  $T = t \cdot Em_2$
  - 4 Who was the beneficiary of the money ( $T$ ) paid for the given pollution? How much better off are the people in the vicinity of the factory? Is the new situation optimal for the people in the vicinity of the factory (did the intervention eliminated the uncompensated violation of their rights)?

# Property rights

- The markets are able to find the optimal solution, if the information can be carried through - the market price provides this kind of information
- In order to create a price for something, it is necessary to establish property rights
- The non-existence or absence of the enforceability of the property rights leads to the failure to “internalize” externalities
  - Creating the environmental regulations and/or levying the taxes on the polluters might be as well viewed as a “license” to pollute (to violate the rights of the people in the vicinity)
  - The transaction costs between large number of participants may be high
  - Proving the damages or losses can be difficult.

# Private solutions to externalities

- Contracts can be made between market participants and the affected “bystanders” (e.g. accept a payment from the polluter to bear the damage, or pay the polluter to stop his production)
- People can create "moral codes" (self-regulation) or "social sanctions"
- *Coase Theorem*:
  - With the existence of property rights (i.e. if it is possible to trade) and there are negligible (or sufficiently low) transaction costs, private bargaining will lead to an efficient outcome regardless of the initial allocation of property rights.

# Public goods

- Public goods are goods that have some special properties regarding their consumption
  - Non-excludeability: a person can not be prevented from using it (radio signals, national defense)
    - Usually only valid up to a certain limit (national defense can only do so much with a given budget etc., air might be limited (e.g. in space stations), even radio/TV broadcasts have limited range (limited power output))
  - Non-rivalry in consumption: consumption of the good by one consumer does not prevent *simultaneous* consumption by other consumers (live music performance, radio signals)
    - Almost any tangible goods are rival in consumption
    - Most of the intellectual property is non-rival in consumption
- It is often possible to construct the means to convert non-rival goods to rival goods (licensing, IP rights, patents and copy protections, encoded broadcasts etc.)

# Common goods (common property)

- Common goods are goods that are
  - rival in consumption
  - not excludable
- Common goods (in the pure fashion) imply open access regime: no limits on who is authorized to use a resource
- Examples:
  - fish stocks in the oceans
  - natural pathways (or public sidewalks)
  - "commons" (forests, rivers, arable land - with no specific owner, shared by all)
- Beware: common ownership  $\neq$  common goods
- Common ownership / Common property (unless considering the extreme case advocated by communism, and extending to formerly private goods) is usually limited to a certain group (often a town, a country)
  - there (typically) exists a legal right to exclude nonmembers of the group from using a resource.

# Tragedy of the commons

- The tragedy of the commons describes a situation when overuse of common goods leads to depletion of the common resource
  - Notably described in 1833 by W. F. Lloyd
  - Similar concepts of "inevitable" depletion of resources were described by Jevons (The Coal Question, 1865), Malthus (An Essay on the Principle of Population, 1798) and others
  - Well known example: an article by G. Hardin (1968) "The Tragedy of the Commons" described the individuals acting in rational self-interest will results overuse of the resources, overpopulation
- A concept is much older 1833 William Forster Lloyd published a pamphlet on herders sharing a common parcel of land on which they are each entitled to let their cows graze

# Government interventions

- For both public and common goods, there is no set market price for the goods
  - Without a market price, the market processes can not work properly
  - Non-existing price vs. desirable consumption → externalities
- Governments intervene in effort to raise the total welfare
  - Typical problem: free riders



# Free rider problem, public goods

- Free rider consumes the good (receives the utility) but does not pay for the goods
- If good is not excludable, there is an incentive to be a free rider (the supplier can not prevent the non-payers from the consumption)
  - since there are still costs of production, the good is either not produced at all or not produced in optimal quantity (even though there buyers might value the good higher than the costs of production → leading to the loss of welfare)
  - government solution: collect taxes from everyone and provide the goods for "free"
    - problem: everybody pays the taxes, but some might not value the provided goods as high as the amount of taxes (causing the loss of welfare)
    - comparing (aggregating) the welfare is impossible (utility functions are strictly individual, there is no universal "unit of value")

# Free rider problem, common goods

- The common goods (rival in consumption): government aims for restriction of the use of the common resources (as the free riders reduce the ability to use the resource)
  - corrective taxes ("internalize the externality")
  - set up a regulation for the use of the resource
  - auction off permits allowing use of the land ("cap and trade")
  - (divide and) privatize the resources (change it into private property)