

# Externalities and Public Goods

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Javier Tasso

# Introduction

Externalities

Positive Externality

Negative Externality

Pigou's Solution

Coase's Solution

Public Goods

# Externalities

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# Definition

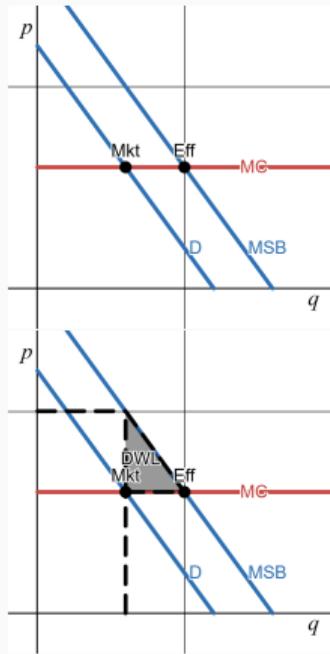
**Externality.** An activity of one agent that affects the welfare of another agent in a way that is outside the market mechanism.

- They can be produced by consumers as well as firms.
- They are reciprocal in nature.
- They can be positive.
- Public goods are a special kind of externality.

# Examples

- Noise from a nightclub.
- Vaccination.
- Air pollution.
- Beekeeper's bees and orchards.
- (not) Higher gas prices because war reduces supply.
- (not) Higher rent prices because a new tech company moves in.

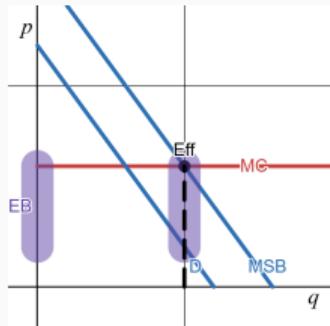
# Positive Externality in Partial Equilibrium



- Example: Vaccination.
- Market outcome involves less vaccines relative to the efficient outcome.
- At the market outcome marginal social benefit (MSB) is higher than marginal cost (MC). The market outcome is not efficient and there's room for improvement.
- DWL of the market outcome.

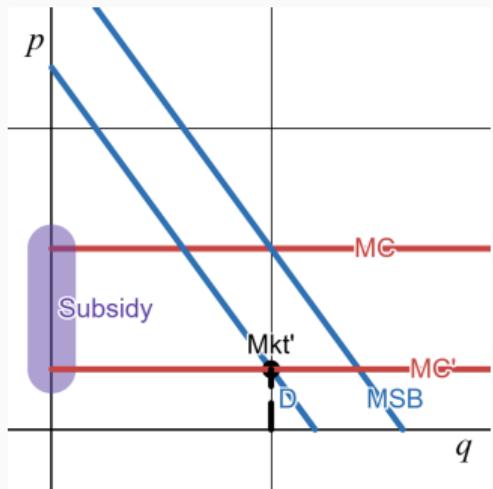
# Marginal External Benefit

**Marginal External Benefit.** The difference between the marginal social benefit (MSB) and the marginal private benefit (MPB) or demand.



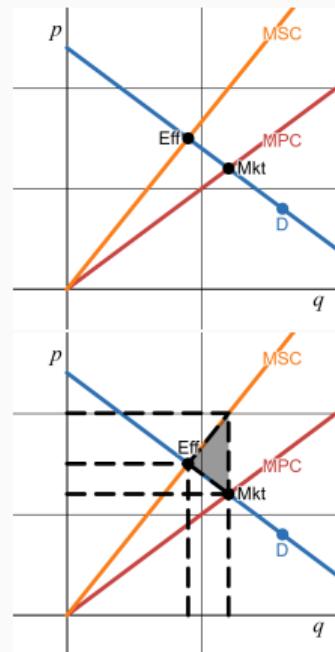
- In monetary terms. Read it from the vertical axis.
- It captures the additional benefit to society that is not accounted for by the individual decision-maker.

# Pigouvian Subsidy



- Subsidize vaccination.
- How much? Marginal external benefit per vaccine applied.
- This incentivizes vaccination and helps us get the efficient outcome.
- Apply subsidy to providers or patients, it doesn't matter.

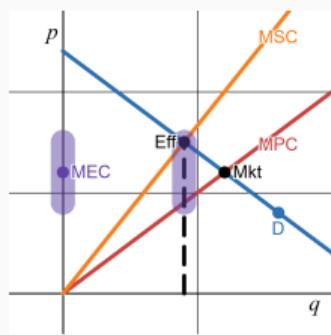
# Negative Externality in Partial Equilibrium



- Example: Pollution from a paper mill.
- Market outcome involves more paper relative to the efficient outcome.
- At the market outcome marginal social cost (MSC) is higher than the marginal benefit (captured by D). The market outcome is not efficient.
- DWL of the market outcome.

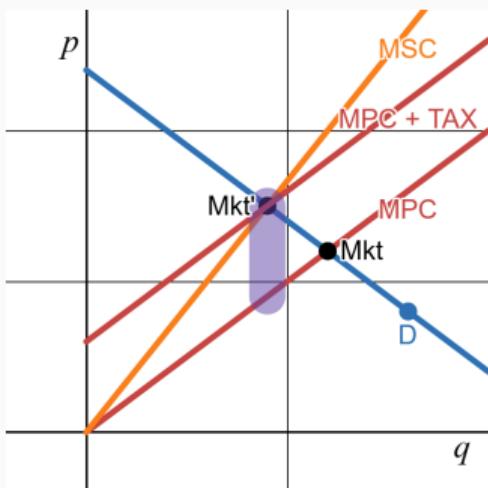
# Marginal Damage

**Marginal Damage.** The difference between the marginal social cost (MSC) and the marginal private cost (MPC).



- In monetary terms. Read it from the vertical axis.
- It captures the additional cost to society that is not accounted for by the individual decision-maker.

# Pigouvian Tax



- Tax paper.
- How much? Marginal damage per unit at the efficient quantity.
- This dampens the production of paper.
- Apply the tax to consumers or producers, it doesn't matter.

# In Pigou's Words



Arthur Cecil Pigou

*It is plain that divergences between private and social net product of the kinds we have so far been considering cannot [...] be mitigated by a modification of the contractual relation between any two contracting parties, because the divergence arises out of service or disservice rendered to persons other than the contracting parties. It is, however, possible for the State, if it so chooses, to remove the divergence in any field by "extraordinary encouragements" or "extraordinary restraints" upon investments in that field. The most obvious forms which these encouragements and restraints may assume are, of course, those of bounties and taxes<sup>a</sup>.*

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<sup>a</sup>From Pigou's *The Economics of Welfare*. Part 2 Chapter 9.

# Negotiation Example

# Animals	Private Cost	Crop Damage	Social Cost
1	\$100	\$200	\$300
2	\$200	\$400	\$600
3	\$400	\$600	\$1000
4	\$700	\$800	\$1500
5	\$1100	\$1000	\$2100
6	\$1600	\$1200	\$2800

- Revenue for each animal  
\$350.
- Efficient situation: Raise 2 animals. Compare marginal revenue and marginal social cost.  
Profits=\$100.
- Market outcome: Raise 4 animals. Compare marginal revenue and marginal private cost.  
Profits=\$700.

# Property Rights: Case #1

- Assume the cattle-raiser is liable for the damage and must compensate the farmer.
- He internalizes all the crop damage. Now this is part of his total cost.
- We reach the efficient outcome of 2 animals.
- Profits are \$100.

# Property Rights: Case #2

- Now assume the damage is responsibility of the farmer.
- Deal: the farmer pays the cattle raiser \$750 if he doesn't raise any animal, \$550 if he raises only one animal, \$350 if ...

# Animals	Revenue	Payment from Farmer	Private Cost
0	\$0	\$750	\$0
1	\$350	\$550	\$100
2	\$700	\$350	\$200
3	\$1050	\$150	\$400
4	\$1400	\$0	\$700

- Optimal choice is to raise two animals. Prof=\$850.

# Coase's Theorem

**The Coase Theorem.** If transaction costs are low, private bargaining will result in an efficient solution to the problem of externalities.



- Transaction costs are low.
- Property rights are clearly assigned.
- There's full information about costs/benefits of the externality.

Ronald Coase

# Public Goods

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# Rivalry

**Rivalry:** A good is **rival** if its consumption by one consumer prevents simultaneous consumption by other consumer.

- Example of rival vs non-rival good.
- A good is non-rival if the cost of providing it to an additional individual is zero.
- Rivalry is about how consumption affects others.

# Excludability

**Excludability.** A good is **excludable** if it is possible to prevent people who haven't paid for it from accessing or using it.

- Example excludable vs non-excludable.
- Excludability describes whether it's feasible (technically or legally) to prevent non-payers from using the good.
- Excludability is not about the physical nature of the good but about how it can be managed or controlled.
- Policy or technology can change excludability. Example: Encryption.

# Classification of Goods

	Excludable	Non-Excludable
Rival	Private Goods	Common Resources
Non-Rival	Club Goods	Public Goods

- Examples:
  - Private good: food, clothing.
  - Common resource: fisheries, open pastures.
  - Club good: streaming service, private beach.
  - Public good: national defense, street lighting.

# Public Good

**Public Good.** A good that is non-rival and non-excludable.

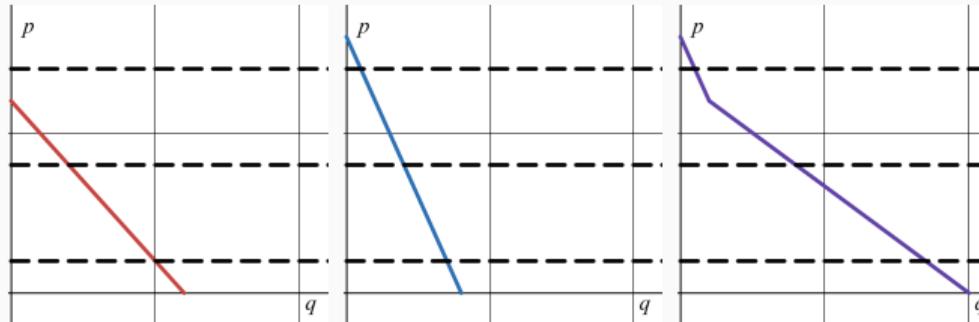
- Public goods often create positive externalities because people benefit without paying.
- Create a **free-rider problem**: People have incentive to avoid paying.
- Refers to the good's characteristics, not who provides it. It can be provided by the government or the public sector.

# Comments

- Even though everyone consumes the same quantity of the public good, it need not to be valued equally by all.
- Classification is not absolute: It depends on market conditions and technology.
- Private goods are not necessarily provided exclusively by the private sector.
- Public provision of a good does not necessarily mean that is also produced by the public sector.

# Efficient Provision of Private Goods

- Horizontal summation.
- MRS is equal to the price ratio  $\frac{p_1}{p_2}$  for all consumers.
- Any time  $MRS \neq \frac{p_1}{p_2}$  efficiency gains are possible.



# Efficient Provision of Public Goods

- Any extra unit is consumed by all consumers.
- The marginal benefit of an extra unit is the sum of what each consumer is willing to pay.
- Vertical summation. Example.
- The sum of all the MRS is equal to the marginal cost (price ratio).

# Free-Rider Problem

**Free-Rider Problem.** The incentive to let other people pay for a public good while you enjoy the benefits.

- Not a fact, it is an implication of the hypothesis that people maximize their own utility.
- In many instances individuals act collectively without government coercion (ex. volunteers keeping Clark Park clean).

# Example

	A	B	C	D
1st film	\$7	\$5	\$3	\$2
2nd film	6	4	2	1
3rd film	5	3	1	0
4th film	4	2	0	0
5th film	3	1	0	0

- Four friends decide how many movies to watch.
- Table shows willingness to pay for each film.
- Streaming each film costs \$8.
- Find the efficient number of films.
- Splitting cost equally does not work. Is there other way of splitting the cost?

# Summary

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