

MICROECONOMICS III

CLASS 4

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EXTERNALITIES

An externality is a cost or a benefit imposed upon someone by actions taken by others. The cost or benefit is, thus, generated externally to that somebody

- An externally imposed benefit is a positive externality
- An externally imposed cost is a negative externality

Positive externalities

- A developer building/fixing a public road
- Improved driving habits that reduce accident risks
- A scientific advance

Negative externalities

- Air pollution
- Loud parties next door
- Traffic congestion
- Second-hand cigarette smoke

EXTERNALITIES

Externalities arise when an agent (a person, firm, government) influences the production or utility function of another agent

- The former agent does not take into account that his behavior affects welfare of the latter agent

Pecuniary externalities arise when actions of an economic agent cause a change in market prices

- Example: more purchases of second homes by city-dwellers in some area may drive up house prices and, thus, make it difficult for young people in the area to buy a house
- They do not shift the production or utility function.
- They do not lead to erroneous market allocation in a purely competitive market.

Pecuniary externalities are not the externalities in the sense discussed in our class

EXTERNALITIES

Externalities can be divided based on

- Net effect: positive (benefits) vs. negative (costs)
- Source: production vs. consumption
- Beneficent: private vs. public

Examples:

- Billboards
- Loud neighbor
- Beekeeper

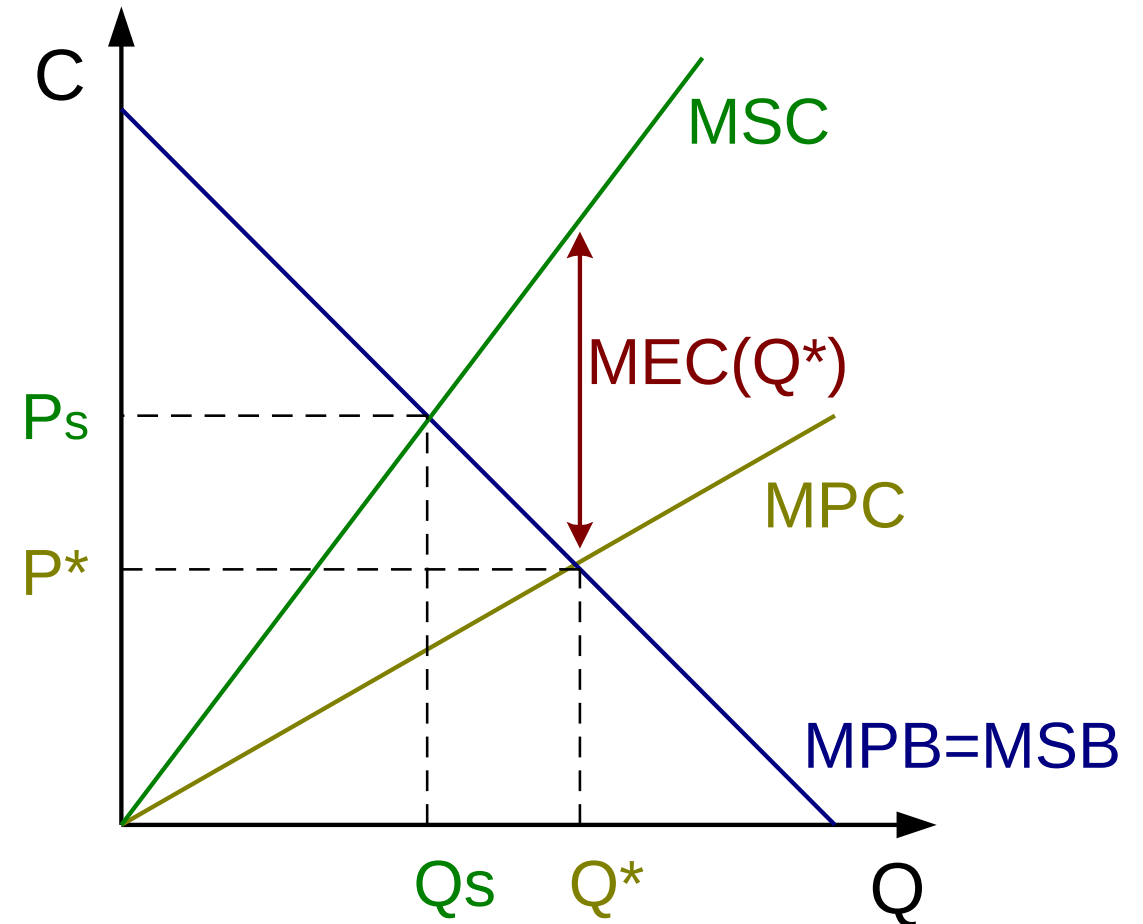
EXTERNALITIES

Total Social Cost (TSC) = Total Private Cost (TPC) + Total External Cost (TEC)

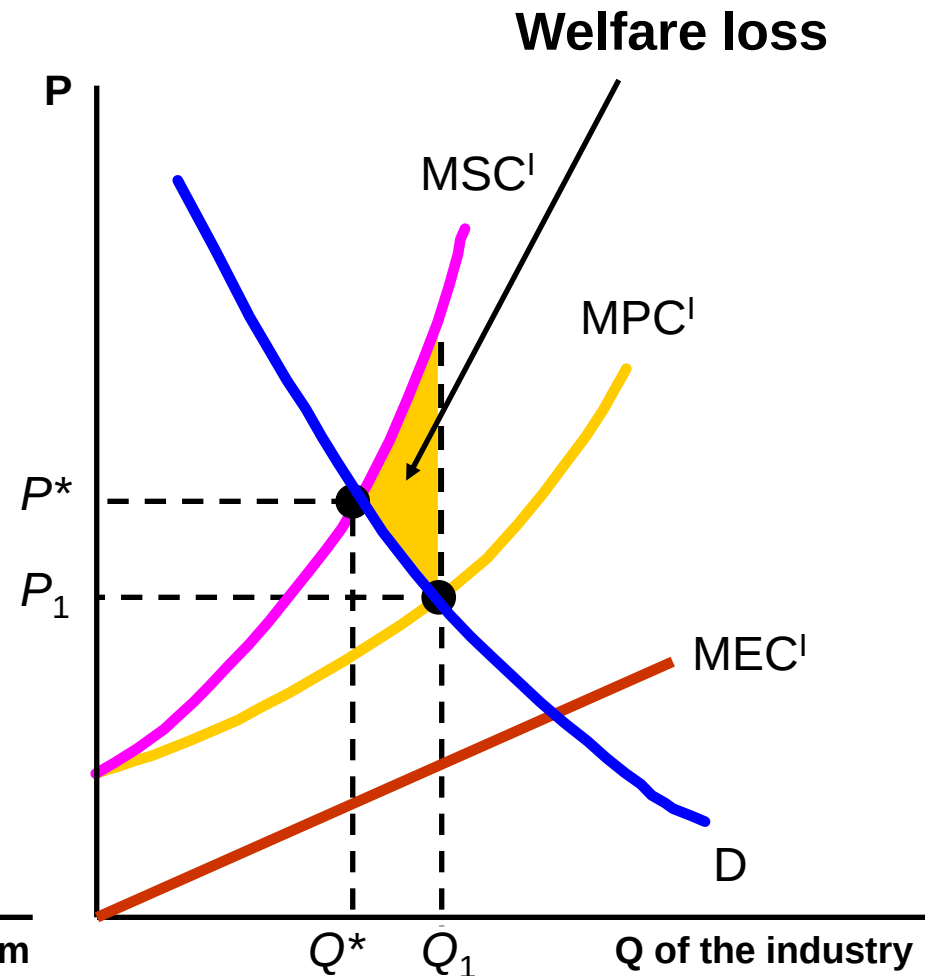
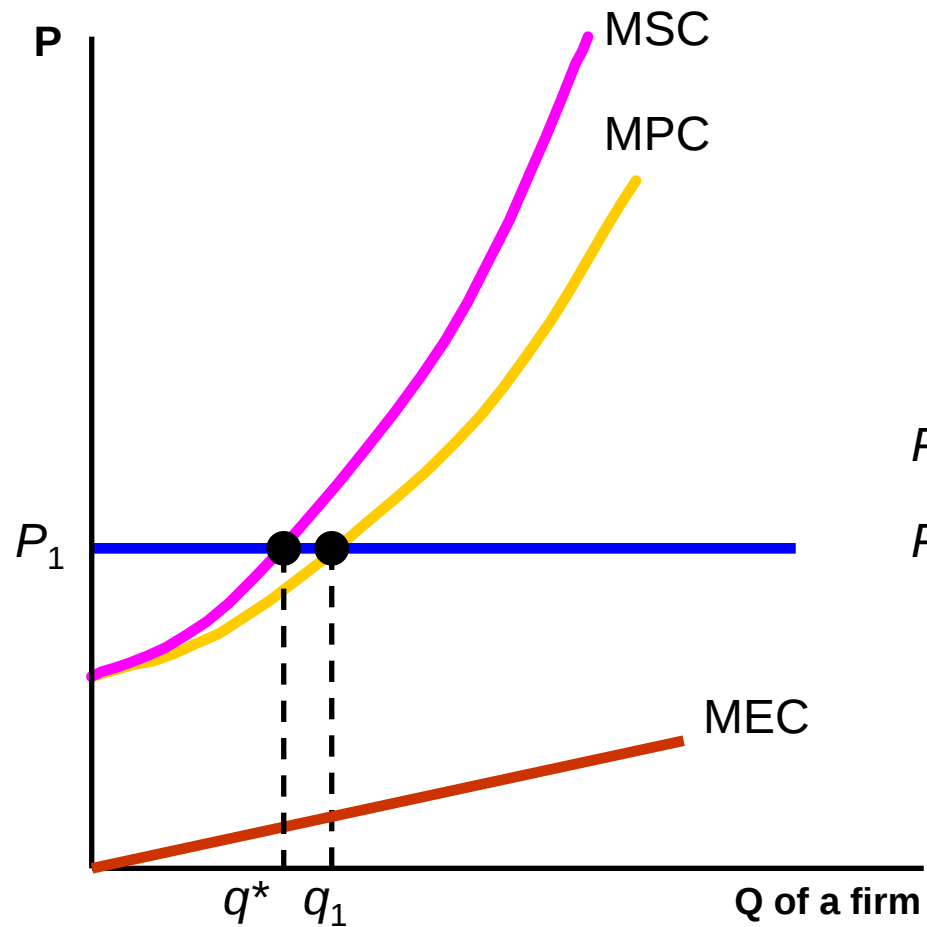
Marginal Social Cost (MSC) = Marginal Private Cost (MPC) + Marginal External Cost (MEC)

Total Social Benefit (TSB) = Total Private Benefit (TPB) + Total External Benefit (TEB)

Marginal Social Benefit (MSB) = Marginal Private Benefit (MPB) + Marginal External Benefit (MEB)



EXTERNALITIES



EXTERNALITIES

Externalities cause Pareto inefficiency

Caused by the producers/consumers not internalizing the whole cost/benefits of their actions when making decisions

Typically:

- Too much resource is allocated to an activity which causes a negative externality.
- Too little resource is allocated to an activity which causes a positive externality.

EXTERNALITIES

Ronald Coase's insight is that most externality problems are due to an inadequate specification of property rights and, consequently, an absence of markets in which trade can be used to internalize external costs or benefits

Causing a producer of an externality to bear the full external cost or to enjoy the full external benefit is called internalizing the externality

- E.g., EU Emissions Trading System (EU ETS)

EXTERNALITIES

Example (consumption)

- Consider two agents, A and B, and two commodities, money and smoke
- Agent A likes money and smoking
- Agent B likes money, but dislikes smoking
- Assume that each agent have 1 unit of money and that they leave together in a flat
- a) Assume the utility functions $U_A = ys$ and $U_B = ys^2$, where s can be treated as a license for smoking in the flat. To begin with, assume that agent B owns the flat, and so he decides how much can be smoked in the flat. Assuming that agent A can pay agent B to be able to smoke in the flat, what will be the equilibrium level of smoking?
- b) Now assume that agent A owns the flat and that agent B can pay him for some of his rights for smoking. Is the optimal level different than in a)?
- c) Will the results differ if utilities functions are given by $U_A = y + s^2$ and $U_B = y + s^3$?

COASE THEOREM

If the following conditions are met:

- low transaction costs,
- clearly defined property rights (there exists an external authority enforcing contracts),
- income redistribution does not influence marginal values,

then:

- the allocation of resources will be identical no matter how property rights are assigned,
- this allocation will be Pareto efficient, and so the problem of externalities will be eliminated.

In practice:

- <https://www.sciencedirect.com/science/article/abs/pii/S1462901121000721>
- Property rights may not be well-defined or not easy to enforce
- High transaction costs

EXTERNALITIES

Example (production)

- Consider a steel mill that produces jointly steel and water pollution. The latter adversely affects a nearby fishery.
 - Assume that both firms are price-takers with $p_S = 12$ and $p_F = 10$.
 - The steel mill total cost function is given by $c_s(s, x) = s^2 + (x - 4)^2$
 - The fishery cost function is given by $c_f(f, x) = f^2 + fx$
- a) Is it beneficial for the steel mill to pollute the water?
 - b) What will be the pollution level at the equilibrium? What will be the profit of these firms?
 - c) Can the profit be improved upon merger of the two firms?
 - d) What if, instead, fishery would own the water and could charge the steel mill for the pollution?

EXTERNALITIES

Why does merger work?

- It internalizes an externality and induces economic efficiency
- Optimization involves the Total Social Cost

Why does property rights work?

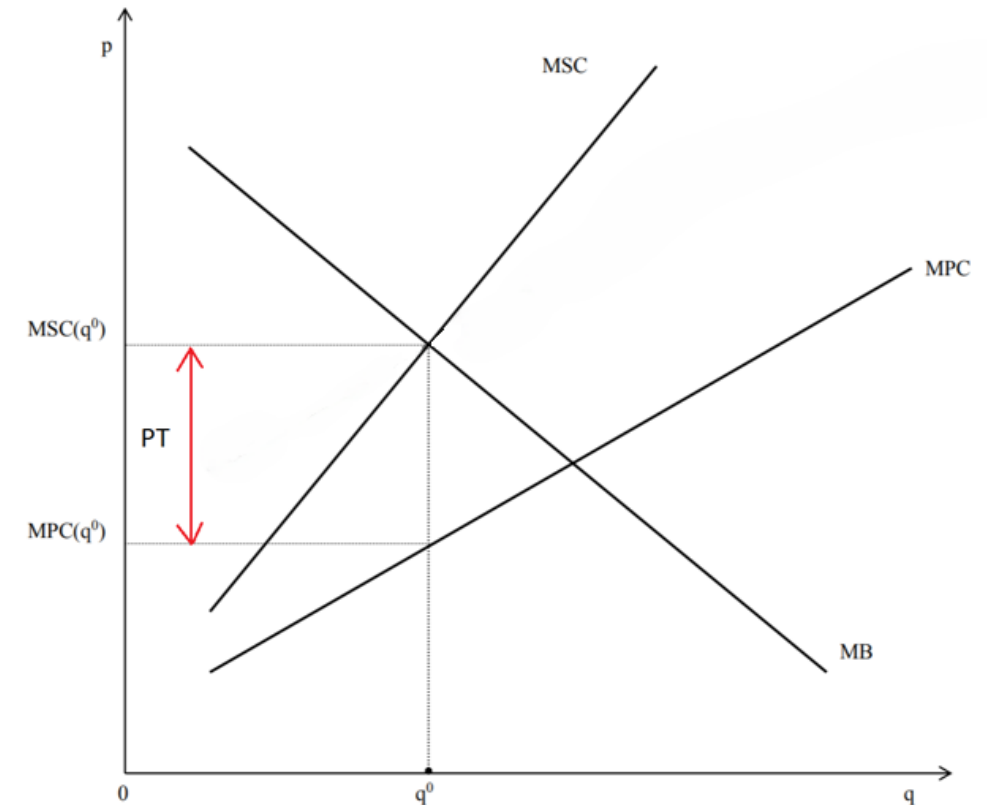
- Again, externality is internalized as the steel mill needs to pay for the pollution rights
- Would it matter if the property right to the water had instead been assigned to the steel mill?
- No. Profit is linear and, therefore, quasi-linear in money, so Coase Theorem states that the same efficient allocation is achieved whichever of the firms was assigned the property right
- The asset owner gets richer, though

PIGOUVIAN TAX

Another way to internalize the externality is introduction of the tax that will redistribute the negative externality cost back to the agent inducing the cost

- Similar to the case of fishery charging the steel mill for pollution
- In this case, the property rights does not have to be strictly defined. It is up to the government to decide who has the “rights” to pollute

Intuitively, the tax is supposed to shift the MPC curve so it would correspond to the MSC



PIGOUVIAN TAX

We either have:

- MSC is larger than MPC, then the tax is such that $PT = MSC(Q_s) - MPC(Q_s)$
- MPB is larger than MSB, and then $PT = MPB(Q_s) - MSB(Q_s)$
- Q_s is a socially optimal level

If we have a positive externality, then we could analogously formulate the Pigouvian subsidy