

Elements of Microeconomics: TA Session

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Reminders

Assignment 5 due on Dec 6, at 11:59pm

Final exam: Dec 13, 2pm-5pm

Externality

Externality: the uncompensated impact of a person's actions on the well-being of bystanders

Example of negative externality:

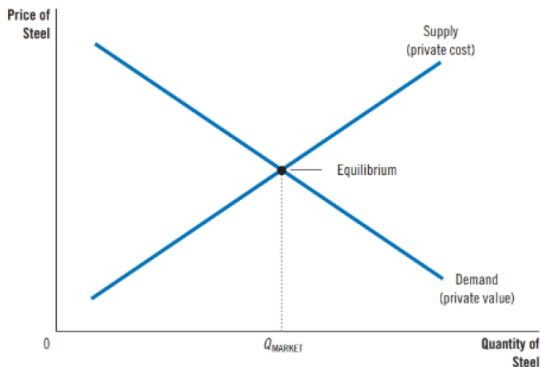
- ▶ Pollution: polluting is free for a factory, but it incurs costs on the environment and, ultimately, on the society

Example of positive externality:

- ▶ Vaccination: By getting vaccinated, you do not only protect yourself from the disease, but also protect others from getting the disease from you

Economic analysis of externality

Consider the market for steel, where its production emits pollution



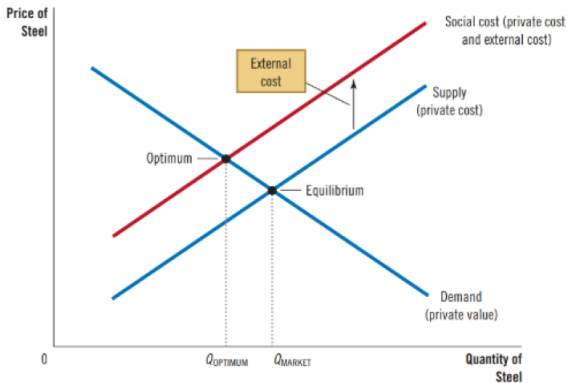
The demand curve shows the **private value** of each unit of steel (i.e. the value to buyers themselves)

The supply curve shows the **private cost** of each unit of steel (i.e. the cost that sellers themselves bear)

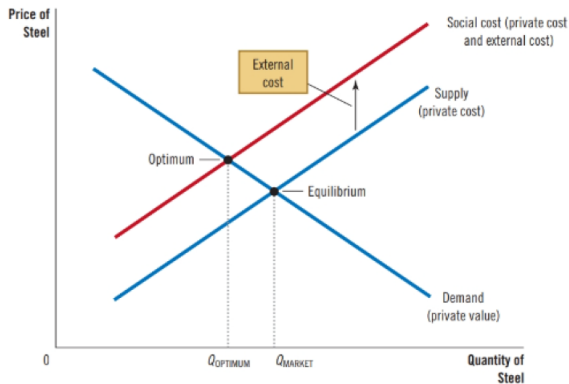
Economic analysis of externality

But, apart from private cost, steel production also has a cost in terms of pollution, which steel producers do not bear but the society bears

- The sum of the private cost and the cost to others is called **social cost**



Economic analysis of externality

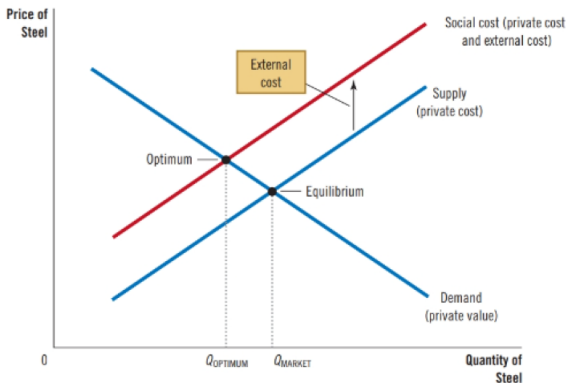


When there is negative externality, the market produces more than what's socially optimal, and vice versa.

- Intuition: without outside intervention, people don't care about the costs/benefits that they themselves don't bear

Intervention: corrective tax

How to move from the private supply curve to the social supply curve?



By levying **corrective taxes**

- In this case, the tax **internalizes the externality**: it alters incentives so that people take into account the external effects of their actions

Intervention: tradable pollution permits

Alternatively, the government could allow a scheme of tradable pollution permits

- ▶ The government could issue a certain amount of pollution permits to each firm, and allows firms to buy and sell permits
- ▶ Market forces will ensure that permits end up in the hands of those firms with the highest willingness to pay
- ▶ The final outcome is socially efficient regardless of the initial allocation of permits

Externality - exercise

Suppose the market for pesticide is perfectly competitive. The demand curve is $P = 100 - 2Q$, and the supply curve is $P = 10 + Q$. The cost of pollution when producing pesticide is \$30 per unit.

1. What is the private marginal cost of producing pesticide? What is the social marginal cost?
2. Calculate the equilibrium price and quantity without government intervention.
3. Calculate the socially optimal price and quantity. Is the actual production higher or lower than the socially optimal amount? Calculate the welfare loss.
4. Suppose the government levies a per-unit tax so that market production is socially optimal, what should the size of the tax be?
5. What is the amount of production when pollution is zero? Why is zero pollution not the socially optimal level?

Externality exercise - explained

1. Private marginal cost = private supply curve = $10 + Q$. Social marginal cost = $10 + Q + 30 = 40 + Q$.
2. $P = 100 - 2Q = 10 + Q \implies P^* = 40, Q^* = 30$.
3. Social optimum: $P = 100 - 2Q = 40 + Q \implies P^S = 60, Q^S = 20$.
Actual production is higher than the socially optimal amount.
Welfare loss = $30 \times 10/2 = 150$.
4. With a per-unit tax of size t , the private supply curve becomes $P = 10 + t + Q$. Then, in equilibrium, $P = 100 - 2Q = 10 + t + Q$.
For $Q = Q^S = 20$, it must be that $t = 30$.
5. The amount of production is zero. Zero pollution is not socially optimal because the production and consumption of pesticide also yields benefits in the form of consumer and producer surplus.