Economic Analysis of Law
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Lecture 2: Coase Theorem

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Welfare and Efficiency

- In economics, we usually compare policies by their comparative efficiency.

- A policy or allocation A is more efficient than B if everybody involved under A has at least as great a profit or utility as under B.

- A policy or allocation is called a Pareto-optimum if nobody's benefit can be improved by decreasing that of at least one of the others.

- Example: Suppose there are two consumers, 1 and 2, and two goods, x and y. Consumer 1 has 2 units of x and consumer 2 has 1 unit of y. The utility tables are as follows.

Welfare and Efficiency

		y	
		0	1
	0	0	1
x	1	2	4
	2	3	6

$u_A(x, y)$

		y	
		0	1
	0	0	2
x	1	3	4
	2	6	5

$u_B(x, y)$

- Originally, the utility of consumer 1 is 3, and that of consumer 2 is 2. This allocation, however, is not efficient.

- Consumer 1 can exchange 1 unit of x with 1 unit of y from consumer 2. In that case his utility increases from 3 to 4, and consumer 2's utility increases from 2 to 3.

- What are the Pareto-optimum allocations?
- $((0, 0), (2, 1))$, which yields utility $(0, 5)$
  $((1, 0), (1, 1))$, which yields utility $(2, 4)$
  $((1, 1), (1, 0))$, which yields utility $(4, 3)$
  $((2, 1), (0, 0))$, which yields utility $(6, 0)$
- The following are not Pareto-optimum allocations:
  $((2, 0), (0, 1))$, which yields utility $(3, 2)$
  $((0, 1), (2, 0))$, which yields utility $(1, 4)$

Externalities

- When the action of one agent affects the environment or welfare of another agent, we say this agent's action has an externality.

- A consumption externality is caused by one agent's consumption. A production externality is caused by an agent's production.

- Example of consumption externality: smoking, playing fireworks, any consumption which cause pollution, growing a garden, receiving education. The first three have negative consumption externality, while the last two have positive consumption externality.

- Examples of production externality: Refining oil or essentially any production process which pollutes. This is the case of negative production externality. Building schools or universities is an example for positive production externality.

Externalities

- Private consumption or production with externalities often leads to inefficiency.

- Negative consumption externality example:

unit of consumption	private benefit	private cost	social cost	net private benefit	net social benefit
1	5	2	1	3	2
2	9.5	4	2	5.5	3.5
3	12	6	3	6	3
4	14.5	8	4	6.5	2.5
5	15	10	5	5	0

- Since a consumer consider his private benefit only, he will buy (consume) 4 units of the good. But the net social benefit attains its maximum at 2 units.

Externalities

- Lesson 1: Negative consumption externality often results in level of consumption <u>greater than</u> social optimum.

- Positive consumption externality example:

unit of consumption	private benefit	private cost	social benefit	net private benefit	net social benefit
1	5	2	2	3	5
2	9.5	4	4	5.5	9.5
3	12	6	6	6	12
4	14.5	8	8	6.5	14.5
5	15	10	10	5	15

- A consumer on his own will buy (consume) 4 units, while social benefit is maximized at 5 units.

Externalities

- Lesson 2: Positive consumption externality often results in level of consumption <u>less than</u> social optimum.
- Reasoning exactly the same for production externality. We therefore have similar lessons.
- Lesson 3: Negative (positive) production externality results in production level greater (smaller) than social optimum.
- How to cure it: Tax or subsidy. The government can tax (in the case of negative externality) or subsidize (in the case of positive externality) consumption or production by <u>exactly the same amount</u> of externality it causes to restore social optimum.

Coase Theorem

- Coase: Social optimum will realize even without governmental intervention, as long as (i) information is perfect, and (ii) bargaining has no friction.

- However, and very importantly, the result on the welfare of people involved will be affected by government policy, especially that of property rights assignment.

Coase Theorem

- Negative consumption externality example:
  - (i) If the consumer has the property right (to consume the good), then in order to avoid the its cost, those who are affected by externality (call them victims) can offer bribe to the consumer to "buy it out". The buyout that is most beneficial to the victims is for them to pay (6.5-5.5) to the consumer, which reduces the cost of the victims from 4 to 2. Net gain: (4-2)-(6.5-5.5)=1.
  - (ii) If the victims have the property right, the consumer can bribe them to "buy the right" to consume. It is like he takes social cost into consideration. Social optimum naturally attains.

Coase Theorem

- Lesson: If the victims can coordinate between themselves and bargain with the consumer costlessly, then efficiency always attains: Regardless of property right assignment, the consumer always consumes 2 units of the good.

- Similar reasoning for positive externality and for case of production.

- Coase Theorem: Under perfect information and costless bargaining assumptions, the production or consumption with externality always results in social efficiency regardless of property assignment.

- However, property assignment affects <u>income distribution</u>.

Coase Theorem

- In the example above, the consumer's benefit is 6.5 (and the victims -3) when the consumer has property right to consume. If the victims have the property right, their benefit is 0 (and that of the consumer 3.5).

- The legal rule which determines property right assignment will not prevent consumption or production from being efficient, but it will affect the income distribution of society.

Tragedy of the Commons

- When people are using a common resource whose property rights are not assigned, the resource tends to be overly expleted.

- Example: Suppose there is a common pasture where villagers graze their cows. The barrels of milk that a cow produces decreases with the number of cows on the pasture, and for simplicity it follows the pattern below:

# cows	barrels of milk per cow: 12-2n
1	10
2	8
3	6
4	4
5	2
6	0

- Suppose the cost to buy a cow is \$2. If the pasture is owned by one villager, then his profit as a function of number of cows he owns (or allow other villagers to graze and charge them) is

# cows	profit
1	8
2	12
3	12
4	8
5	0
6	-12

Tragedy of the Commons

- Profit-maximizing number of cow is either 2 or 3.
- If the pasture is a common ground with no property rights assigned, then anybody can buy a cow at cost \$2 and graze it on the pasture. In that case the number of cow will be such that $12 - 2n = 2$, that is, when the value of milk equals cost to buy a cow. This is the case when $n = 5$.
- The latter case is not efficient since it does not maximize the net value of grazing.
- Other examples: fishing, foresting, etc.