ECON-A4000: Economics of Global Challenges

Lecture 4: Bargaining over externalities

Matti Liski

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Plan for the lecture

This lecture is connected to units 4 and 12 in the book.

- Where is the externality in Prisoners' dilemma and how bargaining changes the game?
- Transaction costs in bargaining
  - Free-rider problem
  - Hold-up problem
  - Reducing transaction costs

Prisoners' dilemma: Where is the externality?

Prisoner's Dilemma = A game with a dominant strategy equilibrium, in which playing the dominant strategy yields lower individual and total payoffs compared to other strategies (unit 4 of the book). Here C=cooperate, D=defect

		Player Y	
		C	D
Player X	C	$2, 2$	$-1, 4$
	D	$4, -1$	$0, 0$

Recall that Prisoners' dilemma describes social dilemmas such as common-pool problems. So, there must be an externality somewhere in Prisoner's Dilemma. By looking at the numbers in the matrix above:

- How big is the externality that one player can impose on the other player?
- What is size of the social loss from not reaching the cooperative outcome?

Prisoners' dilemma: Bargaining outcome

Suppose the players are at liberty to propose and accept contracts. A contract specifies transfers from one player to another depending on actions. What would be a contract that solves the externality problem? Contract should be such that it eliminates the incentive to deviate from (C,C).

		Player Y: C	Player Y: D
Player X	C	$2, 2$	$-1, 4-T$
	D	$4-T, -1$	$0, 0$

Recall the idea of Coase: the party that causes the externality should compensate the victim (if the victim has the right to live without suffering from the externality).

- Thus, a contract that would solve the externality problem requires that when X deviates from C to D, then X has to pay Y the loss which is (-3). This contract nullifies the externality.
- Note that now both players want to choose (C,C). They get payoffs (2,2) which is more than (0,0), so they would be very happy to sign ex ante such a contract that enforces compensations in case of deviations.

How to reach the bargaining outcome? Two basic approaches

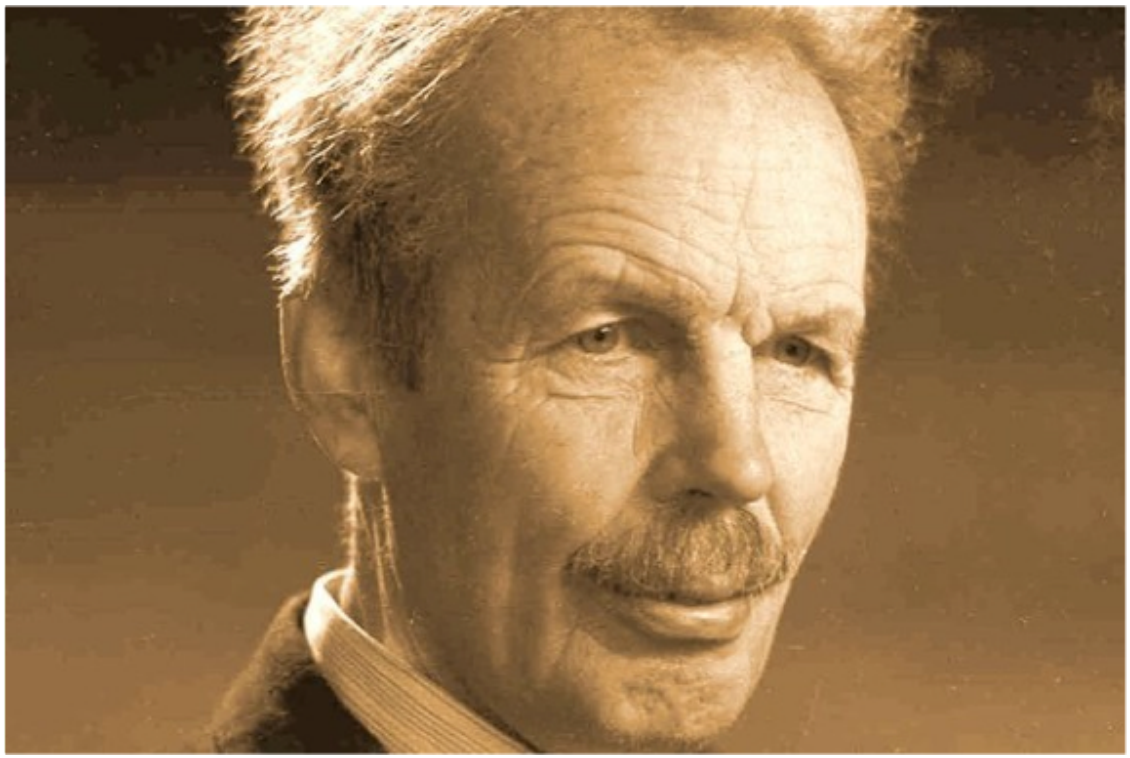
Pigouvian solution (after A.C. Pigou)

- The one we have seen: the society sets the contract and enforces the externality payments. But this approach is not feasible if there is no government with coercive power as in climate change.

Coasian solution: The problem of social cost 1960, Journal of Law and Economics

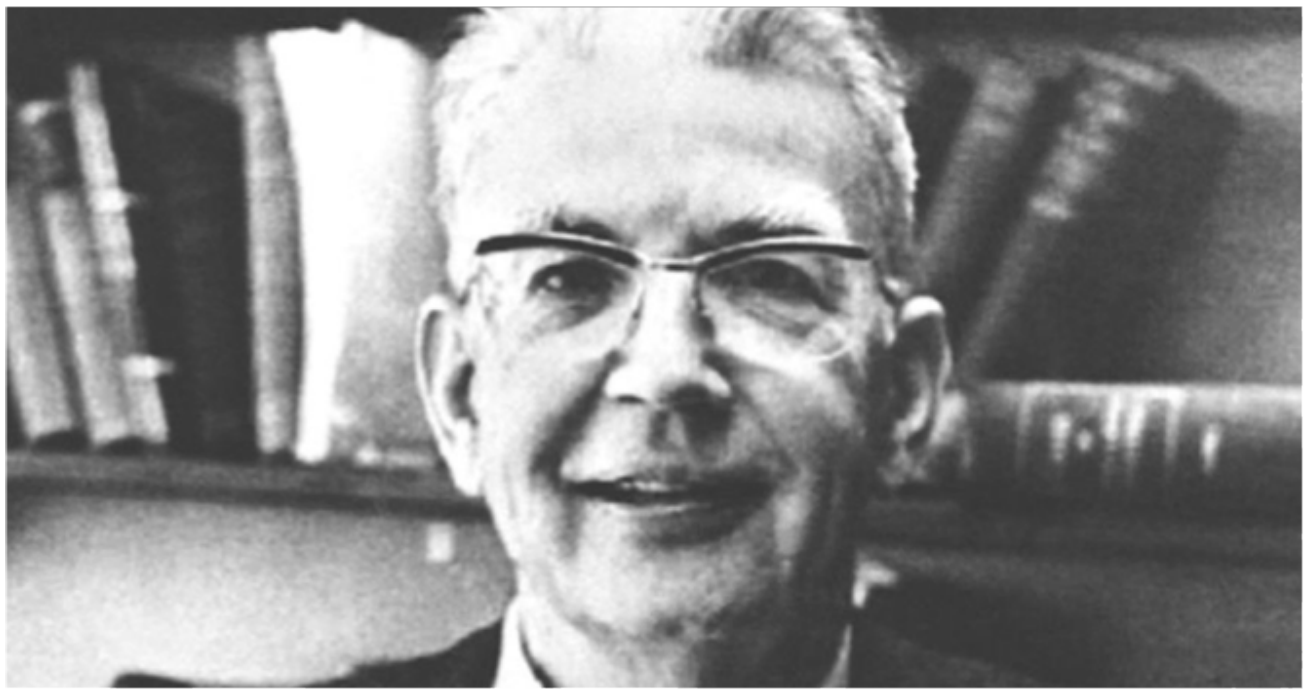
- The approach by Coase does not require a government, so it could work in climate change.
- Coase argued: (1) externalities need not lead to inefficiency; (2) Pigouvian taxes do not always lead to efficient solution; (3) the problem lies in the transaction costs, not in externalities

A.C. Pigou



He proposed a solution to the externality problem, *link*

Ronald Coase



He did not agree with Pigou

Coasian solution

Externalities need not lead to inefficiency, and taxes may not be efficient:

- A factory produces 200 000 €damage/year. It would take 100 000 €/year to eliminate the damage. The victim is can move away from the damage area with cost 50 000 €/year. Does it make sense to impose a tax internalizing the damages?
- if there is no tax, the solution is efficient: it is better that the victim moves from the society's point of view
- if we impose the tax, the outcome is more costly
- generally, the tax makes sense if the party paying the tax happens to be the one who solves the problem at the lowest cost. This hard to know sometimes.

Coasian solution

Coase: define property rights (one way or another), the market will take care of the rest

- Suppose the victim has the right to live without damage: the factory can pay the victim something between 50 000 and 100 000, and all are better off
- if the factory has the right, it can continue polluting. If the cost of abatement is lower than 50 000, the victim can pay the factory not to pollute

The problem is not in the externalities but in transaction costs; the markets may have difficulties in achieving the reallocation of rights
$\Rightarrow$ What are these transaction costs precisely? They arise from hold-up and free-rider problems

Coasian solution: transaction costs

Hold-up problem: suppose there are 100 victims, each suffering 2000 damage. Victims hold the rights.

- If abatement is less costly than moving away, the firm abates without transacting with individuals
- If abatement costs more than moving, the polluter should buy all the rights before being able to operate
- Abatement costs 100 000 and moving 50 000 (500 per head). Suppose the firm tendered 99 rights with overall cost 60 000. The last victim has huge bargaining power; s/he can hold up the firm, and ask up to 40 000 for the transfer of the right

Coasian solution: transaction costs

Free-rider problem: suppose there are 100 victims, each suffering 2000 damage. Cost of moving 500 €per victim. Abatement cost is 20 000

- If the factory has the right to pollute, the victims have to get together to collect 20 000 in order to pay the polluter to stop (assume that eliminating pollution costs less than moving away from the polluted area). If all participate, the cost is 200 per individual which is less than 500 (cost of moving)
- If I don't show up, the rest of the group still finds it profitable to pay the firm; each must contribute just 2 more to make up my share
- However, all individuals like this free-rider idea (no costs but enjoy the gains). The contribution to reduce pollution is a public good that all victims can enjoy

Lessons from Coase

Coase helps in seeing why countries fail to solve grand externality problems such as climate change. More generally: How to design institutions to minimize the cost of externalities?
Property rules are good when the cost of allocating rights through market transactions are low
Liability rules are good when cost of allocating rights through litigation are low.

- Protecting right to my car: liability rule would be much more expensive than property rule
- My wireless network: First, exclude the network by password, and then sell the right to use it (property rule). Second, leave it open and sue others for misusing if it happens. Third, courts may define a fine for misuse. Which one works?

How to reduce transaction costs?

Think about the classroom experiment from Tuesday Feb 25 (data in the first problem set)

- The game presents a collective action problem, where group outcome is maximized when all members contribute. However, Nash equilibrium (recall unit 4) leads no contributions.
- In the data, you see that the contributions are larger than in the Nash equilibrium outcome. Why?
- Trust increases contributions as it enforces "I will if you will" thinking
- Building up trust is easier in village economies with social norms and repeated interactions. The global village should somehow achieve the same.

Negotiating externalities in practise: Two types of climate agreements

Kyoto Protocol of 1997

- "top-down" approach in which the agreement set emission targets for governments on average of 5 percent relative to the 1990 levels.
- emission targets under Kyoto were binding for only 37 countries
- commitments under the Kyoto Protocol were referred to as being legally binding
- commitment periods 5 years long

Conditionality: enters into force only if others ratify the deal. It failed.

Negotiating externalities in practise, Cont.

Paris Agreement, December 2015

- "bottom-up" approach since countries themselves determine how much to cut nationally, without making these cuts conditional on other countries' actions
- before the countries were expected to sign the climate agreement, each party was asked to submit an intended nationally determined contribution
- nearly every country in the world contributes to the Paris Agreement!

Can this type of protocol for negotiations work better than Kyoto? We have a chance to ask the guest next!