

# Public Choice and International Public Goods

## Lecture 1 Basic Concepts of the Public Choice Theory

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# Public Choice

- Public Choice: economic analysis of non-market decision making; application of economics to political science
- Main issues: politicized economic choice, collective action problems
- Research focuses: theories of state and institution; government decision making behavior; behavior of political parties, government bureaucrats and interest groups; voting rules and behavior of voters; social choice, international relations

# Collective Action Defined

- Collective action arises when the efforts of two or more individuals are needed to accomplish an outcome

# Collective Action Problems

- $1 + 1 > 2$  The aggregate gains to a group from collective action could greatly exceed the sum of gains from independent individual efforts, but it by no means follows from this that the collective action would occur.
- $1 + 1 < 2$  Even if it occurs, collective action may fail to achieve an optimal result. Although groups are intended to pursue the collective well-being, the pursuit of private gains by group members may lead to outcomes that spell disaster for collective benefits

# Collective Action Problem: An Example

- Jill and Jack both have two pails that can be used to carry water down a hill. Each makes only one trip down the hill, and each pail of water can be sold for \$5. Carrying the pails of water down requires considerable effort. Both Jill and Jack would be willing to pay \$2 each to avoid carrying one bucket down the hill and an additional \$3 to avoid carrying a second bucket down the hill.
- Given market prices, how many pails of water will each child fetch from the top of the hill?

# Collective Action Problem: An Example (continued)

- Jill and Jack's parents are worried that the two children don't cooperate enough with each other. Suppose they make Jill and Jack share their revenues from selling the water equally.
- Given that both are self-interested, how many pails of water will Jill and Jack carry?

# Payoff Matrix

Jill

	0 pail	1 pail	2 pail
0 pail	(0,0)	(2.5, 0.5)	(5, 0)
1 pail	(0.5, 2.5)	(\$3, \$3)	(5.5, 2.5)
2 pail	(0, 5)	(2.5, 5.5)	(\$5, \$5)

Jack

(Jack, Jill)

# Public Goods

- Non-excludable: benefits of a good are available to all once the good is provided
- Non-rival (indivisible): a unit of good can be consumed by one individual without detracting, in the slightest, from the consumption opportunities still available for others from the same unit
- A pure public good provides benefits that are non-excludable and non-rival between users
- Impure public goods: goods possess benefits that are partially rival and/or partially excludable. They also include those whose benefits are excludable but partially non-rival



# Which of the following is a public good?

- Music in the Theater (until seats run out)
- Full moon rising over the sea
- Fish in the ocean
- The roads leading to expressways in rush hours
- TV programs watched on a local television channel
- Project work done by team mates
- Revenue from selling water by either Jill or Jack

# Externality

- External to parties of the exchange: the action of one agent influences the welfare, in terms of utility or profits, of another agent and no means of compensation exists
- Externality can be positive or negative
- In the case of positive externality, the good will be under-produced
- In the case of negative externality, the good will be over-produced
- Public good is a special case of positive externality

# Free Riders

- Want to enjoy the benefit of a public good, but try to minimize contribution to the public good provision. Free rider usually tries to hide his/her really preference to a public good
- When a good is non-excludable, many people will fail to contribute because they will get the good's benefits free once provided by others

# Olson's laws

- First Law: Sometimes, when each individual considers only his or her interests, a collectively rational outcome emerge automatically
- Second Law: Sometimes, the first law does not hold: no matter how intelligently each individuals pursue his or her interest, no socially rational outcome can emerge spontaneously

# Corollary

- Since individual rationality is not sufficient for group rationality, there is no reason to suppose that a group of individuals will act in their common interest

# Contribution Prisoners Dilemma

- Two players, A and B, are deciding whether to make contributions to the public good.
- If no one contributes, there are no benefits or costs. If B contributes and A free rides, then B receives a net payoff of  $6 - 8 = -2$ , and A gets 6.
- When both players contribute, each receives a net gain of 4 ( $= 2 * 6 - 8$ ).
- Non contributing is a dominant strategy because it provides a greater payoff regardless of the other player's action

# Contribution Prisoners Dilemma: Payoffs

	B Do Not Contribute	B Contribute
A Do Not Contribute	<b>Nash</b> $(0, 0)$	$(6, -2)$
A Contribute	$(-2, 6)$	$(4, 4)$

# Contribution Prisoners Dilemma: Ordinary Representation of Payoffs

	B Do Not Contribute	B Contribute
A Do Not Contribute	<b>Nash</b> $(2, 2)$	$(4, 1)$
A Contribute	$(1, 4)$	$(3, 3)$



# Nash Equilibrium

- Non-cooperative games: when individuals pursue their own best payoffs without coordinating with others
- A Nash equilibrium results when an agent chooses his or her best or optimizing choice given that the other players have chosen their optimizing or best responses for this choice

# Eight-Nation Prisoner's Dilemma

Assumption: nations are identical

	Number of greenhouse-gases-reducing nations other than nation i							
	0	1	2	3	4	5	6	7
Do Not Cut	Nash 0	6	12	18	24	30	36	42
Cut	-2	4	10	16	22	28	34	Social Best 40

# Other Collective Action Failures

- Assurance game
- Coordination game
- Chicken game

# Assurance Game

- A minimal threshold of two units of a public good must be met before a benefit of 8 is received by all
- Provision cost is assumed to be 4
- There is no dominant strategy
- Collective action failure may occur if the bad Nash equilibrium is chosen
- Leadership matters in the assurance game

# Assurance Game

	B Do Not Contribute	B Contribute
A Do Not Contribute	<b>Nash</b> $(0, 0)$	$(0, -4)$
A Contribute	$(-4, 0)$	<b>Nash</b> $(4, 4)$

# Coordination Game

- Only the first unit of the public good supplied yield benefits of 6 to everyone
- The cost per unit is assumed to be 4
- There is no dominant strategy
- There are two Nash equilibriums in which one contributes and the other free rides
- Collective failure may result because an absence of successful coordination may end with the socially inferior diagonal cells being reached

# Coordination Game

	B Do Not Contribute	B Contribute
A Do Not Contribute	$(0, 0)$	Nash $(6, 2)$
A Contribute	Nash $(2, 6)$	$(2, 2)$

# Chicken Game

- The payoffs from collective inaction are negative rather than zero
- The game is named chicken because each player would like to hold out so that the other player acts (or “chicken out”)
- Like the prisoner’s dilemma game, it is assumed that the cost of contribution is 8 and the benefit is 6
- There is no dominant strategy
- There are two Nash equilibriums in which one contributes and the other free rides
- There is a collective failure because the social optimum is not achieved



# Chicken Game

	B Do Not Contribute	B Contribute
A Do Not Contribute	$(-3, -3)$	Nash $(6, -2)$
A Contribute	Nash $(-2, 6)$	$(4, 4)$

# Collective Action Problem Explained

- The benefits of collective action has the properties of public goods: they go to every individual in a group whether or not that individual has borne any of the costs of the collective action
- Each individual's provision of any amount of a collective good would generate "positive externality", i.e. confer some benefit to others
- Collective action suffers from the free rider problem. Thus, collective goods will not be provided through market mechanisms or other straightforward and voluntary arrangements

# Collective Action Friendly Institutions

- Group size: small or large (a constant benefit and varying size, negative net benefits, organization costs, allocative inefficiency etc.)
- Group composition: privileged or not (a privileged group has a pattern of payoffs favorable to dominant players), homogeneous vs. heterogeneous groups
- Selective incentives: positive and negative (private or excludable joint products)
- Interaction: Repeated interactions among players (concern for reputation)
- Institutional Design: A federated structure

# Exploitation of the great by the small

- Heterogeneous memberships would confront an exploitation problem
- The better-endowed members would carry the burdens of the less fortunate
- The dominant member bears the entire burden of collective provision alone
- Small members free-ride

# Joint Products

- The collective activity yields multiple outputs that vary in their degree of publicness
- Some outputs may be private, while others may be purely or impurely public
- Bundling private products with public joint products can induce participation and contribution
- The greater the share of jointly produced excludable benefits to all benefits with the collective activity, the more successful will be the collective action

# Tragedy of the Commons

- A property/resource which has many owners. Each has the right to use the property/resource but does not have the right to exclude others from using. The property ownership structure leads to over-utilization of the property/resource
- Fisheries, forests, oil pools, hunting grounds, deep-sea mineral beds, orbital bands in space are such examples

# Coase Theorem: Controlling Externality through Assigning Property Rights

- In the absence of transaction costs, all government allocations of property are equally efficient, because interested parties will bargain privately to correct any externality
- As a corollary, Coase Theorem also implies that in the presence of transaction costs, government may minimize inefficiency by allocating property initially to the party assigning it the greatest utility.

# Key Points of Coase Theorem

- Clarify property rights in order to internalize the externality
- It does not matter who owns the property. What matter most is the clarification of property rights
- Efficiency can be achieved by bargaining among the interested parties when transaction costs is negligible
- Government has an important role to play when transaction costs are significant



# Information Problems

- Information asymmetry: one of the exchange parties has more information than the other
- Adverse selection: the “bad” products or customers are more likely to be selected
- Moral hazard: the risk that one party to a contract can change his behavior to the detriment of the other party once the contract has been concluded

# Principal-Agent Problem

- Asymmetric information: a principal can view the final outcome but is unable to observe the agent's actual action
- The agent's incentive may not be compatible to the principal's interest
- Principal-agent problem in international organizations