

Section Chapter 15: Property Rights and Common Property Resources

1 Property rights

Property rights are defined in terms of five cumulative rights: 1) access, 2) extraction, 3) management, 4) exclusion, and 5) transfer or alienation (sale).

1. Private Ownership Production will be chosen in order to maximize profits, i.e., where marginal revenue (MR) equals marginal cost (MC).

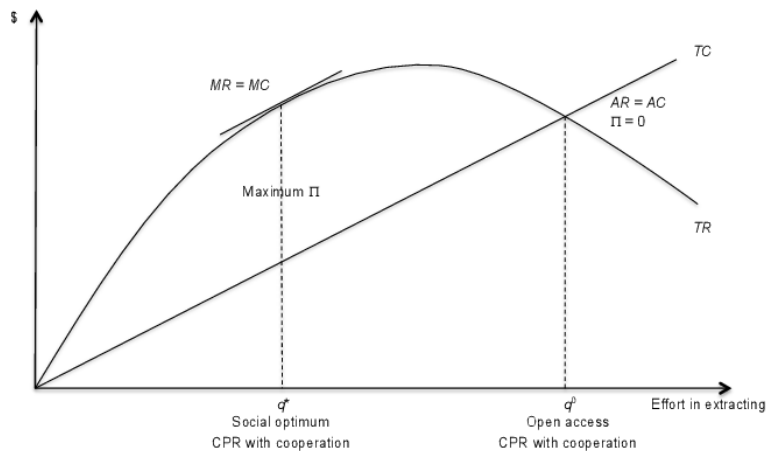
2. Open Access Resources An open access resource is one where everybody has the right to *access* and to *extract*. Clearly, users cannot manage the resource, exclude others, and sell the resource. Users of open access resources only consider the harvesting cost—not the loss of future benefits—when making harvesting choices. They will continue to extract from the resource for as long as there are positive profits, i.e., until $AC = AR$ (i.e. the tragedy of the commons). This leads to over-extraction from the resource and to its eventual total exhaustion if AC is low.

3. Common Property Resources (CPR) In this case, the property right is assigned to a community, with well defined membership and boundaries. Members have the rights of *access*, *extraction*, and *exclusion* of non-members. Common Property Resources yield products or services that are *rival in use* and *collectively excludable in access*. Advantages of CPR are 1) economies of scale, 2) geographical risk spreading, 3) manages resources that can't be assigned individually, 4) reduces potential negative equity effects of individualization, 5) interlinked advantages.¹ Disadvantages can include: 1) over-extraction and 2) under-provision of maintenance services.

- CPR without cooperation: This form of property right will lead to overuse of the resource if the community members who own the resource (and can exclude others) fail to cooperate in managing the resource. Each member extracts like in an open access resource, approximating the tragedy of the commons, particularly if the number of community members is large.
- CPR with cooperation: The community can instead define and enforce rules to manage the resource, codifying how each member is allowed to use the resource. In this case, the outcome can be the same as under private ownership.

Summarizing, incomplete property rights (open access, common property resources (CPR) without cooperation) induce over-extraction from the resource leading to exhaustion. Cooperation in the use of a CPR can be efficient.

¹**Economies of scale:** In extensive grazing, collective management of individually owned herds reduces the cost of animal supervision. **Geographical risk spreading:** Fishermen across fishing spots; herders across large pastures with variable environmental outcomes. **Resources that can't be assigned individually:** the sea, underground aquifers. **Negative equity effects:** Allocation of a heterogeneous, uncertain resource, may be seen as unfair. **Interlinked advantages:** interlinked transactions, market power, lobbying.



2 Management of CPR and determinants of cooperation

How to solve a game:

1. Determine the best strategy for player A:
 - a) What does player A choose if player B chooses to cooperate (C)? Circle this option.
 - b) What does player A choose if player B chooses to default (D)? Circle this option.
2. Determine the best strategy for player B:
 - a) What does player B choose if player A chooses to cooperate (C)? Circle this option.
 - b) What does player B choose if player A chooses to default (D)? Circle this option.
3. Is there any cell with two circles? This is an equilibrium and a solution to the game (there may be more than 1 equilibrium).

Solve the following games:

I. Grounds for pessimism about cooperative behavior: Tragedy of the commons

The Prisoners Dilemma:

Payoffs		Player B	
		Cooperate (C)	Default (D)
Player A	Cooperate (C)	(100, 100)	(-100, 200)
	Default (D)	(200, -100)	(0, 0)

Question: What is the solution to this game?

This game explains the tragedy of the commons: While the cooperative outcome (100,100) is better for both players, each player has an incentive not to cooperate.

II. Grounds for optimism about cooperative behavior: cooperative solutions in non-cooperative games

The chicken game

		Player B	
		Payoffs	
Player A	C	(100, 100)	(50, 150)
	D	(150, 50)	(0, 0)

Question: What is/are the solution(s) to this game?

This game represents a situation where a task (to cooperate) gets done, even though there is no cooperation, because there are gains from cooperating even if the other defaults

The assurance game

		Player B	
		Payoffs	
Player A	C	(100, 100)	(-100, 50)
	D	(50, -100)	(0, 0)

Question: What is/are the solution(s) to this game?

In this game, it is always better to choose the same option as the other player, so there are multiple cooperative equilibria. In order to choose the best equilibrium (C, C) players need exchange information and coordinate, or one player needs to show leadership and choose C.

Repeated Prisoner's Dilemma Games: Folk theorem and Tit-for-tat

The *folk theorem* says that each player cooperates if the present value (PV) of future gains from cooperation exceeds the immediate gain from defaulting. This is more likely with higher time horizons, uncertain endtimes, lower discount rates, and smaller relative one-time gains from defaulting.

Tit-for-tat is a repeated game in which the cost of default is sufficiently high that both sides will continue to cooperate. There is more in the chapter about what conditions apply for this game to work.

III. Grounds for optimism about cooperative behavior: Determinants of cooperation and collective action

Successful cooperation among community members in the management of a CPR requires that: 1) the resource must have well defined property rights and group membership; 2) there must be positive individual expected gains from successful cooperation; 3) members' actions must be observable and monitorable by others; 4) sanctions must be enforceable in case of default; and 5) there must be time to learn to cooperate.

Cooperation under the leadership of an appointed manager

		Player B	
		C	D
Player A	C	(100, 100)	(-100, 200 <u>-150</u>)
	D	(200 <u>-150</u> , -100)	(<u>-150</u> , <u>-150</u>)

Question: What is/are the solution(s) to this game?

As we've seen above, cooperation is not possible in the prisoners dilemma. Cooperation, however, can be achieved in this game by delegating to an authority to impose fines for defaulting.