

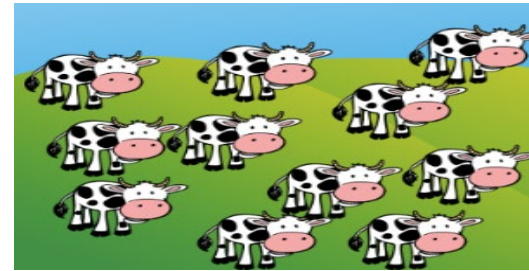
ECO2011 Basic Microeconomics

Mankiw Chapter 15 (Games)

2023

Motivation

- Do you remember what is common resources?
- What is tragedy of the commons?



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The Prisoners' Dilemma

- The prisoners' dilemma
 - Particular “game” between two captured prisoners
 - Illustrates why cooperation is difficult to maintain even when it is mutually beneficial
- Dominant strategy
 - Strategy that is best for a player in a game
 - Regardless of the strategies chosen by the other players
- Nash equilibrium
 - Economic actors interacting with one another, each choose their best strategy

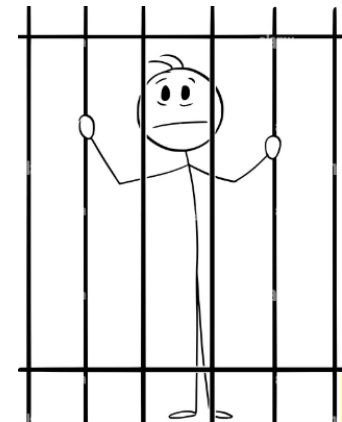
PRISONER'S DILEMMA

		B	
		Betrays	Stays silent
A	Betrays	Each serves 2 years	A = free B = 3 years
	Stays silent	A = 3 years B = free	Each serves 1 year

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Example

- The police have caught Robert and James, two suspected bank robbers, but only have enough evidence to imprison each for 1 year.
- The police question each in separate rooms, offer each the following deal:
 - If you confess and implicate your partner, you go free.
 - If you do not confess but your partner implicates you, you get 20 years in prison.
 - If you both confess, each gets 8 years in prison.



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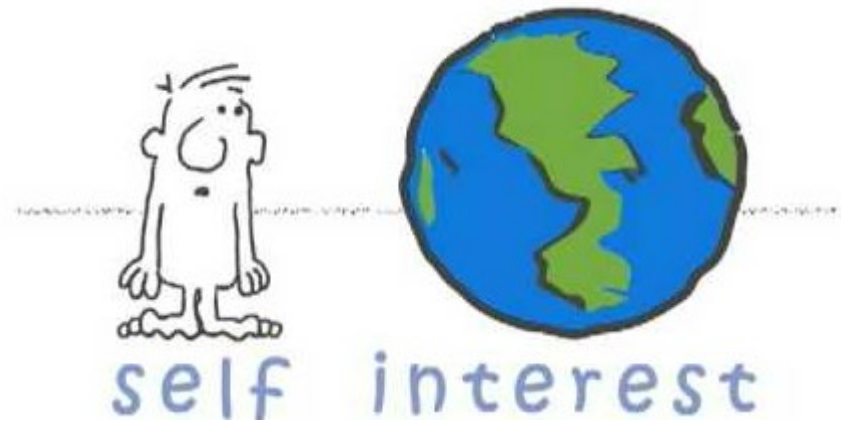
Example

Robert's decision		Confess	Remain silent
James's decision	Confess	Robert gets 8 years James gets 8 years	Robert gets 20 years James goes free
	Remain silent	Robert goes free James gets 20 years	Robert gets 1 year James gets 1 year

- Confessing is the dominant strategy for both players.

Example

- Outcome: Robert and James both confess, each gets 8 years in prison.
 - Both would have been better off if both remained silent.
 - But even if Robert and James had agreed before being caught to remain silent, the logic of self-interest takes over and leads them to confess.



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AT&T & Verizon in the Prisoners' Dilemma

		AT&T	
		$Q = 30$	$Q = 40$
Verizon	$Q = 30$	AT&T's profit = \$900 Verizon's profit = \$900	AT&T's profit = \$1000 Verizon's profit = \$750
	$Q = 40$	AT&T's profit = \$750 Verizon's profit = \$1000	AT&T's profit = \$800 Verizon's profit = \$800

Active Learning

The fare wars game

- The players: Delta Airlines and United Airlines
- The choice: cut fares by 50% or leave fares alone
 - If both airlines cut fares, each airline's profit = \$400 million
 - If neither airline cuts fares, each airline's profit = \$600 million
 - If only one airline cuts its fares, its profit = \$800 million; the other airline's profits = \$200 million
- Draw the payoff matrix, find the Nash equilibrium



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Other Examples of the Prisoners' Dilemma

■ Ad Wars

- Two firms spend millions on TV ads to steal business from each other.
- Each firm's ad cancels out the effects of the other, and both firms' profits fall by the cost of the ads.

■ Organization of Petroleum Exporting Countries

- Member countries try to act like a cartel, agree to limit oil production to boost prices and profits.
- But agreements sometimes break down when individual countries renege.

Other Examples of the Prisoners' Dilemma

- Arms race between military superpowers
 - Each country would be better off if both disarm, but each has a dominant strategy of arming.



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Another Example: Negative Campaign Ads

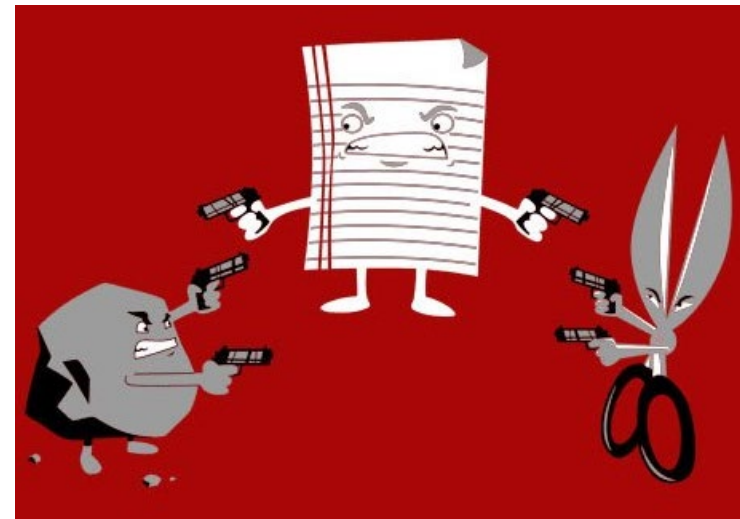
- Election with two candidates, “R” and “D.”
 - If R runs a negative ad attacking D, 3000 fewer people will vote for D (1000 of these people vote for R, the rest abstain).
 - If D runs a negative ad attacking R, R loses 3000 votes, D gains 1000, 2000 abstain.
- R and D agree to refrain from running attack ads. Will each of them stick to the agreement?

Negative Campaign Ads

		R's decision	
		Do not run attack ads (cooperate)	Run attack ads (defect)
D's decision	Do not run attack ads (cooperate)	<div>no votes lost or gained</div> <div>no votes lost or gained</div>	<div>R gains 1000 votes</div> <div>D loses 3000 votes</div>
	Run attack ads (defect)	<div>R loses 3000 votes</div> <div>D gains 1000 votes</div>	<div>R loses 2000 votes</div> <div>D loses 2000 votes</div>

Can You Answer the Following Questions?

- What is Nash equilibrium?
- What is dominant strategy?
- Why cooperation is difficult to maintain even when it is mutually beneficial ?



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End