Social Interaction: Where do rules come from?

ECONOMICS

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Bartlett School of Construction & Project Management

Lecture 4

This Lecture

Previously,

outcomes followed from people's *own choices* and not from others choices.

Individuals motivated by self-interest can produce outcomes that are beneficial for society e.g. entrepreneurship, innovation if there are *"proper rules"* in place.

However,

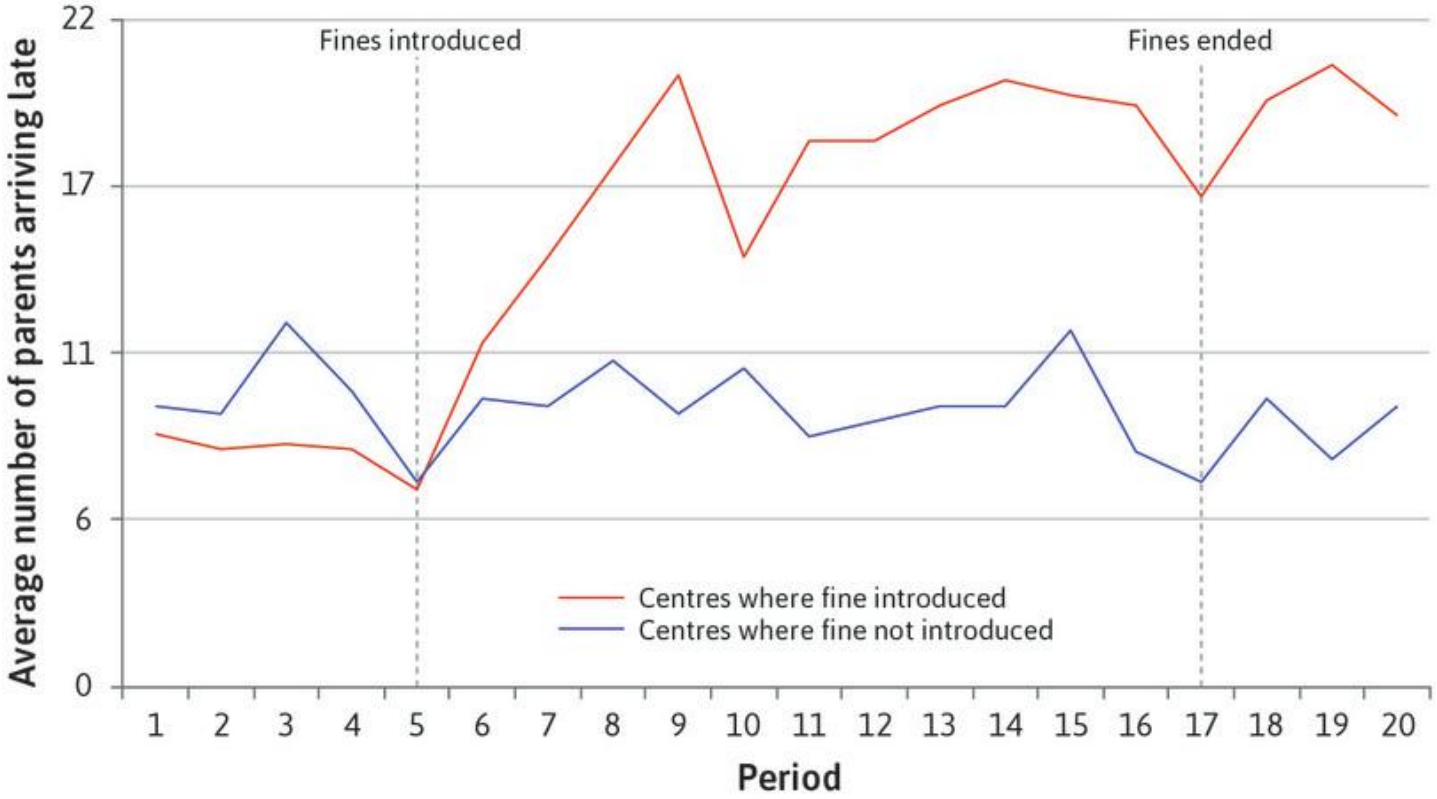
Self-interest can also be *harmful* to society.

When can self-interest be harmful for society?

Can setting up *"proper rules"* limit the damage?

Price of being late

Experiment: A *small fine* for picking up children late in some daycare centres in Haifa, Israel in 1998.



Mafia boss and the cab driver

Why do mafia bosses pay the taxi driver?

Why follows rules?

Why do mafia bosses pay the taxi driver?

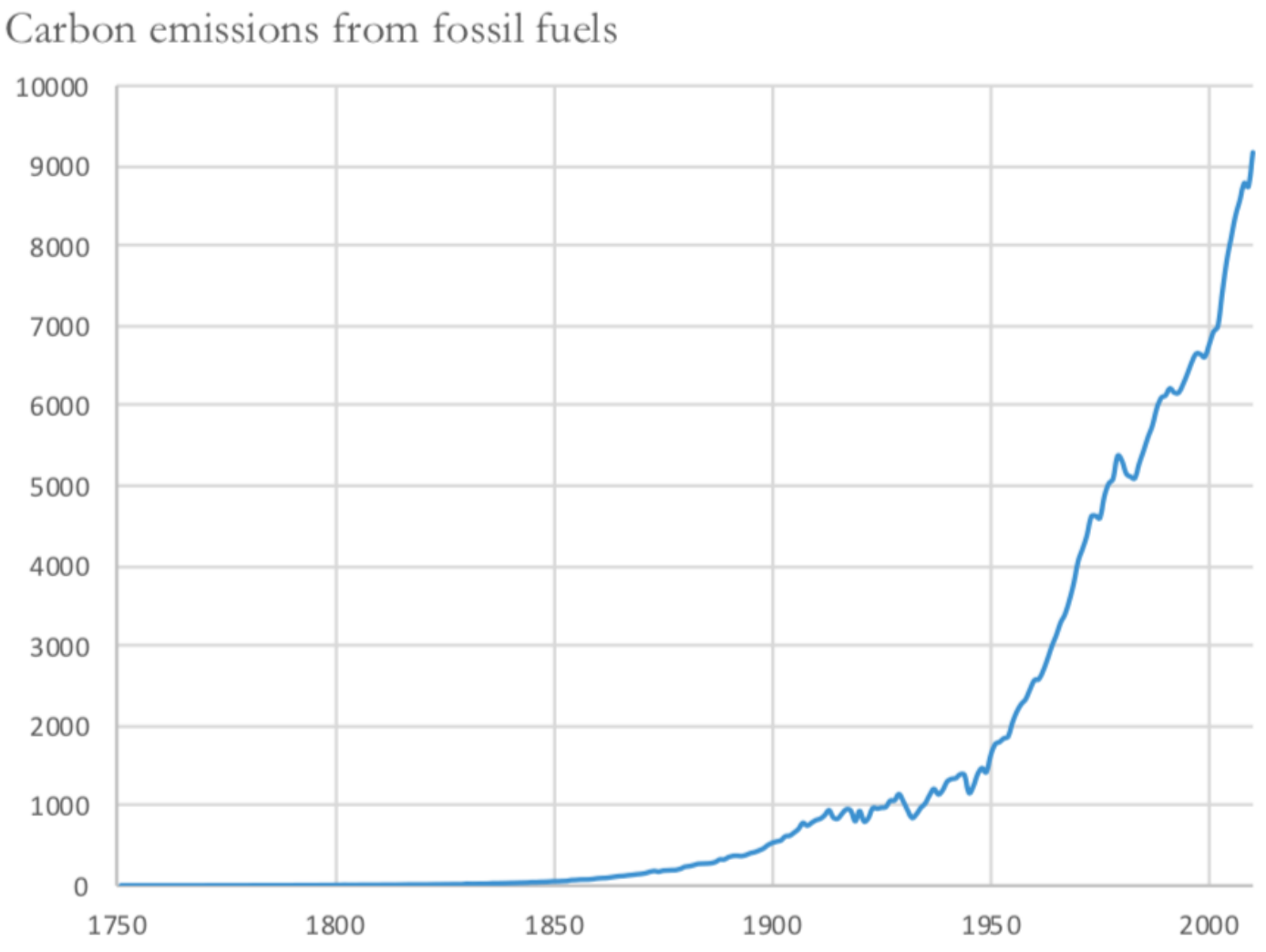
Why do cars stop at traffic lights?

Why do cars stop for pedestrians

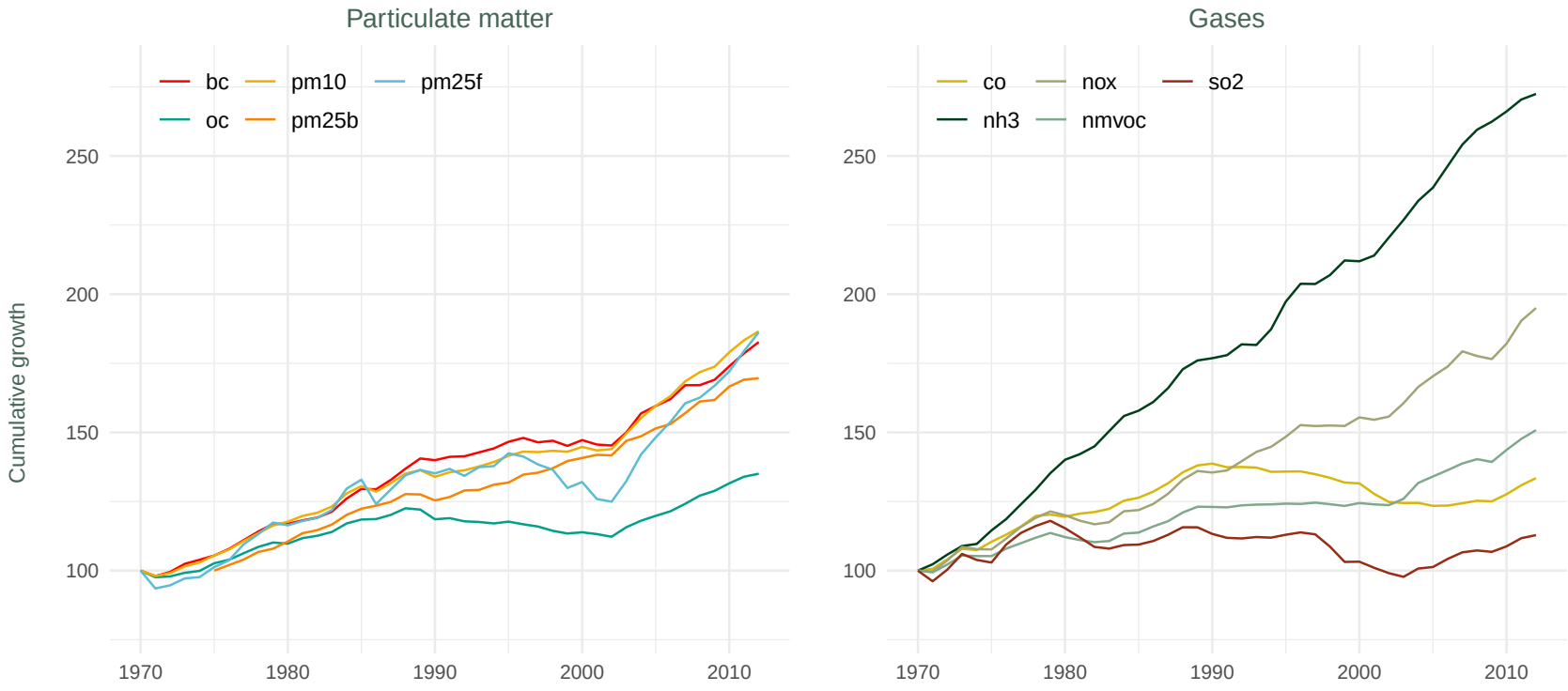
When do you choose to steal and when do choose to be honest?

When do we choose to follow the rules and when do we choose to flout (deviate from) them?

Carbon Emissions



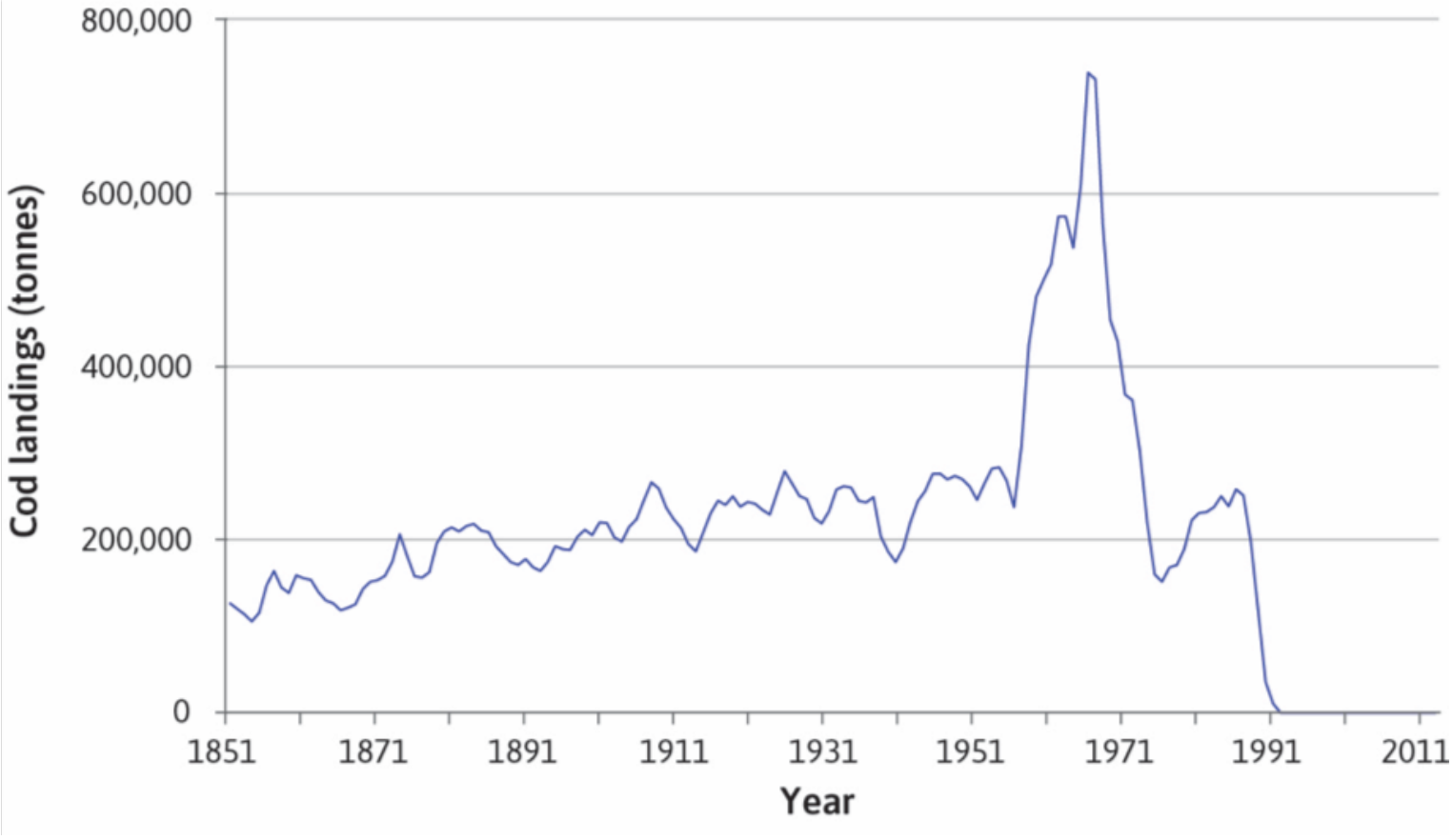
Global Aerosol Emissions: 1970-2012



Cumulative growth in global emissions for particulate matter and gases from 1970−2012

Natural resource management challenge

Industrial fishing led to depletion of cod stocks off Grand Banks



Strategic Social Interaction

Social interaction: two or more people with *agency* interact and *affect* each other

creates a scope for strategic social interaction

Strategy: Action(s) that people can choose when engaging in a social interaction.

Scope where given an an *environment*, people are aware of the ways that their actions affect others.

Environment types *Rules based environments*

Decentralised environments (e.g. markets)

Market for farm produce

Market price falls when it is *flooded* with one crop

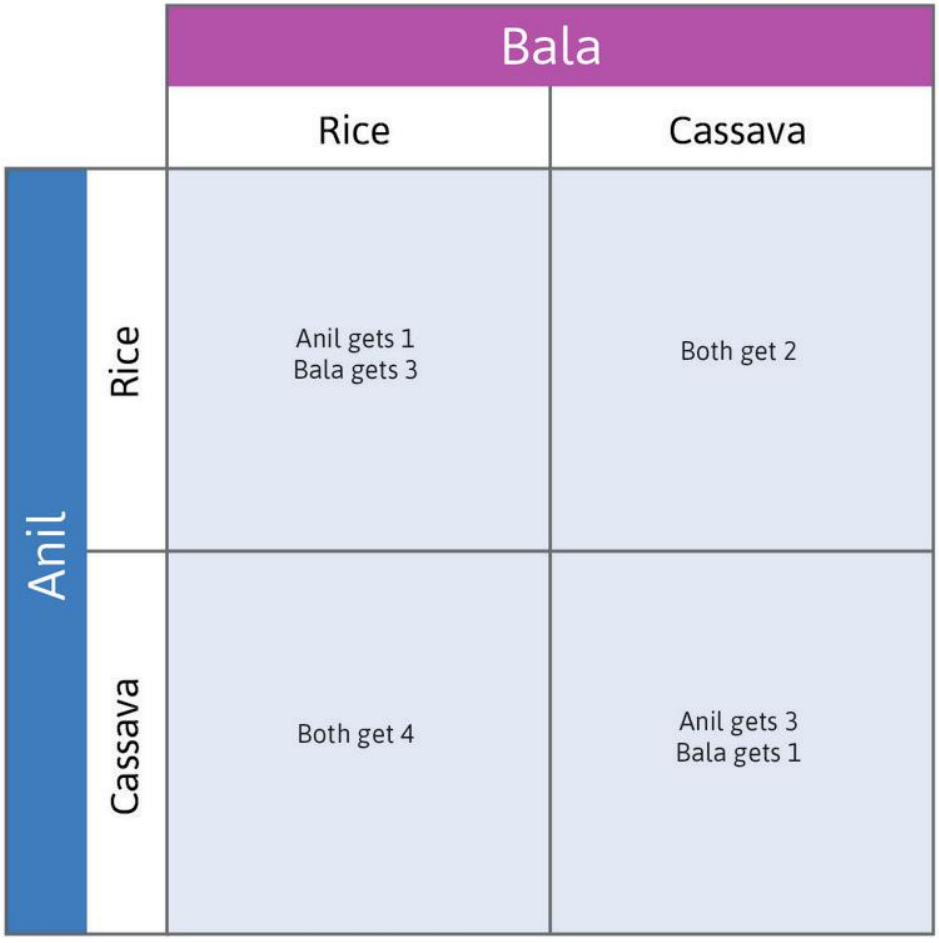
Much better for farmers to *specialise* in crops

- Anil & Bala can do better if they *specialise* compared to when they both produce the same good.
- When they produce different crops, they would both benefit if
  - each person *specialises in the crop* that was most *suitable for their land*.
  - Specialising in suitable crops will hurt them both

Farming Game

		Bala: Rice	Bala: Cassava
Anil: Rice		Both produce rice: there is a glut of rice (low price) There is a shortage of cassava Anil not producing cassava, which he is better able to produce	No market glut High prices for both crops Both farmers producing the crop for which they are less suited
Anil: Cassava		No market glut High prices for both crops Both farmers producing the crop for which they are better suited	Both produce cassava: there is a glut of cassava (low price) There is a shortage of rice Bala not producing rice, which he is better able to produce

Farming Game



Game

Players: people involved in interaction

Strategies: actions each player can take

Information: what each player knows when choosing their action

Outcomes: every unique combination of actions result in a outcome

Payoffs: benefits associated with each outcome

		Bala	
		Rice	Cassava
Anil	Rice	3 1	2 2
	Cassava	4 4	1 3

Farming game

Players: Anil & Bala.

Strategies: Rice or Cassava

Information: Don't know what other will choose

Outcomes: 2×2 actions result in 4 possible outcomes

Payoffs: depend on market prices and quality of land.

		Bala: Rice	Bala: Cassava
Anil	Rice	1, 3	2, 2
Anil	Cassava	4, 4	3, 1

Best Response

Best response: Strategy that yields the highest payoff, given the other player's strategy

Dominant strategy: A best response to all possible strategies of the other player (does not always exist!)

Dominant strategy equilibrium: An outcome of a game in which everyone plays their dominant strategy

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		Rice	Cassava
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Dominant Strategy

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Dominant Strategy Equilibrium

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Dominant strategy equilibrium: An outcome of a game in which everyone plays their dominant strategy

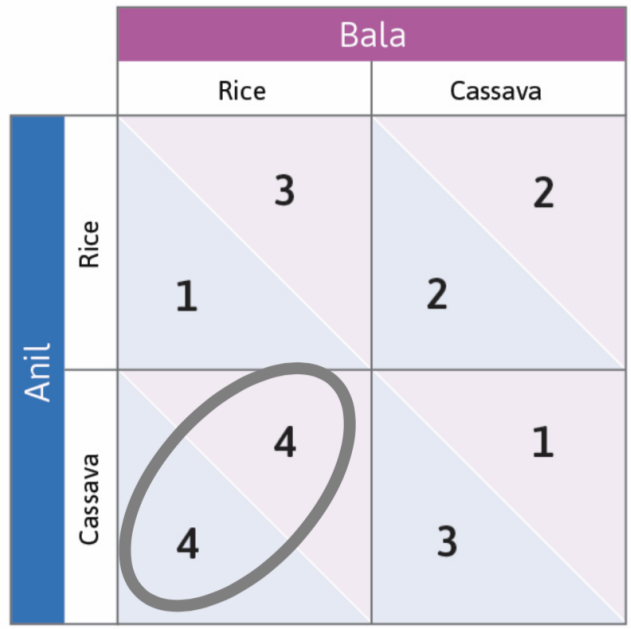
		Bala: Rice	Bala: Cassava
Anil: Rice		3 / 1	2 / 2
Anil: Cassava		4 / 4	1 / 3

Crop choice example

Best response:

If Bala grows rice, Anil's *best response* is to grow cassava.

If Bala grows cassava, Anil's *best response* is to grow cassava.



Best-response

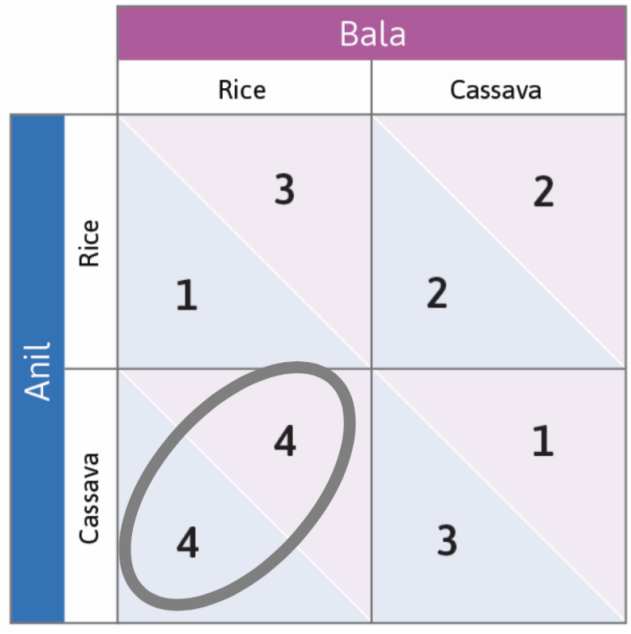
Dominant strategy:

Anil's dominant strategy is to grow cassava.

Bala's dominant strategy is to grow rice.

Dominant strategy Equilibrium

When Anil and Bala each play their dominant strategy, the outcome is (*Cassava*, *Rice*).



Equilibrium

What is an *equilibrium*?

- A self-perpetuating outcome.
- A system that is at rest
  - If it is shocked, it starts a dynamic process till it comes to rest again

Nash Equilibrium

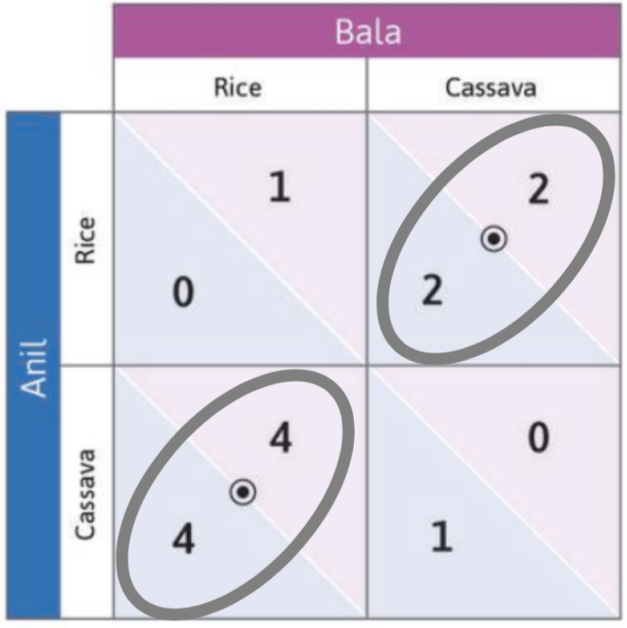
Nash equilibrium: A set of strategies (one per player), such that each player's strategy is the best response to the strategies chosen by everyone else.

In a *Nash equilibrium*,

no player has an incentive to *deviate* unilaterally.

Multiple Nash Equilibrium

There may be more than one Nash equilibrium in a game.



Coordination Problem

With multiple Nash equilibria, the socially optimal outcome may not be selected.

Society could be *"stuck"* in a *suboptimal equilibria (2,2).*

Requires *coordination* to reach the *optimal equilibria (4,4).*

		Bala: Rice	Bala: Cassava
Anil: Rice		1 / 0	2 / 2
Anil: Cassava		4 / 4	0 / 1

Prisoner's Dilemma

In prisoner's dilemma, a game with a *dominant strategy equilibrium* leads to a *sub-optimal outcome*.

Socially optimal outcome is not achieved

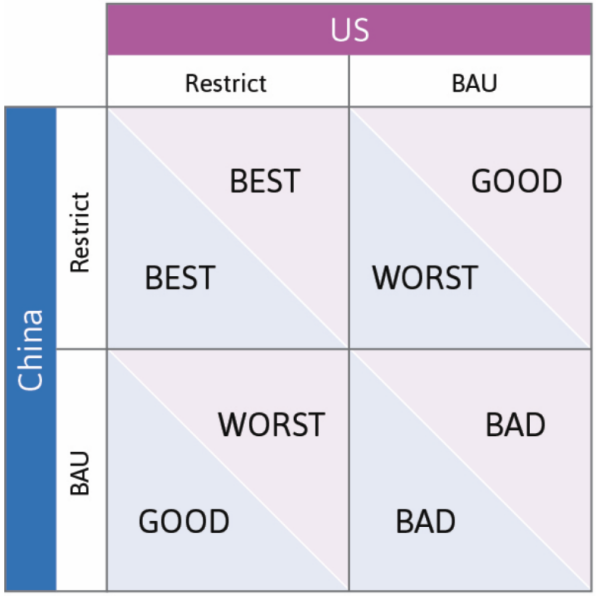
		Louise: Deny	Louise: Accuse
Thelma: Deny		1, 1	0, 10
Thelma: Accuse		10, 0	5, 5

Example: Climate change

Business as usual (BAU) is the dominant strategy for purely self-interested players

An emissions treaty would produce the socially optimal outcome

We are currently stuck on socially sub-optimal equilibria



Game Types

Prisoner's dilemma: a dominant strategy equilibrium leads to a sub-optimal outcome.

Coordination game: in a game with multiple equilibria

occurs when a sub-optimal outcome is a Nash equilibrium

implies that society could be stuck in sub-optimal outcome

Social dilemmas ...

Free riding: One person/party bears all the costs while everyone enjoys the benefits

Tragedy of the Commons: Common property or common resources are often overexploited

Can altruism and/or government policy resolve social dilemmas?

Social dilemmas ··

Social dilemma: occur when people do not fully account for the effect their actions has on others

a situation in which actions taken independently by *self-interested* individuals result in a socially *suboptimal outcome*.

e.g. traffic jams, climate change

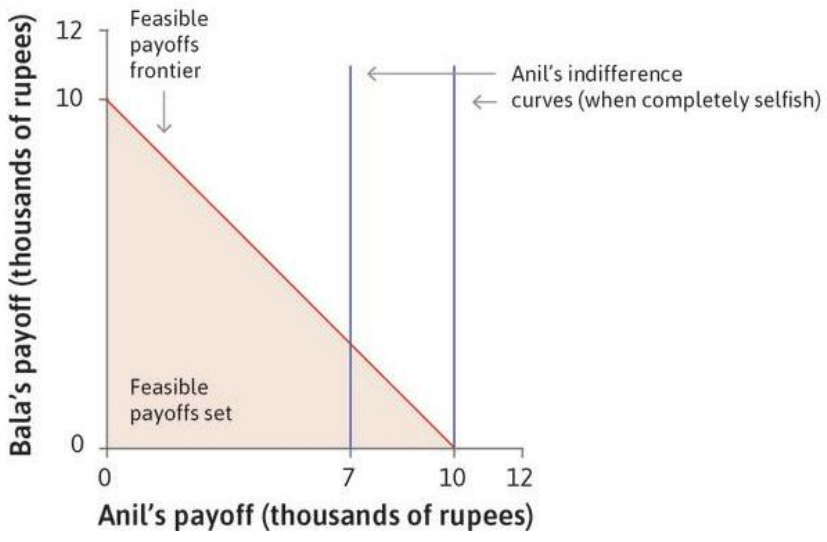
Social interaction leads to social dilemmas

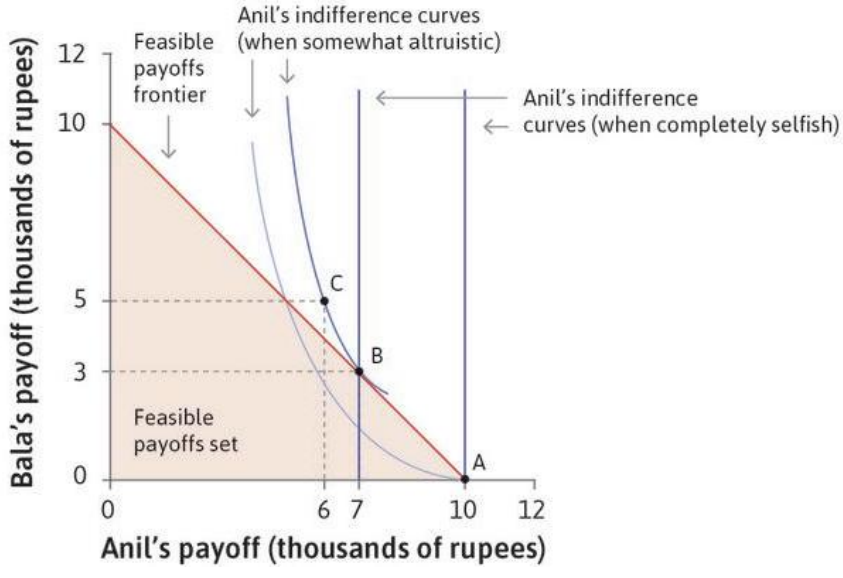
Games theory is the field that analyses social interaction by modelling people's agency and sheds light on why social dilemmas occur

Altruism

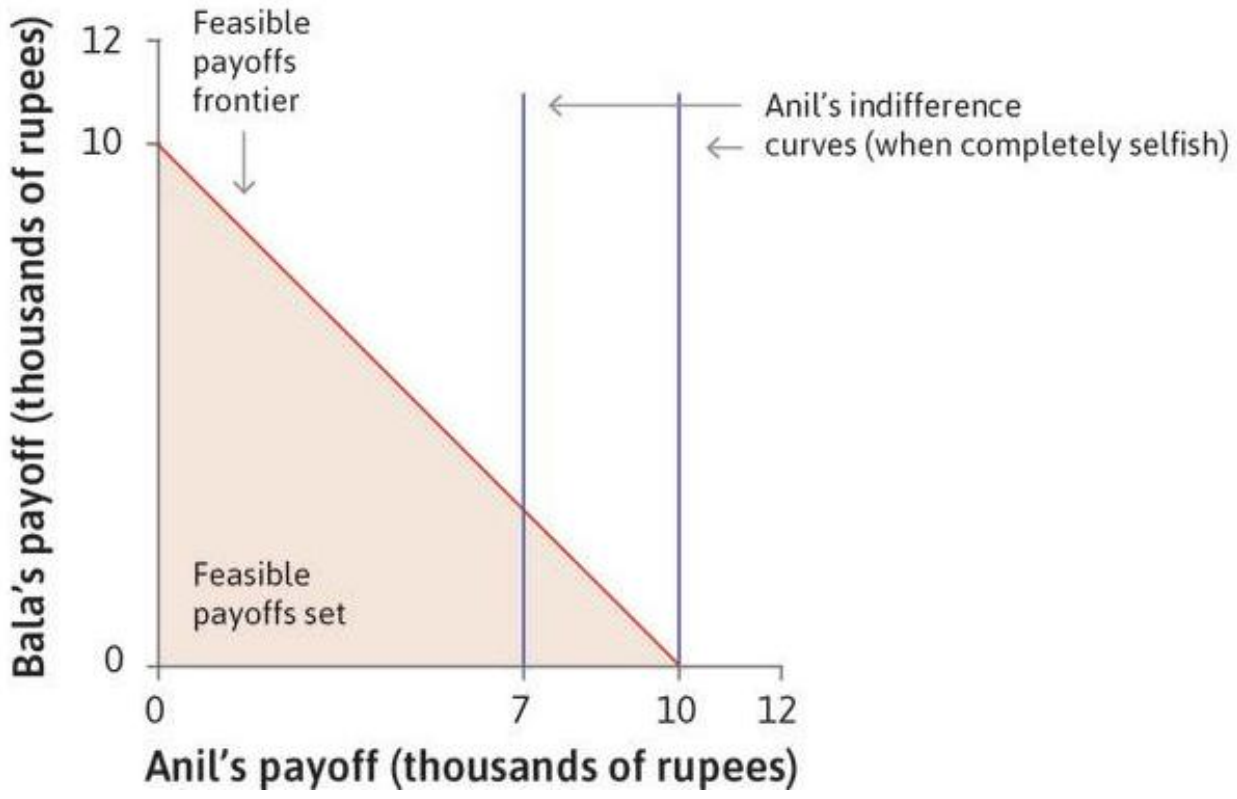
Social dilemmas arise when players are *selfish* and only care about their own payoffs.

In experiments, many players show altruism by choosing the dominated strategy. *Altruistic preferences* affect the *shape of indifference curves*.

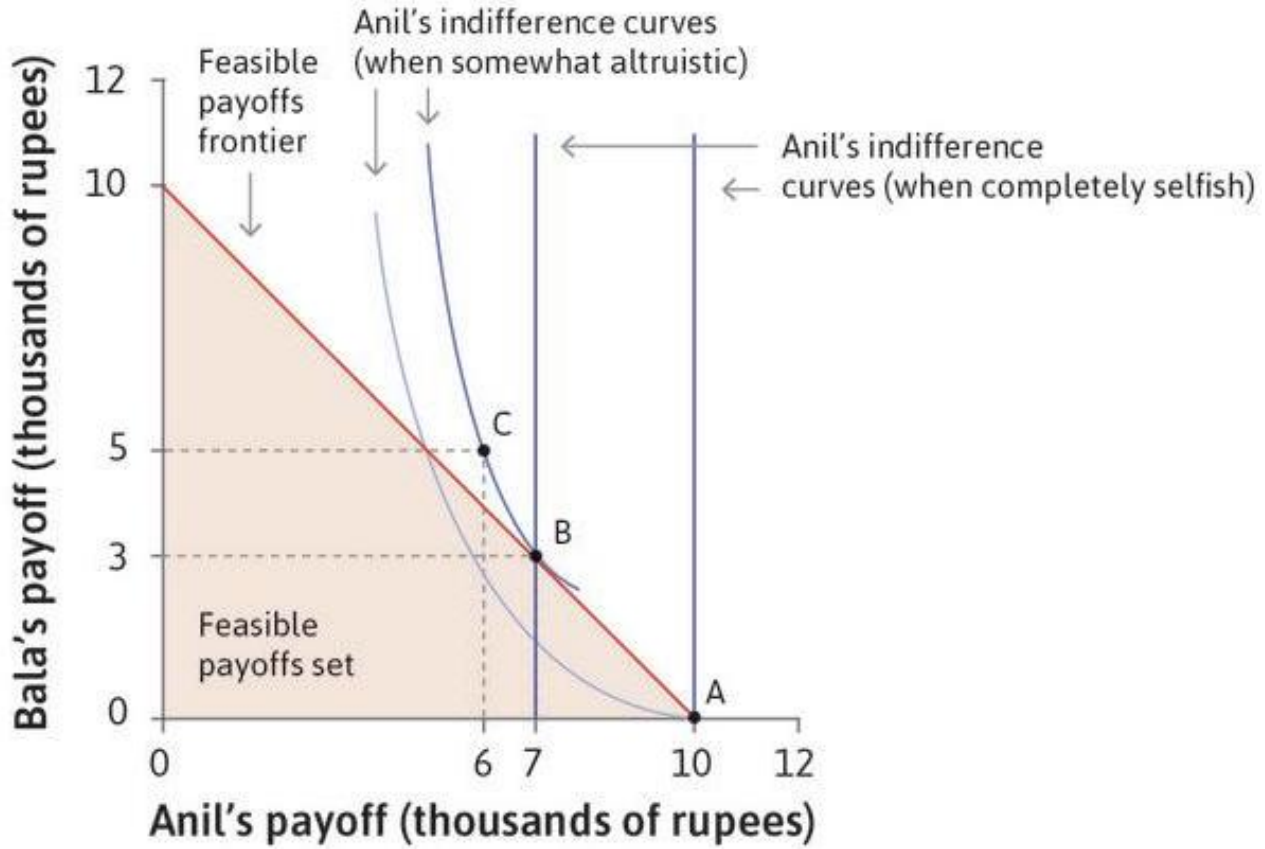




SELFISH


Feasible payoffs frontier
Anil's indifference curves (when completely selfish)
Feasible payoffs set
Bala's payoff (thousands of rupees)
Anil's payoff (thousands of rupees)
12
10
0
0
7
10
12

Altruism


Anil's indifference curves
(when somewhat altruistic)
Feasible
payoffs
frontier
Anil's indifference
curves (when completely selfish)
Bala's payoff (thousands of rupees)
12
10
5
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Feasible
payoffs set
0
6
7
10
12
Anil's payoff (thousands of rupees)

Social preferences: Other types

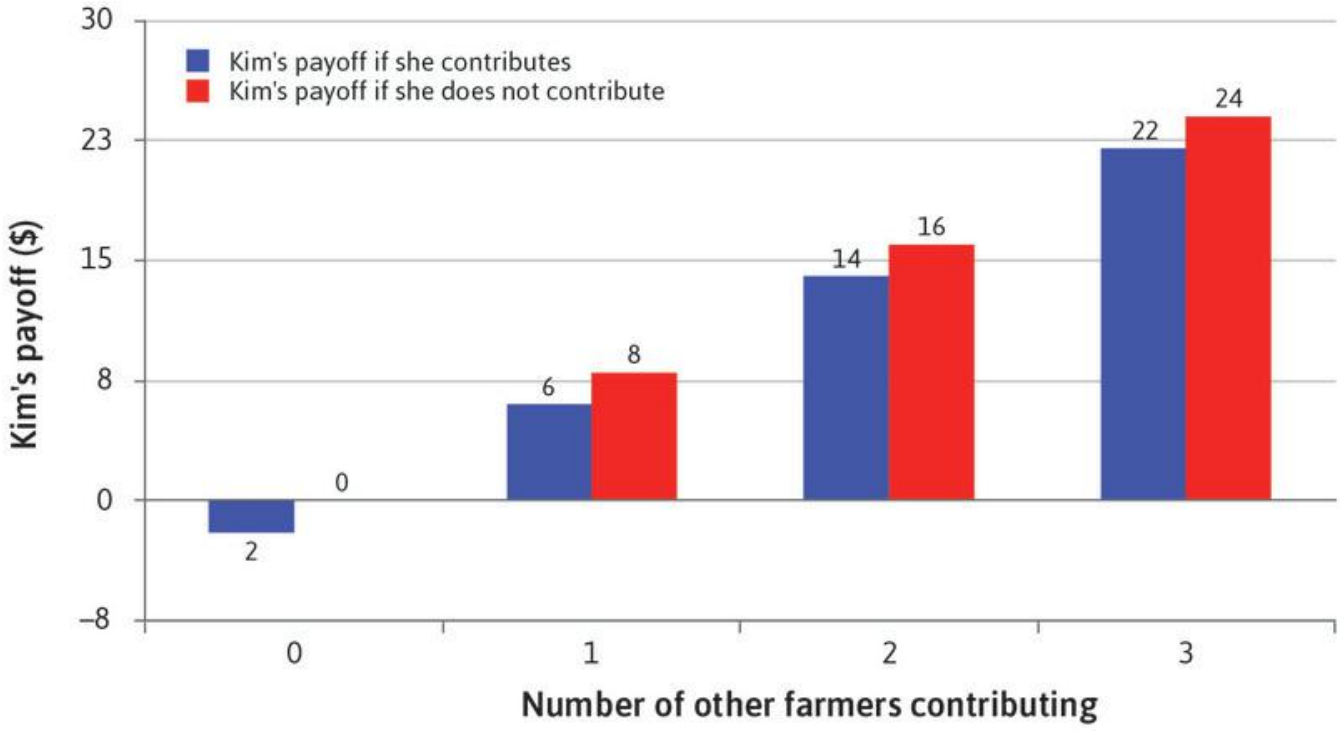
Inequality aversion: Disliking outcomes in which some individuals receive more than others

Reciprocity: Being kind/helpful to others who are kind/helpful, and vice versa.

> We evaluate whether others have been "*kind*" or "*helpful*" according to social norms (common understanding of how to act in situations when one's actions affect others).

Public goods game: Farming example

Each farmer *chooses* whether to *contribute* to the public good (e.g. irrigation project) or *not contribute*. Contributing has a personal cost, but everyone benefits.



Public goods game

Public goods game:

Not contributing (free riding) is a dominant strategy.

Game with a sub-optimal equilibrium

In *public goods experiments:*

People were happy to contribute as long as others do (*reciprocity*).

Contributions differ according to *social norms*.

The ability to identify and *punish free-riders* also increases individual contributions.

Public goods game

Better outcomes can arise in *repeated interactions*

… due to *social norms*, *reciprocity*, and *peer punishment*.

Behaving *selfishly* in one period has *consequences* in future periods, so it may no longer be a dominant strategy.

Social Dilemmas ...

Where do rules comes from?

if people care about one another, social dilemmas are easier to resolve.

... helps us understand the historical examples in which people mutually cooperate for irrigation or enforce the Montreal Protocol to protect the ozone layer, rather than free riding on the cooperation of others.

Institution

What is an *Institution*?

an environment where rules are followed

Where do these rules come from?

... game theory gives us some answers

Examples:

Firms

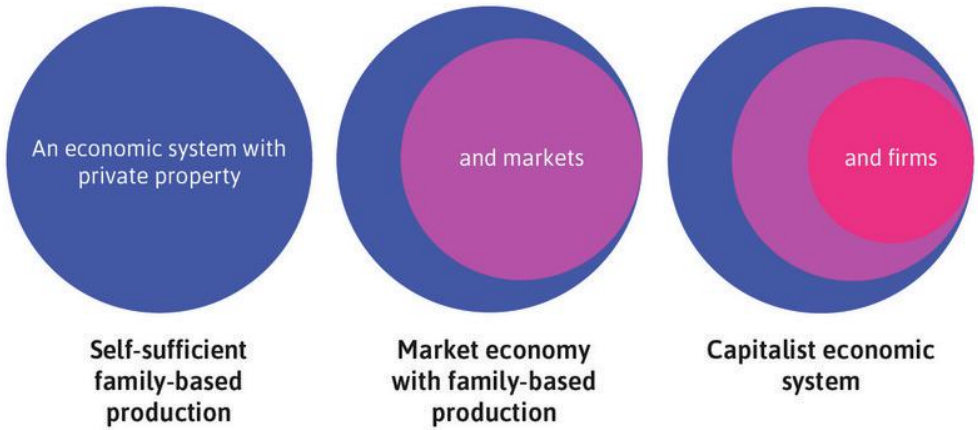
Family

University

Capitalism

Institutions: are the *laws* and *social customs* governing the production and distribution of goods and services.

Capitalism: an economic system where the main institutions are *private property*, *markets*, and *firms*.



Summary

Social interactions can be modelled as games players choose best responses to others' strategies

Social dilemmas e.g. prisoners dilemma can be resolved by social preferences, peer punishment, or binding agreements

> The rules of the game shape the social interaction and drive social equilibrium outcomes

Multiple Nash equilibria can cause coordination problems

Sub-optimal *dominant strategy equilibria* can cause prisoner's dilemma

Economic and political *institutions* can help achieve socially optimal outcomes