Market Failure: Public Goods

EC 201: Principles of Microeconomics

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Winter 2020

Prologue

Market Failure

Causes

1. Absence of property rights.
    - Externalities.
    - Public goods (today).
2. Market power.
    - *e.g.*, monopoly (week 10).
3. Asymmetric information.

Private *vs.* Public Goods

Q_1: Who pays?

Q_2: Who benefits?

Private Good: Groceries

Public Good: Park

Excludability

Definition

> The extent to which a consumer of a good can restrict others from using it.

Excludable: Access to the benefits of a good is restricted to those who pay for the good.

- *e.g.*, groceries, apartments, vehicles, *etc.*

Non-Excludable: Anyone can access the benefits of a good, whether she paid for it or not.

- *e.g.*, parks, national defense, sunshine, *etc.*

Excludable or Non-Excludable?

Podcast

A: Non-excludable.

Phone

A: Excludable.

Excludable or Non-Excludable?

Clean Air

A: Non-excludable.

Beach

A: Depends.

Private $\longrightarrow$ excludable.

Public $\longrightarrow$ non-excludable.

Rivalry

Definition

> Extent to which the consumption of a good by one person reduces the ability of others to consume it.

Rival: Consumption by one person 1) prevents others from consuming or 2) diminishes the value of the good for others.

- *e.g.*, your lunch, your toothbrush, your laptop, *etc.*

Non-Rival: People can consume the good simultaneously without diminishing its value.

- *e.g.*, lighthouses, scenic views, knowledge, *etc.*

Rival or Non-Rival?

Podcast

A: Non-rival.

Phone

A: Rival.

Rival or Non-Rival?

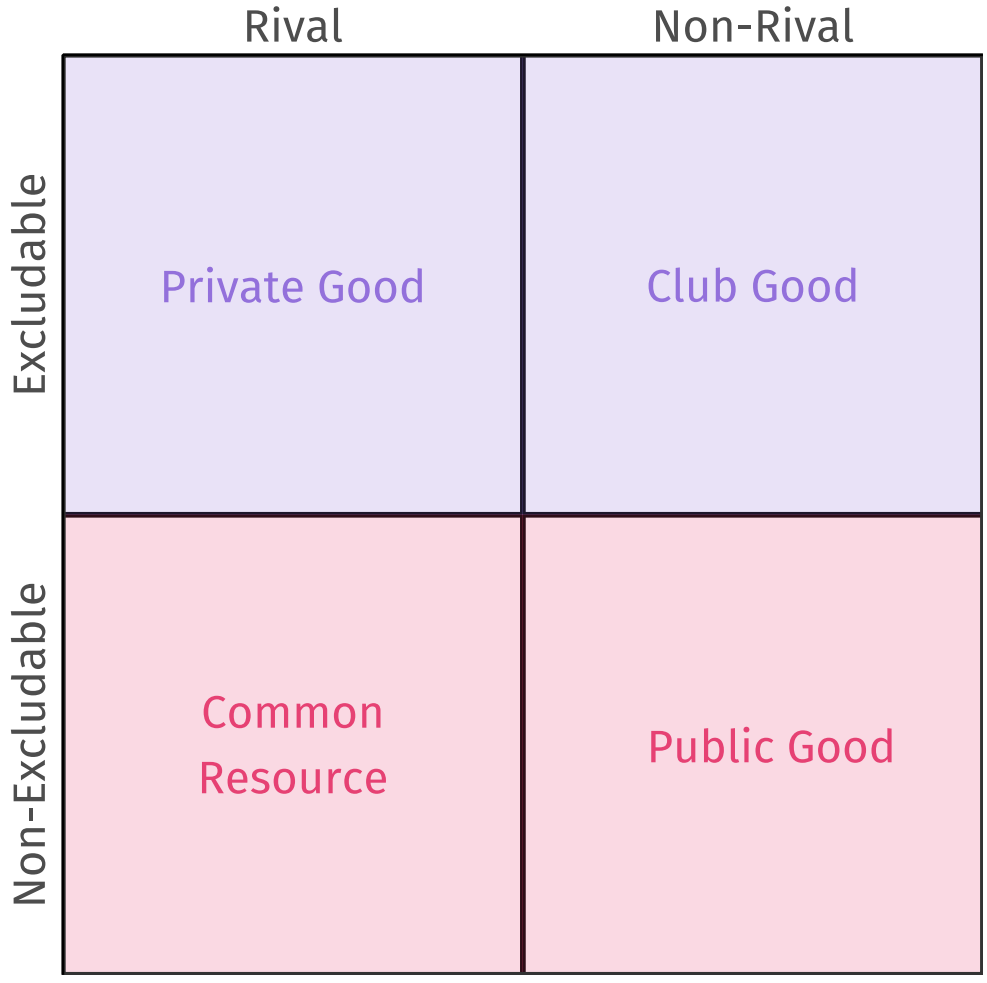
Clean Air

A: Non-rival.

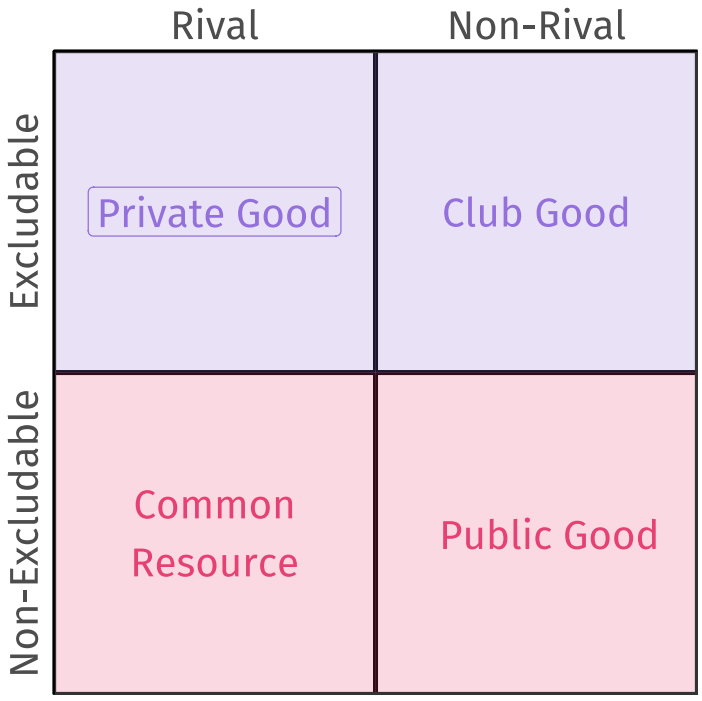
Beach

A: Rival.

Types of Goods



Private Goods

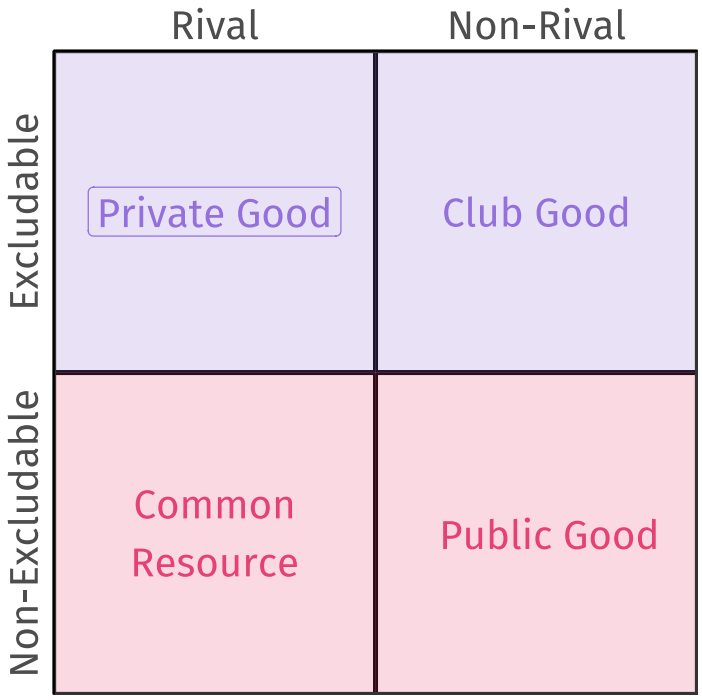


Property rights well-defined $\iff$ Consumer pays all costs and experiences all benefits at the margin.

Most consumer products are private goods.

- *e.g.,* jeans, watches, shoes, groceries, automobiles, notebooks, headphones, vitamins, toothbrushes, houses, *etc.*

Private Goods

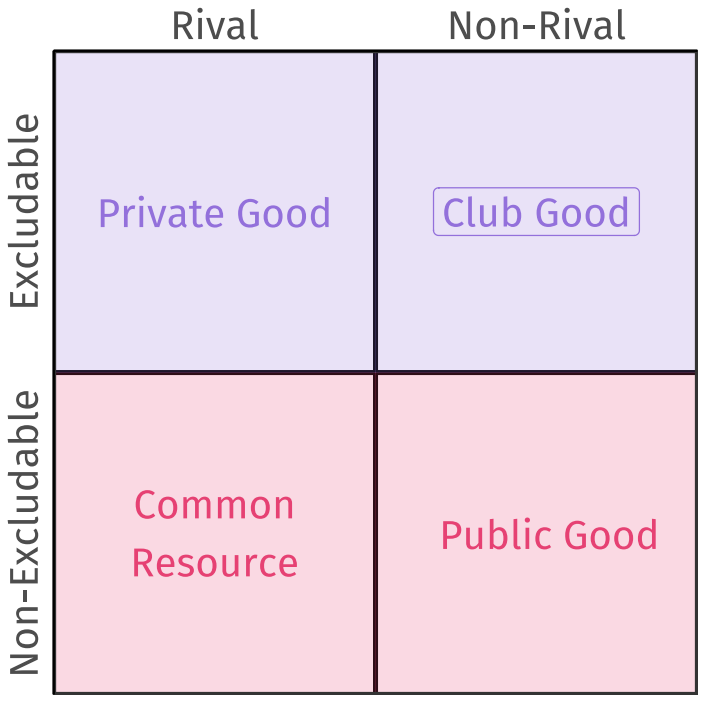


Usually provided by firms in a market setting.

- Competitive markets without externalities allocate private goods efficiently.

Q: Can you think of an example where the government provides private goods?

Club Goods

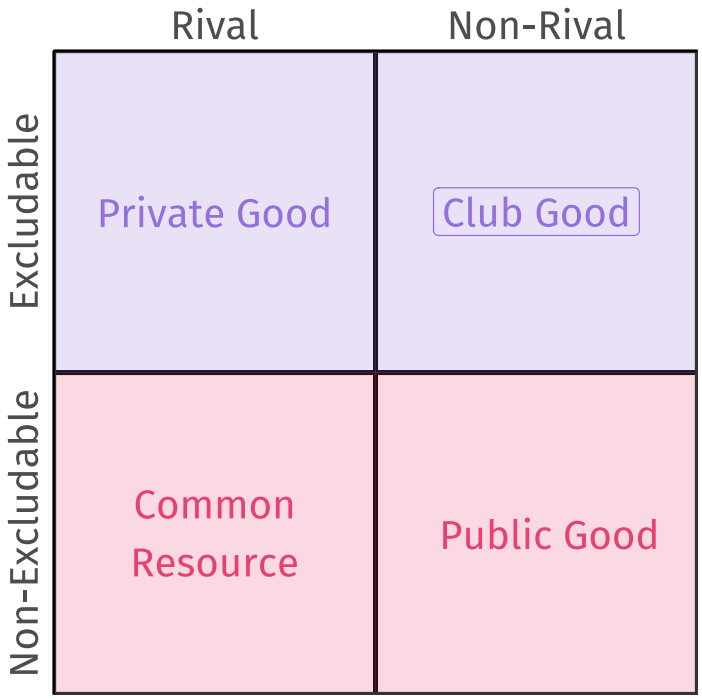


Property rights not well-defined $\iff$ Consumer pays to "join the club," but does not necessarily pay for the marginal costs of using the good thereafter.

Many subscription or membership-based services are club goods.

- *e.g.*, Cable, satellite TV, Netflix, Hulu, HBO, Spotify Premium, country clubs, gyms, *etc.*

Club Goods

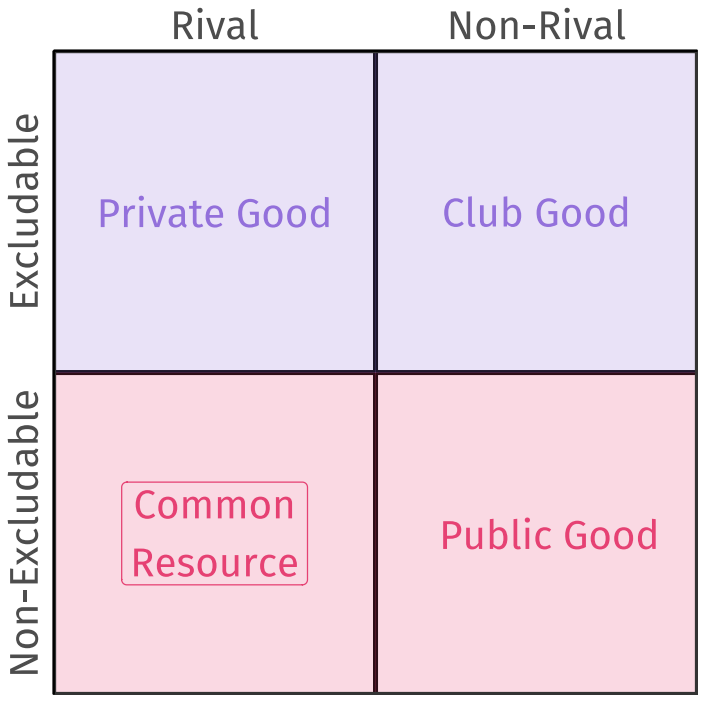


Often provided by firms rather than governments.

Providers of club goods usually have market power (*e.g.*, Comcast).

- Fixed cost of network is high, but marginal cost of new subscription is low.
- Firms set price where MV > MC
  $\longrightarrow$ artificial scarcity
  $\longrightarrow$ inefficient!

Common-Resource Goods

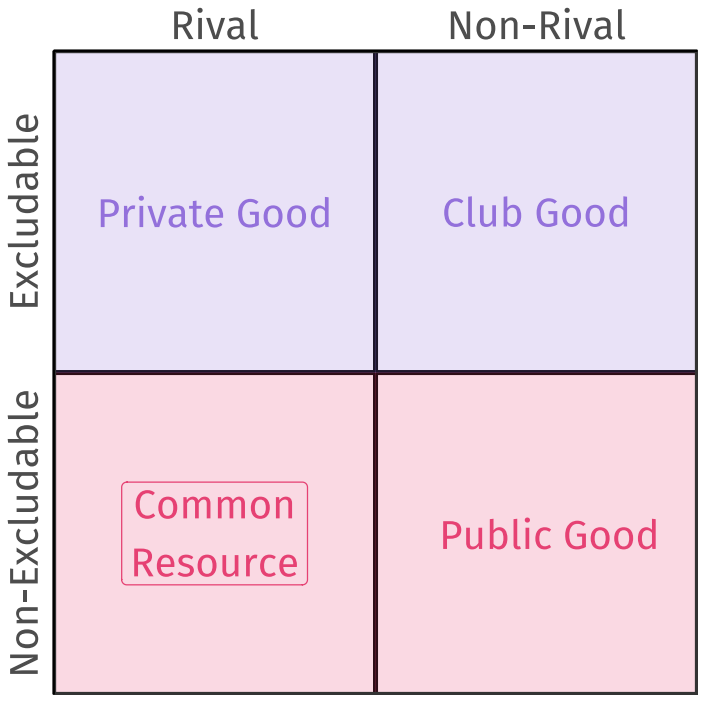


Property rights not well-defined $\iff$ Consumer experiences all marginal benefits, but does not pay all marginal costs.

Some common resources are prone to overextraction.

- *e.g.*, fish, deer or elk on public land, hors d'oeuvres at a party, booze at an open bar, *etc.*

Common-Resource Goods

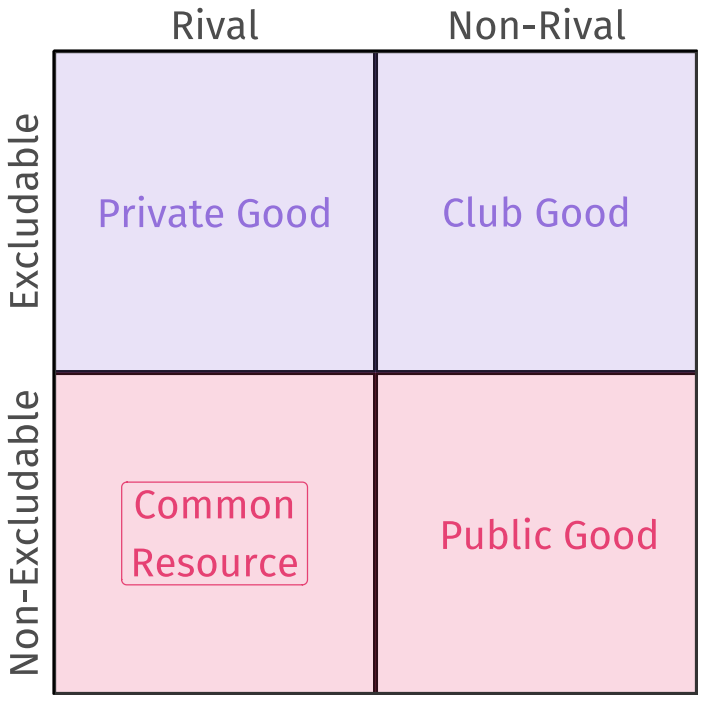


Property rights not well-defined $\iff$ Consumer experiences all marginal benefits, but does not pay all marginal costs.

Other common resources are prone to congestion or pollution.

- *e.g.*, roads, clean water, national parks, your dorm room, *etc.*

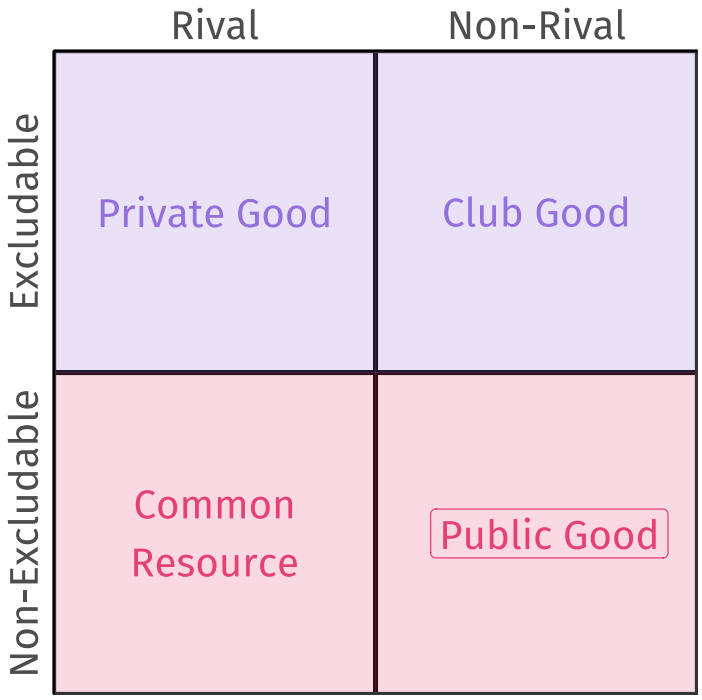
Common-Resource Goods



Unregulated markets often fail to manage commons resources efficiently.

- Rivalry creates a sense of urgency among users to extract the resource before others.
- Non-excludability makes maintenance of the resource unattractive to users.
- **Result:** Overuse and neglect.

Public Goods

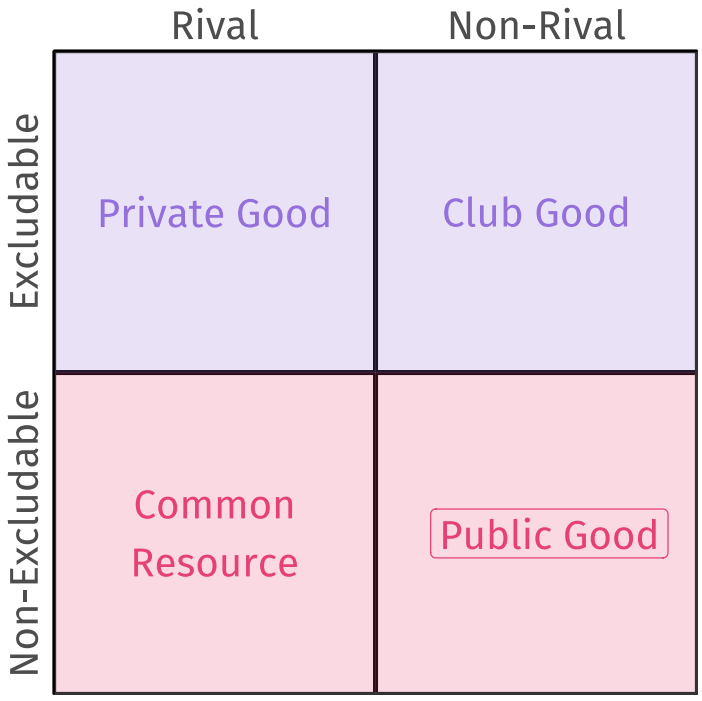


Property rights not well-defined $\Longleftrightarrow$ Consumer experiences all marginal benefits, but does not pay all marginal costs.

Usually provided by governments.

- **Government:** National defense, legal system, flood control dams, autopsies, lighthouses, official statistics, fire protection, *etc.*
- **Other:** Clean air, open-source software, knowledge, *etc.*

Public Goods

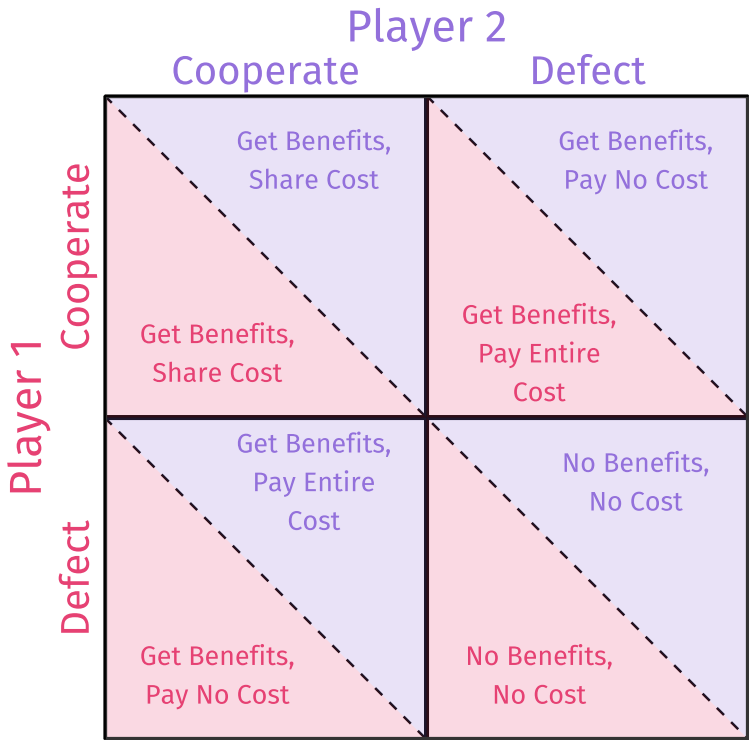


Markets for public goods do not exist!

- Providing public goods is not profitable for firms and too costly for most individuals.
- **Reason:** Cannot exclude those who do not pay.
- **Result:** Too few public goods $\longrightarrow$ inefficient!

Collective Action Problems

Collective Action Problems



Q: Why are public goods underprovided?

- **A:** The free-rider problem!

Q: Why are common resources neglected or overused?

- **A:** Tragedy of the commons!

Prisoner's Dilemma, Reprise: (Cooperate, Cooperate) usually *Pareto dominates* (Defect, Defect), but (Defect, Defect) is often the Nash equilibrium!

Free-Rider Problem

Example: Providing Public Goods

Suppose that a streetlight costs $20 to install.

- Cost exceeds each neighbor's willingness to pay
  $\longrightarrow$ No neighbor would install the streetlight on their own!

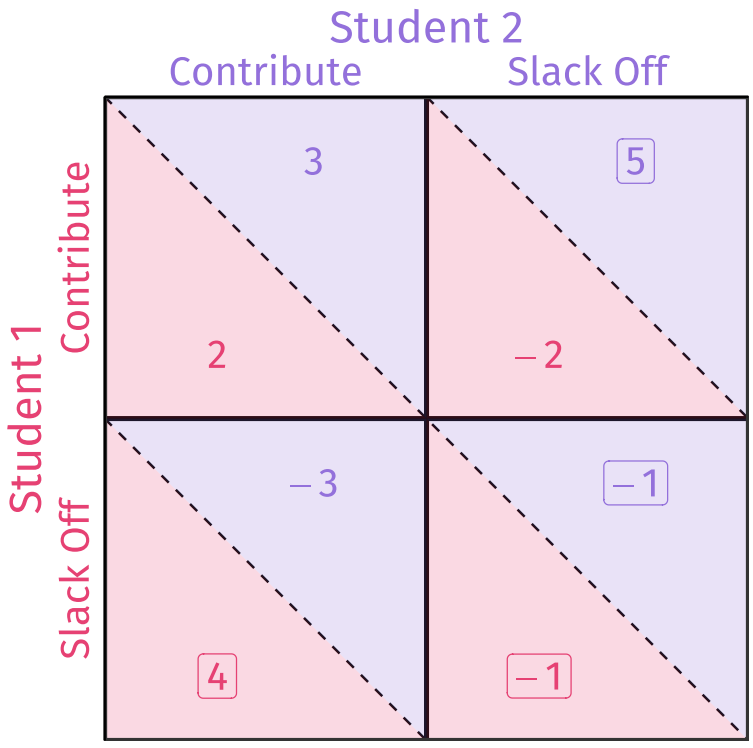
Marginal social benefit
= 9 + 9 + 8 + 8 + 6 + 5 + 4 + 2 = $51.

- Exceeds cost
  $\longrightarrow$ Efficient to install the streetlight!

Neighbor	Maximum WTP
Darrell	$9.00
Zhang	$9.00
Amani	$8.00
Ivan	$8.00
Saoirse	$6.00
Lucy	$5.00
Ibrahim	$4.00
Maria	$2.00

Free-Rider Problem

Example: Group Project



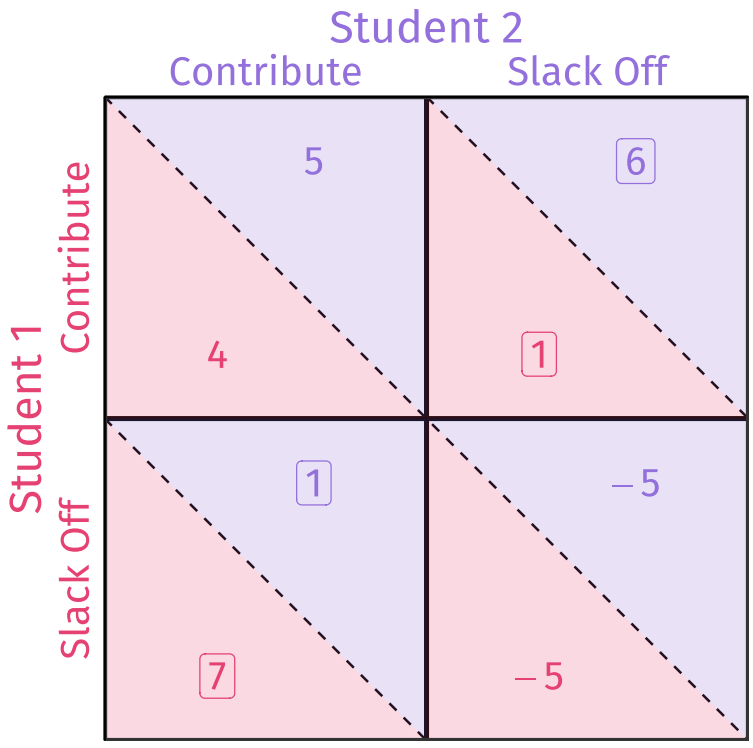
Q: What happens in equilibrium?

A: Both students slack off.

- Why?

Free-Rider Problem

Example: Group Project



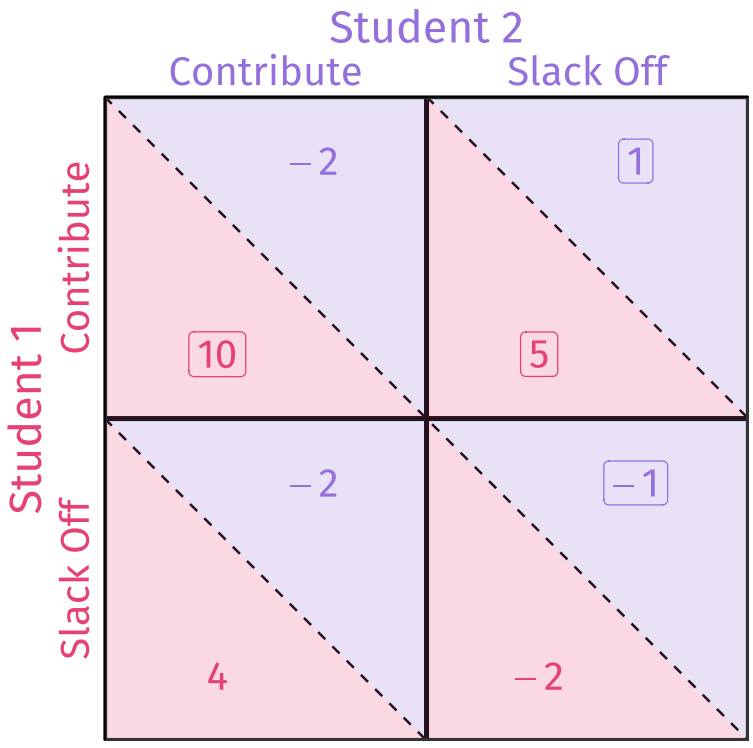
Q: What happens in equilibrium?

A: One student does all the work.

- Why?

Free-Rider Problem

Example: Group Project



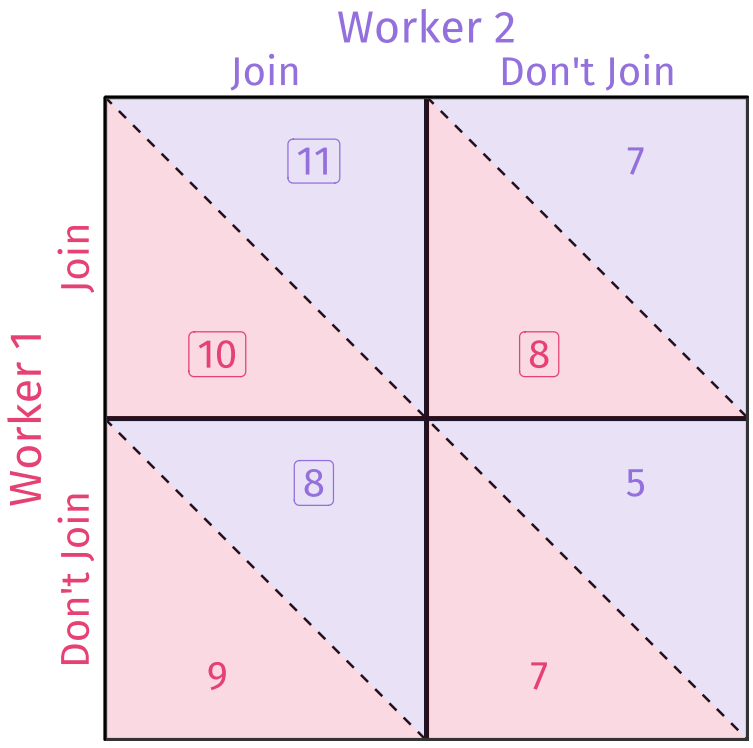
Q: What happens in equilibrium?

A: Student 1 does all the work.

- Why?

Free-Rider Problem

Example: Unions

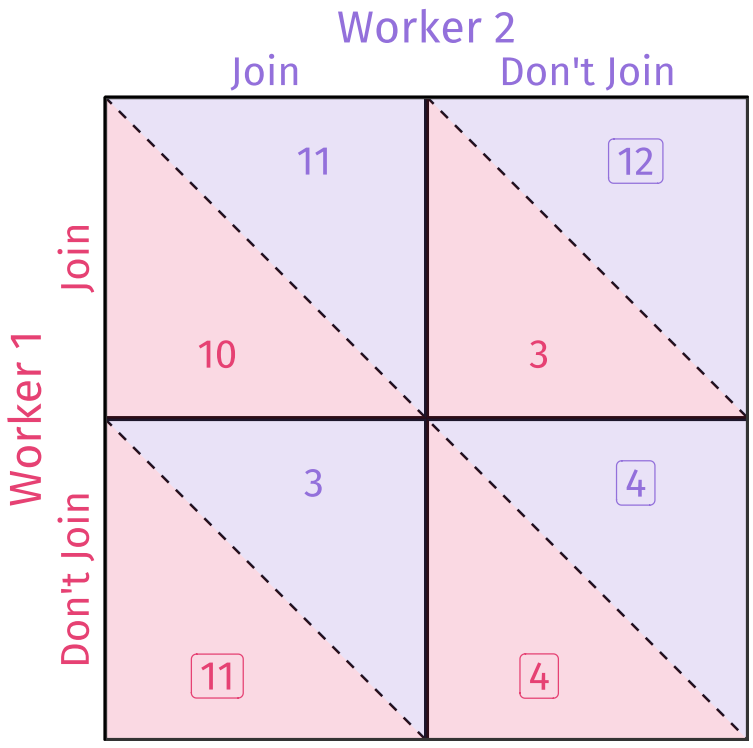


Unions use dues to fund collective bargaining efforts.

- Better CBA $\longrightarrow$ Higher compensation and safer working conditions.
- By law, CBA cannot exclude non-union members.
- To overcome the free-rider problem, unions could charge "fair-share" dues to non-members.

Free-Rider Problem

Example: Unions



Policy changes have reintroduced a free-rider problem.

- Many states now have "right-to-work" laws that prohibit unions from collecting fair-share dues.
- The Supreme Court's decision in *Janus v. AFSCME* prohibits public-sector unions from collecting fair-share dues.

Free-Rider Problem

Example: Columbia River Crossing

Bridge connects Portland, OR with Vancouver, WA.

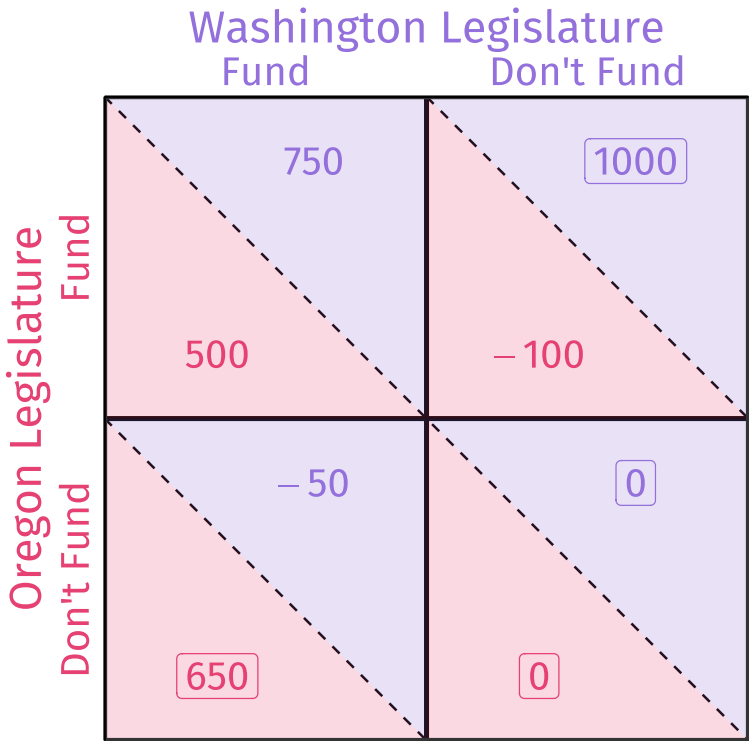
- Built in 1917, decades before scientists discovered plate tectonics.
- Bottleneck for traffic, transit, and freight.

Current Bridge

Proposed Replacement

Free-Rider Problem

Example: Columbia River Crossing



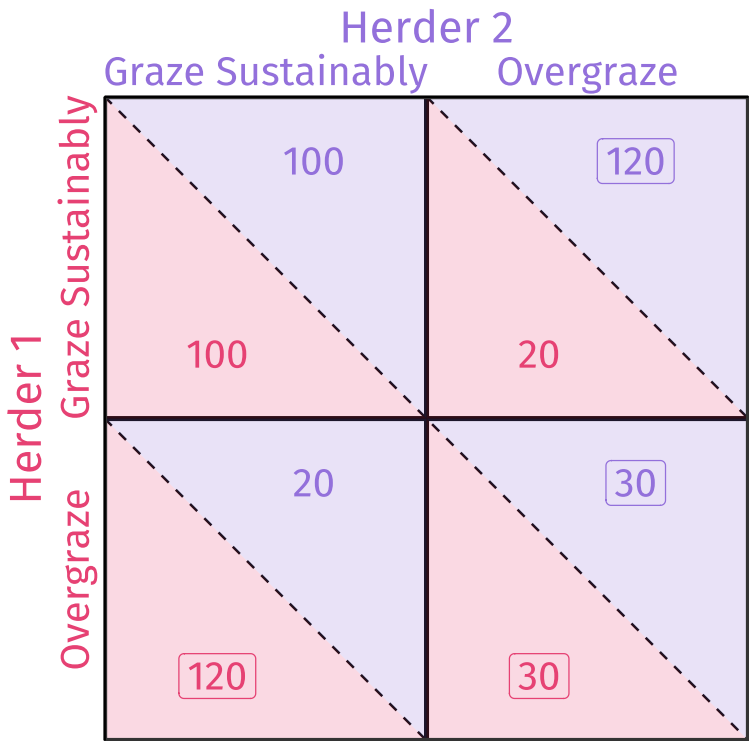
Several governments, one expensive bridge.

Q: What happened?

A: The replacement bridge was never built.

Tragedy of the Commons

Example: Common Pasture

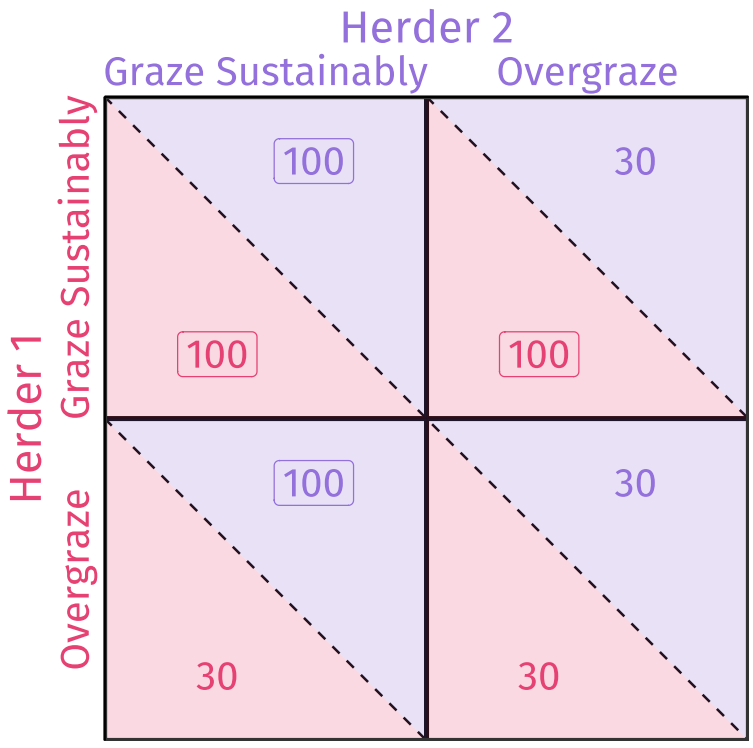


Q: What happens in equilibrium?

A: Both herders overgraze.

Tragedy of the Commons

Example: Common Pasture



Solution: Give each herder property rights to part of the common.

Example: England's Enclosure Acts.

Podcast Question: What do farmers do when their wells run dry?

> **A.** They stop farming.
>
> **B.** They dig deeper wells.
>
> **C.** They plant different crops.

Podcast Question: Which of the following best describes Elinor Ostrom's idea that small groups of people can work together to solve the tragedy of the commons?

> **A.** Pigouvian taxes.
>
> **B.** Government regulation.
>
> **C.** Unregulated markes.
>
> **D.** Coase theorem.
>
> **E.** Property is theft.

Tragedy of the Commons

Example: Aquifers

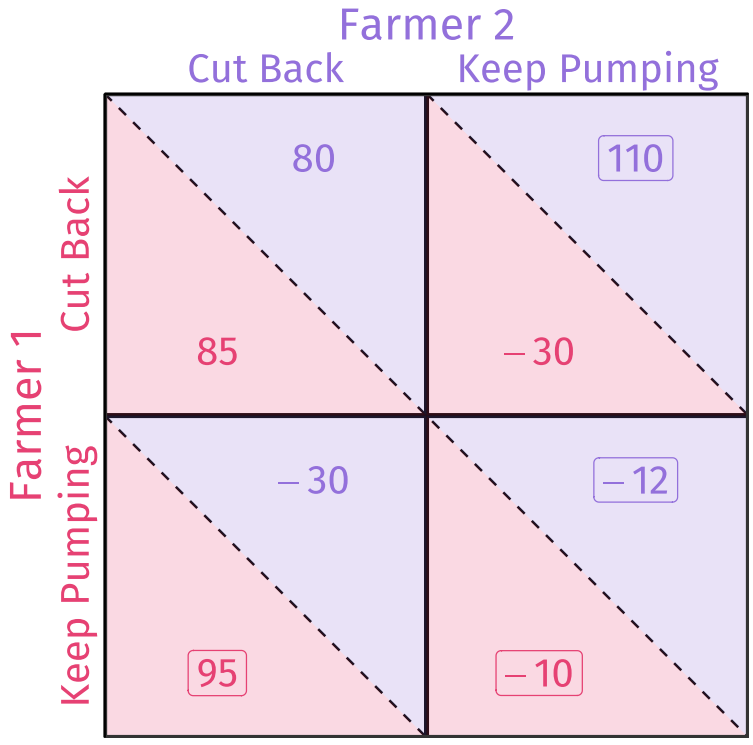
Since 2000, farmers in California's Central Valley have experienced several severe droughts.

Groundwater from aquifers = substitute for rainwater.

- **Difference:** Many farmers share a single aquifer.
- California does not yet regulate groundwater use
  $\longrightarrow$ Undefined property rights!

Tragedy of the Commons

Example: Aquifers



Without rainwater, farmers must rely on groundwater.

- **Choice:** Keep pumping water from aquifer or cut back.

Farmers know that they would earn higher profits if everyone cut back, but incentives are such that **everyone keeps pumping!**

Tragedy of the Commons

Example: Aquifers

Solutions?

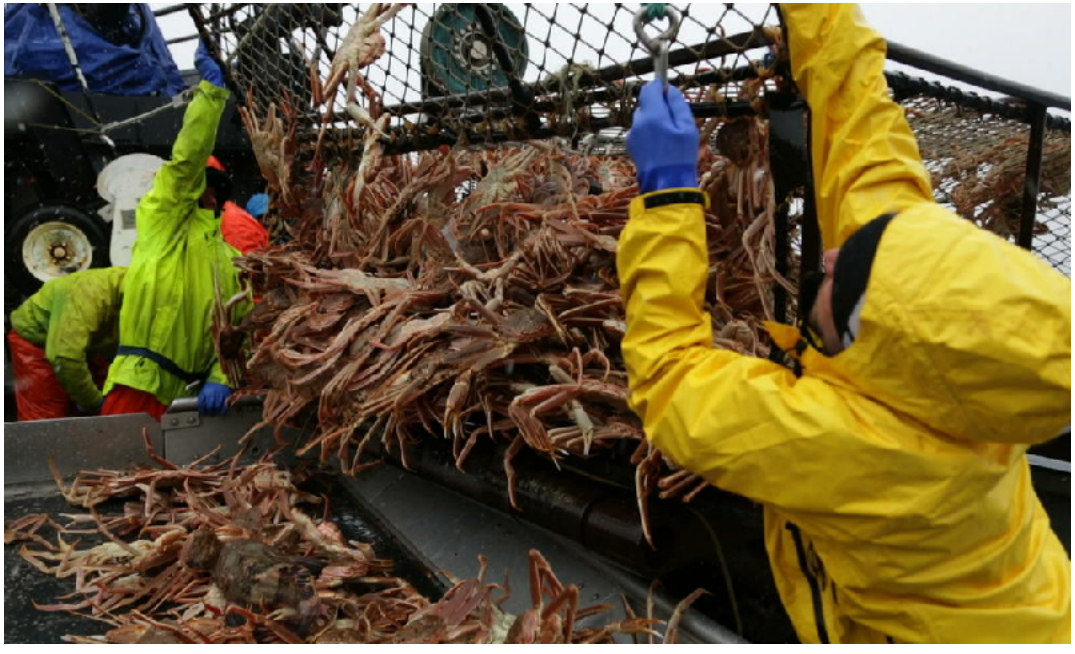
1. Agreements to cut back water consumption with neighbors?
    - Difficult to enforce!
2. Coase theorem?
    - Requires property rights and low transaction costs. Neither exist here!
3. Regulation or Pigouvian taxes?
    - Maybe. Requires costly monitoring system, though.

Tragedy of the Commons

Example: *Deadliest Catch*

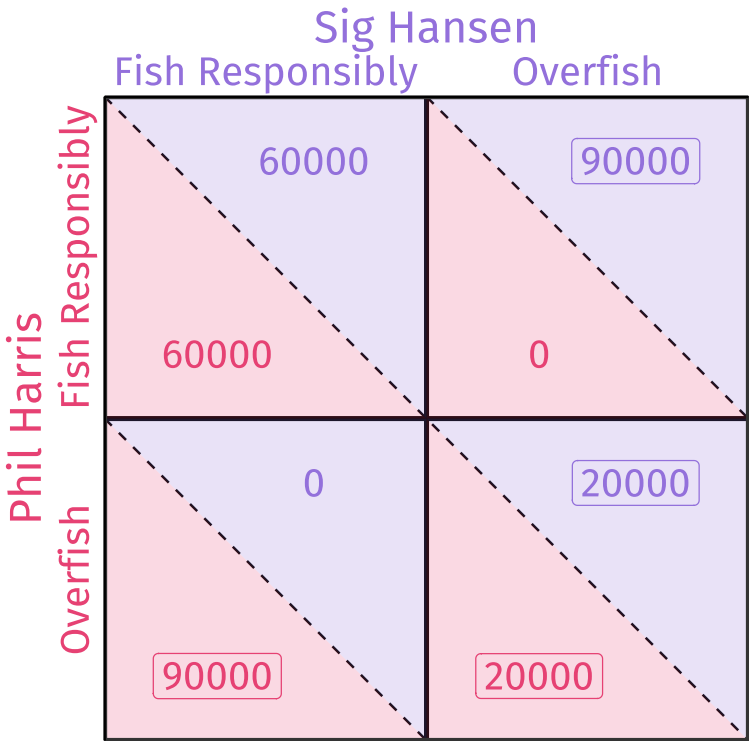
Before 2005, Alaska had a derby for king crab fishing.

- Short window each season to catch as much crab as possible.



Tragedy of the Commons

Example: *Deadliest Catch*



Q: How do fishers compete in a derby?

A: They overfish.

- Smaller payoffs + more fatalities.
- As the game repeats over time, payoffs decrease from increasingly small crab populations.

Tragedy of the Commons

Example: *Deadliest Catch*

Solution: Alaska adopted an individual fishing quota system in 2005.

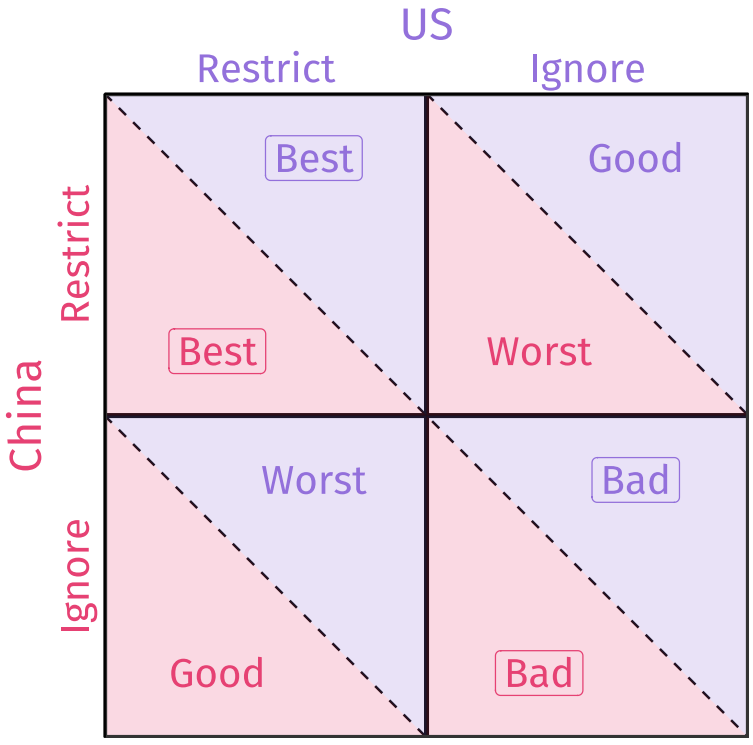
- Each boat receives quota to be filled over a longer period of time.

Results:

- Fewer fatalities.
- Smaller fleets.
- Higher crab prices $\longrightarrow$ higher profits.

Tragedy of the Commons

Example: Climate Change

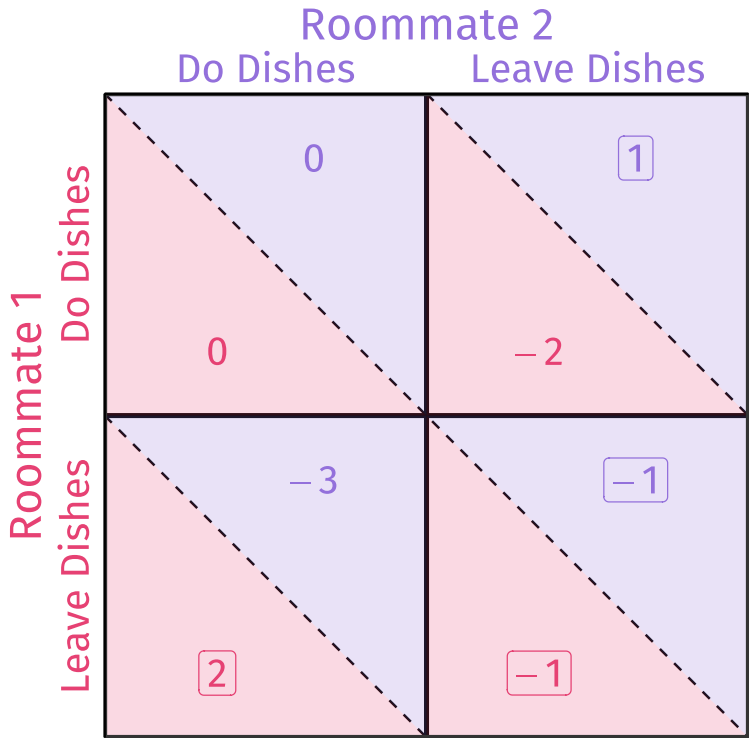


The US and China could reduce the severity of climate change if both countries restrict carbon emissions.

Q: The current equilibrium is (Ignore, Ignore). How could the US and China reach (Restrict, Restrict)?

Tragedy of the Commons

Example: Roommates + Kitchen Sink



Q: How can you and your roommates prevent this tragedy?

Collective Action Problems

Solutions?

1. Assign property rights.
    - *e.g.*, private property, enforceable contracts, conditions for Coase theorem, *etc.*
2. Pigouvian taxes/subsidies.
    - *e.g.*, Oregon's Bottle Bill, water pricing, *etc.*
3. Regulation.
    - *e.g.*, anti-littering laws, individual fishing quotas, *etc.*