Managing Mobile Common Pool Resources

Experimental Evidence on Property Rights and Productivity

Nicolas Quérou, Gabriel Bayle, Robbert-Jan Schaap, Mickael Beaud, Dimitri Dubois, Marc Willinger

CEE-M, CNRS, Univ. Montpellier, INRAE, Institut Agro

Motivation

- How do property rights and productivity differences affect the management of common pool resources (CPRs)?
- We study a dynamic, mobile CPR context with uneven productivity and resource dispersion.
- Focus: consequences of **asymmetrical patch allocation** (1 vs. 2 players in productive areas).

Experimental Setup

- Laboratory experiment at LEEM (Montpellier)
- N = 240 participants
- Between-subject design with 2 treatments:
  - **Ah**: One player manages high-productivity patch A
  - **Bh**: Two players manage high-productivity patch B
- 8 periods per game

Game Mechanics

- Two zones: A and B
- Initial stock: 10 units per patch
- Harvest decision → Growth → Migration

$$x_{i,t+1} = D_{ii} \cdot (1 + \alpha_i) \cdot e_{i,t} + D_{ji} \cdot (1 + \alpha_j) \cdot e_{j,t}$$

- Payoffs: 0.70€ per unit harvested

Decision Interface

> Only the player's own slider determines their decision. The others simulate teammates' choices.

Treatments

Treatment	High-productivity	Players	Growth	Q
Ah	Zone A	1	1.6	1.2
Bh	Zone B	2	1.6	1.2

- Low-productivity patch always has growth = 1.1 (Q = 0.825)
- Migration: 25% from each zone to the other

Main Hypothesis

> When the high-productivity patch is managed by one player (Ah), efficiency is higher than when it is managed by two players (Bh).

$$H_0 : Y_{g,Ah} = Y_{g,Bh} \quad H_1 : Y_{g,Ah} < Y_{g,Bh}$$

- $Y_{g,x}$: Sum of absolute deviations from efficient harvest per group

Analysis Plan

- Shapiro-Wilk normality tests
- Parametric (t-test) or non-parametric (Wilcoxon) comparisons
- Additional analysis:
  - Gini index for inequality
  - Behavior of single player
  - Role of trust, patience, reciprocity

Efficiency – Results

📊 *Insert here your graph comparing deviation from efficient path in Ah vs Bh*

Inequality – Results

📊 *Insert here your graph with Gini coefficients or payoff dispersion*

Single Player Behavior

- Theory: Should wait until last period to harvest
- Observation: Early extraction when B over-exploits
- Interpretation: negative reciprocity or bounded rationality

Individual Preferences

- Negative reciprocity ↔️ retaliation
- Trust ↔️ conservation effort
- Patience ↔️ long-term resource preservation

> Survey adapted from Falk et al. (2018)

Conclusion

- Efficient management is more likely when high-productivity zones are managed by one player
- Asymmetric property rights mitigate overexploitation spillovers
- Social preferences and beliefs (trust, reciprocity) shape conservation behavior

Thank you

Contact: dimitri.dubois@umontpellier.fr
Website: https://duboishome.info/dimitri