Public Good Experiments in the Lab and in the Field

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LMU München
A Typical Public Good Experiment

- Subjects play in groups of four
- Subjects get 20 tokens and must decide how many tokens they put in a common pool
- Tokens in the pool are multiplied by 1.6 and distributed among the group members
- Tokens outside the pool belong to the subject
- This is repeated ten times with the same groups (partner treatment)
Public Good Experiments: Analysis

• 20 into the pool is efficient

• 0 into the pool is individually rational

→ Social Dilemma
PUBLIC GOOD EXPERIMENTS: RESULTS

(Data from our own lab study)
Results from our own lab study, but representative of general results:

– Even initially contribution not 20
– Contribution level goes down over periods
– Some people contribute more than others
PUBLIC GOOD EXPERIMENTS: ROBUSTNESS

- Many variations of this experiment exist:
  - Classic:
  - Per capita return
  - Symmetry/Homogeneity
    - Preferences: Fischbacher & Gächter (2008), Gächter & Thöni (2005)
  - Partner/Stranger
    - Andreoni (1988)
  - Communication
    - Isaac & Walker (1991)
  - Anonymity
    - Fehr and Gächter (1997)
  - Punishment
    - Fehr and Gächter (2000)
  - Learning
    - Andreoni (1988)
Why do we care so much?
The game serves as a metaphor for many economics situations:

- classic public goods (defence, public infrastructure, health system, environmental protection, …)
- intellectual property rights for informational goods
- team production in organizations
- …
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- classic public goods
- intellectual property rights for informational goods
- team production in organizations
- ...

So it would be nice to see whether we can learn something from our lab results for behavior „in the wild“.
APPLICATION: Environmental Economics

PG Problems are very prominent in Environmental Economics:
- Slowing climate change
- Reducing carbon emissions
- Reducing air pollution
- …

Similar Structure: Common Pool Problems
- Over-fishing, …
Question: How can we overcome the market failure caused by externalities?

If we know that behavior in the field and in the lab are related (and that the results are transferable to a whole class of structurally related problems) we can start to analyze solutions to the problems in the lab.
Our Study – Time Line

• First we run a field experiment
  – Real effort task; participants are not aware that this is an experiment; three treatments – one resembles PG

• We invite participants to the lab
  – Play a „typical“ PG experiment

• We compare behavior in the lab and in the field (within subject)
Field Experiment: Task

- 103 Subjects recruited to register of books in our library
- Applicants had to complete a test on the recruiting website → ability measure
- Salary €55, job duration „up to 5 hours“
- Groups of four, two shifts (morning, afternoon)
- Welcome and introduction together (by student helper)
- Work separately in four adjacent offices on laptops with Excel
- Student helper brings books and gives feedback every 30 min
- At the end, one of us pays them money and invites them to a laboratory experiment
Field Experiment: Treatments

Three treatments

• **Single**: Each worker can leave once 170 books have been registered
  - Feedback on individual progress

• **Group**: All workers can leave once 680 books have been registered
  - Feedback on group progress

• **NoIncentives**: All workers must work 3.5 hours
  - Feedback on individual progress
Field Experiment: Set Up
Field Experiment: Set Up
Field Experiment: Set Up
Public Good vs. Field Experiment

Game theoretic structure similar

- Only a share of marginal return in Group treatment.

Prediction: Inefficiently low contribution
Public Good vs. Field Experiment

But many differences:

• Effort in, time out vs. tokens in, tokens out
• Dynamic vs. static
• Labor market vs. neutral framing
• Real life vs. lab
Field Experiment: Results

• Descriptive Statistics
  – Group:
    • Mean 172.41; StdDev. 32.40; # Participants 44
  – Single 169.00 7.29
    • Mean 169.00; StdDev. 7.29; # Participants 32
  – NoIncentives
    • Mean 183.04; StdDev. 44.28; # Participants 27
  – # males 30; # females 73
  – Avg Work Time
    » Group 191.61 min
    » Single 195.2 min
    » NoIn 207.5 min
Field Experiment: Results

**Baseline: NoIncentives**

Standard errors in parenthesis, clustered at the session level

* 5%; ** 1%; *** 0.1% significance

<table>
<thead>
<tr>
<th>Dependent Variable: ((Books*1000)/Minute Testscore)</th>
<th>OLS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>0.126</td>
</tr>
<tr>
<td></td>
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<tr>
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<td>(0.152)*</td>
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<td>Test Standard Deviation</td>
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March 16, 2009 TSE: “Public Goods …“
Field Experiment: Results

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<td>Within Group:</td>
<td>Test Standard Deviation</td>
<td>0.001</td>
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<tr>
<td>Standard deviation of the online test has an effect:</td>
<td></td>
<td>(0.001)</td>
</tr>
<tr>
<td>→ Members of more</td>
<td>Group*TestStd</td>
<td>-0.001</td>
</tr>
<tr>
<td>heterogeneous teams</td>
<td></td>
<td>(0.001)</td>
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<td>do worse!</td>
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Dependent Variable: \( \frac{\text{Books} \times 1000}{\text{Minute Testscore}} \)

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About 2 weeks after the field experiment is over, we run 5 sessions at MELESSA in Munich.
Roughly half of our subjects from the field come to the lab (49 subjects).
We fill the sessions with people from the MELESSA subject pool.
Public Good Experiment

- In total we have 84 subjects (4*16 and 1*20) in the lab.

- Each session lasts roughly 90 minutes.

- Avg. Earnings: 23,85€
Public Good Experiment: Design

- Experiment has 6 rounds
  - Rounds 1-3 non fully anonymous
  - Rounds 4-6 fully anonymous
  - 1. PG, 2. PD, 3. PD, 4. PG, 5. PD, 6. PD

- PG = Standard Public Good as described previously
- PD = Public Debt; new design (not covered in talk; results very similar)
Public Good: Decision Screen
Public Good: Results by Period

Graphs by round
Public Good: Results

<table>
<thead>
<tr>
<th>Dep Variable</th>
<th>avg_eff_4</th>
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<tbody>
<tr>
<td>avg_eff_1</td>
<td>0.6408565</td>
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<tr>
<td></td>
<td>(0.0870637)**</td>
</tr>
<tr>
<td>_cons</td>
<td>0.8030136</td>
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<tr>
<td></td>
<td>(0.8781607)**</td>
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R-squared: 0.3979
Number of obs: 84

Standard errors in parenthesis;
* 5%; ** 1%; *** 0.1% significance
Public Good: Results Merged

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Exit Survey

We ask in total 14 questions from the World Value Survey and the SOEP

- Q1_trust
- Q2_freedom
- Q3_fairness
- Q4_PC
- Q5_coscientiousness
- Q6_risk
  - Q7a_risk_car
  - Q7b_risk_money
  - Q7c_risk_sport
  - Q7d_risk_carreer
  - Q7e_risk_health
  - Q7f_risk_strangers
- Q8_satisfaction
- Q9_satisfaction_5yr
Public Good: Relation to Survey

No clear pattern; nothing really seems to matter.

Standard errors beneath coefficient;

* 5%; ** 1%; *** 0.1% significance
Relation Public Good & Field Experiment

Now, is there a relation between the lab and the field?
Relation Public Good & Field Experiment

Graphs by PG/Einzel

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### Relation Public Good & Field Experiment

**Dependent Variable: Average Contribution Field**

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<tr>
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<td>(3)</td>
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<td>0.0001</td>
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Relation Public Good & Field Experiment

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The effect is large!
• If avg PG contribution moves from 0-20 (min – max) this more than doubles the constant (1.38) in the field regression.
• If avg PG contribution moves from the mean (9) to the max this adds +50%.
• If avg PG contribution moves one SD (4.3) up this adds 25% of the constant.
### Cross-Equation Tests

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<tr>
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<td>0.071</td>
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<td>Public Good - Single</td>
<td>0.055</td>
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Relation P.G. & Field Experiment

Graphs by PG/Einzel

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Conclusion

• „Fair“ behavior in Lab and Field correlated
• In particular true for Public Good treatment
• Indication for external validity of public good experiments

• Game theoretic structure captures important aspects of real life
Thank you very much for your attention and your comments!