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# Including Donors in the Provision of Public Goods

Esther Blanco (*University of Innsbruck, The Ostrom Workshop*)

*j.w.w.*

Natalie Struwe (*University of Innsbruck)*

*Tobias Haller (University of Innsbruck)*

James M. Walker *(Indiana University, The Ostrom Workshop)*

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# In a nutshell

**Main contribution**: Develop a new experimental game to *endogenously* link donors to public goods and providers of public goods.

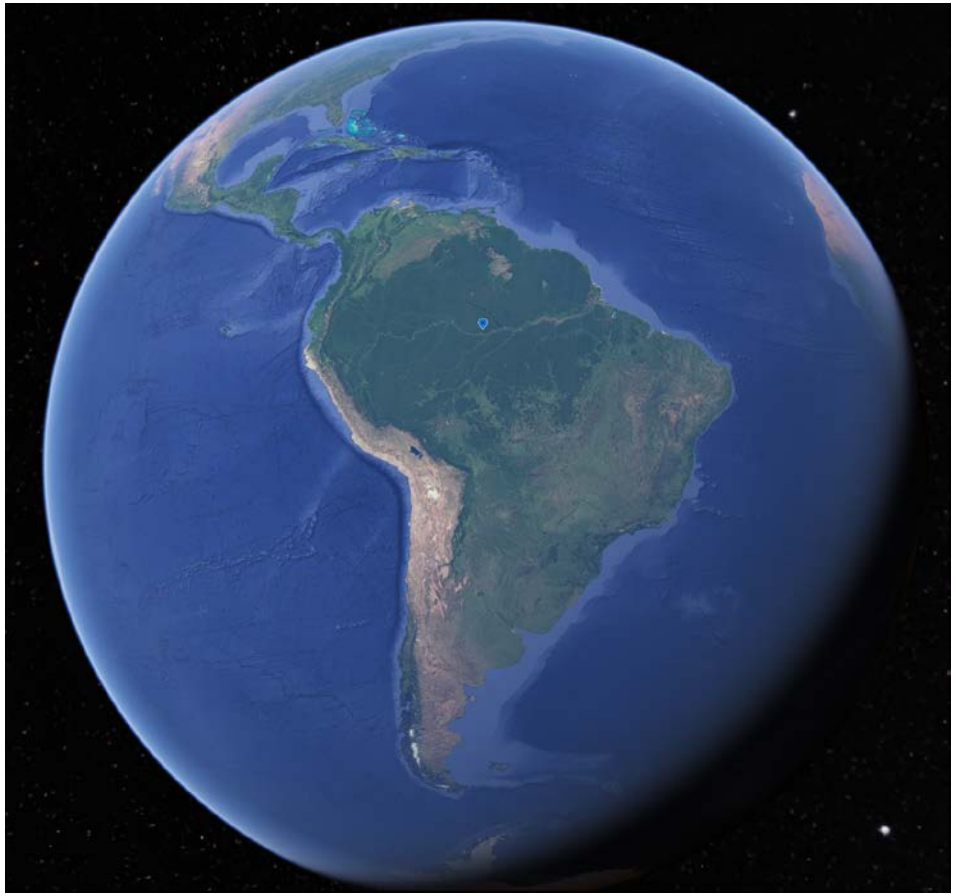
**3 Laboratory experiments**: Assess the relative performance of alternative institutions for distributing *endogenous* donations (n > 1700).

**Main results**:

Equal *endogenous* rewards do not increase public good provision.

All institutions linking relative effort to relative *endogenous* rewards similarly increase public goods.

# Motivation



https://earth.google.com/web/

# Motivation

# Motivation

Often, individuals (*outsiders*) care about public goods they cannot provide themselves (due to physical or institutional constraints).

Another group of individuals (*insiders*) can provide the public good that benefits themselves and the outsiders.

We study the capacity of outsiders to increase public good provision by sending donations to compensate insiders' efforts.

Institutions / NGOs allow outsiders to make donations to support insiders.

e.g. payments for ecosystem services, foreign aid, conditional cash transfer programs.

# Motivation

How can limited funding from outsiders be allocated among public good providers to increase public good provision?

- Test-bed alternative institutions suggested in previous literature on program-design (*e.g. Ferraro and Kiss 2002; Jack et al. 2008; Pattanayak et al. 2010; Ferraro 2011; Hejnowicz et al. 2014; Naeem et al. 2015; Engel, 2016; Wunder et al. 2018*).
- Each study addressing the causal impact from specific attributes of program-design.

A novel experimental game for cumulative empirical evidence:

- Lab experiments allow to identify behavioral responses at the root of causal effects.
- Complements results from naturally occuring settings, where multiple (potentially confounding) variables are at work.
- Generates results to be further investigated in field experiments or RCTs.

# Related Literature

**Passive outsiders in social dilemmas**: *Schwartz-Shea & Simmons 1990; Engel & Rockenbach 2011; Delaney & Jacobson 2014.*

All consider passive recipients of externalities who cannot act to improve outcomes.

**Exogenous incentives to enhance pro-sociality**: Extrinsic incentives can, but do not need to, enhance pro-social behavior of individuals *(e.g. review by Gneezy et al. 2011)*. PES-framed experiments (e.g. *Vollan, 2008; Midler et al. 2015; Gatiso et al. 2018; Moros et al. 2019; Rodriguez et al. 2019*).

All consider only *insiders* and exogenously provided payments (by experimentalist).

**Within-group rewards in PG**: Can work with reputation (*Rand et al 2009*) but are prone to reduced effect through time with anonymity *(Sefton et al. 2007)*.

All consider only *insiders*.

**Drivers of charitable donations:** e.g. *Andreoni 1990; Eckel and Grossman 2003; Vesterlund 2003; Frey & Meier 2004; Eckel et al. 2005; Bénabou & Tirole 2006; Ariely et. al. 2009; Gneezy et al. 2014; Garcia et al. 2020.*

All consider only *outsiders*.

# Contribution

Provide experimental evidence on the capacity of *endogenous* donations to enhance public good provision in *group-to-group* interactions (donors and public good providers).

**Research Questions:**

**Project 1:** Can evenly-shared donations by outsiders increase public good provision?

Do conditional transfers do better?

**Project 2:** Can fixed proportional donations to effort increase public good provision?

Do free-form individual donations further increase public good provision?

**Project 3:** Does strengthening competition for donations further increase public good provision?

**Ongoing:** Do donations that increase the productivity (MPCR) of public good providers enhance public good provision?

# **Project 1:**
# Equal and Conditional Payments in Groups

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## Provision of environmental public goods: Unconditional and conditional donations from outsiders

Esther Blanco [a, c], Tobias Haller [a], James M. Walker [b, c, *]

[a] Department of Public Finance, University of Innsbruck, Universitaetsstrasse 15, 6020 Innsbruck, Austria
[b] Department of Economics, Indiana University, Wylie Hall 105, Bloomington, IN 47405, USA
[c] The Ostrom Workshop, Indiana University, USA

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ABSTRACT

Public goods often provide external benefits to individuals beyond those who actively provide the goods. This paper addresses institutional arrangements between subjects who can provide a public good (insiders) and subjects who also benefit from the public good but cannot provide it (outsiders) due to technical, physical or institutional reasons. Using laboratory experiments, we compare a setting of passive outsiders to situations where outsiders can either make unconditional or conditional transfers to the group of insiders, in environments where transfers are shared equally among insiders. The primary behavioral questions are to what extent outsiders will use the opportunity to subsidize the contributions of insiders and how insiders will respond to those subsidies. In summary, outsiders make transfers to insiders, but reciprocal increases in contributions by insiders to transfers are small. Both transfers and contributions decay over time. Indeed, contributions to the public good with transfer institutions are no greater than those without such institutions.

# Project 1: Experimental Design

Repeated linear public good game with 4 insiders and 4 outsiders in partner matching.

MPCR to insiders and outsiders: 0.4 (global positive externalities).

Between-subjects design, 4 treatment conditions (n= 292 subjects in 34 groups).

| Treatment | Transfers Part 1 (5 periods) | Transfers Part 2 (10 periods) |
|---|---|---|
| *Baseline* | Inactive | Inactive |
| *Donation* | Inactive | Unconditional |
| *Contract* | Inactive | Conditional |
| *Donation II* | Unconditional | Unconditional |

**Hypothesis 1**: For any positive transfer by outsiders, public good contributions in *Donation* are larger than in *Baseline*.

**Hypothesis 2:** Contributions to the public good and transfers are higher in *Contract* than in *Donation*.

# Project 1: The Decision Setting

**Inactive Outsiders**: Each insider *i* makes independent provision decisions ( $g_i$ ) to a Group Account, outsiders ( *j* ) are inactive.

Insiders' utility function:

$$U(\mathrm{g_i})_{Ii} = w - g_i + aG + f(g_i) \text{ where } G = \sum_{i=1}^{n_i} g_i \text{ and } g_i \in [0, w]$$

and where $f(g_i)$ captures warm glow utility from contributing

Outsiders' utility function:

$$U(\mathrm{t_j})_{Oj} = w + \boldsymbol{aG}$$

$w$=100 initial endowment

$a$=0.4 MPCR

# Project 1: The Decision Setting

**[Un]conditional**

**Stage 1**: Each outsider *j* makes independent transfer decisions ( $t_j$ ) that are [un]conditional on insiders' choices.

Transfers are added together in a Transfer Fund ( T ). The size of T is public information.

**Stage 2**: Each insider *i* makes independent provision decisions ( $g_i$ ).

Conditionality: Every token in G brings the group of insiders one token from T (0.25 each), as long as funds are available. Proportional rebate of transfers, if not used.

**Unconditional**

Insiders' utility function:

$$U(\mathrm{g_i})_{Ii} = w - g_i + aG + \frac{1}{n_I} T + f(g_i)$$

Outsiders' utility function:

$$U(\mathrm{t_j})_{Oj} = w + aG - t_j + y(t_j)$$

Where $y(t_j)$ captures additional utility from sending transfers (e.g. warm glow etc)

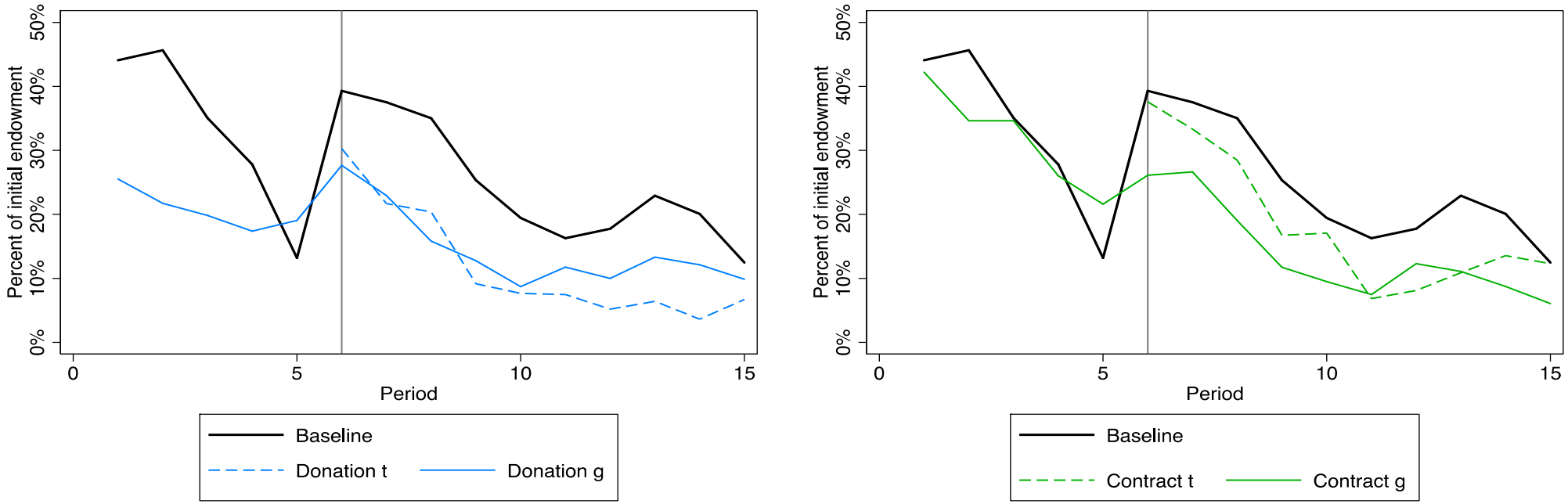
**Conditional**

$$if\ T \leq G \begin{cases} U(\mathrm{g_i})_{Ii} = w - g_i + aG + \frac{1}{n_I} T + f(g_i) \\ U(\mathrm{t_j})_{Oj} = w + aG - t_j + y(t_j) \end{cases}$$

$$if\ T > G \begin{cases} U(\mathrm{g_i})_{Ii} = w - g_i + aG + \frac{1}{n_I} T' + f(g_i) \\ U(\mathrm{t_j})_{Oj} = w + aG - t_j + (T - G)\frac{t_j}{T} + y(t_j) \end{cases}$$

# Project 1: Results

**Fig 1.** Average individual contributions and transfers offered over time




Initial transfers are substantial: 30% in *Donation* and 38% in *Contract*.

In period 6, in only 50% of the *Donation* groups contributions exceeded transfers offered, 11% for the *Contract* groups (substantial transfers returned).

**Result 1 (H1 ✘):** Average provision in *Donation* is not higher than in *Baseline*.

**Result 2 (H2 ✘):** Average provision in *Contract* is not higher than in *Donation*.

# Project 1: Results

**Table 2**
Treatment effects for individual contributions and transfers offered.

| | (1) Contributions (Insiders) | (2) Contributions (Insiders) | (3) Transfers Offered (Outsiders) |
|---|---|---|---|
| Donation | -10.12 | -1.525 | N/A |
| | (0.255) | (0.754) | |
| Contract | -10.75 | -9.829** | 6.636 |
| | (0.213) | (0.033) | (0.126) |
| Avg. G in Periods 1–5 | N/A | 0.173*** | N/A |
| | | (0.000) | |
| Period | -2.143*** | -2.143*** | -2.772*** |
| | (0.000) | (0.000) | (0.000) |
| Constant | 47.11*** | 24.22*** | 40.96*** |
| | (0.000) | (0.000) | (0.000) |
| *N* | 1040 | 1040 | 680 |
| Number of subjects | 104 | 104 | 68 |
| Number of clusters | 26 | 26 | 17 |

*Note:* The table reports results for a multilevel regression with random effects on the group and subject level. *Baseline* is the reference category for column 1 and 2. *Donation* is the reference category for column 3. The analysis is based on decisions in periods 6–15.p-values in parentheses
** $p < 0.05$.
*** $p < 0.01$.

**Result 1 (H1 ✗):** Average provision in *Donation* is not higher than in *Baseline*.

**Result 2 (H2 ✗):** Average provision in *Contract* is not higher than in *Donation*.

# Project 1: Results – Dynamics

**Table 3**
Temporal dynamics of insiders' contributions.

| | Contributions *Baseline* | Contributions *Donation* | Contributions *Contract* | Contributions *Donation II* |
|---|---|---|---|---|
| Individual share of transfers offered | N/A | 0.325*** | 0.329*** | 0.198* |
| | | (0.009) | (0.000) | (0.060) |
| Lagged average contribution of insiders | 0.182** | 0.006 | 0.118 | -0.0693 |
| | (0.016) | (0.954) | (0.104) | (0.398) |
| Period | -2.492*** | -0.700 | -0.884** | -0.895*** |
| | (0.000) | (0.143) | (0.013) | (0.000) |
| Constant | 46.29*** | 17.90** | 15.25*** | 18.80*** |
| | (0.000) | (0.023) | (0.006) | (0.000) |
| N | 360 | 320 | 360 | 448 |
| Number of subjects | 36 | 32 | 36 | 32 |
| Number of groups | 9 | 8 | 9 | 8 |

*Note*: The table reports results for a multilevel regression with random effects on the group and subject level. The analysis is based on decisions in periods 6–15 for columns 1–4 and periods 1–15 for column 4. Subjects include only insiders in each group (4 per group). p-values in parentheses

* $p < 0.10$.
** $p < 0.05$.
*** $p < 0.01$.

Conditional cooperation within insiders, present only in *Baseline*.

Positive but weak reciprocal response of insiders to transfers offered by outsiders.

# Project 1: Results – Expectations

**Table A3**
GLS Insiders' expectations of outsiders' transfers.

| | Contributions *Donation* | Contributions *Contract* | Contributions *Donation II* | Contributions *Donation* | Contributions *Contract* | Contributions *Donation II* |
|---|---|---|---|---|---|---|
| Expectation higher than transfer | -1.733 | -0.287 | 1.911 | N.A. | N.A. | N.A. |
| | (0.474) | (0.872) | (0.360) | | | |
| Expectation minus individual transfer offered | N.A. | N.A. | N.A. | -0.0705 | -0.0193 | 0.0560 |
| | | | | (0.339) | (0.708) | (0.338) |
| Period | -1.546*** | -2.095*** | -1.095*** | -1.495*** | -2.087*** | -1.103*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Constant | 31.55*** | 35.99*** | 21.06*** | 30.42*** | 35.78*** | 21.87*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| N | 320 | 360 | 480 | 320 | 360 | 480 |
| Number of subjects | 32 | 36 | 32 | 32 | 36 | 32 |
| Number of groups | 8 | 9 | 8 | 8 | 9 | 8 |

Note: The table reports results for a multilevel regression with random effects on the group and subject level. In the first three columns the explanatory variable "Expectation higher than transfer" is a dummy variable equal to one if an insider's expectation is higher than the actual individual transfer offered by outsiders. In columns 4 to 6 "Expectation minus individual transfer offered" is a continuous variable measuring the deviation between expectations and transfers offered. The analysis is based on decisions in periods 6–15 except for *Donation II* where periods 1–15 are included. p-values in parentheses,
*** $p<0.01$.

No significant relationship between contributions and deviations between expected transfers and transfers offered.

# Project 1: Discussion

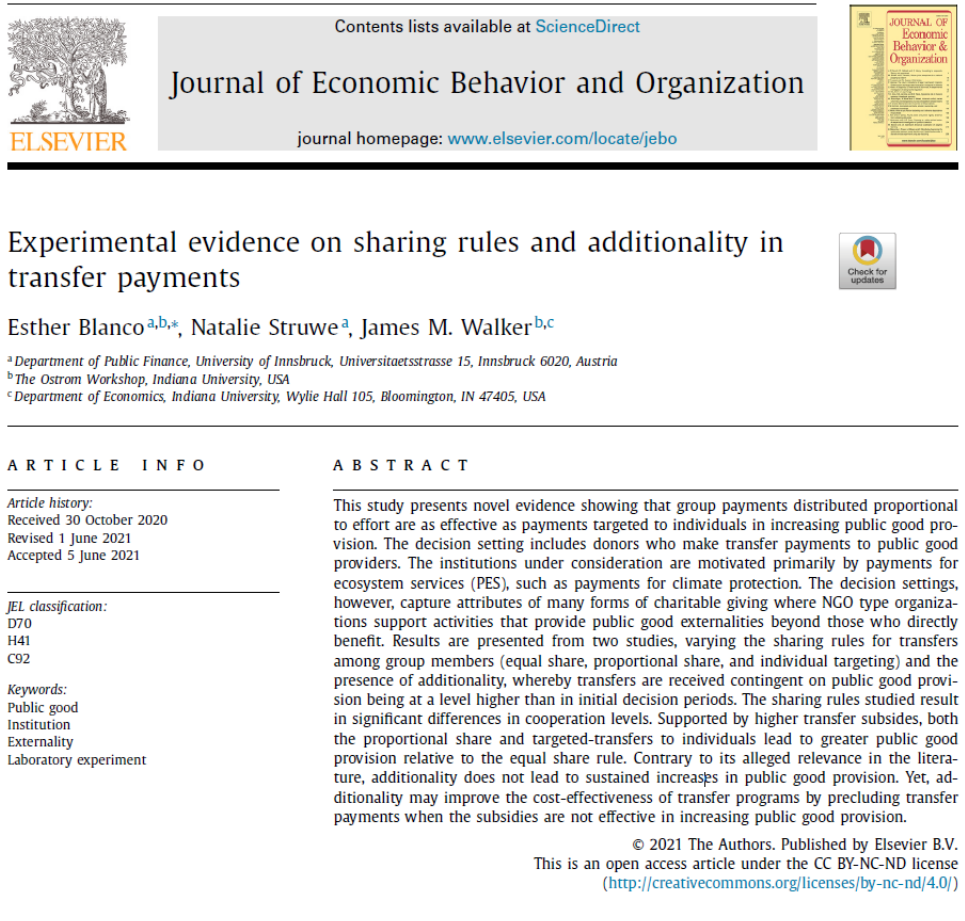
**Donations by outsiders do not trivially increase public good provision.**

What could be the reasons for the limited effect of transfers?

- Payoff differences are not a primary driver of lower contributions (*Donation II*).
- Initial unfulfilled expectations are not the primary reason for the limited cooperation of insiders.
- Within group free-riding, along with a lack of sufficient reciprocity across groups are remarkable obstacles to cooperation.
- Lack of cooperation in *Contract* is particularly remarkable (higher MPCR and substantial transfers).

Further research needed on how group-to-group cooperation can be enhanced through alternative institutional arrangements.

# **Project 2:** Proportional Payments in Groups & Individual Payments



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## Experimental evidence on sharing rules and additionality in transfer payments

Esther Blanco[a,b,*], Natalie Struwe[a], James M. Walker[b,c]

[a] Department of Public Finance, University of Innsbruck, Universitaetsstrasse 15, Innsbruck 6020, Austria
[b] The Ostrom Workshop, Indiana University, USA
[c] Department of Economics, Indiana University, Wylie Hall 105, Bloomington, IN 47405, USA

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ABSTRACT

This study presents novel evidence showing that group payments distributed proportional to effort are as effective as payments targeted to individuals in increasing public good provision. The decision setting includes donors who make transfer payments to public good providers. The institutions under consideration are motivated primarily by payments for ecosystem services (PES), such as payments for climate protection. The decision settings, however, capture attributes of many forms of charitable giving where NGO type organizations support activities that provide public good externalities beyond those who directly benefit. Results are presented from two studies, varying the sharing rules for transfers among group members (equal share, proportional share, and individual targeting) and the presence of additionality, whereby transfers are received contingent on public good provision being at a level higher than in initial decision periods. The sharing rules studied result in significant differences in cooperation levels. Supported by higher transfer subsidies, both the proportional share and targeted-transfers to individuals lead to greater public good provision relative to the equal share rule. Contrary to its alleged relevance in the literature, additionality does not lead to sustained increases in public good provision. Yet, additionality may improve the cost-effectiveness of transfer programs by precluding transfer payments when the subsidies are not effective in increasing public good provision.

# Project 2: Experimental Design

Between-subjects design, 4 main treatment conditions:

| **Study 1:** Group transfers | |
|---|---|
| *Treatment* | *Sharing rule* |
| Equal (baseline 1) | Equal, unconditional of efforts |
| Proportional | Proportional to effort |
| **Study 2:** Individual transfers | |
| *Treatment* | *Sharing rule* |
| Equal (baseline 2) | Equal, unconditional of efforts |
| Targeted-transfers | Individual payments |
| **Study 1 & Study 2**: Relative performance of group and individual transfers. | |

n=944 participants (17-21 groups per treatment) (+ 2 "Additionality" treatments in Study 1), data collected at Innsbruck EconLab.

# Project 2: Decision Setting

**Stage 1:** Outsiders send transfers to Transfer Account (T).

**Stage 2:** Insiders observe Transfer Account and make contributions to Group Account (G).

**Equal** Insiders' utility function:

$$U(\mathrm{g_i})_{Ii} = w - g_i + aG + \frac{1}{n_I} T + f(g_i)$$

Outsiders' utility function:

$$U(t_\mathrm{j})_{Oj} = w + aG - t_j + y(t_j)$$

**[Prop]** Insiders' utility function:

$$U(\mathrm{g_i})_{Ii} = w - g_i + aG + \left(\frac{\boldsymbol{g_i}}{\boldsymbol{G}}\right)\boldsymbol{T} + f(g_i)$$

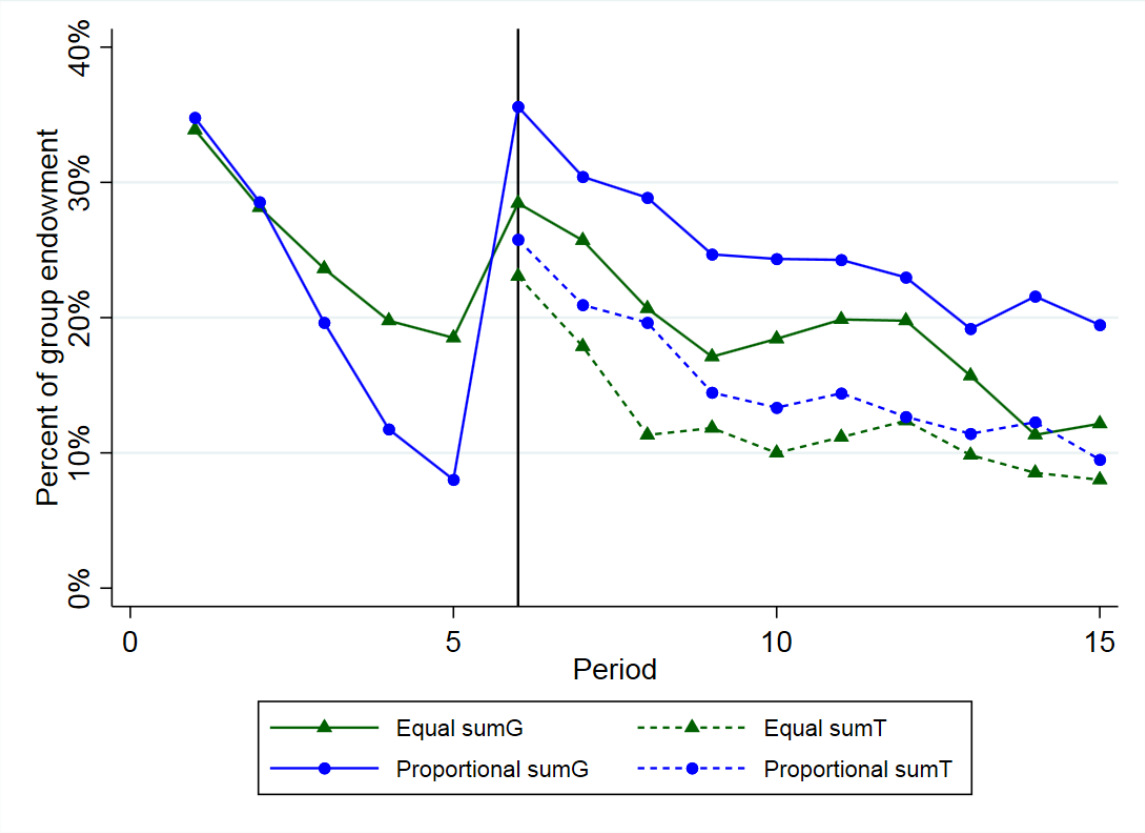
Outsiders' utility function:

$$U(t_\mathrm{j})_{Oj} = w + aG - t_j + y(t_j)$$

**Hypothesis 1:** *Prop* will increase contributions & transfers on average as compared to *Equal*.

# Project 2: Results – Proportional sharing

**Fig 1.** Average group contributions and transfers offered over time




**Result 1 (H1 ✓):** A proportional sharing rule increases both contributions of insiders as well as transfers of outsiders compared to an equal sharing rule.

# Project 2: Results – Proportional sharing

*Mixed Effects Regression for Treatment Effects Proportional vs. Equal:*

| In % of group endowment: | (I)<br>Net group contributions | (II)<br>Net group transfers |
|---|---|---|
| Proportional | 10.46***<br>(3.443) | 7.283**<br>(3.448) |
| Period | -1.586***<br>(0.420) | -1.392***<br>(0.156) |
| Constant | 10.79**<br>(5.046) | 2.224<br>(3.127) |
| *Observations* | *410* | *410* |
| *Number of sessions* | *14* | *14* |
| *Number of groups* | *41* | *41* |
| *Reference Category* | *Equal* | |

*Robust standard errors in parentheses. *** p<0.005, ** p<0.05, * p<0.1*

**Result 1 (H1 ✓):** A proportional sharing rule increases both contributions of insiders as well as transfers of outsiders compared to an equal sharing rule.

# Project 2: Decision setting

**Stage 1:** Insiders make contributions to a Group Account.

**Stage 2:** Outsiders observe contributions of each insider and make transfers.

**Equal(base2)** Insiders' utility function:

$$U(g_i)_{Ii} = w - g_i + aG + \frac{1}{n_I}T + f(g_i)$$

Outsiders' utility function:

$$U(t_j)_{Oj} = w + aG - t_j + y(t_j)$$

**[Targ]** Insiders' utility function:

$$U(g_i)_{Ii} = w - g_i + aG + \sum_{i=1}^{n_O} t_{ij} + f(g_i)$$

Outsiders' utility function:

$$U(t_j)_{Oj} = w + aG - \sum_{j=1}^{n_I} t_{ji} + y(t_j)$$

**Hypothesis 2:** On average, contributions & transfers in *Targ* will be higher than in *Equal(base2)*.

# Project 2: Results – Targeted

## Results – How do outsiders use their opportunity to make targeted transfers?

Fig 1. Individual transfers received relative to deviation from mean contribution of other insiders' in a group in Targeted-transfers

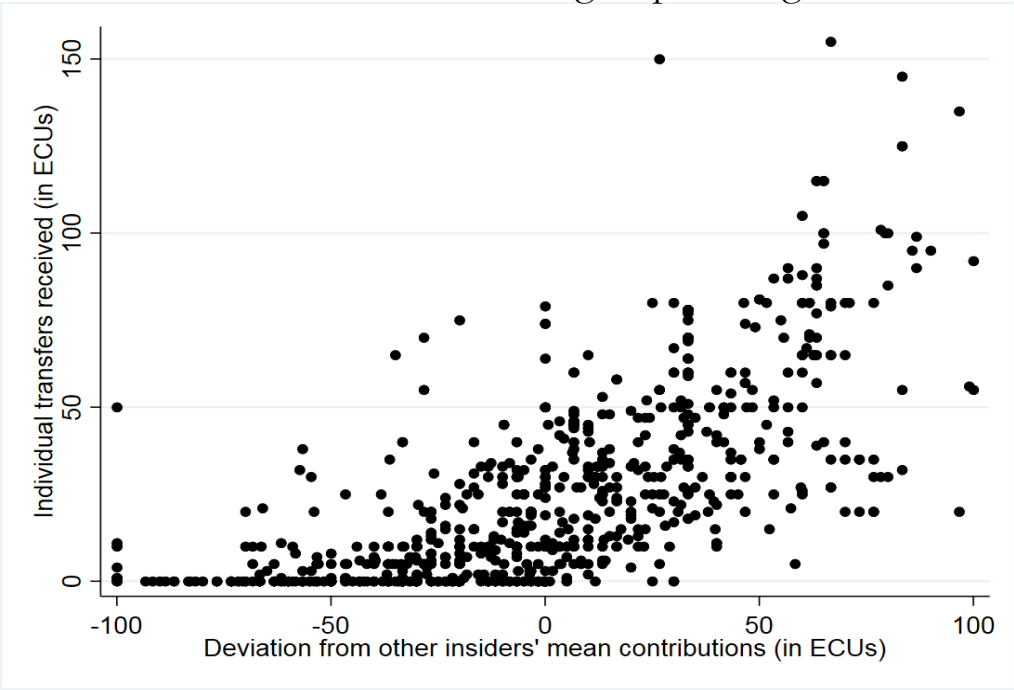



Table 2. Individual transfers received in Targeted-transfers relative to where individual's contributions rank within group

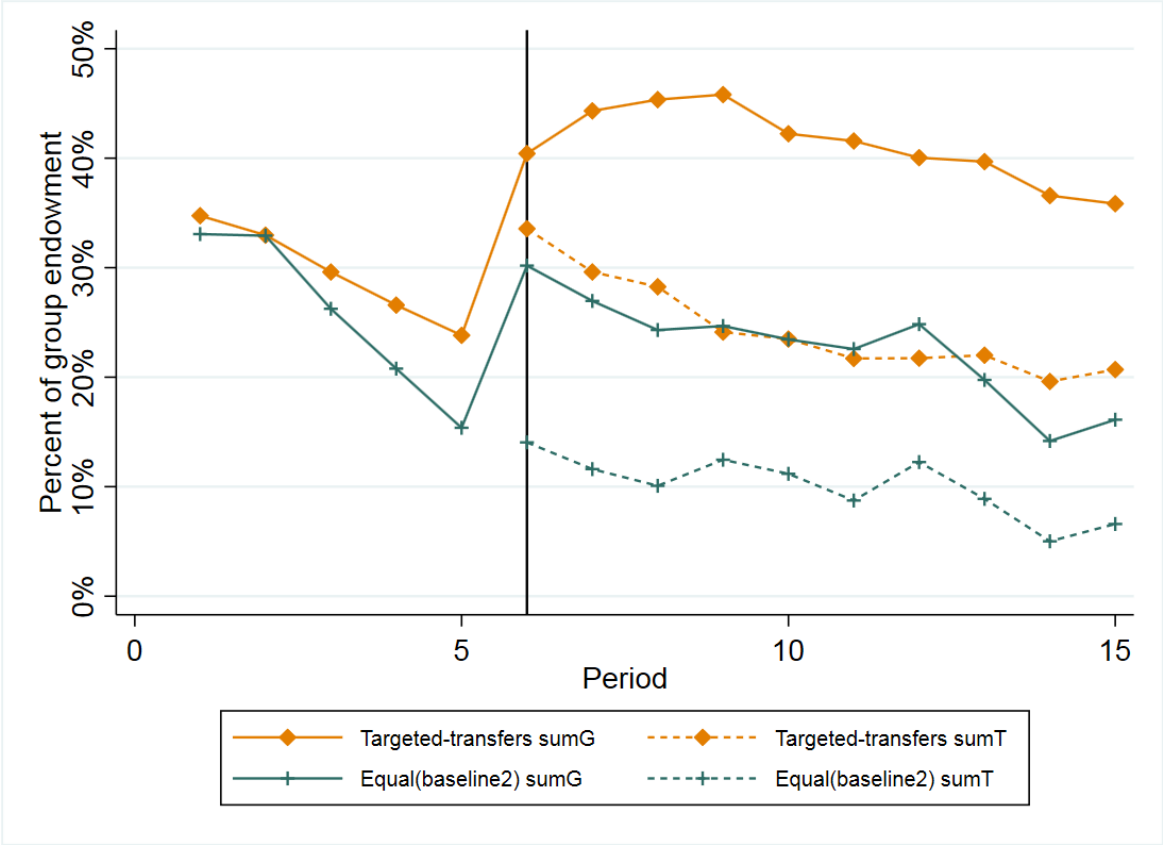
| | Individual transfers received |
|---|---|
| *Rank in contributions in a group:* | |
| 1st rank | 36.45**** |
| | (5.126) |
| 2nd rank | 19.29**** |
| | (3.233) |
| 3rd rank | 6.662**** |
| | (1.801) |
| Period | -1.369**** |
| | (0.313) |
| Constant | 23.26**** |
| | (4.026) |
| *Observations* | *800* |
| *Number of groups* | *20* |
| *Number of subjects* | *80* |

*Robust standard errors in parentheses. **** p<0.005, *** p<0.01, ** p<0.05, * p<0.1.*
*Note: chi-squared tests confirm that all coefficients are significantly different from each other (p-value <0.0001, for all comparisons).*

Use of targeted transfers *similar* to the inflexible proportional share rule in *Proportional*.

# Project 2: Results – Targeted

**Fig 3.** Average group contributions and transfers in Targeted-transfers and Equal (baseline2)




**Result 2 (H2 ✓):** Targeted transfers significantly increase contributions of insiders and transfers of outsiders compared to an equal sharing rule.

# Project 2: Results – Targeted

*Mixed Effects Regression for Treatment Effects Targeted vs. Equal(base2):*

| In % of group endowment: | (I) Net group contributions | (II) Net group transfers |
|---|---|---|
| Targeted-transfers | 14.62*** | 10.51* |
| | (4.901) | (6.253) |
| Period | -1.162*** | -1.048*** |
| | (0.245) | (0.125) |
| Constant | 9.219** | -4.597 |
| | (4.084) | (4.461) |
| *Observations* | *410* | *410* |
| *Number of sessions* | *14* | *14* |
| *Number of groups* | *41* | *41* |
| *Reference Category* | *Equal(baseline2)* | |

*Robust standard errors in parentheses. *** p<0.005, ** p<0.05, * p<0.1*

**Result 2 (H2 ✓):** Targeted transfers significantly increase contributions of insiders and transfers of outsiders compared to an equal sharing rule.

# Project 2: Results – Comparison of Treatment Effects

As compared to their respective baselines:

*Proportional* increases 10.46% net-contributions, 7.3% in net-transfers.

*Targeted-transfers* increases 14.62% net-contributions, 10.5% in net-transfers.

Difference in increase not significant (p-value = 0.24 & 0.41, respectively)

**Result 3**: Proportional group payments do similarly as individual payments (in donations and in public good provision) and better than equal payments.

# Project 2: Results – Dynamics

*Table 6. Determinants of insider's contributions by treatment*

| | Group payments | | Individual Payments |
|---|---|---|---|
| Dep. Var: individual contributions | (I) Proportional | (II) Proportional(Add) | (III) Targeted-transfers |
| Transfers offered | 0.934*** | 1.026*** | 1.011*** |
| | (0.157) | (0.185) | (0.0739) |
| Lagged other insiders | 0.205*** | 0.0939 | 0.251*** |
| | (0.0687) | (0.0686) | (0.0586) |
| Lagged share of transfers | 16.07*** | 22.41*** | 8.736* |
| | (4.185) | (6.016) | (4.750) |
| No Additionality | - | -3.116 | - |
| | | (2.246) | |
| Period | -0.0950 | -1.338*** | 0.435* |
| | (0.351) | (0.458) | (0.244) |
| Constant | 2.766 | 21.32*** | -0.300 |
| | (4.580) | (6.670) | (4.303) |
| *Observations* | *840* | *760* | *800* |
| *Number of groups* | *21* | *19* | *20* |
| *Number of subjects* | *84* | *76* | *80* |

*Robust standard errors in parentheses. *** p<0.005, ** p<0.05, * p<0.1*

Higher shares of transfers received correlate positively with higher future contributions by insiders.

Other insiders‘ behavior is less relevant.

# Project 2: Discussion

Group-transfers from outsiders can increase public good provision by insiders.

Good news: Individual payments are not the only way.

If insiders have peer-monitoring capacity and collective action agreements (needed for a proportional distribution of transfers), group payments could work.

**Importance of guaranteeing that those who make higher efforts in society receive higher financial support.**

Increases effort of recipients & donations from donors (induces positive reciprocity).

# **Project 3:**
# Strengthening competition between insiders

Experimental Economics
https://doi.org/10.1007/s10683-022-09766-7

ORIGINAL PAPER


## Competition among public good providers for donor rewards

Natalie Struwe[1] · Esther Blanco[1,2] · James M. Walker[2,3]

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**Abstract**
We present experimental evidence for decision settings where public good providers compete for *endogenous* rewards which are donations (transfers) offered by outside donors. Donors receive benefits from public good provision but cannot provide the good themselves. The performance of three competition mechanisms is examined in relation to the level of public good provision and transfers offered by donors. In addition to a contest where transfers received by public good providers are proportional to effort, we study two contests with exclusion from transfers, namely a winner-takes-all and a loser-gets-nothing. We compare behavior in these three decision settings to the default setting of no-contest (no-transfers). Results for this novel decision environment with endogenous transfers show that donors offer transfers (contest prizes) at similar levels across contests and contributions to the public good are not significantly different in the three contests settings, but are consistently and significantly higher in all contests compared to the setting with no-transfers. Initially, the winner-takes-all setting leads to a significantly higher increase in public good contributions compared to the other two contests; but this difference diminishes across decision rounds.

# Project 3: Experimental Design

Between-subjects design, 4 treatment conditions:

| Treatment | Distribution of Transfers |
|---|---|
| No Transfers | No Transfers<br>Passive outsiders |
| Proportional | Nobody excluded<br>Proportional share of transfers to insiders' effort |
| Loser-gets-nothing (LN) | 3 winners, 1 excluded<br>Lowest insider contributor in a group receives no transfers, proportional share for top 3 |
| Winner-takes-all (WA) | 1 winner, 3 excluded<br>Highest insider contributor in a group receives all transfers |

n=480 subjects (13-21 groups per treatment), data collected at Innsbruck EconLab.

# Project 3: The Decision Setting

**Stage 1:** Each outsider *j* makes independent transfer decisions ($\boldsymbol{t_j}$) to a Transfer Account (T= $\sum_{j=1}^{n_O} t_j$).
**Outsider's** utility function **with transfers**: $U_{Oj} = w + aG - t_j + f(t_j)$

**Stage 2:** **Insider's** (expected) utility function **with transfers**: $U_{Ii} = w - g_i + aG + \boldsymbol{z}(g_i, \boldsymbol{g_{-i}})\mathrm{T} + f(g_i)$
where $\boldsymbol{z}(.)$ defines each contest's success function, as follows:

*Proportional contest:* $$z(g_i, \boldsymbol{g_{-i}}) = \left(\frac{g_i}{\mathrm{G}}\right)$$

*Winner-takes-all contest:* $$z(g_i, \boldsymbol{g_{-i}}) = \begin{cases} 1 & if\ g_i > max(\boldsymbol{g_{-i}}) \\ \frac{1}{m} & \text{in case i ties with m} - 1 \text{ other insiders} \\ 0 & if\ g_i < max(\boldsymbol{g_{-i}}) \end{cases}$$

*Loser-gets-nothing contest:* $$z(g_i, \boldsymbol{g_{-i}}) = \begin{cases} \left(\frac{g_i}{\mathrm{G}_w}\right) & if\ g_i > min(\boldsymbol{g_{-i}}) \\ \left(\frac{g_i}{\mathrm{G}}\right) & \text{in case of any ties} \\ 0 & if\ g_i < min(\boldsymbol{g_{-i}}) \end{cases}$$

# Project 3: Results

Fig. 1a: Average group contributions

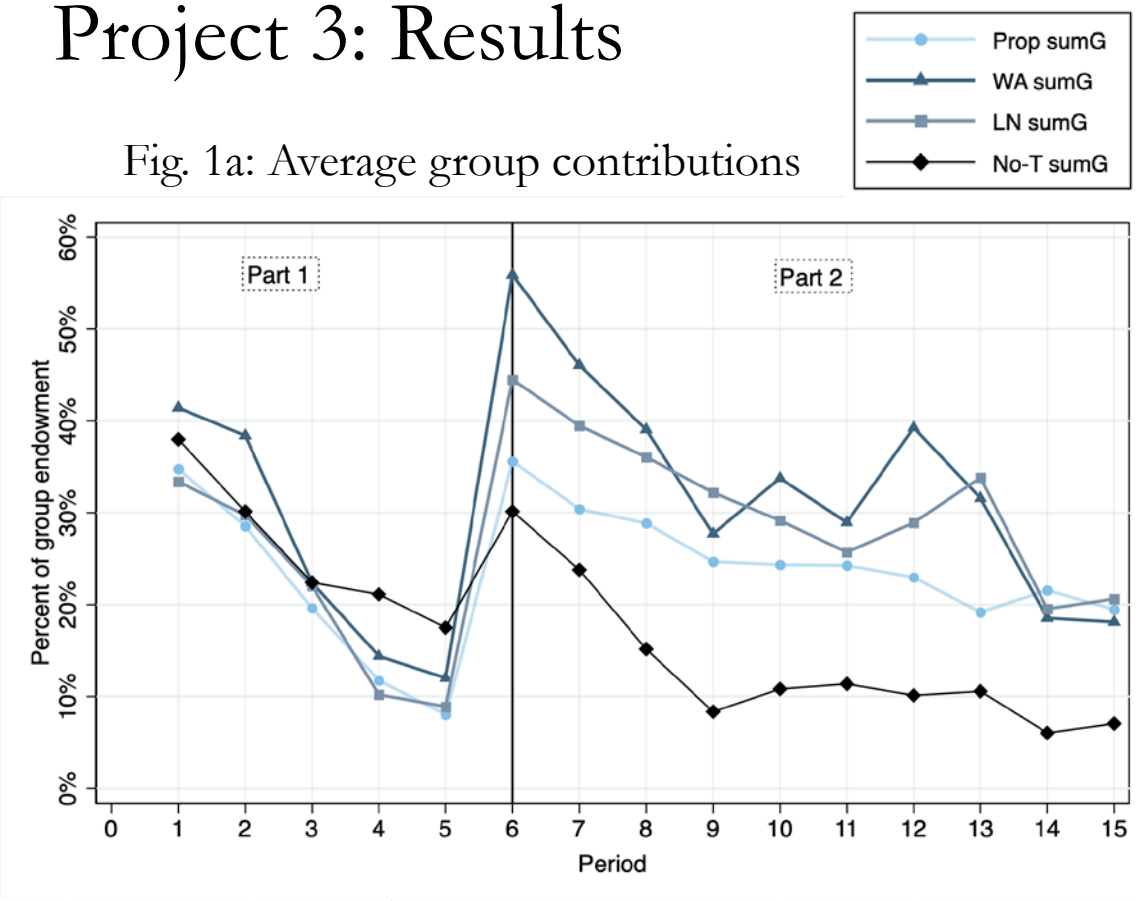
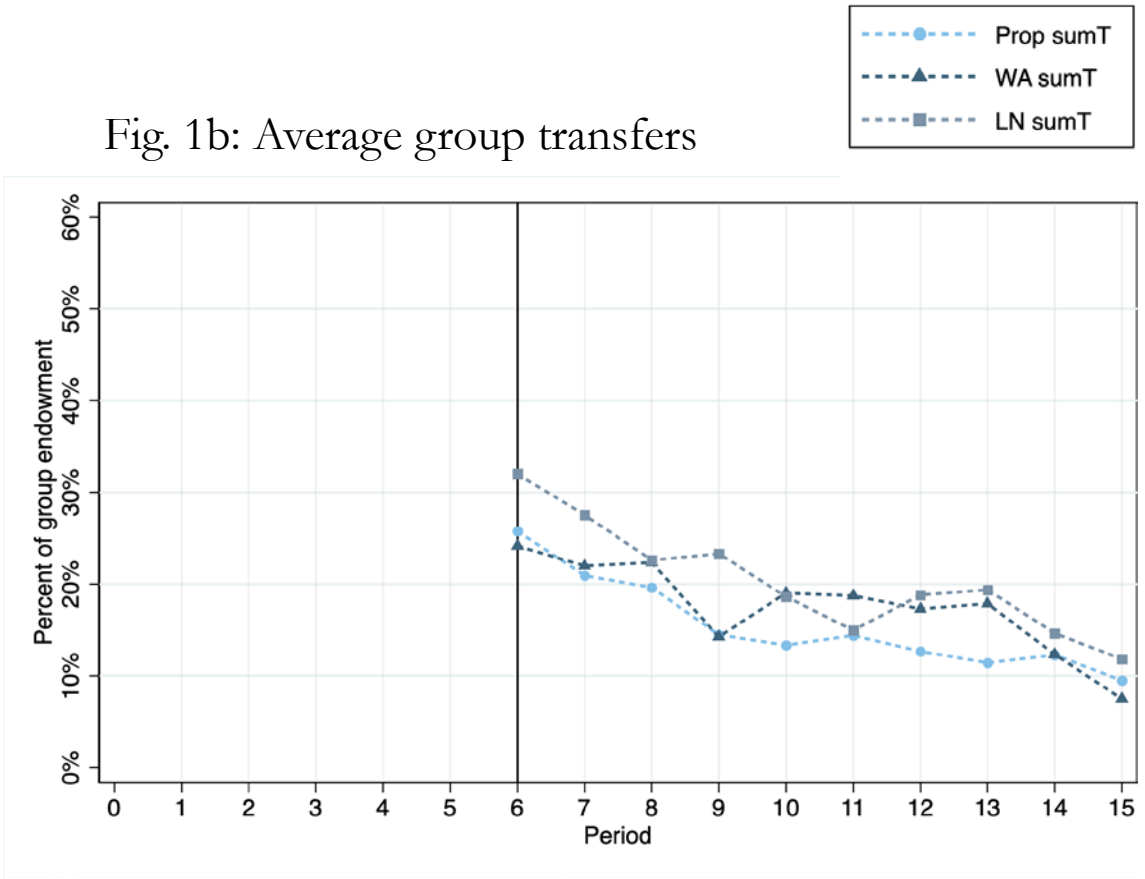



Fig. 1b: Average group transfers



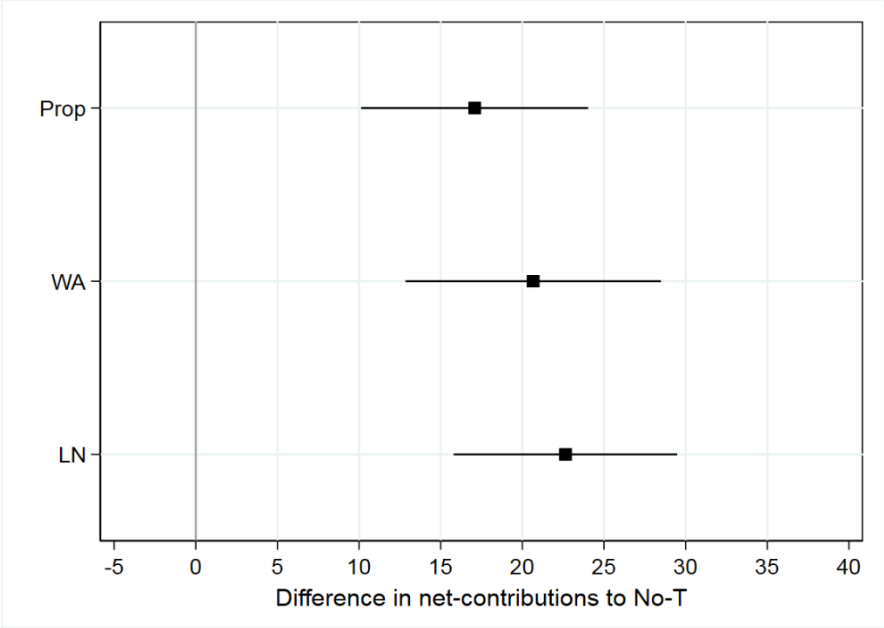

**Result 1 (H1 ✓):** All contests generate significantly higher contributions of insiders relative to *No-T*.

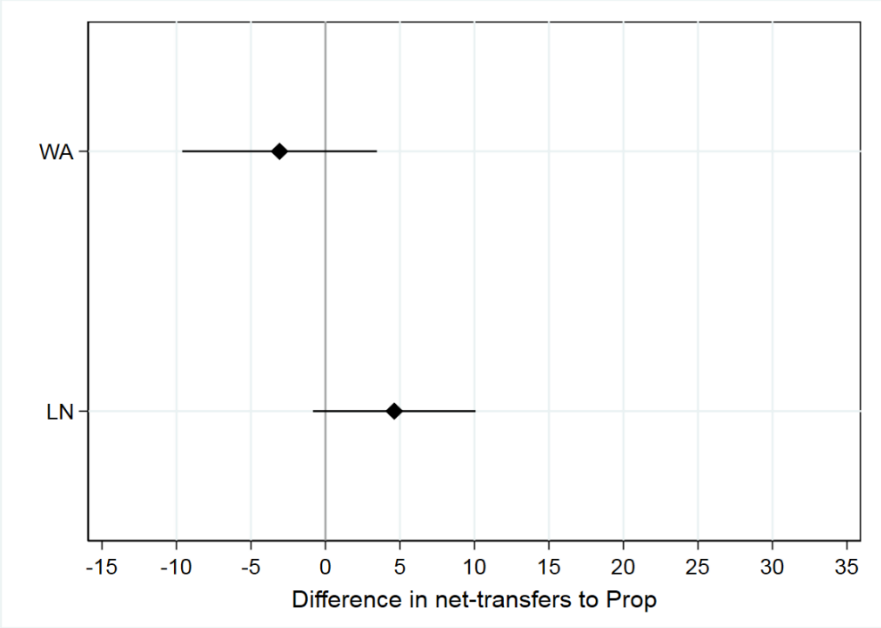
**Result 2 (H2 ✗):** Contributions of insiders in *WA* not different to *Proportional* & *LN*.

Transfers of outsiders significantly lower in *WA* relative to *LN*.

# Project 3: Results

*Point estimates and 95% confidence intervals based on cluster-robust standard errors on the session level for treatment differences from multilevel mixed-effects regressions with random effects at the group and session level.*



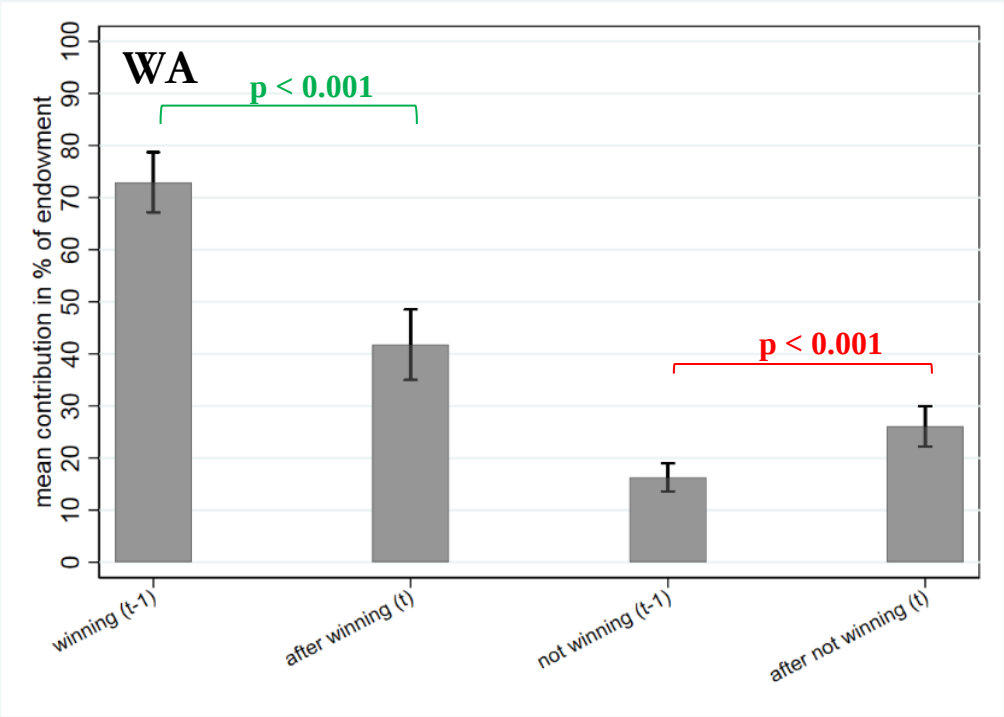

**Result 1 (H1 ✓):** All contests generate significantly higher contributions of insiders relative to *No-T*.

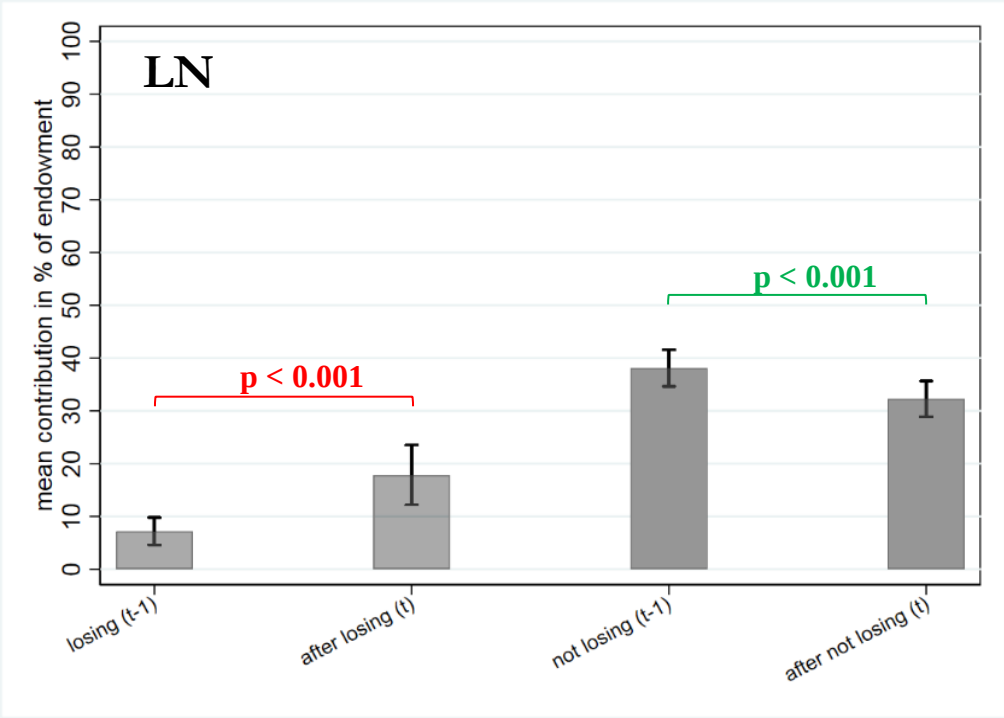
**Result 2 (H2 ✗):** Contributions of insiders in *WA* not different to *Proportional* & *LN*.

Transfers of outsiders significantly lower in *WA* relative to *LN*.

# Project 3: Results – Impact of exclusion over time

Fig 3: mean contributions of insiders before & after (not) winning in *WA*, and before & after (not) losing in *LN*, excluding period 6.



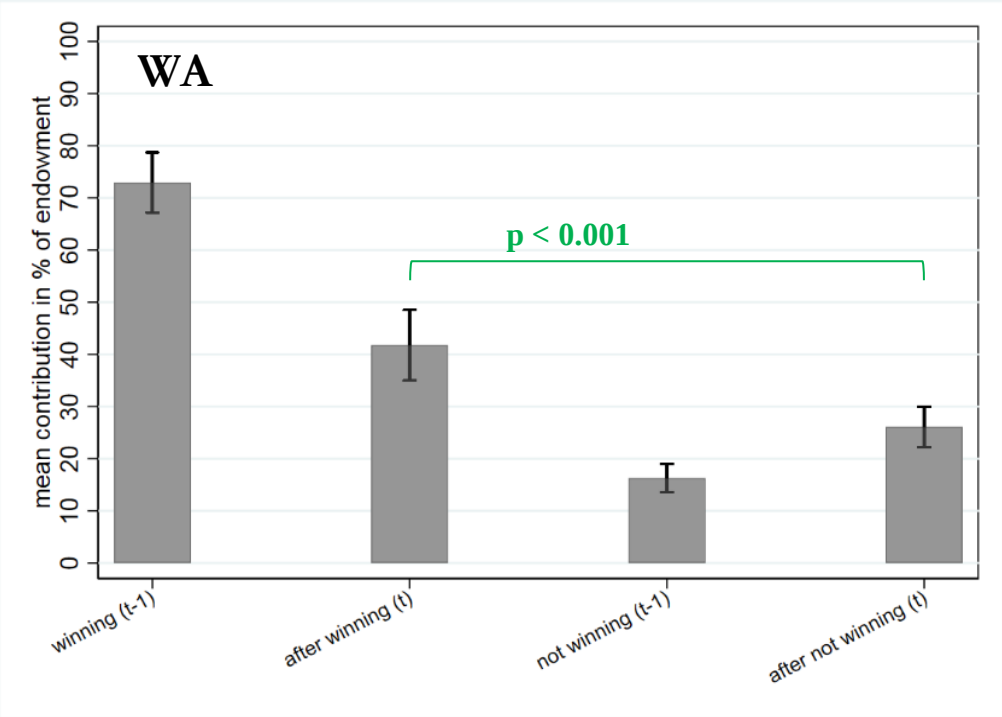

**Result 3:**

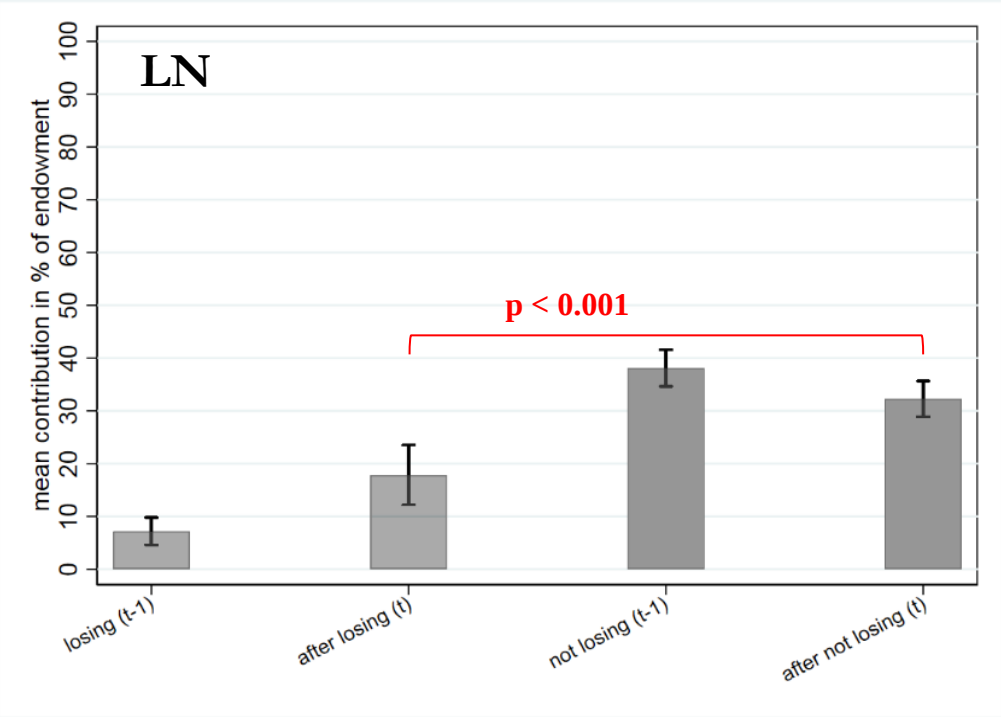
After winning, insiders significantly decrease their contributions.

After losing, insiders significantly increase their contributions.

# Project 3: Results – Impact of exclusion over time

Fig 3: mean contributions of insiders before & after (not) winning in *WA*, and before & after (not) losing in *LN*, excluding period 6.




**Result 3:**

But on average, winners tend to continue to be winners and losers tend to continue to be losers.

# Project 3: Results – Dynamics

**Table B2.** Determinants of insiders' behavior in contests, Periods 6-15, controlling for avg. transfers offered. Robust standard errors in parentheses. *** p<0.005, ** p<0.05, * p<0.1

| Dep. Variable: individual contribution in period t, in % of endowment | (I) *Prop* | (II) *WA* | (III) *LN* |
|---|---|---|---|
| other insiders$_{t-1}$ | 0.156** | -0.166*** | 0.0278 |
| | (0.0678) | (0.0588) | (0.0781) |
| avg_transfers$_t$ | 0.942*** | 1.136*** | 0.776*** |
| | (0.165) | (0.167) | (0.141) |
| avg$_{1-5}$ | 0.415*** | 0.420*** | 0.485*** |
| | (0.125) | (0.0733) | (0.0877) |
| winner$_{t-1}$ | - | 6.196 | - |
| | | (5.334) | |
| #winners$_{t-1}$ | - | -0.947 | - |
| | | (2.284) | |
| loser$_{t-1}$ | - | - | -6.735*** |
| | | | (1.810) |
| period | -0.0971 | -1.846*** | -0.884 |
| | (0.380) | (0.492) | (0.673) |
| constant | -0.645 | 27.25*** | 14.84 |
| | (4.709) | (9.195) | (9.402) |
| *Observations* | *840* | *520* | *480* |
| *Number of groups* | *21* | *13* | *12* |
| *Number of subjects* | *84* | *52* | *48* |

Higher transfers offered correlate positively with higher future contributions by insiders.

Other insiders' behavior is less relevant.

# Project 3: Results – Expectations

Table 1: Mixed effects regression, robust sdt. errors in parantheses

| Dep. Variable: individual contribution in period t, in % of endowment | (I) *Prop* | (II) *WA* | (III) *LN* |
|---|---|---|---|
| other insiders$_{t-1}$ | 0.282*** | -0.0273 | 0.0995 |
| | (0.0659) | (0.0584) | (0.0658) |
| unmet-expectation$_t$ | 0.123 | 0.0391 | -0.0747 |
| | (0.120) | (0.117) | (0.0732) |
| exceeded-expectation$_t$ | 0.359* | 0.895** | 0.462* |
| | (0.200) | (0.334) | (0.246) |
| avg$_{1-5}$ | 0.478*** | 0.451*** | 0.540*** |
| | (0.144) | (0.0959) | (0.101) |
| winner$_{t-1}$ | - | 8.753* | - |
| | | (5.151) | |
| #winners$_{t-1}$ | - | 0.460 | - |
| | | (2.759) | |
| loser$_{t-1}$ | - | - | -6.928*** |
| | | | (2.121) |
| period | -1.338*** | -2.973*** | -1.955*** |
| | (0.464) | (0.645) | (0.502) |
| constant | 20.15*** | 47.35*** | 37.18*** |
| | (5.434) | (10.50) | (7.413) |
| *Observations* | *840* | *520* | *480* |
| *Number of groups* | *21* | *13* | *12* |
| *Number of subjects* | *84* | *52* | *48* |

*** p<0.005, ** p<0.05, * p<0.1

The "prize" from competition is endogenously decided by outsiders. Insiders form expectations (beliefs) and can act upon them.

**Result 4:**

*Unmet-expectations* of transfers do not significantly decrease insiders' contributions.

*Exceeded-expectations* of transfers significantly increase contributions in *WA*.

# Project 3: Discussion

Competition can be an effective mechanism to increase transfer program outcomes:

Linking relative rewards to relative effort increases public good provision.

**All competitive environments generate similar increases in public good provision, irrespective of the degree of exclusion.**

# Putting it all together

**The capacity of donations to increase public good provision in group-to-group settings should not be taken for granted** (BHW 2018)

**Group-donations from outsiders can increase public good provision by groups of public good providers** (BSW 2021, 2022).

Proportional allocations, individual-donations, mild and strong exclusion, all result in similar increases in public good provision.

Individual payments are not the only way.

**Suggestive evidence supporting proportional inclusive payments** (BHW 2018, BSW 2021, 2022)**:**

These are simpler to implement in field settings: simpler to communicate; simpler to enforce; and possibly outcome-based fairer *(Wells et al., 2020)*.

These are able to sufficiently motivate donors, which is also critical *(Wunder et al., 2018, 2020)*.

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Thanks to the generous support of the Austrian Science Fund (FWF)

P 25973-G11 (2015-2018); P 32859 (2019-2023)

https://www.esther-blanco.com

# Ongoing work

Main Research Question:

What is the behavioral response of insiders to the transfer decisions by outsiders that endogenously define the MPCR?

Secondary Research Questions:

1. Does it matter whether the MPCR is exogenously or endogenously defined through the transfers by outsiders?
2. Does it matter whether the MPCR is modified continuously or as a threshold?

# Ongoing work: Experimental Design

Prolific subjects in UK and one-shot decisions (first time in this decision environment).

Pre-registered: https://aspredicted.org/C6T_2FL

Between-subjects design, 6 treatment conditions with equal impact of transfers:

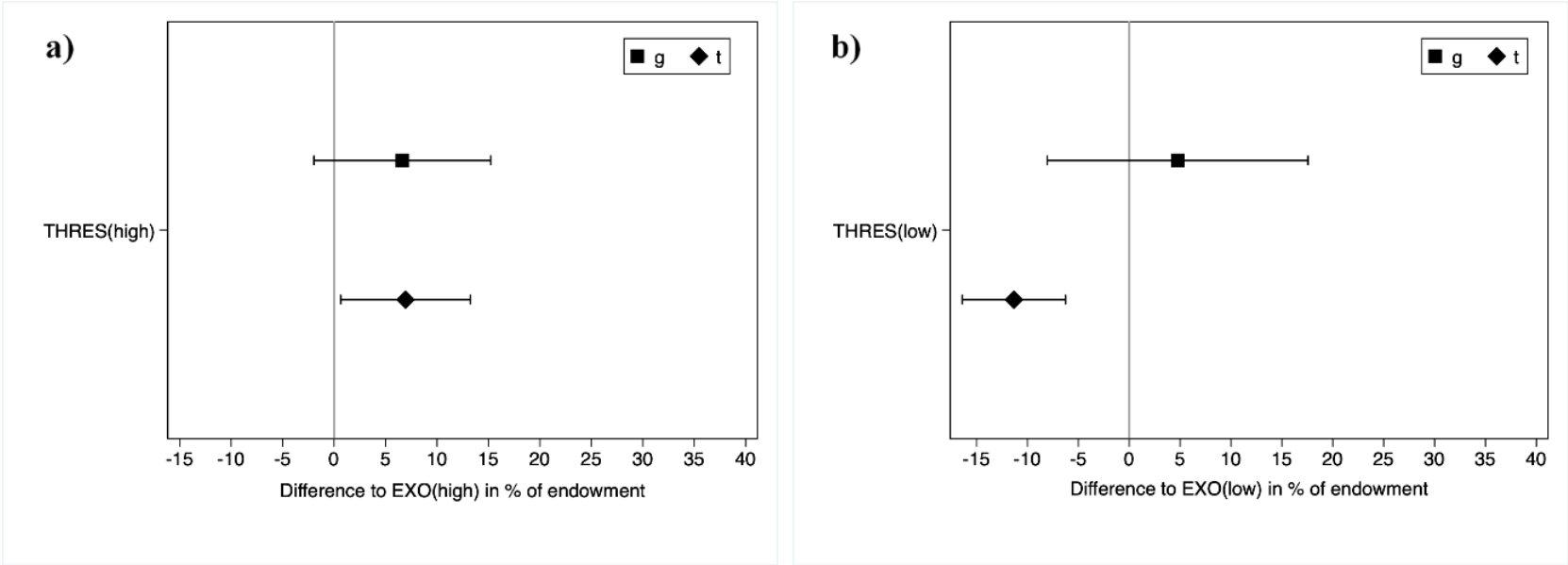
| Treatments | Role of outsiders | MPCR ($a$) | # observations |
|---|---|---|---|
| **THRES** | Transfers define MPCR | Defined by outsiders, either 0.4 or 0.8 | 320 individuals<br>40 groups |
| **CONT** | Transfers define MPCR | Defined by outsiders, continuous increases between 0.4 and 0.8 in 0.004 increments | 320 individuals<br>40 groups |
| **EXO(high)** | Send transfer donations | Exogenously given at 0.8. | 160 individuals<br>20 groups |
| **EXO(low)** | Send transfer donations | Exogenously given at 0.4. | 168 individuals<br>21 groups |
| **NoT(high)** | inactive | Exogenously given at 0.8. | 152 individuals<br>19 groups |
| **NoT(low)** | inactive | Exogenously given at 0.4 | 160 individuals<br>20 groups |

n=1280 in May 2022; 20 minutes and participants earned on average £5.71.

# Ongoing work: Results – Exogenous vs. Endogenous MPCR

In 87.5% of groups in THRES & 67.5% of groups in CONT, outsiders offer sufficient transfers to establish high MPCR of 0.8.

**Comparison of groups in THRES vs. groups in EXO:**




**Result 1 (H1✖):** Investments by insiders in public goods do not significantly change for endogenous vs. exogenously defined MPCRs.

# Ongoing work: Results – Continuous vs. Threshold

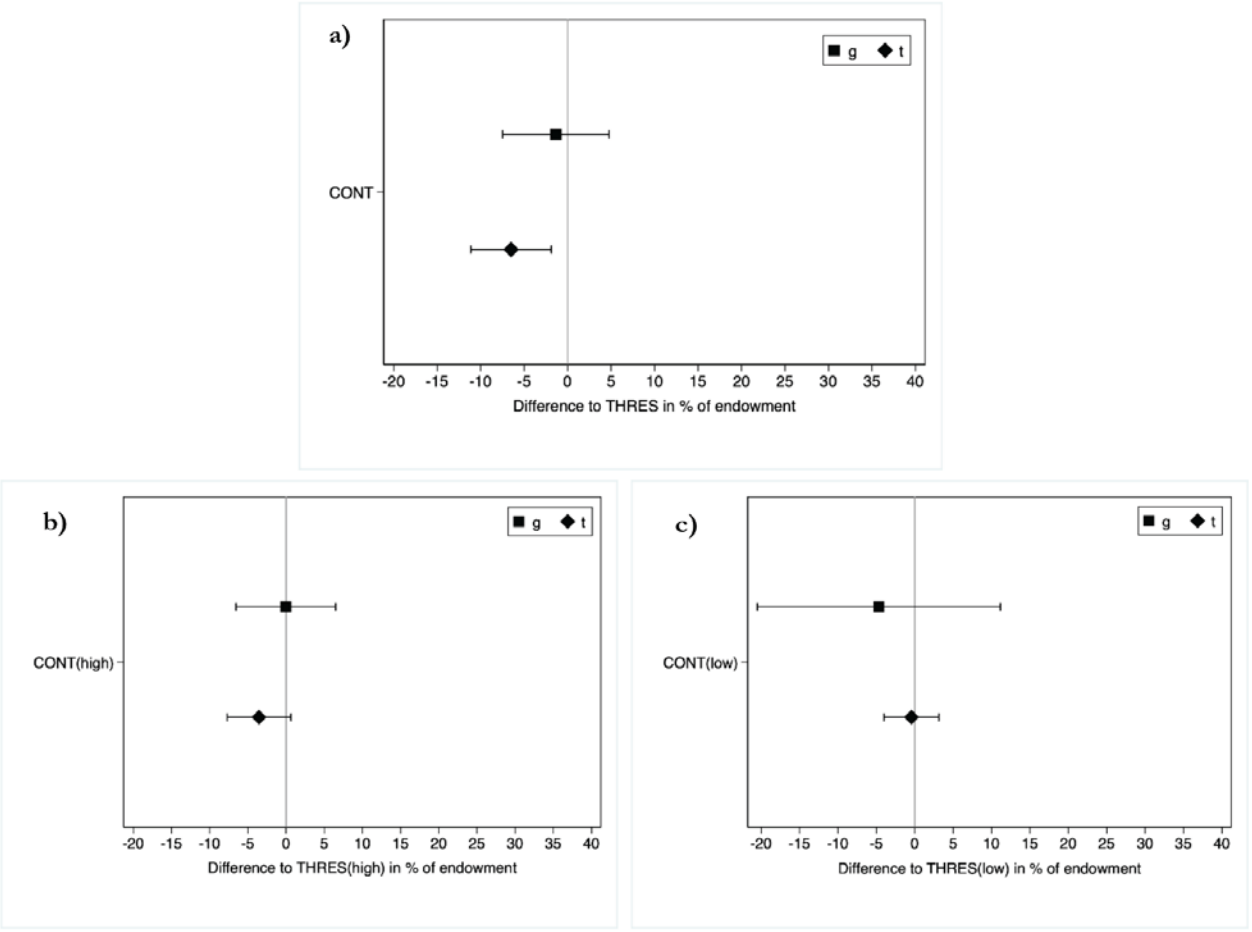



**FIGURE 4.2: COMPARISON OF AVERAGE INDIVIDUAL CONTRIBUTIONS (G) AND AVERAGE INDIVIDUAL TRANSFERS (T) FOR THE CONT VS THRES TREATMENT (PANEL A), FOR CONT(HIGH) VS THRES(HIGH) GROUPS (PANEL B) AND CONT(LOW) VS THRES(LOW) GROUPS (PANEL C).**

Point estimates and 95% confidence intervals from OLS regression with clustered standard errors at the group level.

**Result 2 (H2✖):** There is no significant difference in average contributions between CONT and THRES. Average transfers in CONT are significantly below average transfers in THRES.

When comparing CONT (above / below 25% transfers) separately to groups reaching or failing to reach the threshold in THRES, there are no significant differences in contributions nor transfers.

# Ongoing work: Beliefs & other heterogeneity in behavior

**TABLE 4.3: EFFECT OF EXPECTATIONS & MOTIVES ON OUTSIDERS' TRANSFERS.**
Cluster-robust standard errors on the group level in parentheses. *** p<0.005, ** p<0.05, * p<0.1

| dep. var.: individual transfers (t) | THRES (high) | THRES (low) | CONT (high) | CONT (low) | EXO (high) | EXO (low) |
|---|---|---|---|---|---|---|
| estimate | 0.380*** | 0.503*** | 0.615*** | 0.299* | 0.509*** | 0.657*** |
| | (0.118) | (0.0702) | (0.0958) | (0.152) | (0.146) | (0.122) |
| mistrust in-group | -2.528 | -2.083 | 3.025 | -0.188 | 0.909 | -0.689 |
| | (4.332) | (4.807) | (4.154) | (6.874) | (3.860) | (3.396) |
| mistrust out-group | 4.220 | 13.87** | -4.361 | -0.652 | -9.206 | 0.453 |
| | (5.644) | (4.116) | (4.543) | (6.483) | (6.233) | (3.752) |
| in-group bias | 1.184 | -13.49 | -0.386 | 3.759 | 2.599 | 2.968 |
| | (4.240) | (10.50) | (5.245) | (6.065) | (6.778) | (4.938) |
| no impact | -2.428 | 4.390 | -2.026 | 6.708 | 5.407 | -6.187** |
| | (4.105) | (8.002) | (4.071) | (4.495) | (4.166) | (2.783) |
| egoism | -7.754** | -10.18 | -2.309 | -10.54* | -5.978 | -1.068 |
| | (3.712) | (6.927) | (4.620) | (5.341) | (4.439) | (4.074) |
| social efficiency | 14.21*** | 0.510 | 10.75** | -2.892 | 5.964 | 7.829* |
| | (4.086) | (7.016) | (3.790) | (5.624) | (6.468) | (3.888) |
| responsibility | 3.778 | 2.765 | 8.411 | -6.901 | -2.891 | 1.260 |
| | (4.907) | (3.652) | (5.003) | (6.489) | (5.997) | (3.326) |
| social norm | 4.766 | -0.694 | -4.425 | 6.454 | 18.00*** | 3.491 |
| | (4.614) | (5.973) | (4.535) | (6.186) | (4.712) | (3.380) |
| confusion | 6.469 | -3.957 | -12.36 | -3.932 | 36.33** | 19.23 |
| | (7.134) | (15.72) | (9.366) | (5.535) | (12.63) | (11.22) |
| constant | 10.26* | 3.392 | 5.542 | 12.15** | 6.459 | 2.533 |
| | (6.030) | (7.732) | (4.592) | (5.364) | (8.330) | (5.821) |
| *# individuals* | *140* | *20* | *108* | *52* | *80* | *84* |
| *# groups* | *35* | *5* | *27* | *13* | *20* | *21* |
| *R-squared* | *0.356* | *0.774* | *0.447* | *0.257* | *0.544* | *0.545* |

For **outsiders**, significant determinants of transfer are:

Higher beliefs of insiders' subsequent public good provision.

Social efficiency concerns, in the groups that indeed achieve higher MPCRs endogenously.

# Ongoing work: Beliefs & other heterogeneity in behavior

**TABLE 4.4: EFFECT OF EXPECTATIONS & MOTIVES ON INSIDERS' CONTRIBUTIONS.**
Cluster-robust standard errors on the group level in parentheses. *** p<0.005, ** p<0.05, * p<0.1

| dep. var.: individual contribution (g) | THRES (high) | THRES (low) | CONT (high) | CONT (low) | EXO (high) | EXO (low) |
|---|---|---|---|---|---|---|
| transfers offered / MPCR | -0.0407 | 1.323** | 0.0618 | 0.284 | - | - |
| | (0.0799) | (0.323) | (0.0519) | (0.163) | | |
| avg. transfers received | - | - | - | - | 0.213 | 0.208 |
| | | | | | (0.238) | (0.171) |
| estimate | 0.218** | 0.329 | 0.530*** | 0.577*** | 0.549*** | 0.597*** |
| | (0.0837) | (0.335) | (0.0993) | (0.153) | (0.169) | (0.180) |
| insufficient transfers | -4.368 | 2.364 | 0.263 | 1.001 | 1.932 | 9.087 |
| | (5.254) | (11.06) | (7.890) | (10.57) | (7.847) | (7.866) |
| mistrust in-group | -6.854 | -12.61** | -11.90** | -19.32** | -8.538 | -2.256 |
| | (5.418) | (4.511) | (5.096) | (7.889) | (7.538) | (6.127) |
| in-group bias | 4.622 | 2.651 | 1.404 | 2.055 | -1.255 | -10.11 |
| | (4.684) | (6.750) | (4.502) | (6.633) | (9.367) | (6.718) |
| egoism | -14.66** | -8.732 | -2.359 | 13.02* | -7.484 | -6.344 |
| | (5.034) | (9.871) | (5.650) | (6.808) | (7.413) | (5.265) |
| social efficiency | 13.76** | 13.62 | 11.62* | 9.349 | 19.60** | 3.053 |
| | (4.630) | (11.73) | (5.660) | (5.940) | (7.539) | (5.400) |
| responsibility | -9.441 | -53.81*** | -2.456 | 10.72 | -3.909 | 1.108 |
| | (6.451) | (7.262) | (5.431) | (11.15) | (9.005) | (6.690) |
| social norm | 5.335 | 36.68 | 1.929 | 8.140 | 12.95 | 13.65** |
| | (5.854) | (21.54) | (5.198) | (9.421) | (9.633) | (5.352) |
| confusion | -2.727 | -22.57* | -0.273 | -5.831 | 2.224 | -15.41** |
| | (9.091) | (10.17) | (6.596) | (9.085) | (6.723) | (6.622) |
| constant | 40.66*** | -64.07 | 10.26 | -22.92 | 4.840 | 2.482 |
| | (13.40) | (48.47) | (11.06) | (17.21) | (10.45) | (8.922) |
| *# individuals* | *140* | *20* | *108* | *52* | *80* | *84* |
| *# groups* | *35* | *5* | *27* | *13* | *20* | *21* |
| *R-squared* | *0.224* | *0.811* | *0.341* | *0.567* | *0.406* | *0.373* |

For **insiders**, significant determinants of public good provision are:

Higher beliefs of outsiders' transfers.

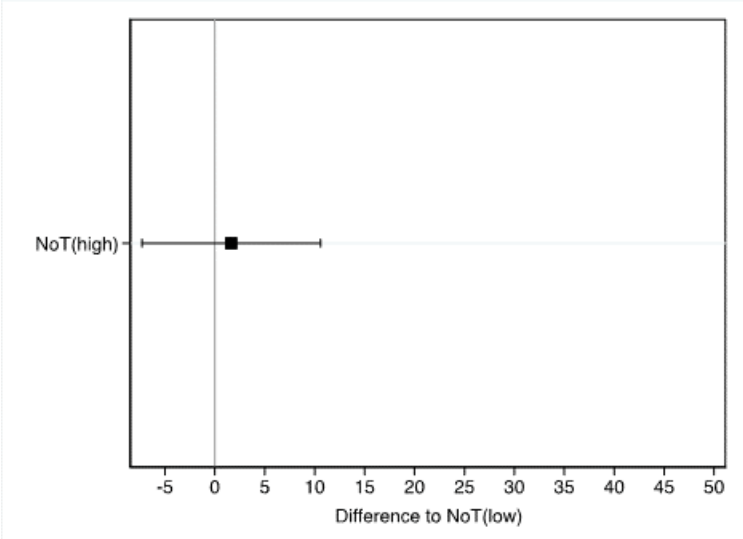
Social efficiency concerns, in the groups that achieved higher MPCRs endogenously or exogenously.

Remarkably, higher transfers do not systematically increase public good provision (no support for reciprocal behavior).

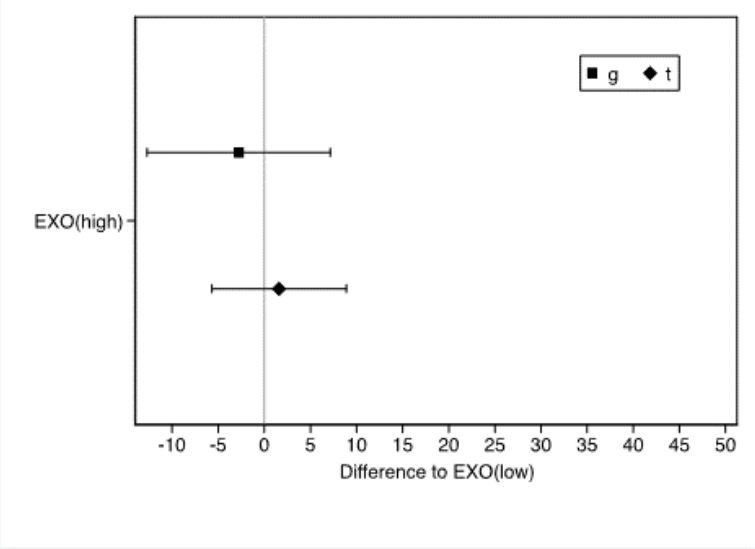
# Ongoing work: Why no responses to changes in MPCR?

It is not about outsiders being active (not even with high value transfers)

Passive outsiders



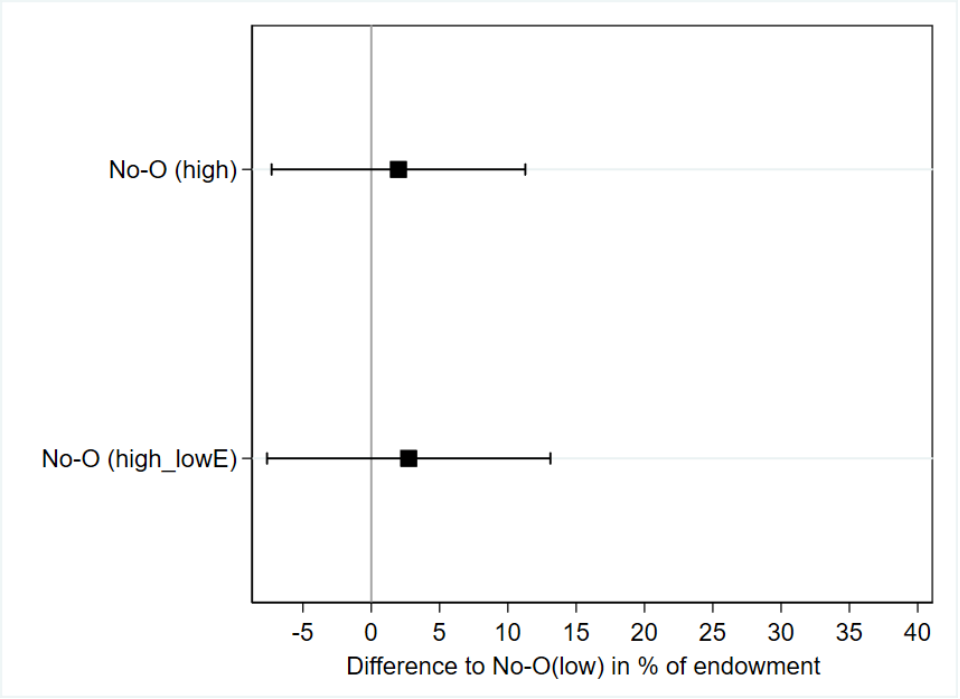

Active outsiders




**Additional Result 1 (A-H1×):** Subjects do not respond to exogenous changes in the MPCR, neither with active nor with passive outsiders.

# Ongoing work: Why no responses to changes in MPCR?

It is not about outsiders being present.




n=76-80 individuals per treatment

**Follow-up result 1 (FU-H1✖):** In a conventional one-shot public good experiment (no outsiders), prolific subjects do not respond on average to between-subject changes in the MPCR (pre-registered https://aspredicted.org/HSX_P32).

# Ongoing discussions

The research question of this ongoing study is not answered with our data…

…after spending 15,000 Euros.

… after 7 months of data collection and analysis.

This is how science works! We failed to answer our initial research question (with a clean method and protocols) and thus opened wider research questions.

Is it adequate to study cooperation…

… with a Prolific subject pool?

… online?

… in the lab?

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# Including Donors in the Provision of Public Goods

Esther Blanco (*University of Innsbruck, The Ostrom Workshop*)

*j.w.w.*

Natalie Struwe (*University of Innsbruck)*

*Tobias Haller (University of Innsbruck)*

James M. Walker *(Indiana University, The Ostrom Workshop)*

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Vienna Center for Experimental Economics – 18 November 2022