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**Experimental Insights on Forest Management
Under an Exogenous Income Shock**

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Experimental insights on forest management under an exogenous income shock

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Abstract: Negative income shocks may increase households' reliance on common-pool resources and thereby undermine sustainable resource management. We study this in a pre-registered laboratory experiment with 120 participants playing a dynamic resource extraction game framed around a community forest. Participants in the **CONTROL** condition play the baseline game three times, whereas participants in the **SHOCK** condition experience a temporary loss of exogenous income in the second part before income is restored in the third. This design allows us to distinguish responses to the income shock from common changes associated with repeated play and to observe behavior after the shock ends. We find that forest extraction increases in Part 2 for the **SHOCK** treatment relative to the ongoing baseline in the **CONTROL** condition. After income is restored in Part 3, extraction decreases and the forest partially recovers. However, the equivalence tests do not clearly show whether behavior fully returns to its pre-shock level or whether some of the shock effect remains. Our findings support previous evidence that economic hardship can increase pressure on shared natural resources.

JEL classification codes: D70, Q20, Q23, Q50, Q56.

Keywords: Resource extraction game; Forest commons; Income shock; Lab experiment; Co-operation

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1 Introduction

Forests can provide an important buffer against adverse economic conditions. When other sources of income decline, households may increase their reliance on forest resources to smooth consumption and cope with financial hardship (Wunder et al., 2014; Mulungu & Kilimani, 2023). While this safety-net function can be crucial for individual households, it may come at a collective cost when higher extraction puts pressure on a commonly managed forest (Hardin, 1968) and thereby undermines sustainable resource use (Ostrom, 1990; Busch & Ferretti-Gallon, 2023). The COVID-19 pandemic provides a prominent example of this tension. Particularly in the Global South, disruptions to trade, tourism, remittances, and non-forest employment were expected to generate substantial losses in household income (Wunder et al., 2021). Consistent with increased pressure on forest resources, spatial studies document higher levels of deforestation during the early stages of the pandemic in several regions of the world (Brancalion et al., 2020; Kganyago & Shikwambana, 2021; Céspedes et al., 2023; Fiestas-Flores et al., 2025). Yet such aggregate patterns cannot reveal whether income losses per se cause forest users to change their behavior when managing a shared resource.

Suri et al. (2026a) take an important step toward identifying this income channel experimentally. In a resource extraction game with Ethiopian smallholder farmers, they show that removing an exogenous source of income increases extraction from a community forest, even though the shock does not alter marginal monetary incentives or payoff-maximizing strategies in the game. Their experimental design, however, always exposes participants to a baseline scenario before introducing the income shock. Consequently, changes in extraction between the two scenarios may partly reflect repetition, learning, fatigue, or other time trends in addition to the behavioral response to the income shock (see, for example, Leyens et al., 2026). Moreover, their experiment ends while participants are exposed to the shock and therefore leaves open what happens once the shock is resolved. Does an exogenous income shock indeed increase extraction from a shared resource once potential time trends are accounted for? And, if so, does this behavioral response disappear when the shock ends, or does it extend beyond the period of economic hardship?

We address these questions in a laboratory experiment with 120 participants in Bonn, Germany.¹ Participants repeatedly play a dynamic resource extraction game that is framed around a community forest and closely follows Suri et al. (2026a). In groups of three, participants decide how many trees to harvest from a shared forest over five rounds. Harvested trees generate private income, whereas trees remaining in the forest generate benefits for the group, thus creating a trade-off between individual extraction and collective resource conservation—a defining feature of a commons dilemma (Hardin, 1968). In addition to earnings from the forest, participants receive exogenous income and incur exogenous costs in each round. The income component allows us to introduce an economic shock without changing the marginal monetary incentive structure associated with harvesting from the common resource.

Our experiment employs a mixed 2×3 design with two treatment conditions and three experimental parts. Groups randomly assigned to the CONTROL condition play the baseline

¹For the research question at hand, the laboratory setting provides the necessary level of control to investigate the causal channel of an income shock on forest management compared to data collected in the field, as done, for example, by Suri et al. (2026a). For a discussion, see Harrison and List (2004), Ostrom (2006), and Gächter (2010), but also the findings by Englberger et al. (2025).

game three consecutive times. Participants in the SHOCK condition first play the same baseline game, after which their exogenous income is removed while their exogenous costs remain unchanged. In the third part, their income is restored and they again play the baseline game. In each treatment condition, only one part is randomly chosen at the end of the study to calculate participants' payments. The repeated baseline games in the CONTROL condition allow us to account for common time trends. Comparing changes across conditions therefore allows us i) to identify the behavioral response to the introduction of the income shock, and ii) to assess the extent to which behavior adjusts once the shock is removed.

We find that the negative income shock increases resource extraction. Relative to the corresponding change in the CONTROL condition, deforestation within groups exposed to the shock increases by about 4.8% per round. Within the SHOCK condition, this increase in extraction leaves the forest stock about 15.5% smaller at the end of the shock game than at the end of the preceding baseline game. Once the exogenous income is restored, extraction decreases and the forest stock partially recovers. However, the change from the shock period to the post-shock period is not statistically distinguishable from the corresponding change in the CONTROL condition. At the same time, post-shock harvesting behavior is also not statistically distinguishable from its pre-shock level. Equivalence tests do not resolve this ambiguity, as the confidence intervals overlap the regions of practical equivalence but extend beyond their bounds.

Our findings contribute to two strands of literature. First, we add to the experimental literature on how economic shocks affect cooperation in social dilemmas. A broad experimental literature shows that shocks and uncertainty can alter cooperative behavior in public-good and common-pool resource settings, although the direction and magnitude of these effects depend on the nature of the shock and the institutional environment (see, e.g., Gangadharan & Nemes, 2009; Cherry et al., 2015; Howe et al., 2016; Cárdenas et al., 2017; Zhang, 2019; Safarzyńska, 2018; Schill & Rocha, 2023; Atella-Suri & Janssen, 2026). Most of these studies manipulate characteristics of the social dilemma itself, such as resource availability, returns, or the risk of resource loss. An interesting addition to this literature is Hochleitner (2025), who studies an exogenous income shock following an initial production stage and subsequent redistribution in an unbounded dictator game. She finds that participants redistribute more income toward those who experienced the shock. Furthermore, Shachat et al. (2021) find that cooperation in a prisoner's dilemma game increased after the COVID-19 pandemic shock in 2020 compared to a pre-shock baseline in 2019.² Moreover, as mentioned already above, Suri et al. (2026a) show that removing exogenous income in a forestry resource extraction game increases deforestation. But they cannot differentiate the effect of the shock from common time trends.

The present study thus informs Suri et al. (2026a) by more cleanly isolating the behavioral effect of losing exogenous income on resource extraction. We arrive at the same results that this removal increases the pressure to deforest; implying that the results by Suri et al. (2026a)

²Looking more closely at disasters "in the wild," there are also some studies documenting changes, for example, in levels of trust (Castillo & Carter, 2011; Mackay et al., 2024), reciprocity (Fleming et al., 2014), pro-sociality (Adena & Harke, 2022), antisocial behavior (Prediger et al., 2014) or risk attitudes (Harrison et al., 2022; Mineyama & Tokuoka, 2024) in the aftermath of such disasters. With regard to the COVID-19 pandemic specifically, Umer (2023) provides a literature review on the impact of the pandemic on economic preferences. Much of this literature, however, does not provide pre-post-shock panel data that would allow for a clean identification of the changes.

do not solely need to be attributed to common trends. Our finding also adds to the broader strand of literature that has, so far, mostly focused on shocks changing the marginal incentive structure, and shows that exogenous shocks such as those introduced by the COVID-19 pandemic have different impacts for resource allocation decisions compared to abstract cooperation settings (as in Shachat et al., 2021).

Second, we contribute to the literature studying whether behavioral responses persist after a temporary change in incentives or decision environments has been reversed. Evidence from large-scale environmental field experiments suggests that behavioral interventions can leave persistent, although often decaying, effects on conservation behavior after treatment exposure is reduced or discontinued (see, e.g., Ferraro et al., 2011; Allcott & Rogers, 2014). Experimental evidence from social dilemmas, however, suggests that such persistence is highly context-dependent. If a response depends primarily on current conditions, removing the intervention may lead to a strong reversal; thus behavior does not need to adjust gradually but can also change rapidly. For example, cooperation may sharply decline once temporary monetary incentives are removed (Bruttel & Friehe, 2014; Nakagawa et al., 2022), while changes in collective risk can generate more persistent cooperative behavior when they are accompanied by stronger social norms (Szekely et al., 2021).

Several studies examine such path dependence directly in common-pool resource dilemmas. Pfaff et al. (2015) show that extraction under a given level of water availability depends on scarcity experienced in previous rounds: upstream farmers appropriate a larger share of an abundant resource after previously facing greater scarcity. Similarly, Blanco et al. (2015) experimentally reduce the availability of a common resource and subsequently allow it to rebound. Participants who experienced the reduction continue to appropriate more after resource availability returns to its initial level than participants whose resource availability remained unchanged. Other interventions in common-pool resource games likewise demonstrate that behavior after an intervention is removed can depend on the preceding institutional environment (DeCaro et al., 2015), although evidence also shows cases in which treatment effects disappear quickly once the intervention is withdrawn (Montero-Porras et al., 2025). Together, these studies motivate examining both behavioral persistence and rapid adjustment following a temporary change in the resource-use environment.

We examine these competing possibilities following a temporary loss of income originating outside the common-pool resource. Our treatment leaves the resource dynamics and marginal monetary returns to extraction unchanged. After the shock, we restore the original income and reset the forest to its initial stock, so that participants again face the baseline income and resource conditions. If additional extraction is a response to the current income shortfall, or is considered acceptable only while that shortfall lasts, restoring income could bring an immediate return to pre-shock behavior. By contrast, if the experience changes expectations about others, perceived norms, or behavioral routines, extraction may remain altered after income is restored. Our results do not conclusively distinguish between these possibilities. While we find partial reversion of harvesting behavior once income is restored, neither the remaining difference relative to pre-shock behavior nor the reversal relative to the shock period is estimated precisely enough to establish persistence or recovery. Equivalence tests lead to the same conclusion. In this respect, our findings add to the mixed evidence in the existing literature by showing that post-treatment adjustment is also ambiguous following

a temporary income shock that originates outside the common-pool resource environment. More broadly, our results suggest that the context dependence documented for changes in incentives, risk, institutions, and resource availability also extends to shocks that leave the underlying resource-use incentives unchanged.

The remainder of the paper is organized as follows. Section 2 presents the experimental design, behavioral benchmarks, hypotheses, empirical strategy, and describes the procedures of our study. Section 3 reports our empirical findings which is followed by a discussion and conclusion in Section 4.

2 Methods

2.1 Experimental design

The resource extraction game follows the “no-shock” version of Suri et al. (2026a).³ Participants interact in fixed groups of three and jointly manage a renewable community forest over five rounds. The number of rounds is common knowledge.

At the beginning of the first round, the forest contains 100 trees, which also constitutes its maximum carrying capacity. In each round, all three group members independently, privately, and simultaneously choose how many trees to harvest. Individual harvest choices are restricted to integer values between 0 and 7 trees. Each tree harvested generates a monetary payoff for the participant who extracts it.

After all participants have made their decisions, the group’s total harvest in that round is announced. The corresponding number of trees is removed from the forest, after which the forest regenerates by 10% of the remaining stock, subject to the carrying capacity of 100 trees.⁴ The resulting stock constitutes the forest available at the beginning of the subsequent round.

In addition to income from harvesting, each participant receives an exogenous source of income in every round and incurs an exogenous cost in every round. These components are independent of participants’ harvest decisions and the state of the forest.

Following the fifth and final harvest decision, the forest regenerates once more according to the same rule. Each tree in the resulting final stock is worth four points to the group, and this value is divided equally among the three group members. Each participant’s total earnings from the game therefore consist of an initial endowment of 50 points, harvest income of two points per tree across the five rounds, exogenous income of eight points per round net of exogenous costs of eight points per round, and one-third of the final forest value.

The baseline version of the game described above constitutes Part 1 and is identical for all participants. For Part 2, participants remain in the same group but groups are randomly assigned to either the CONTROL or the SHOCK condition. At the beginning of Part 2, the forest is reset to its initial stock of 100 trees in both conditions and each participant receives a new endowment of 50 points. Groups assigned to CONTROL play the baseline version of the resource extraction game again. In SHOCK, participants face the same decision environment except that the exogenous income of eight points per round is removed in all five rounds, while the

³The design in Suri et al. (2026a) builds on the common-pool resource experiments of Cárdenas et al. (2013) and Janssen et al. (2013), and incorporates a payment for the remaining resource stock following Gatiso et al. (2015), which mirrors the basic features of commons dilemma in reality more closely.

⁴Regrowth is rounded down to the nearest integer; only whole trees can regrow.

exogenous cost of eight points per round remains unchanged. In Part 3, the forest is again reset to 100 trees and all participants play the baseline version of the game. Hence, the sequence across the three parts is baseline-baseline-baseline in CONTROL and baseline-shock-baseline in SHOCK.

At the end of the experiment, one of the three parts is randomly selected for payment separately for each group. All three group members are then paid according to their own decisions and those of the other group members in the selected part. Experimental points are converted at an exchange rate of EUR 0.09 per point.

2.2 Behavioral benchmarks

The incentive structure of the game gives rise to two behavioral benchmarks: individual payoff maximization and socially optimal sustainable extraction.⁵ Under the first benchmark, participants maximize their own monetary payoff without taking into account the consequences of extraction for the other group members (since it does not affect their own payoff) or for the future resource stock (since the individual payoff from a tree today is higher than the individual payoff from a tree at the end of the game). Each participant therefore harvests the maximum of 7 trees in every round. At the group level, this corresponds to a harvest of $3 \times 7 = 21$ trees per round, as illustrated in Figure 1A. The resulting extraction exceeds the regenerative capacity of the forest and progressively depletes the resource. Under this path, the forest stock declines to 17 trees following regeneration in the final round, as shown by the dotted line in Figure 1B.

The second benchmark is socially optimal sustainable extraction. Given the regeneration rule and the carrying capacity of 100 trees, a group can harvest up to 9 trees per round while allowing the forest to return to its carrying capacity after every round. This group-level harvest is shown in Figure 1A, while the dashed line in Figure 1B depicts the resulting forest stock, which remains at its maximum level throughout the game. Under the parametrization of the experiment, group payoffs are therefore maximized when the group harvests exactly 9 trees in every round.⁶

Harvesting fewer than 9 trees does not maximize aggregate payoffs because some trees that could have been harvested without reducing the forest stock available in the subsequent round are left unexploited. Conversely, harvesting more than 9 trees reduces the forest below its carrying capacity. This lowers the stock on which subsequent regeneration occurs and thereby reduces the amount of resource available in later rounds. Hence, the 9-tree benchmark captures the trade-off between obtaining current harvest income and preserving the regenerative capacity of the common resource.

Importantly, these two benchmark predictions are unchanged by the income shock under the standard assumption of monetary payoff maximization. The shock removes a fixed amount of exogenous income but leaves both the marginal monetary return to harvesting a tree and the physical dynamics of the resource unchanged. Consequently, a participant who

⁵The payoff parameters and resource dynamics follow those reported in Suri et al. (2026a), who provide detailed theoretical derivations of both benchmarks. We therefore restrict attention here to their economic intuition and implications for behavior and refer interested readers to their formal derivations.

⁶An equal allocation of this group harvest corresponds to three trees per participant. Equality of individual harvests is not required for efficiency: any feasible allocation across group members that yields an aggregate harvest of 9 trees produces the same resource-level outcome.

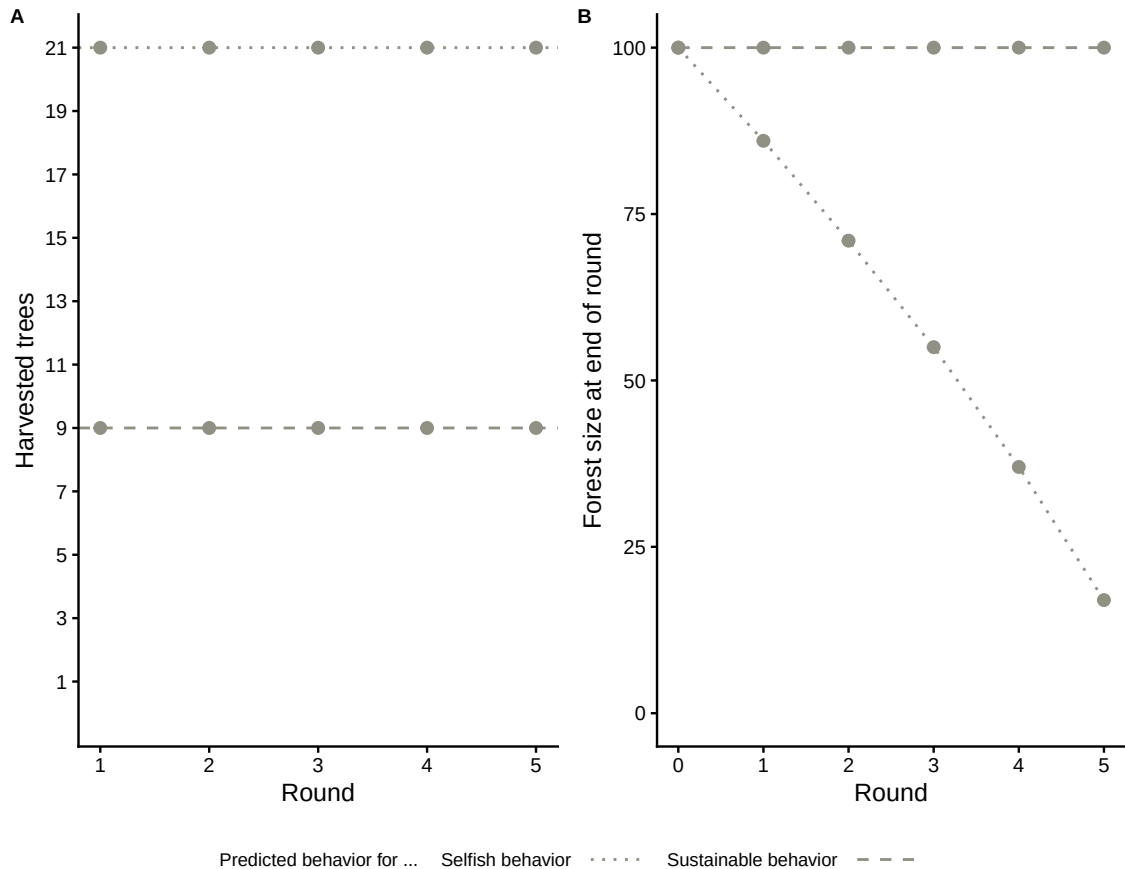


Figure 1: Predicted harvest and forest size for each round. Panel A shows predicted group-level harvest under the individual payoff-maximization and socially optimal sustainable-extraction benchmarks. Panel B shows the corresponding evolution of the forest stock across rounds. The figure is adapted from Suri et al. (2026a), whose experimental design and parametrization we closely follow.

maximizes monetary earnings has the same optimal harvest choice in the baseline and shock versions of the game. Behavioral responses may nevertheless arise if the income loss affects motives beyond monetary payoff maximization, for example through perceived needs, reference dependence, beliefs about others' behavior, or normative assessments of appropriate extraction. Whether the fixed income loss changes extraction behavior is therefore an empirical question.

2.3 Hypotheses and estimation strategy

Exogenous income shocks can arise through different channels. As laid out in the introduction, the COVID-19 pandemic is a prominent example: disruptions to trade, employment, tourism, and remittances reduced non-forest income for many rural households, potentially increasing their reliance on forests as a safety net (Wunder et al., 2021, 2014). Spatial evidence documents increases in deforestation during the early stages of the pandemic in several regions (Brancalion et al., 2020; Kganyago & Shikwambana, 2021; Céspedes et al., 2023; Fiestas-Flores et al., 2025). At the behavioral level, Suri et al. (2026a) show that removing an exogenous source of income can increase extraction from a shared forest even when the marginal

monetary incentives to harvest remain unchanged. Economic hardship may therefore shift behavior toward greater private extraction at the expense of collective resource conservation.

The consequences of an income shock may also extend beyond the period in which the shock is present. Behavioral responses developed under adverse conditions may persist if the experience changes beliefs, perceived norms, or coping strategies, or if newly adopted behavior carries over once economic conditions improve. Evidence from environmental and social-dilemma experiments suggests that behavioral responses can persist after an intervention or change in the decision environment is removed, although such effects often decay over time and are not observed in all settings (see, e.g., Ferraro et al., 2011; Allcott & Rogers, 2014; Pfaff et al., 2015; Blanco et al., 2015). These considerations motivate our two main hypotheses:

Main hypothesis 1⁷: A negative exogenous income shock leads to less cooperative behavior in the resource extraction game.

Main hypothesis 2: The experience of a negative exogenous income shock temporarily alters behavior after the income shock has passed.

In addition, we expect that the mere repetition of the baseline game does not affect participants' extraction behavior. All hypotheses were preregistered on AsPredicted. To test our hypotheses, we estimate comparison-specific random-effects models at the group level and linear mixed-effects models at the individual level:

$$Harvest_{g,r} = \beta_{0,p} + \beta_{1,p} Part_{r,p} + \beta_{2,p} Shock_g + \beta_{3,p} (Part_{r,p} \times Shock_g) + \beta_{4,p} Round_{r,p} + \alpha_g + u_{g,r} \quad (1)$$

$$Harvest_{i,r} = \beta_{0,p} + \beta_{1,p} Part_{r,p} + \beta_{2,p} Shock_{g(i)} + \beta_{3,p} (Part_{r,p} \times Shock_{g(i)}) + \beta_{4,p} Round_{r,p} + X_i' \delta_p + \alpha_{g(i)} + \gamma_i + u_{i,r} \quad (2)$$

where $r = 1, \dots, 15$ indexes the game rounds, $g = 1, \dots, 40$ the groups, and $i = 1, \dots, 120$ the individual participants, with $g(i)$ denoting the group to which participant i belongs. Let $p \in \{12, 23, 13\}$ index the comparison between Parts 1 and 2, between Parts 2 and 3, and between Parts 1 and 3 respectively. Each model is estimated separately for each comparison using only observations from the corresponding two parts.⁸

The dependent variable *Harvest* measures the number of trees harvested in a given round at either the group level (Equation (1)) or the individual level (Equation (2)). The independent variables are $Part_{r,p}$, which is a dummy variable indicating either Part 2 ($Part_{r,12} = 1$) or Part 3 ($Part_{r,23} = 1$ or $Part_{r,13} = 1$), $Shock_g$, which is a dummy variable indicating the treatment condition SHOCK (if $Shock_g = 1$), and the interaction effect of both variables represented by $Part_{r,p} \times Shock_g$. Thus, the coefficient of interest is the difference-in-differences estimator $\beta_{3,p}$.

We also include a numeric variable $Round_{r,p}$ indicating the game round within the respective part (1 to 5), and, for the individual-specific regressions, individual-level control variables which are collected in the vector X_i (age, gender, income, experiences with income loss,

⁷Main hypothesis 1 was preregistered as a directional hypothesis. The nonparametric tests of the shock effect reported below are consequently one-sided.

⁸We also estimate a full model in Table SI-2 in which Part 1 is the reference part and obtain the same substantive results as in the separate estimations.

and the following economic preferences measured by the approach in Falk et al. (2018): positive reciprocity, negative reciprocity, altruism, and trust).

In the group-level model (Equation (1)), α_g denotes a time-invariant group-specific random effect and $u_{g,r}$ the idiosyncratic error term. In the individual-level model (Equation (2)), the hierarchical structure of the data is accounted for by including random intercepts at both the group and participant levels. Specifically, $\alpha_{g(i)}$ denotes the random intercept of the group to which participant i belongs, γ_i denotes the participant-specific random intercept, and $u_{i,r}$ is the remaining idiosyncratic error term. Thus, the individual-level specification accounts for both common unobserved heterogeneity among participants belonging to the same group and persistent unobserved heterogeneity across individuals.

2.4 Procedures

Our study received ethical approval from the German Association for Experimental Economic Research e.V. (No. SRFbJ6SR) and was preregistered on AsPredicted (<https://aspredicted.org/ak7zw3.pdf>). The experiment was implemented using oTree (Chen et al., 2016) and conducted in person at the BonnEconLab (University of Bonn) in August 2023. We invited a random sample from the BonnEconLab participant pool, which is managed using hroot (Bock et al., 2014), based on the following preregistered eligibility criteria: participants had to be at least 18 years old and native German speakers. Groups were randomly assigned by oTree to either the CONTROL or SHOCK condition within each of the seven experimental sessions. Based on an ex ante power analysis, we preregistered a target sample of 60 participants per treatment condition, corresponding to 20 groups of three participants each.⁹

At the beginning of the experiment, participants received instructions for the baseline version of the game, including an example illustrating the decisions and corresponding payoffs of three hypothetical decision-makers in a reduced version of the game (see Section SI-2 for screenshots of the original instructions). Before making their first decision in Part 1, participants had to correctly answer five comprehension questions to ensure their understanding of the game mechanics and incentive structure. In each of the five rounds, participants made an extraction decision and subsequently received feedback on the group's total harvest, forest regrowth, and remaining forest stock. At the end of each part, participants were informed about the individual payoff they would receive if that part were randomly selected for payment at the end of the experiment.

Before Part 2, participants again received the game instructions. Participants in the CONTROL condition received the baseline instructions, whereas participants in the SHOCK condition received modified instructions in which the removal of the exogenous income was highlighted using strikethrough text. They additionally received a reminder that this income component was no longer available. Before Part 3, participants in both conditions were informed that they would again play the baseline version of the game and were given the opportunity to review the instructions.

After completing all three parts, participants were asked to report the reasons for their behavior in each part. We then elicited their normative beliefs about appropriate harvesting

⁹We conducted a two-sample, one-sided power analysis with 80% power and $\alpha = .10$, using the effect size for the change in harvesting behavior due to the introduction of the exogenous income shock reported in Suri et al. (2026a). To accommodate potentially greater outcome variance in our setting, we increased the resulting sample-size requirement of $n = 5$ per condition and targeted 20 groups per treatment condition instead.

behavior, following Engel and Kurschilgen (2020) and Suri et al. (2026a). All participants answered this normative-belief question for Part 1: “In your opinion, in Part 1—in which you had income and costs of 8 points each—what is the maximum number of trees from the community forest that each group member should generally be expected to harvest per round?” Participants in the SHOCK condition additionally answered the following question for Part 2: “In your opinion, in the part in which you had no additional income but had expenses of 8 points, what is the maximum number of trees from the community forest that each group member should generally be expected to harvest per round?” Finally, participants provided socio-demographic information and completed the positive reciprocity, negative reciprocity, altruism, and trust elicitation items from Falk et al. (2018). Each experimental session consisted of six to eight groups and lasted for 70 minutes. Participants earned on average EUR 16.23.

3 Results

Our sample comprises 120 participants who have been randomly assigned in equal numbers to the two experimental conditions. Each condition therefore contains 20 three-person groups, yielding 40 groups in total. Overall, 40.8% of participants are male, with no statistically significant differences between conditions (Pearson’s Chi-squared test: $p = .710$). Participants are about 28 years old on average. In CONTROL, participants are on average 3.2 years older than in SHOCK (two-sided Wilcoxon rank sum test: $p = .048$). Mean reported monthly income is EUR 812.26 and does not differ significantly between conditions (two-sided Wilcoxon rank sum test: $p = .485$). In addition, 41.7% of participants have previously experienced an income loss during their lifetime, with no statistically significant difference between conditions (Pearson’s Chi-squared: $p = .518$).

We first examine harvesting behavior in Part 1, in which participants in both conditions played the baseline version of the game with the exogenous source of income. Figure 2A shows mean group harvest by round and condition. Harvest levels are relatively stable across rounds, ranging from 14.2 to 15.4 trees per group on average. We find no statistically significant differences between CONTROL and SHOCK in any round (two-sided Wilcoxon rank sum tests with the false-discovery-rate (FDR) adjustment introduced by Benjamini and Hochberg (1995): all adjusted $p = .967$; all unadjusted $p > .541$). Because mean group harvest exceeds the level compatible with sustainable resource use, forest stocks decline over the course of Part 1. At the end of Part 1, the mean forest stock is 61.1 trees in CONTROL and 58.7 trees in SHOCK, with the difference not being statistically significant (two-sided Wilcoxon rank sum test: $p = .735$).

In Part 2, the exogenous source of income was removed in the SHOCK condition, whereas participants in CONTROL continued to play the baseline version of the game. Recall that we hypothesized that this leads to less cooperative behavior indicated by higher harvesting behavior in SHOCK. In line with this, mean harvest is descriptively higher in SHOCK throughout Part 2. Indeed, the lowest round-specific mean in SHOCK (15.6 trees, observed in Round 4) is even larger than the highest round-specific mean in CONTROL (15.2 trees, observed in Round 1). Nevertheless, none of the round-specific differences is statistically significant (one-sided Wilcoxon rank sum tests: all FDR adjusted $p = .215$).

Within the SHOCK condition, the mean final forest stock falls from 58.7 trees in Part 1 to

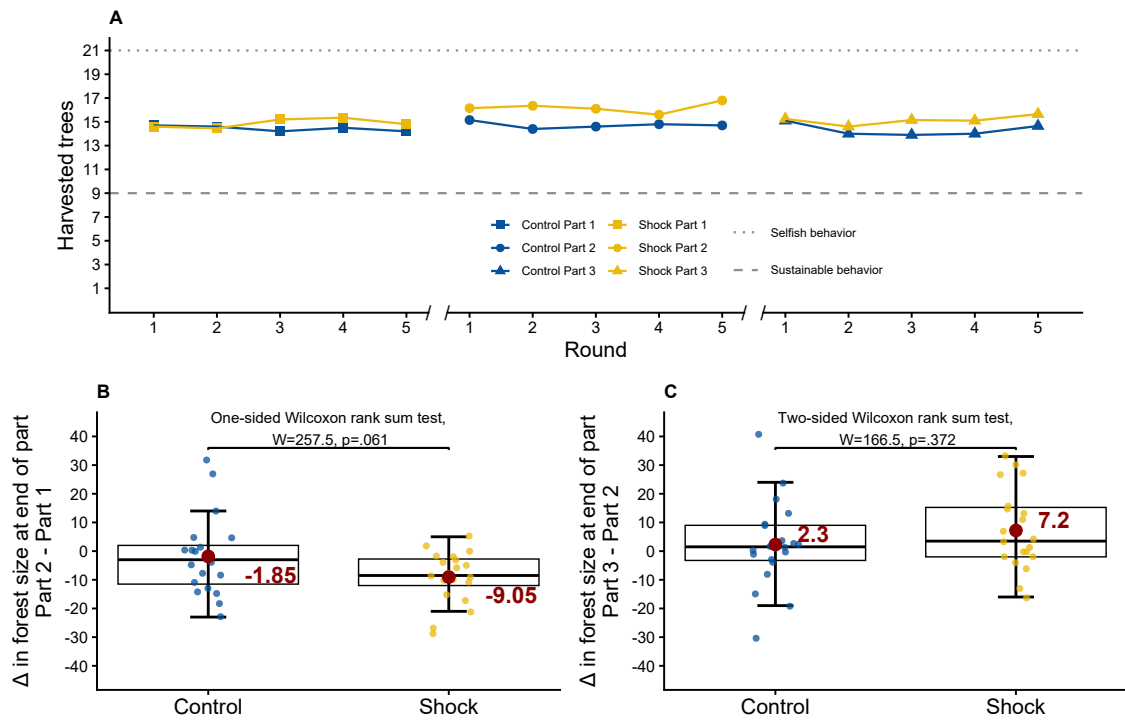


Figure 2: Harvesting behavior and changes in final forest stock. This figure displays the change in harvesting behavior across each round in all three parts separated by treatment condition (panel A), the change in forest size at the end of Part 2 and Part 1 (panel B), and the change in forest size at the end of Part 3 and Part 2 (panel C). The red values indicate the means and the solid black lines show the medians. The forest is reset to 100 trees at the beginning of each part.

49.6 trees in Part 2, corresponding to a decline of approximately 9.1 trees (see Figure 2B). This within-group decline is statistically significant (one-sided Wilcoxon signed rank test: $p < .001$). In CONTROL, the mean final forest stock is 1.9 trees lower in Part 2 than in Part 1, but this change is not statistically significant (two-sided Wilcoxon signed rank test: $p = .331$).

To estimate the differential change associated with the income shock, Figure 2B compares the Part 1-to-Part 2 change in final forest stock across conditions. The mean decline is approximately 7.2 trees larger in SHOCK than in CONTROL, which is statistically significant at the 10% level (one-sided Wilcoxon rank sum test: $p = .061$). The regression results reported in Table 1 are consistent with greater extraction following the income shock. Columns 1 and 3 compare Parts 1 and 2, with Part 1 serving as the reference period. At the group level, the difference-in-differences estimate ($\text{SHOCK} \times \text{Part 2}$) is 1.03 ($SE = 0.58, p < .100$), which indicates that the increase in mean group harvest from Part 1 to Part 2 was 1.03 trees per round larger in SHOCK than in CONTROL after accounting for the baseline difference between the two conditions and the common trend between parts in CONTROL. The corresponding individual-level interaction in Column 3—which includes control variables on the participant level, such as age, gender, and economic preferences—is 0.35 trees per participant ($SE = 0.20, p < .100$).

We additionally elicited participants' normative judgments about the maximum number of trees that should generally be considered an appropriate harvest for each group member (following Engel & Kurschilgen, 2020; Suri et al., 2026a). For the baseline version of the game, the mean normative judgment is 4.3 trees in CONTROL and 4.6 trees in SHOCK (two-

Table 1: Treatment effects on harvest levels

	Dependent variable: Harvest			
	Group level		Individual level	
	(1)	(2)	(3)	(4)
Constant	14.42*** (0.84)	14.70*** (0.86)	4.67*** (0.50)	4.75*** (0.49)
Round	0.01 (0.12)	0.01 (0.11)	0.003 (0.04)	0.003 (0.04)
Shock	0.44 (1.21)	1.47 (1.26)	0.08 (0.41)	0.45 (0.41)
Part 2	0.29 (0.48)		0.10 (0.17)	
Part 3		−0.40 (0.56)		−0.13 (0.20)
Shock × Part 2	1.03* (0.58)		0.35* (0.20)	
Shock × Part 3		−0.65 (0.74)		−0.24 (0.25)
Wald F Statistic	4.22***	1.51	2.46**	1.89
Controls	No	No	Yes	Yes
Observations	400	400	1,150	1,150
Data	Part 1 & 2	Part 2 & 3	Part 1 & 2	Part 2 & 3
Adjusted R ²	0.04	0.02		
Log Likelihood			−2,039.70	−2,040.57
Akaike Inf. Crit.			4,111.41	4,113.14
Bayesian Inf. Crit.			4,192.17	4,193.90

Notes: The table reports coefficient estimates from random-effects models in Columns 1–2 and linear mixed-effects models in Columns 3–4. The dependent variable is group-level harvest in Columns 1–2 and individual-level harvest in Columns 3–4. The models in Columns 3–4 include random intercepts for groups and participants. Shock indicates the SHOCK treatment condition. The full table including controls is depicted in Table SI-1. Some observations were dropped in Columns 3–4 due to missing values in the control variables. CR2 cluster-robust standard errors are reported in parentheses and are clustered at the group level in all columns. Levels of significance: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

sided Wilcoxon rank sum test: $p = .184$). In both conditions, the mean judgment exceeds the symmetric allocation of the sustainable group harvest—three trees per participant—by more than one tree.

Participants in SHOCK were also asked to state the maximum appropriate harvest for Part 2, when the income shock occurred. The corresponding results are shown in Figure SI-1. Within the SHOCK condition, the reported maximum appropriate harvest is approximately half a tree higher for Part 2 than for the baseline situation. This within-participant difference is statistically significant (two-sided Wilcoxon signed rank test: $p = .006$). Thus, participants report a less restrictive normative standard for harvesting when the exogenous source of income is

absent.¹⁰

After exogenous income is restored in Part 3, mean harvest in SHOCK moves descriptively toward that observed in CONTROL. We find no statistically significant round-specific differences between conditions (two-sided Wilcoxon rank sum tests: all FDR adjusted $p > .830$; all unadjusted $p > .455$). In CONTROL, the mean final forest stock is 61.6 trees, representing an increase of 2.3 trees relative to Part 2. This change is not statistically significant (see Figure 2C; two-sided Wilcoxon signed rank test: $p = .472$).

In SHOCK, the mean final forest stock increases by 7.2 trees between Parts 2 and 3 (see Figure 2C). This increase is statistically significant at the 10% level (two-sided Wilcoxon signed rank test: $p = .058$). After accounting for the corresponding change in CONTROL, however, the differential increase in final forest stock is not statistically significant (two-sided Wilcoxon rank sum test: $p = .372$). This finding is consistent with the regression estimates in Columns 2 and 4 of Table 1: the difference-in-differences estimates ($\text{SHOCK} \times \text{Part 3}$) are negative but not statistically significant at either the group level (-0.65 , $SE = 0.74$, $p > .100$) or the individual level (-0.24 , $SE = 0.25$, $p > .100$).

To assess whether harvesting behavior after the shock differs from its pre-shock level, we additionally compare Parts 1 and 3. The corresponding difference-in-differences estimate is positive but not statistically significant at the group level (0.38 , $SE = 0.77$, $p > .100$; see Column 1 of Table SI-2). The estimate remains unchanged when all three parts are included in the regression (Column 2 of Table SI-2) and is likewise positive but not statistically significant at the individual level (Columns 3 and 4 of Table SI-2). Using Part 1 as the common reference, the point estimates are consistent with partial reversion: the differential increase in group harvest associated with the exogenous income shock is 1.03 trees during the shock, compared with 0.38 trees after income is restored.

However, the non-significant comparisons alone do not establish either persistence or a return to baseline behavior, which we want to investigate based on our second main hypothesis. We therefore additionally conduct an equivalence testing approach.¹¹ The results are shown in Figure SI-2. We consider two alternative regions of practical equivalence. First, we define a small effect as one corresponding to Cohen's $d = 0.2$. Second, we use the estimated difference-in-differences effect of the exogenous income shock as a context-specific benchmark for a substantively meaningful effect. For both the Part 2-to-Part 3 and Part 1-to-Part 3 comparisons, the confidence intervals overlap the respective regions of practical equivalence but extend beyond their bounds under both definitions. Hence, we can neither establish practical equivalence nor rule out differences of a substantively meaningful magnitude. Taken together, the post-shock estimates are therefore too imprecise to distinguish conclusively between persistent shock-induced behavior and a return toward pre-shock behavior.

Finally, the estimates reported in Table 1 provide no statistically significant evidence of systematic changes in extraction during repeated play of the baseline game. In the CONTROL condition, the estimated change from Part 1 to Part 2 is small and not statistically significant

¹⁰Both normative judgments were elicited retrospectively after participants had completed all three parts of the resource extraction game. The observed difference therefore cannot establish that a change in normative judgments caused the behavioral response to the income shock. In particular, we cannot rule out that participants adjusted their reported judgments *ex post* to justify their own extraction behavior.

¹¹The approach follows the ideas outlined in Lakens et al. (2018) and Fitzgerald (2024) and is increasingly being used in the economics literature to assess the robustness of null results (see, e.g., Dimant, 2026; Suri et al., 2026b, 2026c).

at either the group or individual level (Columns 1 and 3). Likewise, the estimated change from Part 2 to Part 3 is not statistically significant (Columns 2 and 4). The coefficients on *Round* are close to zero and not statistically significant across all specifications, indicating no evidence of a common linear trend over the five rounds within each part. These results are consistent with our preregistered expectation that repetition of the baseline game does not systematically alter extraction behavior.

4 Discussion and conclusion

In this study, we investigated the behavioral mechanism behind common-pool resource management in the face of an exogenous income shock. Participants in the CONTROL condition play the same baseline game three times, whereas participants in SHOCK lose an exogenous source of income in the second iteration of the game and regain it in the third. We find evidence that the income shock increases extraction after accounting for common time trends estimated from CONTROL. This result supports the interpretation of the income-shock effect in Suri et al. (2026a) by separating the response to income loss from common changes associated with learning, repetition or fatigue.

After income is restored, extraction decreases descriptively and the final forest stock increases, but these changes are not statistically distinguishable from the corresponding changes in the CONTROL condition. At the same time, harvesting behavior in Part 3 is also not statistically distinguishable from its pre-shock level in Part 1. The point estimates are therefore consistent with partial reversion, but the post-shock estimates are too imprecise to distinguish conclusively between persistent shock-induced behavior and a return toward pre-shock behavior. The equivalence tests lead to the same conclusion: the confidence intervals overlap the regions of practical equivalence but extend beyond their bounds, such that we can neither establish practical equivalence nor rule out substantively meaningful differences. This uncertainty is particularly relevant for the role of forests as safety nets: temporary income losses may increase reliance on these resources while households are under economic pressure (Wunder et al., 2014; Mulungu & Kilimani, 2023), yet it remains important to determine how quickly behavior adjusts once income recovers. Path dependence in other common-pool resource settings suggests that prior experience can influence subsequent resource use (Pfaff et al., 2015; Blanco et al., 2015). In our setting, any behavioral carryover could reflect adaptation, changed expectations about others' behavior, or shifts in perceived appropriate extraction, but the current evidence does not distinguish among these explanations, which remains an important avenue for future research.

The normative judgments provide suggestive evidence about one possible channel of the initial response to income loss. Participants exposed to the shock retrospectively report that higher extraction is appropriate when exogenous income is absent, consistent with the interpretation in Suri et al. (2026a). However, because the judgments were elicited only after participants had completed all three parts of the experiment, we cannot distinguish a change in normative judgments that shapes behavior from *ex post* justification of behavior. Moreover, the absence of corresponding Part 2 judgments in the CONTROL condition limits the causal attribution, and no Part 3 judgments were collected to assess the normative persistence. These results should therefore be interpreted as suggestive rather than as an identified mechanism.

At the same time, the interpretation of our post-shock results requires caution. We observe participants for only five rounds after income is restored, and our estimates are not sufficiently precise to distinguish between persistence and a return toward pre-shock behavior.¹² The equivalence tests likewise indicate that neither finding is a robust null result. Hence, our design cannot establish the extent or duration of behavioral persistence after income is restored. Longer post-shock observation periods, larger samples, and designs with greater power to detect or establish equivalence could provide stronger evidence on the dynamics of post-shock adjustment. The laboratory setting and our German participant sample also limit the extent to which estimated magnitudes can be generalized to forest-dependent households “in the wild.” Our findings therefore complement rather than replace the framed field evidence in Suri et al. (2026a).

Our design deliberately implements a simple and deterministic income shock in order to isolate its behavioral effect. In real-world settings, however, economic shocks are unlikely to affect income in isolation. They may propagate through commodity and labor markets, migration, resource stocks, and governance institutions, thereby generating feedback loops that eventually alter the incentives governing common-pool resource extraction (Anderies et al., 2004; Wunder et al., 2021). In this respect, our approach could be viewed as providing a lower bound for the behavioral effect of an economic income shock on sustainable behavior. Relatedly, the shock in our design was deterministic, while shocks in real-world settings are likely to be stochastic in nature. Future experiments could thus introduce stochastic income shocks that occur unexpectedly in some rounds but not others. Uncertainty about whether and when a shock occurs may itself affect extraction decisions and could generate precautionary behavior before a loss is realized. Varying the duration of shocks would also allow researchers to examine whether repeated or prolonged exposure affects subsequent behavioral adjustment. In addition, investigating such treatments with farmers could increase external validity and might reveal additional insights, as student samples cannot always substitute for farming populations (Rommel et al., 2023; Rellensmann & Thomas, 2026).

A second extension concerns the distribution and intensity of economic hardship. In our experiment, all members of a treated group experience the same income loss. In reality, the consequences of shocks may differ substantially across households even within the same community. Krendelsberger et al. (2025) show that collective shocks reduce cooperation, while individual shocks can have the opposite effect. Brown and Kroll (2021) further provide evidence that inequality in resources and risk of loss decreases the likelihood of achieving the required threshold in a threshold public goods game. Therefore, future work could study heterogeneity in both the exposure to and intensity of exogenous income shocks. This would also allow researchers to investigate whether individuals who are more severely affected increase extraction at the expense of less affected group members and how such asymmetries influence subsequent cooperation.

Finally, future research could investigate whether institutions can mitigate both the immediate and any persistent consequences of income shocks. In resource extraction games, rules and sanctions, can foster cooperation in absence of such shocks (Cárdenas et al., 2013; Janssen et al., 2013; Gatiso et al., 2015; Handberg & Angelsen, 2015; Gatiso & Vollan, 2017;

¹²Note that our sample size selection was based on answering the main hypothesis one, not necessarily the question about persistence; even though we had a four-times larger sample size than required by the power calculation outlined in Section 2.

Kasymov et al., 2022; Zhang et al., 2022). Allowing group members to punish unsustainable harvesting, communicate, or collectively establish extraction rules could reveal whether commonly observed governance mechanisms in common-pool resource settings (Ostrom, 1990) prevent an income shock from triggering higher extraction in the first place or accelerate the return to more sustainable behavior once the shock ends.

Overall, our results highlight a behavioral link between economic vulnerability and environmental pressure. A temporary loss of income can increase extraction from a shared natural resource even when the marginal monetary incentives associated with resource use remain unchanged. Once income is restored, extraction moves descriptively toward its pre-shock level, but our estimates are too imprecise to determine whether the shock leaves a persistent behavioral effect or whether behavior effectively returns to baseline. Policies that protect households against severe income losses may therefore generate environmental benefits in addition to their direct welfare effects, while effective local resource-governance institutions may become particularly important when economic shocks cannot be avoided.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Declaration of AI and AI-assisted technologies in the writing process

During the preparation of this work, we used ChatGPT in order to improve readability and language. After using this service, we reviewed and edited the content as needed and take full responsibility for the content of the publication.

Authorship contribution statement

Dominik Atella-Suri: Conceptualization, Data collection, Data curation, Formal analysis, Methodology, Visualization, Writing – original draft, Writing – review & editing. **Annalena Tetzner:** Conceptualization, Data collection, Methodology, Writing – review & editing. **Sebastian Kube:** Conceptualization, Methodology, Writing – review & editing. **Jan Börner:** Conceptualization, Methodology, Writing – review & editing.

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Supplementary Information

for

Experimental insights on forest management under an exogenous income shock

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SI-1 Supplementary Figures and Tables

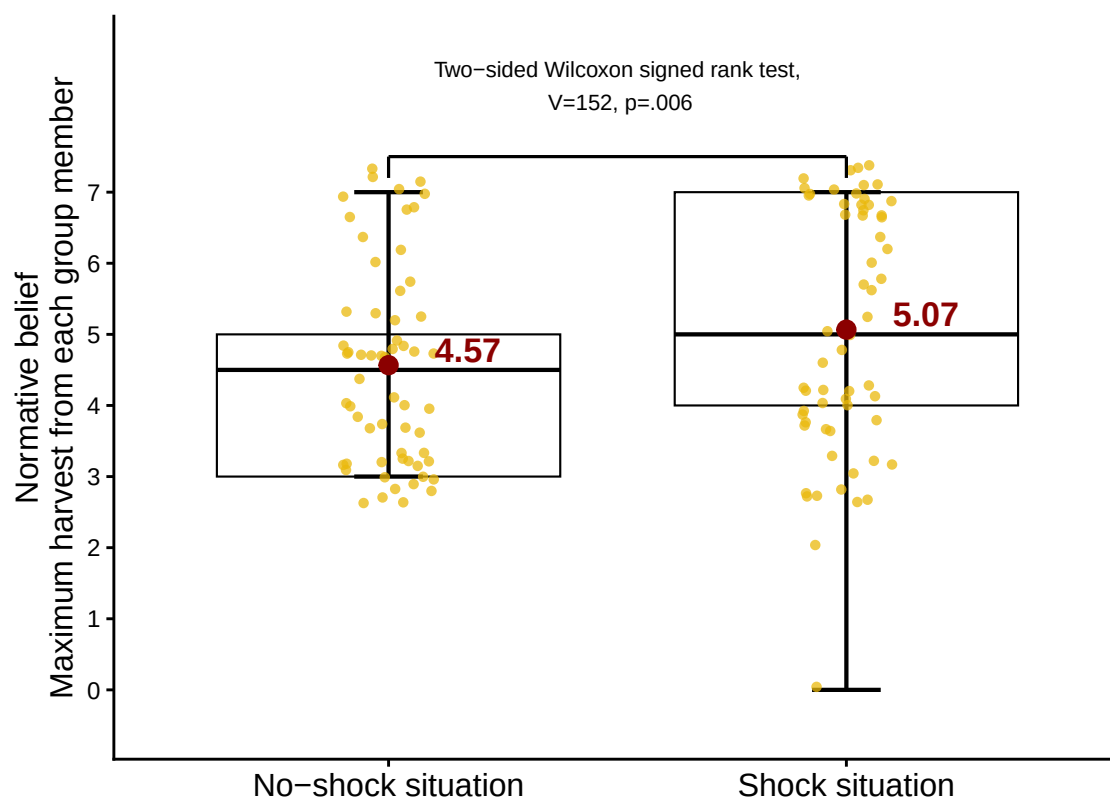


Figure SI-1: Maximum harvest belief in the SHOCK condition for Part 1 and Part 2. The figure shows the answer to the following question: “What do you believe is the maximum harvest from the community forest in Part 1 [Part 2] that should generally be expected from every group member?” The questions were asked after all three parts were finished. For Part 1 (no-shock situation) was specified that this is the situation where the exogenous income was available. For Part 2 (shock situation) was specified that the exogenous income was not available. The red values indicate the means and the solid black lines show the medians. The lower and upper hinges correspond to the first and third quartiles. Only data from the SHOCK condition is displayed.

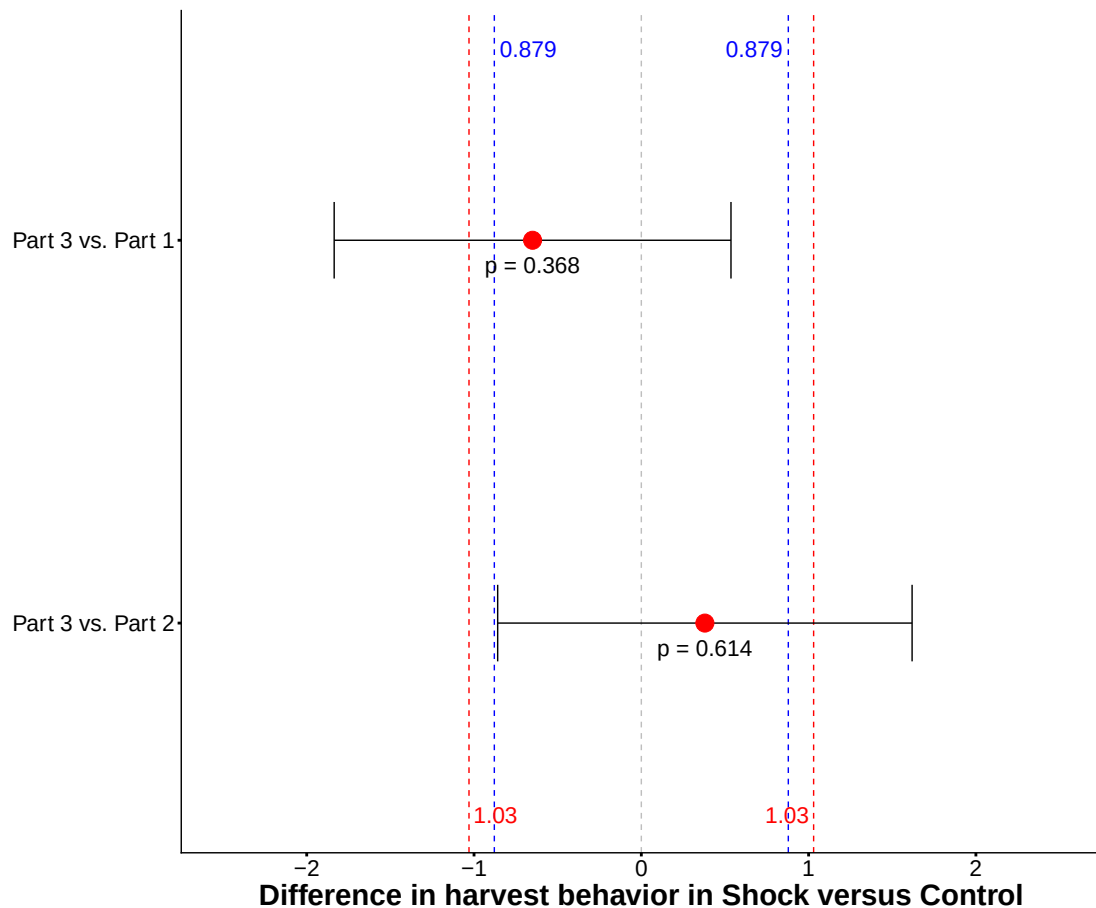


Figure SI-2: Equivalence testing of differences in group harvest behavior across treatment conditions. The figure shows the treatment effect of Shock $\times$ Part 3 as regression coefficients of the models displayed in Column 2 of Table SI-1 and Column 1 of Table-SI-2 with 90% confidence intervals using the respective data mentioned in the tables. The red dotted line indicates the maximum region of practical equivalence identified by the significant treatment effect of Shock $\times$ Part 2 as outlined in Column 1 of Table SI-1. The blue dotted line indicates the maximum region of practical equivalence corresponding to 0.2 standard deviations of the outcome (which makes use of the small effect size definition by Cohen's $d = 0.2$). Reported p-values refer to two-sided tests of the null hypothesis that the Shock $\times$ Part 3 coefficient equals zero and are based on heteroskedasticity- and serial-correlation-robust standard errors clustered at the group level.

Table SI-1: Treatment effects on harvest levels

	Dependent variable: Harvest			
	Group level		Individual level	
	(1)	(2)	(3)	(4)
Constant	14.42*** (0.84)	14.70*** (0.86)	4.67*** (0.50)	4.75*** (0.49)
Round	0.01 (0.12)	0.01 (0.11)	0.003 (0.04)	0.003 (0.04)
Shock	0.44 (1.21)	1.47 (1.26)	0.08 (0.41)	0.45 (0.41)
Part 2	0.29 (0.48)		0.10 (0.17)	
Part 3		-0.40 (0.56)		-0.13 (0.20)
Shock × Part 2	1.03* (0.58)		0.35* (0.20)	
Shock × Part 3		-0.65 (0.74)		-0.24 (0.25)
Age			-0.002 (0.01)	-0.0002 (0.01)
Male			-0.07 (0.36)	-0.07 (0.34)
Income			0.0003** (0.0001)	0.0003* (0.0001)
Income loss			-0.25 (0.27)	-0.12 (0.26)
Positive reciprocity			-0.01 (0.24)	0.03 (0.23)
Negative reciprocity			-0.06 (0.14)	-0.09 (0.14)
Altruism			-0.02 (0.15)	-0.14 (0.13)
Trust			-0.38** (0.17)	-0.34** (0.15)
Wald F Statistic	4.22***	1.51	2.46**	1.89
Observations	400	400	1,150	1,150
Data	Part 1 & 2	Part 2 & 3	Part 1 & 2	Part 2 & 3
Adjusted R ²	0.04	0.02		
Log Likelihood			-2,039.70	-2,040.57
Akaike Inf. Crit.			4,111.41	4,113.14
Bayesian Inf. Crit.			4,192.17	4,193.90

Notes: The table reports coefficient estimates from random-effects models in Columns 1–2 and linear mixed-effects models in Columns 3–4. The dependent variable is group-level harvest in Columns 1–2 and individual-level harvest in Columns 3–4. The models in Columns 3–4 include random intercepts for groups and participants. *Income loss* is a binary variable indicating whether the participant had a sudden income loss (=1) in their life. *Positive reciprocity*, *Negative reciprocity*, *Altruism*, and *Trust* represent z-scores calculated on the full sample. Some observations were dropped in Columns 3–4 due to missing values in the control variables. CR2 cluster-robust standard errors are reported in parentheses and are clustered at the group level in all columns. Levels of significance: *p<0.10, **p<0.05, ***p<0.01.

Table SI-2: Treatment effects on harvest levels with Part 1 as reference

	Dependent variable: Harvest			
	Group level		Individual level	
	(1)	(2)	(3)	(4)
Constant	14.40*** (0.80)	14.41*** (0.82)	4.55*** (0.45)	4.63*** (0.46)
Round	0.01 (0.12)	0.01 (0.10)	0.004 (0.04)	0.003 (0.04)
Shock	0.44 (1.21)	0.44 (1.21)	0.11 (0.41)	0.10 (0.41)
Part 2		0.29 (0.48)		0.10 (0.17)
Part 3	-0.11 (0.66)	-0.11 (0.66)	-0.03 (0.23)	-0.03 (0.23)
Shock × Part 2		1.03* (0.58)		0.35* (0.20)
Shock × Part 3	0.38 (0.77)	0.38 (0.77)	0.11 (0.27)	0.11 (0.27)
Age			0.003 (0.01)	0.0003 (0.01)
Male			0.04 (0.35)	-0.04 (0.35)
Income			0.0002 (0.0001)	0.0003* (0.0001)
Income loss			-0.22 (0.25)	-0.20 (0.25)
Positive reciprocity			0.07 (0.26)	0.03 (0.24)
Negative reciprocity			-0.09 (0.15)	-0.08 (0.14)
Altruism			-0.07 (0.13)	-0.07 (0.13)
Trust			-0.33* (0.16)	-0.35** (0.16)
Wald F Statistic	0.15	2.73**	0.72	2.16*
Observations	400	600	1,150	1,725
Data	Part 1 & 3	Full sample	Part 1 & 3	Full sample
Adjusted R ²	-0.01	0.02		
Log Likelihood			-2,086.72	-3,050.18
Akaike Inf. Crit.			4,205.43	6,136.35
Bayesian Inf. Crit.			4,286.19	6,234.51

Notes: The table reports coefficient estimates from random-effects models in Columns 1–2 and linear mixed-effects models in Columns 3–4. The dependent variable is group-level harvest in Columns 1–2 and individual-level harvest in Columns 3–4. The models in Columns 3–4 include random intercepts for groups and participants. *Income loss* is a binary variable indicating whether the participant had a sudden income loss (=1) in their life. *Positive reciprocity*, *Negative reciprocity*, *Altruism*, and *Trust* represent z-scores calculated on the full sample. Some observations were dropped in Columns 3–4 due to missing values in the control variables. CR2 cluster-robust standard errors are reported in parentheses and are clustered at the group level in all columns. Levels of significance: *p<0.10, **p<0.05, ***p<0.01.

SI-2 Experimental Instructions

This section presents the original instruction of the resource extraction game in German as presented to participants alongside an English translation. Each horizontal line indicates a new screen. Where appropriate, we add comments **** in italic text between asterisks ****. These comments were not shown to participants.

SI-2.1 Part 1: The baseline game (identical for all)

Instruktionen für Teil 1

Allgemeines

Sie bilden gemeinsam mit zwei anderen Personen eine Gruppe. Diese Personen nehmen jetzt gerade auch an der Studie hier im BonnEconLab teil. Sie wissen nicht, wer die anderen zwei Personen sind. Ebenso wissen die anderen Gruppenmitglieder nicht, wer Sie sind und wer die jeweils andere Person ist.

Dieser Teil besteht aus 5 Runden.

Entscheidungssituation

Als Gruppe verfügen Sie über einen Wald. Jedes Gruppenmitglied trifft in jeder Runde die Entscheidung, wie viele Bäume er/sie aus dem Wald entnehmen möchte.

Zu Beginn der ersten Runde stehen 100 Bäume im Wald.

Die maximale Anzahl, die jedes Gruppenmitglied in einer Runde entnehmen kann, ist 7 Bäume. Jedes Gruppenmitglied trifft in jeder Runde die Entscheidung, ob er/sie 0, 1, 2, 3, 4, 5, 6 oder 7 Bäume entnehmen möchte.

Diese Entscheidung wird zeitgleich getroffen. Am Ende jeder Runde erhält jedes Gruppenmitglied die Information, wie viele Bäume die gesamte Gruppe entnommen hat, nicht aber, wie viele Bäume jedes einzelne Gruppenmitglied entnommen hat.

Entwicklung des Waldes

Wenn Bäume entnommen werden, dann nimmt die Größe des Waldes zunächst ab. Am Ende jeder Runde können Bäume nachwachsen.

Es wachsen 10% der verbliebenen Bäume nach. Es können jedoch nur ganze Bäume nachwachsen, d. h. es wird auf ganze Bäume abgerundet. Nehmen Sie z. B. an, dass nach der Entnahme 85 Bäume vorhanden sind. 10% hiervon sind 8,5 Bäume. Dies wird auf 8 ganze Bäume abgerundet, sodass am Ende der Runde 93 Bäume vorhanden sind.

Insgesamt kann der Wald aus maximal 100 Bäumen bestehen.

Verdienst

Jeder entnommene Baum generiert 2 Punkte für die Person, die ihn entnommen hat. Für 0 entnommene Bäume erhält man 0 Punkte, für 1 entnommenen Baum erhält man 2 Punkte, für 2 entnommene Bäume erhält man 4 Punkte usw. Wenn ein Gruppenmitglied 7 Bäume entnimmt, erhält er/sie am Ende der Runde 14 Punkte.

Neben den entnommenen Bäumen generieren die am Ende der 5. Runde verbliebenen Bäume ebenso Punkte. Der Wert des Waldes (2 Punkte pro verbliebenem Baum) wird hierfür verdoppelt. Dann erhält jedes Gruppenmitglied einen gleichen Anteil des Wertes des Waldes. Nehmen Sie z. B. an, dass 15 Bäume am Ende der 5. Runde vorhanden sind. Diese 15 Bäume haben einen Wert von 30 Punkten. Dieser Wert wird auf 60 Punkte verdoppelt. Jedes Gruppenmitglied erhält nun einen gleichen Anteil dieser 60 Punkte, also 20 Punkte.

Jedes Gruppenmitglied hat in jeder Runde eine zusätzliche Einkommensquelle, die 8 Punkte generiert.

Gleichzeitig hat jedes Gruppenmitglied in jeder Runde Ausgaben in Höhe von 8 Punkten.

Die Entscheidung, wie viele Bäume entnommen werden, hat keinen Einfluss auf die zusätzliche Einkommensquelle und die Ausgaben.

Zusätzlich erhält jedes Gruppenmitglied zu Beginn der 1. Runde 50 Punkte als Startguthaben.

Am Ende jeder Runde wird die zusätzliche Einkommensquelle zu den Punkten, die Sie durch Ihre Entscheidung generiert haben, hinzugefügt. Dann werden die Ausgaben abgezogen. Das Ergebnis hiervon wird zu den Punkten hinzuaddiert, die Sie in den bisherigen Runden generiert haben, inklusive Ihres Startguthabens.

Am Ende der Studie werden die Punkte in reales Geld umgewandelt. Hierbei wird jeweils **1 Punkt in 9 Cent umgewandelt**.

Instructions for Part 1

General Information

You form a group together with two other persons. These persons are currently also participating in the study here at the BonnEconLab. You do not know who the other two persons are. Likewise, the other group members do not know who you are or who the respective other

person is.

This part consists of 5 rounds.

Decision Situation

As a group, you have access to a forest. In each round, each group member decides how many trees he/she would like to harvest from the forest.

At the beginning of the first round, there are 100 trees in the forest.

The maximum number of trees that each group member can harvest in one round is 7. In each round, each group member decides whether he/she would like to harvest 0, 1, 2, 3, 4, 5, 6, or 7 trees.

These decisions are made simultaneously. At the end of each round, each group member receives information about how many trees the group as a whole has harvested, but not about how many trees each individual group member has harvested.

Development of the Forest

When trees are harvested, the size of the forest initially decreases. At the end of each round, trees can regrow.

The number of trees that regrow is equal to 10% of the trees remaining in the forest. However, only whole trees can regrow, i.e., the number is rounded down to the nearest whole number. For example, suppose that 85 trees remain after harvesting. 10% of these are 8.5 trees. This is rounded down to 8 whole trees, so that there are 93 trees in the forest at the end of the round. The forest can contain a maximum of 100 trees in total.

Earnings

Each harvested tree generates 2 points for the person who harvested it. Harvesting 0 trees yields 0 points, harvesting 1 tree yields 2 points, harvesting 2 trees yields 4 points, and so on. If a group member harvests 7 trees, he/she receives 14 points at the end of the round.

In addition to the harvested trees, the trees remaining at the end of the 5th round also generate points. For this purpose, the value of the forest (2 points per remaining tree) is doubled. Each group member then receives an equal share of the value of the forest. For example, suppose that 15 trees remain at the end of the 5th round. These 15 trees have a value of 30 points. This value is doubled to 60 points. Each group member then receives an equal share of these 60 points, i.e., 20 points.

In each round, each group member has an additional source of income that generates 8 points. At the same time, each group member incurs costs of 8 points in each round.

The decision about how many trees to harvest has no effect on the additional source of income or on the costs.

In addition, each group member receives an initial endowment of 50 points at the beginning of the 1st round.

At the end of each round, the additional source of income is added to the points that you generated through your decision. The costs are then deducted. The resulting amount is added to the points that you have generated in the previous rounds, including your initial endowment. At the end of the study, the points are converted into real money. **Each point is converted into 9 euro cents.**

Ein Beispiel

Im Folgenden wird die Situation, in der Sie sich in diesem Teil befinden, anhand eines Beispiels dargestellt. Dieses Beispiel umfasst 3 Runden.

Bitte beachten Sie: Sie werden Ihre Entscheidungen nicht über 3, sondern über 5 Runden hinweg treffen, und zu Beginn von Runde 1 werden 100 Bäume im Wald stehen.

Runde 1

Zustand des Waldes zu Beginn von Runde 1

Zu Beginn der Runde sind 65 Bäume im Wald vorhanden.



Entscheidungen der drei Gruppenmitglieder

- Gruppenmitglied A entnimmt 5 Bäume.
- Gruppenmitglied B entnimmt 2 Bäume.
- Gruppenmitglied C entnimmt 3 Bäume.

Die gesamte Gruppe hat 10 Bäume entnommen.

Bitte beachten Sie: Sie haben später lediglich die Information, wie viele Bäume Sie und Ihre Gruppe als Ganzes entnommen haben.

Zustand des Waldes nach der Entnahme

Zu Beginn der Runde sind 65 Bäume im Wald vorhanden. Die Gruppe entnimmt 10 Bäume. Nach der Entnahme sind 55 Bäume vorhanden.



Verdienst in Runde 1

Gruppenmitglied A

Als Startguthaben erhält Gruppenmitglied A 50 Punkte.

Gruppenmitglied A erhält 10 Punkte für die entnommenen Bäume. Es werden 8 Punkte für die zusätzliche Einkommensquelle hinzugefügt und 8 Punkte für die Ausgaben abgezogen. In dieser Runde erhält Gruppenmitglied A insgesamt 10 Punkte.

Nach dieser Runde hat Gruppenmitglied A 50 Punkte Startguthaben + 10 Punkte aus entnommenen Bäumen + 8 Punkte zusätzliches Einkommen - 8 Punkte Ausgaben = 60 Punkte.

Gruppenmitglied B

Als Startguthaben erhält Gruppenmitglied B 50 Punkte.

Gruppenmitglied B erhält 4 Punkte für die entnommenen Bäume. Es werden 8 Punkte für die zusätzliche Einkommensquelle hinzugefügt und 8 Punkte für die Ausgaben abgezogen. In dieser Runde erhält Gruppenmitglied B insgesamt 4 Punkte.

Nach dieser Runde hat Gruppenmitglied B 50 Punkte Startguthaben + 4 Punkte aus entnommenen Bäumen + 8 Punkte zusätzliches Einkommen - 8 Punkte Ausgaben = 54 Punkte.

Gruppenmitglied C

Als Startguthaben erhält Gruppenmitglied C 50 Punkte.

Gruppenmitglied C erhält 6 Punkte für die entnommenen Bäume. Es werden 8 Punkte für die zusätzliche Einkommensquelle hinzugefügt und 8 Punkte für die Ausgaben abgezogen. In dieser Runde erhält Gruppenmitglied C insgesamt 6 Punkte.

Nach dieser Runde hat Gruppenmitglied C 50 Punkte Startguthaben + 6 Punkte aus entnommenen Bäumen + 8 Punkte zusätzliches Einkommen - 8 Punkte Ausgaben = 56 Punkte.

Zustand des Waldes am Ende von Runde 1

Nach der Entnahme sind 55 Bäume vorhanden. Aufgrund der Wachstumsrate von 10 % wachsen 5 Bäume nach. Am Ende der Runde sind 60 Bäume vorhanden.



Runde 2

Zu Beginn der Runde sind 60 Bäume im Wald vorhanden.



Entscheidungen der drei Gruppenmitglieder

- Gruppenmitglied A entnimmt 0 Bäume.
- Gruppenmitglied B entnimmt 0 Bäume.
- Gruppenmitglied C entnimmt 0 Bäume.

Die gesamte Gruppe hat somit 0 Bäume entnommen.

Zustand des Waldes nach der Entnahme

Zu Beginn der Runde sind 60 Bäume im Wald vorhanden. Die Gruppe entnimmt 0 Bäume. Nach der Entnahme sind 60 Bäume vorhanden.



Verdienst in Runde 2

Gruppenmitglied A

Aus der vorherigen Runde hat Gruppenmitglied A 60 Punkte.

Gruppenmitglied A erhält 0 Punkte für die entnommenen Bäume. Es werden 8 Punkte für die zusätzliche Einkommensquelle hinzugefügt und 8 Punkte für die Ausgaben abgezogen. In dieser Runde erhält Gruppenmitglied A insgesamt 0 Punkte.

Nach dieser Runde hat Gruppenmitglied A 60 Punkte aus der vorherigen Runde + 0 Punkte aus entnommenen Bäumen + 8 Punkte zusätzliches Einkommen - 8 Punkte Ausgaben = 60 Punkte.

Gruppenmitglied B

Aus der vorherigen Runde hat Gruppenmitglied B 54 Punkte.

Gruppenmitglied B erhält 0 Punkte für die entnommenen Bäume. Es werden 8 Punkte für die zusätzliche Einkommensquelle hinzugefügt und 8 Punkte für die Ausgaben abgezogen. In dieser Runde erhält Gruppenmitglied B insgesamt 0 Punkte.

Nach dieser Runde hat Gruppenmitglied B 54 Punkte aus der vorherigen Runde + 0 Punkte aus entnommenen Bäumen + 8 Punkte zusätzliches Einkommen - 8 Punkte Ausgaben = 54 Punkte.

Gruppenmitglied C

Aus der vorherigen Runde hat Gruppenmitglied C 56 Punkte.

Gruppenmitglied C erhält 0 Punkte für die entnommenen Bäume. Es werden 8 Punkte für die zusätzliche Einkommensquelle hinzugefügt und 8 Punkte für die Ausgaben abgezogen. In dieser Runde erhält Gruppenmitglied C insgesamt 0 Punkte.

Nach dieser Runde hat Gruppenmitglied C 56 Punkte aus der vorherigen Runde + 0 Punkte aus entnommenen Bäumen + 8 Punkte zusätzliches Einkommen - 8 Punkte Ausgaben = 56 Punkte.

Zustand des Waldes am Ende von Runde 2

Nach der Entnahme sind 60 Bäume vorhanden. Aufgrund der Wachstumsrate von 10 % wachsen 6 Bäume nach. Am Ende der Runde sind 66 Bäume vorhanden.



Runde 3

Zu Beginn der Runde sind 66 Bäume im Wald vorhanden.



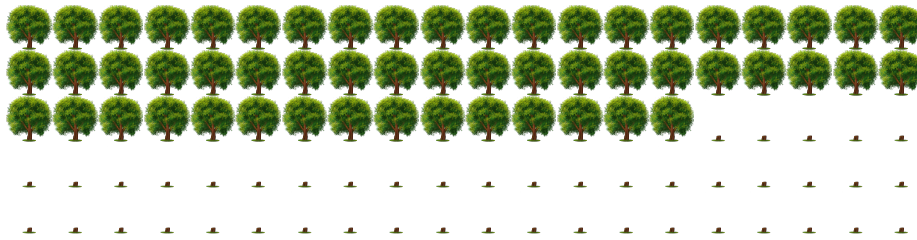
Entscheidungen der drei Gruppenmitglieder

- Gruppenmitglied A entnimmt 1 Baum.
- Gruppenmitglied B entnimmt 3 Bäume.
- Gruppenmitglied C entnimmt 7 Bäume.

Die gesamte Gruppe hat 11 Bäume entnommen.

Zustand des Waldes nach der Entnahme

Zu Beginn der Runde sind 66 Bäume im Wald vorhanden. Die Gruppe entnimmt 11 Bäume. Nach der Entnahme sind 55 Bäume vorhanden.



Verdienst in Runde 3

Gruppenmitglied A

Aus der vorherigen Runde hat Gruppenmitglied A 60 Punkte.

Gruppenmitglied A erhält 2 Punkte für die entnommenen Bäume. Es werden 8 Punkte für die zusätzliche Einkommensquelle hinzugefügt und 8 Punkte für die Ausgaben abgezogen. In dieser Runde erhält Gruppenmitglied A insgesamt 2 Punkte.

Nach dieser Runde hat Gruppenmitglied A 60 Punkte aus der vorherigen Runde + 2 Punkte aus entnommenen Bäumen + 8 Punkte zusätzliches Einkommen - 8 Punkte Ausgaben = 62 Punkte.

Gruppenmitglied B

Aus der vorherigen Runde hat Gruppenmitglied B 54 Punkte.

Gruppenmitglied B erhält 6 Punkte für die entnommenen Bäume. Es werden 8 Punkte für die zusätzliche Einkommensquelle hinzugefügt und 8 Punkte für die Ausgaben abgezogen. In dieser Runde erhält Gruppenmitglied B insgesamt 6 Punkte.

Nach dieser Runde hat Gruppenmitglied B 54 Punkte aus der vorherigen Runde + 6 Punkte aus entnommenen Bäumen + 8 Punkte zusätzliches Einkommen - 8 Punkte Ausgaben = 60 Punkte.

Gruppenmitglied C

Aus der vorherigen Runde hat Gruppenmitglied C 56 Punkte.

Gruppenmitglied C erhält 14 Punkte für die entnommenen Bäume. Es werden 8 Punkte für die zusätzliche Einkommensquelle hinzugefügt und 8 Punkte für die Ausgaben abgezogen. In dieser Runde erhält Gruppenmitglied C insgesamt 14 Punkte.

Nach dieser Runde hat Gruppenmitglied C 56 Punkte aus der vorherigen Runde + 14 Punkte aus entnommenen Bäumen + 8 Punkte zusätzliches Einkommen - 8 Punkte Ausgaben = 70 Punkte.

Zustand des Waldes am Ende von Runde 3

Nach der Entnahme sind 55 Bäume vorhanden. Aufgrund der Wachstumsrate von 10 % wachsen 5 Bäume nach. Am Ende der Runde sind 60 Bäume vorhanden.



Gesamtauszahlung nach Runde 3

Nehmen Sie an, dass Runde 3 die letzte Runde ist. Nun erhält jedes Gruppenmitglied einen gleichen Anteil an dem Wert des Waldes. 60 Bäume sind im Wald verblieben. Diese haben einen Wert von 120 Punkten. Nun wird der Wert zu 240 Punkten verdoppelt.

Jedes Gruppenmitglied erhält nun einen gleichen Anteil von $240/3 = 80$ Punkten.

- Gruppenmitglied A erhält insgesamt 50 Punkte (Startguthaben) + 10 Punkte (Runde 1) + 0 Punkte (Runde 2) + 2 Punkte (Runde 3) + 80 Punkte (Anteil am Wert des Waldes am Ende der letzten Runde) = 142 Punkte.
- Gruppenmitglied B erhält insgesamt 50 Punkte (Startguthaben) + 4 Punkte (Runde 1) + 0 Punkte (Runde 2) + 6 Punkte (Runde 3) + 80 Punkte (Anteil am Wert des Waldes am Ende der letzten Runde) = 140 Punkte.

- Gruppenmitglied C erhält insgesamt 50 Punkte (Startguthaben) + 6 Punkte (Runde 1) + 0 Punkte (Runde 2) + 14 Punkte (Runde 3) + 80 Punkte (Anteil am Wert des Waldes am Ende der letzten Runde) = 150 Punkte.

An Example

The situation you will face in this part is illustrated below using an example. This example consists of 3 rounds.

Please note: You will make your decisions over 5 rounds, not 3 rounds, and at the begin-

ning of Round 1 there will be 100 trees in the forest.

Round 1

State of the Forest at the Beginning of Round 1

At the beginning of the round, there are 65 trees in the forest.

< Image of the forest is displayed. >

Decisions of the Three Group Members

- Group member A harvests 5 trees.
- Group member B harvests 2 trees.
- Group member C harvests 3 trees.

The group as a whole has harvested 10 trees.

Please note: Later, you will only receive information about how many trees you harvested and how many trees your group harvested as a whole.

State of the Forest After Harvesting

At the beginning of the round, there are 65 trees in the forest. The group harvests 10 trees. After harvesting, 55 trees remain.

< Image of the forest is displayed. >

Earnings in Round 1

Group Member A

As an initial endowment, group member A receives 50 points.

Group member A receives 10 points for the harvested trees. 8 points from the additional source of income are added, and 8 points for costs are deducted. In this round, group member A receives a total of 10 points.

After this round, group member A has 50 points initial endowment + 10 points from harvested trees + 8 points additional income - 8 points costs = 60 points.

Group Member B

As an initial endowment, group member B receives 50 points.

Group member B receives 4 points for the harvested trees. 8 points from the additional source of income are added, and 8 points for costs are deducted. In this round, group member B receives a total of 4 points.

After this round, group member B has 50 points initial endowment + 4 points from harvested trees + 8 points additional income - 8 points costs = 54 points.

Group Member C

As an initial endowment, group member C receives 50 points.

Group member C receives 6 points for the harvested trees. 8 points from the additional source of income are added, and 8 points for costs are deducted. In this round, group member C receives a total of 6 points.

After this round, group member C has 50 points initial endowment + 6 points from harvested trees + 8 points additional income - 8 points costs = 56 points.

State of the Forest at the End of Round 1

After harvesting, 55 trees remain. Due to the growth rate of 10%, 5 trees regrow. At the end of the round, there are 60 trees in the forest.

< Image of the forest is displayed. >

Round 2

At the beginning of the round, there are 60 trees in the forest.

< Image of the forest is displayed. >

Decisions of the Three Group Members

- Group member A harvests 0 trees.
- Group member B harvests 0 trees.
- Group member C harvests 0 trees.

Thus, the group as a whole has harvested 0 trees.

State of the Forest After Harvesting

At the beginning of the round, there are 60 trees in the forest. The group harvests 0 trees. After harvesting, 60 trees remain.

< Image of the forest is displayed. >

Earnings in Round 2

Group Member A

From the previous round, group member A has 60 points.

Group member A receives 0 points for the harvested trees. 8 points from the additional source of income are added, and 8 points for costs are deducted. In this round, group member A receives a total of 0 points.

After this round, group member A has 60 points from the previous round + 0 points from harvested trees + 8 points additional income - 8 points costs = 60 points.

Group Member B

From the previous round, group member B has 54 points.

Group member B receives 0 points for the harvested trees. 8 points from the additional source of income are added, and 8 points for costs are deducted. In this round, group member B receives a total of 0 points.

After this round, group member B has 54 points from the previous round + 0 points from harvested trees + 8 points additional income - 8 points costs = 54 points.

Group Member C

From the previous round, group member C has 56 points.

Group member C receives 0 points for the harvested trees. 8 points from the additional source of income are added, and 8 points for costs are deducted. In this round, group member C receives a total of 0 points.

After this round, group member C has 56 points from the previous round + 0 points from harvested trees + 8 points additional income - 8 points costs = 56 points.

State of the Forest at the End of Round 2

After harvesting, 60 trees remain. Due to the growth rate of 10%, 6 trees regrow. At the end of the round, there are 66 trees in the forest.

< Image of the forest is displayed. >

Round 3

At the beginning of the round, there are 66 trees in the forest.

< Image of the forest is displayed. >

Decisions of the Three Group Members

- Group member A harvests 1 tree.
- Group member B harvests 3 trees.
- Group member C harvests 7 trees.

The group as a whole has harvested 11 trees.

State of the Forest After Harvesting

At the beginning of the round, there are 66 trees in the forest. The group harvests 11 trees. After harvesting, 55 trees remain.

< Image of the forest is displayed. >

Earnings in Round 3

Group Member A

From the previous round, group member A has 60 points.

Group member A receives 2 points for the harvested tree. 8 points from the additional source of income are added, and 8 points for costs are deducted. In this round, group member A receives a total of 2 points.

After this round, group member A has 60 points from the previous round + 2 points from harvested trees + 8 points additional income - 8 points costs = 62 points.

Group Member B

From the previous round, group member B has 54 points.

Group member B receives 6 points for the harvested trees. 8 points from the additional source of income are added, and 8 points for costs are deducted. In this round, group member B receives a total of 6 points.

After this round, group member B has 54 points from the previous round + 6 points from harvested trees + 8 points additional income - 8 points costs = 60 points.

Group Member C

From the previous round, group member C has 56 points.

Group member C receives 14 points for the harvested trees. 8 points from the additional source of income are added, and 8 points for costs are deducted. In this round, group member C receives a total of 14 points.

After this round, group member C has 56 points from the previous round + 14 points from harvested trees + 8 points additional income - 8 points costs = 70 points.

State of the Forest at the End of Round 3

After harvesting, 55 trees remain. Due to the growth rate of 10%, 5 trees regrow. At the end of the round, there are 60 trees in the forest.

< Image of the forest is displayed. >

Total Payout After Round 3

Suppose that Round 3 is the final round. Each group member now receives an equal share of the value of the forest. There are 60 trees remaining in the forest. These have a value of 120 points. This value is then doubled to 240 points.

Each group member now receives an equal share of $240/3 = 80$ points.

- Group member A receives a total of 50 points (initial endowment) + 10 points (Round 1) + 0 points (Round 2) + 2 points (Round 3) + 80 points (share of the value of the forest at the end of the final round) = 142 points.
 - Group member B receives a total of 50 points (initial endowment) + 4 points (Round 1) + 0 points (Round 2) + 6 points (Round 3) + 80 points (share of the value of the forest at the end of the final round) = 140 points.
 - Group member C receives a total of 50 points (initial endowment) + 6 points (Round 1) + 0 points (Round 2) + 14 points (Round 3) + 80 points (share of the value of the forest at the end of the final round) = 150 points.
-

Kontrollfragen

Im Folgenden werden Sie einige kurze Kontrollfragen beantworten. Wir nutzen diese Kontrollfragen lediglich dazu, um sicherzustellen, dass alle Studienteilnehmenden die Entscheidungssituation verstanden haben. Ihre Antworten zu den Kontrollfragen haben keinen Einfluss auf Ihre Auszahlung.

[Instruktionen noch einmal anzeigen](#)

1. Erhalten Sie Punkte für die Anzahl der Bäume, die am Ende der 5. Runde im Wald stehen?

☐ Ja ☐ Nein ☐ Kann man pauschal nicht sagen.

2. Hängt die Anzahl der Bäume am Ende der 5. Runde nur von Ihren Entscheidungen ab?

☐ Ja ☐ Nein ☐ Kann man pauschal nicht sagen.

3. Bis zu wie viele Bäume kann jedes Gruppenmitglied in jeder Runde maximal entnehmen?

4. Können Sie frei entscheiden, wie viele Bäume Sie in jeder Runde entnehmen wollen (unter der Beschränkung aus der vorherigen Frage)?

☐ Ja ☐ Nein ☐ Kann man pauschal nicht sagen.

5. Kann der Wald größer als 100 Bäume werden?

☐ Ja ☐ Nein ☐ Kann man pauschal nicht sagen.

[Weiter](#)

Comprehension Questions

In the following, you will answer a few short comprehension questions. We use these questions solely to ensure that all study participants have understood the decision situation. Your answers to the comprehension questions have no effect on your payout.

< Button to display the instruction again. >

1. Do you receive points for the number of trees remaining in the forest at the end of Round 5? < Answer options: Yes / No / It is not possible to say in general.>

2. Does the number of trees remaining in the forest at the end of Round 5 depend only on your decisions? < Answer options: Yes / No / It is not possible to say in general.>

3. What is the maximum number of trees that each group member can harvest in each round? < Integer field for answer. >

4. Can you freely decide how many trees you want to harvest in each round, subject to the restriction stated in the previous question? < Answer options: Yes / No / It is not possible to say in general.>

5. Can the forest grow to more than 100 trees? < Answer options: Yes / No / It is not possible to say in general.>

Runde 1



Im Wald stehen 100 Bäume.

Ihre Ausgaben betragen diese Runde 8 Punkte. Ihr zusätzliches Einkommen beträgt 8 Punkte.

Wie viele Bäume möchten Sie entnehmen?

Round 1

< Image of the forest is displayed. >

There are 100 trees in the forest.

Your expenses in this round are 8 points. Your additional income is 8 points.

How many trees would you like to harvest? < Integer field for answer. >

Runde 1



Sie haben diese Runde 7 Bäume entnommen. Für diese haben Sie 14 Punkte erhalten.

Im Wald standen 100 Bäume. Ihre Gruppe hat in dieser Runde insgesamt 21 Bäume entnommen. Damit bleiben 79 Bäume übrig.

Da für jeden zehnten Baum einer nachwächst (Wachstumsrate von 10%), sind 7 Bäume nachgewachsen. Aktuell stehen 86 Bäume im Wald.

Sie hatten diese Runde Ausgaben in Höhe von 8 Punkten und ein zusätzliches Einkommen in Höhe von 8 Punkten. Insgesamt haben Sie diese Runde damit 14 Punkte erhalten.

Klicken Sie „Weiter“, um mit der nächsten Runde zu starten.

Weiter

Round 1

< Image of the forest is displayed. >

You harvested 7 trees in this round. You received 14 points for these trees.

There were 100 trees in the forest. In this round, your group harvested a total of 21 trees. This leaves 79 trees.

Since one tree regrows for every ten trees remaining (growth rate of 10%), 7 trees have regrown. There are currently 86 trees in the forest.

Your expenses in this round were 8 points, and your additional income was 8 points.

Overall, you received 14 points in this round.

Click “Continue” to start the next round.

*** *In this example, each group member harvested 7 trees. Visual animation showed the harvest and the re-growth. This decision-making situation continues for four more rounds.* ***

Ergebnis

Das war Teil 1 dieser Studie.

Sie haben in diesem Teil über alle Runden hinweg zusammengerechnet 35 Bäume entnommen. Ihre Gruppe hat insgesamt 105 Bäume entnommen.

Ihr Punktestand nach der Entnahme in der letzten Runde beträgt 120 Punkte.

Am Ende der letzten Runde sind noch 17 Bäume vorhanden. Diese haben einen Wert von $17 \text{ Bäumen} \times 2 \text{ Punkten pro Baum} = 34,0 \text{ Punkten}$. Nun wird der Wert zu 68 Punkten verdoppelt. Jedes Gruppenmitglied erhält davon einen gleichen Anteil in Höhe von 22,67 Punkten.

Insgesamt haben Sie in diesem Teil 142,67 Punkte verdient.

Wenn dieser Teil am Ende der Studie zufällig ausgewählt wird, erhalten Sie den Geldwert dieser Punkte zusätzlich zu Ihrer Auszahlung für den Fragebogen.

Result

This was Part 1 of the study.

Across all rounds in this part, you harvested a total of 35 trees. Your group harvested a total of 105 trees.

Your point total after harvesting in the final round is 120 points.

At the end of the final round, 17 trees remain. These have a value of $17 \text{ trees} \times 2 \text{ points per tree} = 34.0 \text{ points}$. This value is then doubled to 68 points. Each group member receives an equal share of 22.67 points.

Overall, you earned 142.67 points in this part.

If this part is randomly selected at the end of the study, you will receive the monetary value of these points in addition to your payment for the questionnaire.

*** *In this example, each group member harvested 7 trees throughout each round of the game.*

SI-2.2 Part 2: The baseline game (only in CONTROL)

Instruktionen für Teil 2

Sie befinden sich in **derselben** Entscheidungssituation wie in Teil 1.

Der Wald wird zu Beginn der ersten Runde erneut auf 100 Bäume aufgefüllt.

Ihre Gruppe bleibt dieselbe wie zuvor.

[Instruktionen aus Teil 1 noch einmal anzeigen](#)

[Weiter](#)

Instructions for Part 2

You are in the **same** decision situation as in Part 1.

At the beginning of the first round, the forest is replenished to 100 trees.

Your group remains the same as before.

< Button to display the instruction again. >

*** Afterwards, participants face a similar decision screen as displayed before, including the image of the forest and the animation of harvest and re-growth. ***

SI-2.3 Part 2: The shock situation (only in Shock)

Instruktionen für Teil 2

Sie befinden sich in einer ähnlichen Entscheidungssituation wie in Teil 1, mit einer Ausnahme: **Anders als in Teil 1 hat nun jedes Gruppenmitglied keine zusätzliche Einkommensquelle mehr.** Das heißt, jedes Gruppenmitglied erhält am Ende jeder Runde zunächst die Anzahl an Punkten für die entnommenen Bäume. Dann werden die Ausgaben abgezogen.

Ansonsten gibt es keine Änderung im Vergleich zu Teil 1.

Der Wald wird zu Beginn der ersten Runde erneut auf 100 Bäume aufgefüllt.

Ihre Gruppe bleibt dieselbe wie zuvor.

[Instruktionen aus Teil 1 noch einmal anzeigen](#)

[Weiter](#)

Instructions for Part 2

You are in a decision situation similar to Part 1, with one exception: **Unlike in Part 1, each group member now no longer has an additional source of income.** This means that at the end of each round, each group member first receives the number of points generated by the trees they harvested. The expenses are then deducted.

Otherwise, there are no changes compared with Part 1.

At the beginning of the first round, the forest is replenished to 100 trees.

Your group remains the same as before.

< Button to display the instruction again. >

*** Afterwards, participants face a similar decision screen as displayed before, including the image of the forest and the animation of harvest and re-growth. ***

SI-2.4 Part 3: The baseline game (only in CONTROL)

Instruktionen für Teil 3

Sie befinden sich in **derselben** Entscheidungssituation wie in Teil 1.

Der Wald wird zu Beginn der ersten Runde erneut auf 100 Bäume aufgefüllt.

Ihre Gruppe bleibt dieselbe wie zuvor.

Instruktionen aus Teil 1 noch einmal anzeigen

Weiter

Instructions for Part 3

You are in the **same** decision situation as in Part 1.

At the beginning of the first round, the forest is replenished to 100 trees.

Your group remains the same as before.

< Button to display the instruction again. >

*** Afterwards, participants face a similar decision screen as displayed before, including the image of the forest and the animation of harvest and re-growth. ***

SI-2.5 Part 3: The baseline game (only in SHOCK)

Instruktionen für Teil 3

Sie befinden sich in **derselben** Entscheidungssituation wie in Teil 1.

Zur Erinnerung: In Teil 1 hatten Sie ein zusätzliches Einkommen, welches jede Runde 8 Punkte generiert hat. Dieses haben Sie auch jetzt.

Der Wald wird zu Beginn der ersten Runde erneut auf 100 Bäume aufgefüllt.

Ihre Gruppe bleibt dieselbe wie zuvor.

Instruktionen aus Teil 1 noch einmal anzeigen

Weiter

Instructions for Part 3

You are in the **same** decision situation as in Part 1.

As a reminder: In Part 1, you had an additional source of income that generated 8 points in each round. You also have this additional income now.

At the beginning of the first round, the forest is replenished to 100 trees.

Your group remains the same as before.

< Button to display the instruction again. >

*** Afterwards, participants face a similar decision screen as displayed before, including the image of the forest and the animation of harvest and re-growth. ***
