

Not for Publication

Supplementary Online Appendix for Kamei:

“Cooperation and Endogenous Repetition
in an Infinitely Repeated Social Dilemma”

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Appendix A: Instructions Used in the Experiment

(a) The ENDO-U treatment

The following are instructions for the ENDO-U treatment.

Instructions

You are now taking part in a decision-making experiment. Depending on your decisions and the decisions of other participants, you will be able to earn money in addition to the £3 guaranteed for your participation. Please read the following instructions carefully.

During the experiment you are not allowed to communicate with other participants. If you have questions, raise your hand. One of us will come to answer your question.

During the experiment your earnings will be calculated in points. At the end of the experiment your points will be converted to U.K. pounds at the following rate:

45 points = £1

(or each point will be exchanged for around 2.2 pence of real money). At the end of the experiment your total earnings (including the **£3** participation fee) will be paid out to you in cash. Your payment will be rounded to the nearest 10 pence (e.g., £15.30 if it is £15.33; and £15.40 if it is £15.37).

This experiment consists of five phases. Each phase is divided into multiple periods. In each period, you will interact with three other participants in your group. We will first explain how you will be interacting with them in each period. We will then explain how your interaction partners and interaction durations are determined.

Your interactions in each period:

You and the other three members in your group will be each given an **endowment of 20 points** in each period. You and the three others simultaneously decide how to allocate the endowment. There are two accounts to allocate: private account and group account. You will be asked how many points you would like to allocate to your group account. Only integers between 0 and 20 are allowed for this purpose. The remaining points (20 minus your allocation to the group account) will be automatically allocated to your private account.

Your earnings in a given period depend on (a) the total number of points in the group account and (b) the number of points in your private account.

How to calculate your earnings in a given period:

Your earnings from your private account are equal to the number of points you allocate to the private account. That is, for example, if you decide to allocate 5 points to your private account, **you get 5 points as earnings**. The points you allocate to your private account do not affect the earnings of your group members.

Your earnings from the group account equal the **sum** of points allocated to the group account by you and your group members multiplied by 0.4. In other words, **when you allocate 1 point to the group account, you and your three group members each get 0.4 ($= 1 \times .4$) points as earnings**. For example, suppose that you decide to allocate 5 points to the group account. Also suppose that your three group members decide to allocate 9 points, 3 points and 4 points, respectively, to the group account. In this case, the sum of points in the group account is 21 ($= 5 + 9 + 3 + 4$) points. The earnings of you and your three group members from the group account would be 8.4 ($= 21 \times 0.4$) points.

In summary, your earnings in a given period are calculated with the following formula:

$$\text{(sum of points in your private account)} + 0.4 \times \text{(sum of points allocated by you and your three group members to the group account)}$$

Note that you get 1 point as earnings when you allocate 1 point to your private account. If you instead allocate 1 point to your group account, your earnings from your allocation is $0.4 \times 1 = 0.4$ points. However, by allocating 1 point to the group account, the earnings of each of your group members also increase by 0.4 points. Therefore, the total earnings in your group are $0.4 \times 4 = 1.6$ points, which are greater than 1 point. Note that you also obtain earnings from points allocated to the group account by your group members. You obtain $0.4 \times 1 = 0.4$ points for each point your group member allocates to your group account.

Group members and the duration of your interaction with them

At the onset of each phase, each participant is randomly assigned to a group of four. The group assignment is completely random. Neither your decisions nor your interaction outcomes in the past phase influence the assignment process.

Once you are assigned to a group of four, you and your three group members decide the duration of your interactions in a given phase. There are two options:

Option 1: all periods in a given phase

Under this option, the group composition stays fixed during the phase. You and your three group members interact with each other throughout the entire periods in a given phase.

Option 2: one period

Under this option, the group composition is not fixed during the phase. Your interaction with the three other members is one-time. Once your interaction with them is over, your group will be dissolved. Other groups that choose Option 2 will also be dissolved. After that, you will be randomly matched with three participants from all who were in groups that chose Option 2. You will not be told whether you have interacted with the newly assigned group members before in a given phase or how many groups were dissolved by choosing Option 2.

The total number of periods in each phase is **not pre-determined**. The duration of a given phase is determined as follows: at the end of each period, a random number from 1 to 100 will be drawn by the computer in a session. If the number drawn is less than or equal to 75, you will have the next round in the given phase. By contrast, if it is greater than 75, the present phase will be over. As explained, regardless of which, Option 1 or Option 2, your group chooses, at the end of each phase (i.e., when the randomly drawn number is greater than 75), your group and all other groups will be dissolved and assigned to a new group with three randomly assigned group members.

Since the probability that you will have the next period is 75%, the expected length of each phase is 4. However, since the length is stochastically determined, the duration of a phase might be longer or shorter than 4.

The way in which your group chooses Option 1 or Option 2 in a given phase is as follows:

1. You and your three group members simultaneously vote between Option 1 or 2 at the onset of the phase.
2. If all four members in your group choose the same option, then, your group operates with the selected option.
3. If all four do not choose the same option, you and your three group members vote again. (that is, “Step 1” above.) Until all group members reach an agreement, the voting process repeats. However, in case that an agreement has not been made at the 20th vote, a majority rule will be applied (in case where the vote share of each option is 50% in the 20th vote, the computer will randomly break the tie).

Summary:

At the beginning of each phase, you will be randomly assigned to a group of four. Your group then collectively decides the duration of your interactions in a given phase: either “all periods in a given phase” or “one period.” If your group selects the “all periods in a given phase” option, you and your assigned group members interact with each other for the entire periods in a given phase. If your group selects the “one period” option, your group composition is not fixed in a given phase. That is, once you and your group members interact once, your group will be dissolved. After that, you will be randomly assigned to a group of four among participants from groups that chose the “one period” option. You will repeat this random grouping process and one-shot interaction until the start of the next phase.

The duration of each phase is not pre-determined. At the end of each period, a random number between 1 and 100 is drawn by the computer in a session. If it is less than or equal to 75, you will have the next period in a given phase. If it is greater than 75, the present phase will be over. You will move on to the next phase, and will be randomly assigned to a group of four.

In each period, you and your three interaction partners are each given an endowment of 20 points, and simultaneously decide how many points to allocate to the group account. Your earnings are determined by (1) your allocation to your private account and (2) the total allocations to the group account in your group.

If you have any questions, please raise your hand. When all questions are answered, we will move on to comprehension questions.

Comprehension questions

Please answer the following questions. Raise your hand if you need help.

1. How many phases do you have? _____
2. At the beginning of each phase, you are randomly assigned to a group with three other participants. Each group then decides the duration of interactions, either all periods or one period, they play with each other in a given phase. How does your group choose the duration of interaction?
 - a. One person is randomly selected in your group; and s/he can decide the duration based on his or her opinions.
 - b. You and the three group members vote which option they want to adopt until all agree to one option.

3. Suppose that you and all three persons in your group allocate 0 points to the group account in a given period.

a) How much do you earn? _____

b) How much does each of the other group members earn? _____

4. Suppose that you and all three persons in your group allocate 20 points to the group account in a given period.

a) How much do you earn? _____

b) How much does each of the other group members earn? _____

5. Suppose that your three group members in total allocate 30 points to the group in a given period. Answer the following:

a) How much do you earn if you allocate 0 points to the group account? _____

b) How much do you earn if you allocate 10 points to the group account? _____

c) How much do you earn if you allocate 20 points to the group account? _____

Any questions?

(b) The ENDO-M treatment

The following are instructions for the ENDO-M treatment.

Instructions

You are now taking part in a decision-making experiment. Depending on your decisions and the decisions of other participants, you will be able to earn money in addition to the £3 guaranteed for your participation. Please read the following instructions carefully.

During the experiment you are not allowed to communicate with other participants. If you have questions, raise your hand. One of us will come to answer your question.

During the experiment your earnings will be calculated in points. At the end of the experiment your points will be converted to U.K. pounds at the following rate:

$$\mathbf{45\ points = \pounds 1}$$

(or each point will be exchanged for around 2.2 pence of real money). At the end of the experiment your total earnings (including the **£3** participation fee) will be paid out to you in cash. Your payment will be rounded to the nearest 10 pence (e.g., £15.30 if it is £15.33; and £15.40 if it is £15.37).

This experiment consists of five phases. Each phase is divided into multiple periods. In each period, you will interact with three other participants in your group. We will first explain how you will be interacting with them in each period. We will then explain how your interaction partners and interaction durations are determined.

Your interactions in each period:

You and the other three members in your group will be each given an **endowment of 20 points** in each period. You and the three others simultaneously decide how to allocate the endowment. There are two accounts to allocate: private account and group account. You will be asked how many points you would like to allocate to your group account. Only integers between 0 and 20 are allowed for this purpose. The remaining points (20 minus your allocation to the group account) will be automatically allocated to your private account.

Your earnings in a given period depend on (a) the total number of points in the group account and (b) the number of points in your private account.

How to calculate your earnings in a given period:

Your earnings from your private account are equal to the number of points you allocate to the private account. That is, for example, if you decide to allocate 5 points to your private account, **you get 5 points as earnings**. The points you allocate to your private account do not affect the earnings of your group members.

Your earnings from the group account equal the **sum** of points allocated to the group account by you and your group members multiplied by 0.4. In other words, **when you allocate 1 point to the group account, you and your three group members each get 0.4 ($= 1 \times .4$) points as earnings**. For example, suppose that you decide to allocate 5 points to the group account. Also suppose that your three group members decide to allocate 9 points, 3 points and 4 points, respectively, to the group account. In this case, the sum of points in the group account is 21 ($= 5 + 9 + 3 + 4$) points. The earnings of you and your three group members from the group account would be 8.4 ($= 21 \times 0.4$) points.

In summary, your earnings in a given period are calculated with the following formula:

$$\text{(sum of points in your private account)} + 0.4 \times \text{(sum of points allocated by you and your three group members to the group account)}$$

Note that you get 1 point as earnings when you allocate 1 point to your private account. If you instead allocate 1 point to your group account, your earnings from your allocation is $0.4 \times 1 = 0.4$ points. However, by allocating 1 point to the group account, the earnings of each of your group members also increase by 0.4 points. Therefore, the total earnings in your group are $0.4 \times 4 = 1.6$ points, which are greater than 1 point. Note that you also obtain earnings from points allocated to the group account by your group members. You obtain $0.4 \times 1 = 0.4$ points for each point your group member allocates to your group account.

Group members and the duration of your interaction with them

At the onset of each phase, each participant is randomly assigned to a group of four. The group assignment is completely random. Neither your decisions nor your interaction outcomes in the past phase influence the assignment process.

Once you are assigned to a group of four, you and your three group members decide the duration of your interactions in a given phase by voting. There are two options:

Option 1: all periods in a given phase

Under this option, the group composition stays fixed during the phase. You and your three group members interact with each other throughout the entire periods in a given phase.

Option 2: one period

Under this option, the group composition is not fixed during the phase. Your interaction with the three other members is one-time. Once your interaction with them is over, your group will be dissolved. Other groups that choose Option 2 will also be dissolved. After that, you will be randomly matched with three participants from all who were in groups that chose Option 2. You will not be told whether you have interacted with the newly assigned group members before in a given phase or how many groups were dissolved by choosing Option 2.

The total number of periods in each phase is **not pre-determined**. The duration of a given phase is determined as follows: at the end of each period, a random number from 1 to 100 will be drawn by the computer in a session. If the number drawn is less than or equal to 75, you will have the next round in the given phase. By contrast, if it is greater than 75, the present phase will be over. As explained, regardless of which, Option 1 or Option 2, your group chooses, at the end of each phase (i.e., when the randomly drawn number is greater than 75), your group and all other groups will be dissolved and assigned to a new group with three randomly assigned group members.

Since the probability that you will have the next period is 75%, the expected length of each phase is 4. However, since the length is stochastically determined, the duration of a phase might be longer or shorter than 4.

The way in which your group chooses Option 1 or Option 2 in a given phase is based on majority rule. That is, whichever option that receives 3 or 4 support will be used in your group. In case that votes are split in half (two persons support Option 1 while the other two support Option 2), the computer will randomly break the tie (i.e., each option will be selected with a probability of 50%).

Summary:

At the beginning of each phase, you will be randomly assigned to a group of four. Your group then collectively decides the duration of your interactions in a given phase: either “all periods in a given phase” or “one period.” The voting rule used in this experiment is majority rule. If your group selects the “all periods in a given phase” option, you and your assigned group members interact with each other for the entire periods in a given phase. If your group selects the “one period” option, your group composition is not fixed in a given phase. That is, once you and your group members interact once, your group will be dissolved. After that, you will be randomly

assigned to a group of four among participants from groups that chose the “one period” option. You will repeat this random grouping process and one-shot interaction until the start of the next phase.

The duration of each phase is not pre-determined. At the end of each period, a random number between 1 and 100 is drawn by the computer in a session. If it is less than or equal to 75, you will have the next period in a given phase. If it is greater than 75, the present phase will be over. You will move on to the next phase, and will be randomly assigned to a group of four.

In each period, you and your three interaction partners are each given an endowment of 20 points, and simultaneously decide how many points to allocate to the group account. Your earnings are determined by (1) your allocation to your private account and (2) the total allocations to the group account in your group.

If you have any questions, please raise your hand. When all questions are answered, we will move on to comprehension questions.

Comprehension questions

Please answer the following questions. Raise your hand if you need help.

1. How many phases do you have? _____
2. At the beginning of each phase, you are randomly assigned to a group with three other participants. Each group then decides the duration of interactions, either all periods or one period, they play with each other in a given phase. How does your group choose the duration of interaction?
 - a. One person is randomly selected in your group; and s/he can decide the duration based on his or her opinions.
 - b. You and the three group members vote which option they want to adopt. Then, majority rule determines which option is employed.
3. Suppose that you and all three persons in your group allocate 0 points to the group account in a given period.
 - a) How much do you earn? _____
 - b) How much does each of the other group members earn? _____

4. Suppose that you and all three persons in your group allocate 20 points to the group account in a given period.

a) How much do you earn? _____

b) How much does each of the other group members earn? _____

5. Suppose that your three group members in total allocate 30 points to the group in a given period. Answer the following:

a) How much do you earn if you allocate 0 points to the group account? _____

b) How much do you earn if you allocate 10 points to the group account? _____

c) How much do you earn if you allocate 20 points to the group account? _____

Any questions?

(c) The EXO treatment

The following are instructions for the EXO treatment.

Instructions

You are now taking part in a decision-making experiment. Depending on your decisions and the decisions of other participants, you will be able to earn money in addition to the £3 guaranteed for your participation. Please read the following instructions carefully.

During the experiment you are not allowed to communicate with other participants. If you have questions, raise your hand. One of us will come to answer your question.

During the experiment your earnings will be calculated in points. At the end of the experiment your points will be converted to U.K. pounds at the following rate:

$$\mathbf{45\ points = \pounds 1}$$

(or each point will be exchanged for around 2.2 pence of real money). At the end of the experiment your total earnings (including the **£3** participation fee) will be paid out to you in cash. Your payment will be rounded to the nearest 10 pence (e.g., £15.30 if it is £15.33; and £15.40 if it is £15.37).

This experiment consists of five phases. Each phase is divided into multiple periods.

At the onset of each phase, each participant is randomly assigned to a group of four. The group assignment is completely random. Neither your decisions nor your interaction outcomes in the past phase influence the assignment process. The group composition within a given phase stays the same. In each period of a given phase, you will interact with the other three assigned participants in your group.

Your interactions in each period:

You and the other three members in your group will be each given an **endowment of 20 points** in each period. You and the three others simultaneously decide how to allocate the endowment. There are two accounts to allocate: private account and group account. You will be asked how many points you would like to allocate to your group account. Only integers between 0 and 20 are allowed for this purpose. The remaining points (20 minus your allocation to the group account) will be automatically allocated to your private account.

Your earnings in a given period depend on (a) the total number of points in the group account and (b) the number of points in your private account.

How to calculate your earnings in a given period:

Your earnings from your private account **are equal to the number of points you allocate to the private account**. That is, for example, if you decide to allocate 5 points to your private account, you get 5 points as earnings. The points you allocate to your private account do not affect the earnings of your group members.

Your earnings from the group account equal the **sum** of points allocated to the group account by you and your group members multiplied by 0.4. In other words, **when you allocate 1 point to the group account, you and your three group members each get 0.4 ($= 1 \times .4$) points as earnings**. For example, suppose that you decide to allocate 5 points to the group account. Also suppose that your three group members decide to allocate 9 points, 3 points and 4 points, respectively, to the group account. In this case, the sum of points in the group account is 21 ($= 5 + 9 + 3 + 4$) points. The earnings of you and your three group members from the group account would be 8.4 ($= 21 \times 0.4$) points.

In summary, your earnings in a given period are calculated with the following formula:

$$(\text{sum of points in your private account}) + 0.4 \times (\text{sum of points allocated by you and your three group members to the group account})$$

Note that you get 1 point as earnings when you allocate 1 point to your private account. If you instead allocate 1 point to your group account, your earnings from your allocation is $0.4 \times 1 = 0.4$ points. However, by allocating 1 point to the group account, the earnings of each of your group members also increase by 0.4 points. Therefore, the total earnings in your group are $0.4 \times 4 = 1.6$ points, which are greater than 1 point. Note that you also obtain earnings from points allocated to the group account by your group members. You obtain $0.4 \times 1 = 0.4$ points for each point your group member allocates to your group account.

The duration of each phase:

The total number of periods in each phase is **not pre-determined**. The duration of a given phase is determined as follows: at the end of each period, a random number from 1 to 100 will be drawn by the computer in a session. If the number drawn is less than or equal to 75, you will have the next round in the given phase. By contrast, if it is greater than 75, the present phase will be over; you will move on to the next phase and will be randomly assigned to a new group with three other participants.

Since the probability that you will have the next period is 75%, the expected length of each phase is 4. However, since the length is stochastically determined, the duration of a phase might be longer or shorter than 4.

If you have any questions, please raise your hand. When all questions are answered, we will move on to comprehension questions.

Comprehension questions

Please answer the following questions. Raise your hand if you need help.

1. How many phases do you have? _____
2. Suppose that you and all three persons in your group allocate 0 points to the group account in a given period.
 - a) How much do you earn? _____
 - b) How much does each of the other group members earn? _____
3. Suppose that you and all three persons in your group allocate 20 points to the group account in a given period.
 - a) How much do you earn? _____
 - b) How much does each of the other group members earn? _____
4. Suppose that your three group members in total allocate 30 points to the group in a given period. Answer the following:
 - a) How much do you earn if you allocate 0 points to the group account? _____
 - b) How much do you earn if you allocate 10 points to the group account? _____
 - c) How much do you earn if you allocate 20 points to the group account? _____

Any questions?

(d) A screen shot in the belief elicitation stage in the ENDO-U treatment

Remaining time (sec) 3

Your group chose to interact for all of the periods in this phase.

We're interested in knowing your guess on the average per-period allocation by your group members to the group account during this phase.

Your guess:

Note: Your answer must be an integer between 0 and 20.

Your response to this question will not affect your earnings.

OK

(e) A screen shot in the belief elicitation stage in the EXO treatment

Remaining time (sec) 27

We're interested in knowing your guess on the average per-period allocation by your group members to the group account during this phase.

Your guess:

Note: Your answer must be an integer between 0 and 20.

Your response to this question will not affect your earnings.

OK

Appendix B: Theoretical Consideration for Groups that Collectively Select the Random Matching Protocol in the ENDO-U and ENDO-M treatments

In this part of the Appendix, I first show that the mutual full contribution situation holds as an equilibrium outcome (Section B.1). I then illustrate that there also exists a symmetric, positive less-than-full-contribution equilibrium for any contribution level $\zeta \in \{1, 2, \dots, 19\}$ (Section B.2).

B.1. Mutual Full Contribution Equilibrium

In order to illustrate that there are no incentives to deviate from the mutual full contribution situation, I consider a very extreme case in which all (six) groups in a session selected the random matching protocol in an endogenous (either ENDO-U or ENDO-M) treatment and that all subjects in these groups have contributed their full endowment amount (E) so far (before round t) in a given round. I also suppose that subjects have acted on a grim trigger strategy until this round. I show that even in this situation subject i decides not to defect. This suggests that the mutual full contribution equilibrium exists independently to the number of groups that selected the random matching protocol ($\in \{1, 2, 3, 4, 5, 6\}$). The reasoning is the following: the more groups that select the random matching protocol in a given supergame, the higher the incentive for a subject i to deviate in that supergame, because i can more easily engage in the hit-and-run strategy (defect and then escape from the current group members) if more groups select the random matching protocol.

Suppose that the subject i 's three peers and all subjects in other groups that selected the random matching protocol continue to choose the grim trigger strategy in round t and onward in a given supergame.

If subject i also continues to act on the grim trigger strategy for the rest of rounds in the given supergame, she would obtain the following expected payoff:

$$E_t[\pi_i] = \sum_{s=t}^{\infty} \delta^{s-t} \cdot \pi_{i,t}(c_{i,t}) = \frac{r \cdot N \cdot E}{1-\delta} = 128, \quad (\text{B1})$$

where $\delta = .75$, $r = .4$, $N = 4$ and $E = 20$.

Step 1: *There are no incentives for subject i to contribute 0 points in round t and then return to the full contribution in round $t + 1$*

Suppose that i contributes 0 points in round t but returns to full contribution in round $t + 1$. In this scenario, subject i obtains $E - 0 + r \cdot (N - 1) \cdot E = 44$ points in round t . The expected payoff of subject i in round $t + 1$ is computed as:

$$E_t[\pi_{i,t+1}] = 32 \cdot \frac{\binom{20}{3}\binom{3}{0}}{\binom{23}{3}} + 24 \cdot \frac{\binom{20}{2}\binom{3}{1}}{\binom{23}{3}} + 16 \cdot \frac{\binom{20}{1}\binom{3}{2}}{\binom{23}{3}} + 8 \cdot \frac{\binom{20}{0}\binom{3}{3}}{\binom{23}{3}} \approx 28.8696. \quad (\text{B2})$$

After round $t + 1$, any subject that encounters at least one 0-contributor in round t , round $t + 1$ or later rounds also becomes a 0-contributor. The three peers of subject i in round t are 0-contributors in round $t + 2$ with a probability of 100%. The probability that a subject j in a group to which subject i 's did not belong in round t does not become a 0-contributor in round $t + 2$ is calculated as:

$$p \equiv \frac{\binom{20}{3}\binom{3}{0}}{\binom{23}{3}} = \frac{1140}{1771} \approx 64.37\%,$$

because the number of full contributors except j in round $t + 1$ is 20. Here, I claim that the probability that j remains to be a full contributor in round $t + 3$ (p') is less than 12%, regardless of i 's action choice in round $t + 2$ as below:

Claim: $p' < .12$.

When i contributed E points in round $t + 2$,

$$p' \equiv p \cdot \frac{p^3 \binom{19}{3}\binom{3}{0} + 1 \cdot p^2 \binom{19}{2}\binom{3}{0}}{\binom{23}{3}} = .1197 < .12.$$

When i contributed 0 points in round $t + 2$,

$$p' \equiv p \cdot \frac{p^3 \binom{19}{3}\binom{3}{0}}{\binom{23}{3}} = .0939 < .12.$$

This calculation indicates that $p' < .12$. ■

Subject i would obtain the largest per-round payoff in round $t + 2$ when i contributes 0 points in round $t + 2$:

$$E_t[\pi_{i,t+2}]|_{c_{i,t+2}=0} = 20 + 8 \cdot \left[(3p^3 + 2p^2(1-p) + p(1-p)^2) \cdot \frac{\binom{20}{3}\binom{3}{0}}{\binom{23}{3}} + (2p^2 + p(1-p)) \frac{\binom{20}{2}\binom{3}{1}}{\binom{23}{3}} + p \cdot \frac{\binom{20}{1}\binom{3}{2}}{\binom{23}{3}} \right], \quad (\text{B3})$$

which equals 28.961.

The per-round expected payoff that subject i obtains after round $t + 2$ is less than the round $t + 3$ expected payoff when i contributed 0 points (while assuming $p' = .12$), which is equal to around 21.014 (this value is obtained by evaluating Eq. (B3) by substituting $p = .12$). Thus, we have the following inequality for i 's after round $t + 2$:

$$E_t\left[\sum_{s=t+3}^{\infty} \delta^{s-t} \cdot \pi_{i,t}\right] \ll \frac{\delta^3}{1-\delta} E_t[\pi_{i,t+3}] < \max \frac{\delta^3}{1-\delta} E_t[\pi_{i,t+3}] < \frac{(.75)^3 \cdot 21.014}{1-.75} \approx 35.46.$$

Therefore,

$$E_t[\pi_i] = E_t\left[\sum_{s=t}^{\infty} \delta^{s-t} \cdot \pi_{i,t}\right] \ll 44 + \delta \cdot 28.87 + \delta^2 \cdot 28.96 + 35.46 = 117.4, \quad (\text{B4})$$

which is lower than the sum of total expected payoffs under the mutual full contribution situation calculated in Eq. (B1). This means that contributing 0 points in round t and then returning to the full contribution in round $t + 1$ is not the best response for subject i .

Step 2: *There are no incentives for subject i to contribute 0 points in both round t and round $t + 1$*

Suppose that subject i contributes 0 points in round $t + 1$, in addition to round t . Then, the expected payoff of subject i in round $t + 1$ is computed as:

$$E_t[\pi_{i,t+1}] = 20 + \left[24 \cdot \frac{\binom{20}{3}\binom{3}{0}}{\binom{23}{3}} + 16 \cdot \frac{\binom{20}{2}\binom{3}{1}}{\binom{23}{3}} + 8 \cdot \frac{\binom{20}{1}\binom{3}{2}}{\binom{23}{3}} \right] \approx 40.8696. \quad (\text{B5})$$

The probability that a subject j in a group to which subject i did not belong in round t does not become a 0-contributor in round $t + 2$ is:

$$q = \frac{\binom{19}{3}\binom{3}{0}}{\binom{23}{3}} = \frac{969}{1771} = 54.71\% < 54.75\%,$$

because the number of full contributors other than j in round $t + 1$ is 19. Thus, subject i 's expected payoff in round $t + 2$ is less than or equal to the value of Eq. (B3) evaluated at $p = q = .5475$: i.e., $E_t[\pi_{i,t+2}] < 26.84$.

Here, I claim that the probability that j remains to be a full contributor in round $t + 3$ (q') is less than 6.49%, regardless of i 's action choice in round $t + 2$.

Claim: $q' < .0649$.

When i contributed E points in round $t + 2$,

$$q' \equiv q \cdot \frac{q^3 \binom{19}{3} \binom{3}{0} + q^2 \binom{19}{2} \binom{3}{0}}{\binom{23}{3}} = .06485 < .0649.$$

When i contributed 0 points in round $t + 2$,

$$q' \equiv q \cdot \frac{q^3 \binom{19}{3} \binom{3}{0}}{\binom{23}{3}} = .049 < .05.$$

This calculation indicates that $q' < .0649$. ■

The per-round expected payoff that subject i obtains after round $t + 2$ is less than her round $t + 3$ expected payoff when i contributed 0 points in round $t + 3$ while assuming $q' = .0649$, whose payoff is equal to around 20.53 (this value is obtained by evaluating Eq. (B3) by substituting $p = q' = .0649$). Thus, we have the following inequality for i 's payoffs after round $t + 2$:

$$E_t[\sum_{s=t+3}^{\infty} \delta^{s-t} \cdot \pi_{i,t}] \ll \frac{\delta^3}{1-\delta} E_t[\pi_{i,t+3}] < \frac{(.75)^3 \cdot 20.53}{1-.75} \approx 34.65.$$

In other words, we obtain the following strict inequality:

$$E_t[\pi_i] = E_t[\sum_{s=t}^{\infty} \delta^{s-t} \cdot \pi_{i,t}] \ll 44 + \delta \cdot 40.87 + \delta^2 \cdot 26.84 + 34.65 \approx 124.40. \quad (B6)$$

This expected payoff (left-hand side) is lower than the sum of expected payoffs in the mutual full contribution situation calculated in Eq. (B1). This result means that contributing 0 points in both rounds t and $t + 1$ is not a materially beneficial deviation for subject i .

The Steps 1 and 2 above suggest that the mutual full contribution situation holds as an equilibrium outcome.

B.2. Symmetric, Positive, but Less-than-full-Contribution Equilibrium

Calculations similar to Section B.1 show that there also exists a symmetric, positive, but less-than-full-contribution equilibrium for each contribution level $\zeta \in \{1, 2, \dots, 19\}$. The following table indicates the summary of the calculations. For each level ζ , I considered the two cases (Step 1 and Step 2) as in Section B.1.

ζ	Total expected payoff from symmetric, positive contribution equilibrium with the level of ζ points ($= E + (rN - 1)\zeta/(1 - \delta)$)	The supremum of the expected payoff when i contributes 0 in round t and then returns to contribute ζ points in round $t + 1$ (Eq.(B4), included in step 1 above, calculated for each ζ points)	The supremum of the expected payoff when i contributes 0 in both rounds t and $t + 1$ (Eq.(B6), in step 2 above, calculated for each ζ points)
1	82.4	81.9	82.2
2	84.8	83.7	84.4
3	87.2	85.6	86.7
4	89.6	87.5	88.9
5	92.0	89.4	91.1
6	94.4	91.2	93.3
7	96.8	93.1	95.5
8	99.2	95.0	97.8
9	101.6	96.8	100.0
10	104.0	98.7	102.2
11	106.4	100.6	104.4
12	108.8	102.4	106.6
13	111.2	104.3	108.9
14	113.6	106.2	111.1
15	116.0	107.3	113.3
16	118.4	109.9	115.5
17	120.8	111.8	117.7
18	123.2	113.7	112.0
19	125.6	115.5	122.2
20	128.0 ^{#1}	117.4 ^{#2}	124.4 ^{#3}

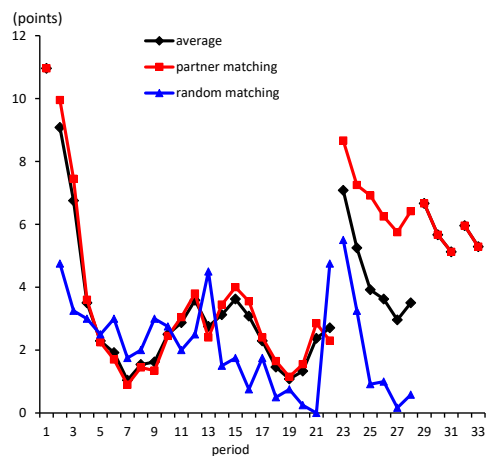
Notes: ^{#1} This is the case of the full contribution equilibrium (see Section B.1 for the details). The payoff was calculated with Eq. (B1). ^{#2} This was calculated with Eq. (B4). ^{#3} This was calculated with Eq. (B6).

This table indicates that deviating from contributing ζ points is not materially beneficial for each subject, assuming that all of their peers are employing the grim trigger strategy in that they

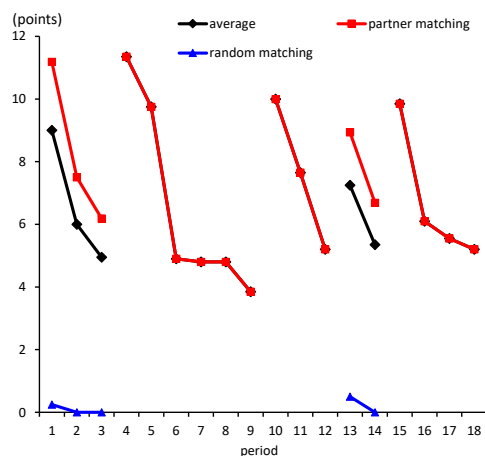
contribute ζ points until they observe that at least one of peers contribute less than ζ points; and once they see such defection they begin to contribute 0 points until the end of a given supergame.

Appendix C: Additional Figures and Tables

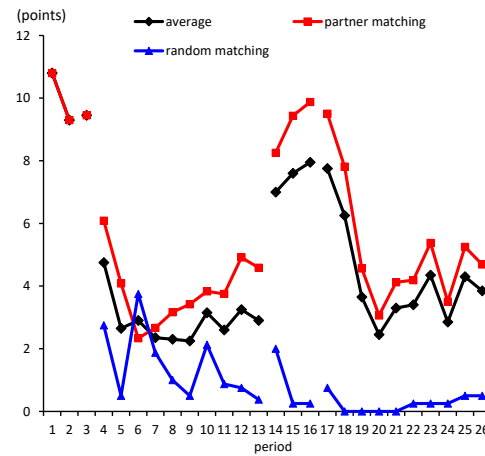
Figure C.1: *The Trends of Average Contributions by Session.*



Session 1 (24 subjects)

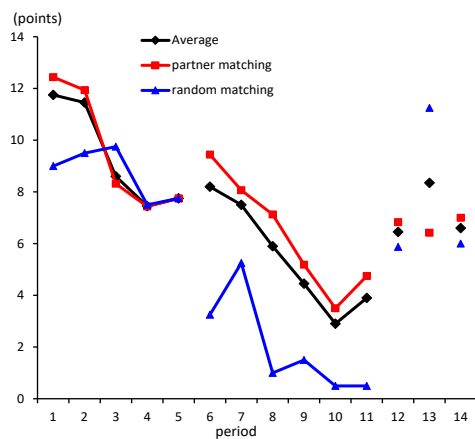


Session 2 (20 subjects)

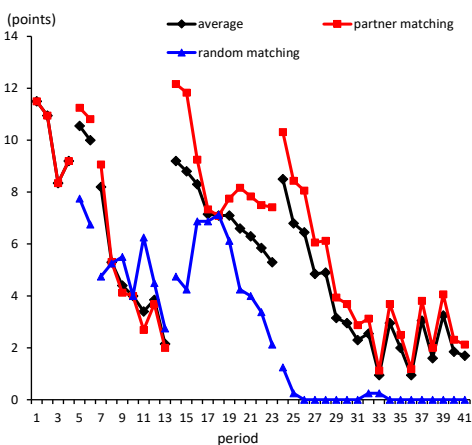


Session 3 (20 subjects)

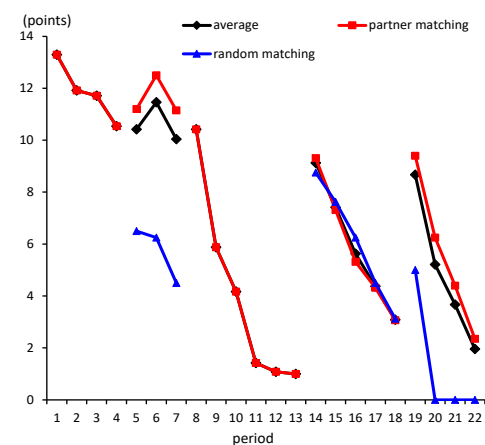
(a) ENDO-U treatment



Session 7 (20 subjects)

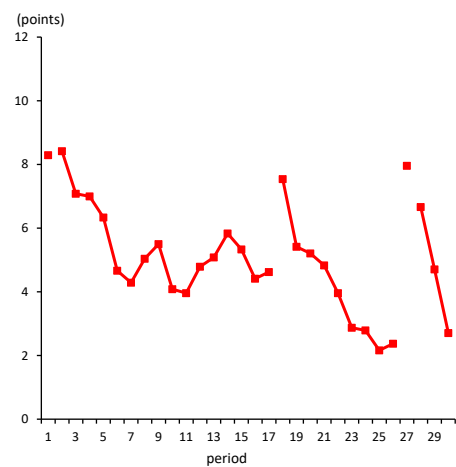


Session 8 (20 subjects)

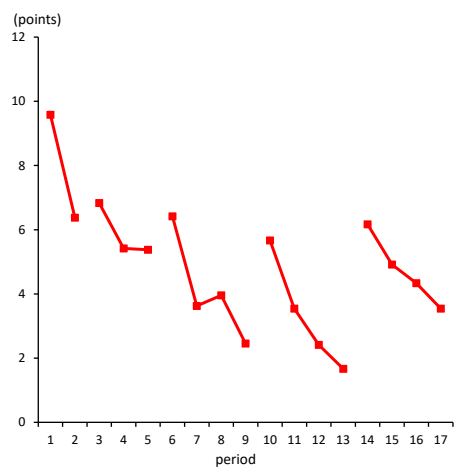


Session 9 (24 subjects)

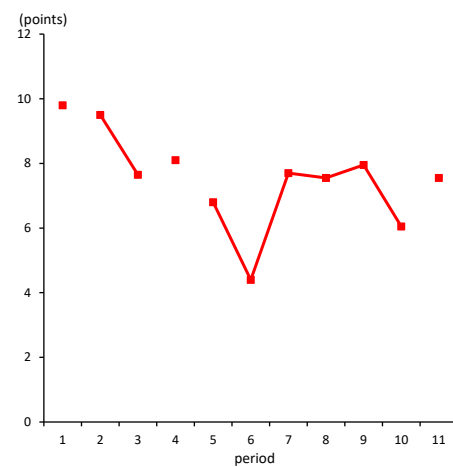
(b) ENDO-M treatment



Session 4 (24 subjects)



Session 5 (24 subjects)



Session 6 (20 subjects)

(c) EXO treatment

Notes: Lines are depicted so that they are disconnected between the supergames. There are four disconnections in each figure as there are five supergames in each session.

Table C.1: Distribution of Votes by Group

I. The Number of Voting Stages Required to Reach a Consensus by Group in the ENDO-U treatment

(a) Session 1

The # of voting stages required so that groups reached an agreement	1 st SG	2 nd SG	3 rd SG	4 th SG	5 th SG
1	2 groups	3 groups		1 group	1 group
2	2 groups	2 groups		3 groups	3 groups
3			1 group		
4		1 group	2 groups	1 group	
5			2 groups	1 group	
6					
7	1 group				
8					
9					
10			1 group		1 group
11					
12					
13					
14					
15					
16					
17					
18					
19					
20	1 group ^{#1}				1 group ^{#2}
Average	6.6	2.2	6.2	3.2	7.4

(b) Session 2

The # of voting stages required so that groups reached an agreement	1 st SG	2 nd SG	3 rd SG	4 th SG	5 th SG
1	3 groups	2 groups	2 groups	1 group	1 group
2		1 group	1 group		
3	2 groups	1 group		1 group	
4			1 group		
5				1 group	
6		1 group			2 groups
7					
8					
9			1 group		
10					
11					

12					
13					1 group
14					
15					
16					
17					
18					
19					
20				2 groups ^{#3}	1 group ^{#4}
Average	1.8	2.6	3.4	9.8	9.2

(c) Session 3

The # of voting stages required so that groups reached an agreement	1 st SG	2 nd SG	3 rd SG	4 th SG	5 th SG
1		1 group	1 group	3 groups	2 groups
2	4 groups		1 group	1 group	2 groups
3	1 group				
4					
5		2 groups	1 group		
6					
7		1 group			
8		1 group	1 group		
9			1 group		1 group
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20				1 group ^{#5}	
Average	2.2	5.2	5	5	3

Notes: ^{#1} Three subjects voted for the partner matching protocol and one subject voted for the random matching protocol. A majority rule was applied and the partner matching protocol was implemented in this group.

^{#2} Two subjects voted for the partner matching protocol and the other two subjects voted for the random matching protocol. The computer broke the tie and the partner matching protocol was implemented in this group.

^{#3} One subject voted for the partner matching protocol and three subjects voted for the random matching protocol in one of the two groups. A majority rule was applied and the random matching protocol was implemented in that group. In the other group, two subjects voted for the partner matching protocol and the other two subjects voted for the random matching protocol. The computer broke the tie and the partner matching protocol was implemented in this group.

^{#4} Two subjects voted for the partner matching protocol and the other two subjects voted for the random matching protocol. The computer broke the tie and the partner matching protocol was implemented in this group.

^{#5} Four subjects voted for the random matching protocol in the 20th voting stage in this group.

II. The Number of Supports for the Partner Matching Protocol in the ENDO-M treatment

(a) Session 7

The # of supports for the partner matching protocol	1 st SG	2 nd SG	3 rd SG	4 th SG	5 th SG
0					
1				1 group	
2	1 group	1 group	4 groups	1 group	2 groups
3	3 groups	4 groups	1 group	2 groups	2 groups
4	1 group			1 group	1 group

(b) Session 8

The # of supports for the partner matching protocol	1 st SG	2 nd SG	3 rd SG	4 th SG	5 th SG
0					
1			1 group		
2		3 groups		2 groups	2 groups
3	3 groups	2 groups	3 groups	3 groups	1 group
4	2 groups		1 group		2 groups

(c) Session 9

The # of supports for the partner matching protocol	1 st SG	2 nd SG	3 rd SG	4 th SG	5 th SG
0					
1		1 group		1 group	
2		1 group		2 groups	1 group
3	2 group	2 groups	4 groups	1 group	4 groups
4	4 groups	2 groups	2 groups	2 groups	1 group

Table C.2: The Effects of Democratic Decision-Making on Enhancing Cooperation
(supplementing Table 3 of the paper) – Robustness check 1

Independent Variable:	Unanimity Rule			Majority Rule		
	Voting rule: Data: 1 st Supergame Period: Round 1	All Supergames Round 1 Rounds 1-3		1 st Supergame Round 1	All Supergames Round 1 Rounds 1-3	
	(1)	(2)	(3)	(4)	(5)	(6)
(i) Endo dummy {= 1 for the ENDO-U and the ENDO-M treatments; 0 for the EXO treatment}	.28*** (.076)	.48*** (.16)	.44*** (.12)	.45*** (.11)	.72*** (.23)	.82*** (.27)
(ii) Supergame number {= 1, 2, 3, 4, 5}	---	-.16*** (.022)	-.15*** (.024)	---	-.15*** (.024)	-.14*** (.027)
Interaction term: (i) × (ii)	---	-.046 (.088)	.042 (.052)	---	-.056 (.076)	-.073 (.085)
(iii) Rounds within supergames {=1, 2, 3}	---	---	-.25*** (.039)	---	---	-.24*** (.038)
Interaction term: (i) × (iii)	---	---	-.22*** (.058)	---	---	-.084*** (.036)
# of observations	128	620	1452	128	592	1,428
Log likelihood	-288.5	-1380.5	-3276.5	-272.0	-1326.9	-3791.1

Notes: Ordered probit regressions with robust standard errors clustered by session ID. Individual random effects are included except for columns (1) and (4). Observations only in groups that operated under the partner matching protocol were used. The observations from the ENDO-U and EXO treatments were used for columns (1) to (3), while the observations from the ENDO-M and EXO treatments were used for columns (4) to (6). The dependent variable is contribution amount of subject i in a given round of a given supergame. The numbers in parentheses are standard errors. Cut points are omitted to conserve space.

*, **, and *** indicate significance at the .10 level, at the .05 level and at the .01 level, respectively.

Result: Estimation results in Table 3 are robust. Specifically,

(a) the impact of democracy: the Endo dummy has a significantly positive coefficient for every specification;

(b) trends across supergames: the impact of democracy is consistently observed across the supergames, whether the unanimity or majority rule is used [see the interaction term between variables (i) and (ii) – the impact does not differ by supergame.];

(c) trends within supergames: the impact of democracy largely persists within supergames when the majority rule is used (the ENDO-M treatment), whereas it diminishes from round to round within supergames when the unanimity rule is used (the ENDO-U treatment).¹

¹ The coefficient estimate of the interaction term between variables (i) and (iii) is significantly negative in column (6), but the size is only around one-tenth (10%) of the coefficient estimate of the Endo dummy.

Table C.3: The Effects of Democratic Decision-Making on Enhancing Cooperation
(supplementing Table 3 of the paper) – Robustness check 2

As mentioned in the paper, some groups did not unanimously agree on one protocol even in the final voting stage (voting stage 20). The following includes estimation results when excluding these groups from regressions in the ENDO-U treatment.

[1. Results using tobit regressions]

Dependent variable: Contribution amount of subject i in a given round of a given supergame

Independent Variable:	Voting rule: Data: Period:	1 st Supergame Round 1 (1)	Unanimity Rule All Supergames Round 1 Rounds 1-3 (2) (3)	
(i) Endo dummy {= 1 for the ENDO-U and the ENDO-M treatments; 0 for the EXO treatment}		2.80*** (.85)	3.03** (1.29)	2.89*** (1.06)
(ii) Supergame number {= 1, 2, 3, 4, 5}		---	-.90*** (.14)	-.96*** (.13)
Interaction term: (i) $\times$ (ii)		---	-.25 (.58)	.36 (.39)
(iii) Rounds within supergames {=1, 2, 3}		---	---	-2.13*** (.16)
Interaction term: (i) $\times$ (iii)		---	---	-1.21** (.50)
Constant		9.44*** (.73)	9.77 (.44)	11.8*** (.49)
# of observations		124	604	1420
# of left-censored observations		14	120	392
# of right-censored observations		28	98	159
Log likelihood		-346.8	-1668.2	-3755.8

Notes: Tobit regressions with robust standard errors clustered by session ID. Observations only in groups that operated under the partner matching protocol were used. Groups that did not reach a unanimous agreement in the 20th vote were excluded from the regressions. The numbers in parentheses are standard errors.

*, **, and *** indicate significance at the .10 level, at the .05 level and at the .01 level, respectively.

[2. Results using ordered probit regressions]

Dependent variable: Contribution amount of subject i in a given round of a given supergame

Independent Variable:	Voting rule:	Unanimity Rule		
	Data:	1 st Supergame	All Supergames	
	Period:	Round 1	Round 1	Rounds 1-3
		(1)	(2)	(3)
(i) Endo dummy {= 1 for the ENDO-U and the ENDO-M treatments; 0 for the EXO treatment}		.34*** (.10)	.43** (.21)	.33*** (.11)
(ii) Supergame number {= 1, 2, 3, 4, 5}		---	-.16*** (.022)	-.15*** (.024)
Interaction term: (i) $\times$ (ii)		---	-.0083 (.13)	.098 (.075)
(iii) Rounds within supergames {=1, 2, 3}		---	---	-.25*** (.038)
Interaction term: (i) $\times$ (iii)		---	---	-.23*** (.060)
# of observations		124	604	1420
Log likelihood		-280.7	-1348.8	-3221.1

Notes: Ordered probit regressions with robust standard errors clustered by session ID. Individual random effects were included in columns (2) and (3). Observations only in groups that operated under the partner matching protocol were used. Groups that did not reach a unanimous agreement in the 20th vote were excluded from the regressions. The numbers in parentheses are standard errors. Cut points are omitted to conserve space.

*, **, and *** indicate significance at the .10 level, at the .05 level and at the .01 level, respectively.

Table C.4: *The Effects of Democratic Decision-Making on Enhancing Cooperation (supplementing Table 3 of the paper) – Robustness check 3: controlling for possible selection effects*

One group in each of the ENDO-U and ENDO-M treatments selected the random matching protocol in the 1st supergame (Table 1). These specific groups may be the ones with the lowest cooperative dispositions. If this is the case, the result for the impact of democracy in Table 3 and Appendix Table C.2 might be overestimated. As a robustness check, I conducted regressions with the same specifications as columns (1) and (4) of Table 3 and Appendix Table C.2, while dropping one group with the lowest average round 1 contribution in the EXO treatment. The estimation results are as follows:

[1. Results using tobit regressions (Robustness check of Table 3)]

Dependent variable: Contribution amount of subject i in round 1 of the 1st supergame

Independent Variable:	Voting rule: Unanimity Rule (1)	Majority Rule (4)
(i) Endo dummy {= 1 for the ENDO-U and the ENDO-M treatments; 0 for the EXO treatment}	1.79*** (.32)	4.51*** (.89)
Constant	10.1*** (.25)	10.2*** (.33)
# of observations	124	124
# of left-censored observations	14	17
# of right-censored observations	29	38
Log pseudo likelihood	-345.8	-322.7

Notes: Tobit regressions with robust standard errors clustered by session ID. The numbers in parentheses are standard errors. Observations only in groups that operated under the partner matching protocol in the first supergame were used.

*, **, and *** indicate significance at the .10 level, at the .05 level and at the .01 level, respectively.

[2. Results using ordered probit regressions (Robustness check of Appendix Table C.2)]

Dependent variable: Contribution amount of subject i in round 1 of the 1st supergame

Independent Variable:	Voting rule: Unanimity Rule (1)	Majority Rule (4)
(i) Endo dummy {= 1 for the ENDO-U and the ENDO-M treatments; 0 for the EXO treatment}	.22*** (.032)	.39*** (.088)
# of observations	124	124
Log pseudo likelihood	-278.1	-260.1

Notes: Ordered probit regressions with robust standard errors clustered by session ID. The numbers in parentheses are standard errors. Observations only in groups that operated under the partner matching protocol in the first supergame were used. Cut points are omitted to conserve space as in Table C.2.

*, **, and *** indicate significance at the .10 level, at the .05 level and at the .01 level, respectively.

RESULT: *The results in the 1st supergame (Table 3 and Appendix Table C.2) are not inflated by possible selection bias.*

Likewise, I conducted a robustness check of columns (2), (3), (5) and (6) of Table 3 of the paper and Table C.2 in the Appendix.

One group, one group, five groups, two groups and one group in the ENDO-U treatment selected the random matching protocol in the 1st, 2nd, 3rd, 4th, and 5th supergames, respectively (see Table 1 of the paper). Likewise, one group, three groups, three groups, six groups and four groups in the ENDO-M treatment selected the random matching protocol in the 1st, 2nd, 3rd, 4th and 5th supergames, respectively. These specific groups may be the ones with the lowest cooperative dispositions. If this is the case, the results from columns (2), (3), (5) and (6) of Table 3 and Appendix Table C.2 might be overestimated for the impact of democracy.

As a robustness check, I conducted regressions with the same specifications as columns (2), (3), (5) and (6) of Table 3 and Appendix Table C.2 while dropping the observations of the same number of groups with the lowest average round 1 contributions in a given supergame from the EXO treatment. The following includes estimation results:

[1. Results using tobit regressions (Robustness check of Table 3)]

Dependent variable: Contribution amount of subject i in a given round of a given supergame

Independent Variable:	Voting rule: Period:	Unanimity Rule		Majority Rule	
		Round 1 (2)	Rounds 1-3 (3)	Round 1 (5)	Rounds 1-3 (6)
(i) Endo dummy {= 1 for the ENDO-U and the ENDO-M treatments; 0 for the EXO treatment}		2.41** (1.06)	2.55* (1.50)	4.53*** (1.20)	5.72** (2.43)
(ii) Supergame number {= 1, 2, 3, 4, 5}		-.88*** (.056)	-.93 (.23)	-.56*** (.068)	-.59*** (.087)
Interaction term: (i) $\times$ (ii)		-.43 (.47)	.031 (.39)	-.81** (.41)	-.98 (.66)
(iii) Rounds within supergames {= 1, 2, 3}		---	-2.28*** (.20)	---	-2.27*** (.34)
Interaction term: (i) $\times$ (iii)		---	-1.02* (.55)	---	-.22 (.50)
Constant		10.5*** (.24)	12.5*** (.91)	10.1*** (.21)	12.0*** (.41)
# of observations		580	1,356	524	1,240
# of left-censored observations		112	377	95	298
# of right-censored observations		98	158	105	193
Log pseudo likelihood		-1604.1	-3579.8	-1434.7	-3315.5

Notes: Tobit regressions with robust standard errors clustered by session ID. Observations only in groups that operated under the partner matching protocol in the first supergame were used.

*, **, and *** indicate significance at the .10 level, at the .05 level and at the .01 level, respectively.

[2. Results using ordered probit regressions (Robustness check of Appendix Table C.2)]

Dependent variable: Contribution amount of subject i in a given round of a given supergame

Independent Variable:	Voting rule: Period:	Unanimity Rule		Majority Rule	
		Round 1 (2)	Rounds 1-3 (3)	Round 1 (5)	Rounds 1-3 (6)
(i) Endo dummy {= 1 for the ENDO-U and the ENDO-M treatments; 0 for the EXO treatment}		.45*** (.17)	.39*** (.13)	.74*** (.24)	.83*** (.26)
(ii) Supergame number {= 1, 2, 3, 4, 5}		-.15*** (.017)	-.14*** (.027)	-.098*** (.012)	-.091*** (.022)
Interaction term: (i) $\times$ (ii)		-.056 (.087)	.036 (.054)	-.10 (.074)	-.12 (.083)
(iii) Rounds within supergames {= 1, 2, 3}		---	-.26*** (.043)	---	-.24*** (.050)
Interaction term: (i) $\times$ (iii)		---	-.21*** (.062)	---	-.075 (.050)
# of observations		580	1,356	524	1,240
Log pseudo likelihood		-1303.2	-3081.0	-1174.9	-2865.0

Notes: Ordered probit regressions with robust standard errors clustered by session ID. Individual random effects are included. Observations only in groups that operated under the partner matching protocol in each supergame were used. Cut points are omitted to conserve space.

*, **, and *** indicate significance at the .10 level, at the .05 level and at the .01 level, respectively.

RESULT: *The results in columns (2), (3), (5) and (6) of Table 3 and Appendix Table C.2 are not inflated by possible selection bias.*

Table C.5: *The Effects of Democratic Decision-Making on the Formation of Subjects' Beliefs (supplementing Table 5 of the paper)*

Dependent variable: Subject i 's belief on his or her three interaction partners' average contribution amount in a given supergame

Independent Variable:	Voting rule: Data:		Unanimity Rule		Majority Rule	
	1 st Supergame	All Supergames	1 st Supergame	All Supergames	1 st Supergame	All Supergames
	(1)	(2)	(3)	(4)	(3)	(4)
(i) Endo dummy {= 1 for the ENDO-U and the ENDO-M treatments; 0 for the EXO treatment}	.30** (.13)	.31 (.21)	.43** (.20)	.33 (.31)		
(ii) Supergame number {= 1, 2, 3, 4, 5}	---	-.29*** (.043)	---	-.23*** (.038)		
Interaction term: (i) $\times$ (ii)	---	-.041 (.065)	---	.015 (.099)		
# of observations	128	620	128	592		
Log Pseudo likelihood	-283.9	-1488.3	-281.6	-1480.0		

Notes: Ordered probit regressions with robust standard errors clustered by session ID. Individual random effects are included in columns (2) and (4). As for the ENDO-U and ENDO-M treatments, only observations in groups which selected the partner matching protocol were used. The numbers in parentheses are standard errors. Cut points are omitted to conserve space.

*, **, and *** indicate significance at the .10 level, at the .05 level and at the .01 level, respectively.

Table C.6: *The Effects of Democratic Decision-Making by the Number of Voting Stages Required to Reach a Consensus in the ENDO-U treatment, and by the Number of Y-voters in the ENDO-M treatment (supplementing Figure 2 of the paper)*

(1) Testing the differences in the average contribution between the ENDO-U and EXO treatments

	Data for round 1		Data for rounds 1 to 3
	1 st SG	All SG ¹	All SG ¹
# of voting stages = 1	.004***	.023**	.099*
# of voting stages = 2	.076*	.161	.306
# of voting stages $\in \{3, 4, \dots, 19\}$	.241	.351	.552
# of voting stages = 20	.000###	.000###	.000###

Notes: Two-sided p -values based on tobit regressions with robust standard errors clustered by session ID. Each test compares the average contributions of groups that operated under the partner matching protocol between the ENDO-U and EXO treatments. See Panel (I) in Figure 2 of the paper for the average contribution amounts.

¹ Individual random effects were additionally included for these regressions.

*, **, and *** indicate that the average contribution is significantly larger in the ENDO-U treatment than in the EXO treatment at the .10 level, at the .05 level and at the .01 level, respectively.

#, ##, and ### indicate that the average contribution is significantly lower in the ENDO-U treatment than in the EXO treatment at the .10 level, at the .05 level and at the .01 level, respectively.

(2) Testing the differences in the average contribution between the ENDO-M and EXO treatments

	Data for round 1		Data for rounds 1 to 3
	1 st SG	All SG ¹	All SG ¹
# of Y-voters = 4	.000***	.000***	.000***
# of Y-voters = 3	.440	.001***	.012**
# of Y-voters = 2	N/A	.329	.052*

Notes: Two-sided p -values based on tobit regressions with robust standard errors clustered by session ID. Each test compares the average contributions of groups that operated under the partner matching protocol between the ENDO-M and EXO treatments. See Panel (II) in Figure 2 of the paper for the average contribution amounts.

¹ Individual random effects were additionally included for these regressions.

*, **, and *** indicate that the average contribution is significantly larger in the ENDO-M treatment than in the EXO treatment at the .10 level, at the .05 level and at the .01 level, respectively.

[The next two tables include results for statistical tests of the differences in beliefs:]

(3) Testing the differences in the average belief between the ENDO-U and EXO treatments

	1 st SG	All SG ¹
# of voting stages = 1	.070*	.145
# of voting stages = 2	.080*	.058*
# of voting stages $\in \{3, 4, \dots, 19\}$	.304	.907
# of voting stages = 20	.036**	.176

Notes: Two-sided p -values based on tobit regressions with robust standard errors clustered by session ID. Each test compares the average beliefs of groups that operated under the partner matching protocol between the ENDO-U and EXO treatments. See Panel (I) in Figure 2 of the paper for the average beliefs in the ENDO-U and EXO treatments.

¹ Individual random effects were additionally included for these regressions.

*, **, and *** indicate that the average belief is significantly larger in the ENDO-U treatment than in the EXO treatment at the .10 level, at the .05 level and at the .01 level, respectively.

(4) Testing the differences in the average belief between the ENDO-M and EXO treatments

	Data for round 1	
	1 st SG	All SG ¹
# of Y-voters = 4	.000***	.000***
# of Y-voters = 3	.659	.113
# of Y-voters = 2	N/A	.794

Notes: Two-sided p -values based on tobit regressions with robust standard errors clustered by session ID. Each test compares the average beliefs of groups that operated under the partner matching protocol between the ENDO-M and EXO treatments. See Panel (II) in Figure 2 of the paper for the average beliefs in the ENDO-M and EXO treatments.

¹ Individual random effects were additionally included for these regressions.

*, **, and *** indicate that the average belief is significantly larger in the ENDO-M treatment than in the EXO treatment at the .10 level, at the .05 level and at the .01 level, respectively.

Table C.7: The Effects of Experiences on Voting under the Partner Matching Protocol

Dependent variable: A dummy which equals 1 if subject i voted for the partner matching protocol in the t^{th} supergame; and 0 if the subject voted for the random matching protocol.

Independent Variable:	ENDO- U (1)	ENDO- M (2)
(Average realized contribution by i 's group members in Supergame $t - 1$) /(Subject i 's belief on peers' contribution amounts in Supergame $t - 1$)	.069 (.039)	.14*** (.012)
Constant	.65*** (.042)	.57*** (.012)
# of observations	215	198
Prob > F	.2224	.0073***

Notes: Linear probability models. Standard errors, clustered by session ID, were in parenthesis. Individual fixed effects were included to control for time-invariant individual heterogeneity. Observations in groups that operated under the partner matching protocol in the $t - 1^{\text{th}}$ supergame were used.

*, **, and *** indicate significance at the .10 level, at the .05 level and at the .01 level, respectively.