Threshold-Level Public Good Provision with Multiple Units: Experimental Effects of
      Disaggregated Groups with Rebates
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Online Supplementary Appendix

Sample Experiment Instruction for "Threshold Level Public Goods Provision with Multiple Units: Experimental Effects of Disaggregated Groups with Rebates" [1]

by Pengfei Liu, Stephen K. Swallow and Christopher M. Anderson

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This is an experiment in the economics of decision-making. During the experiment, you will be asked to make a series of decisions. If you follow the instructions and make careful decisions, you can earn a considerable amount of money.

Treatment 1

Experiment Overview
You will be randomly assigned to a group of 5 to 7 participants at the beginning. You will stay with the same people in your group, in the first two of three treatments. You will be asked to decide how much money to offer towards the cost of your group's project. This cost is predetermined and known to you. All members of your group receive a benefit when the project is implemented, which occurs only when the total offers of all members in a group meets or exceeds the cost of the project.

How You Earn Money
At the beginning of each period, you will be told the individual value (benefit) you receive if a project is implemented. Your individual value for one project will be between 4 and 12 experimental dollars and is different across people. Your individual value will be constant for a single treatment, but can be different across different treatments. You will then be asked to make an offer from zero up to your current balance. *Please do not contribute more than you have.*

You will be working with experimental dollars. One experimental dollar equals to twenty cents. Your initial fund will be 25 experimental dollars, which represents your fee for showing up today. Your earnings for each period will be added to or subtract from this amount.

The Process
Again, you will be asked to decide how much money you will offer towards the cost of a project.

- If your group's total offers **equal** the cost of the project, the project will be implemented. Your earnings will be your individual value for the project minus your contribution.

- If your group's total offers **exceed** the cost of the project, the project will be implemented and excess funds will be rebated. Your earnings will be your individual value for the project minus your offer, plus your rebate. Your rebate will be in proportion to the excess funds offered by your group. So, if X% of your group's total offers is not needed, your rebate will be X% of your offer.

- If the group's total offers are not sufficient to implement the project, your offer will not be collected and you will receive no additional earnings.

Examples
There are two possible outcomes in each period:

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(Outcome 1) The group offers **exceed or equal** the project cost and the project is implemented.

In this example, total offers exceed the amount needed, so a portion of each offer will be rebated. Your earnings are your individual value for the project, minus your offer, plus your *rebate*. This rebate is based upon the proportion of total offers represented by excess funds offered by your group.

Project Cost (*unknown to you*)	$100.0	
Your Individual Value	$10.0	*Others in your group may have values higher or lower than yours*
Your Offer	$8.0	*Others in your group may offer more or less than you do*
Total Offers of Your Group	$200.0	*Exceeds project cost*
Total Excess Contributions	$100.0	*$200 offered - $100 needed*
Your Rebate from Excess Contributions	$4.0	*We need 50% of the money offered, so you get 50% of your money back*
Your Earnings for This Period	$6.0	* $10.0 Value* *- $8.0 Offer* *+ $4.0 rebate* *=$6.0 earnings*

The project cost is exceeded, so the project is implemented. Because we only need 50% of the money offered, you get 50% of your offer back. Your earnings ($6.0) are your individual value ($10.0) minus your offer ($8.0), plus your rebate ($4.0).

If the total offers equal to the project cost, your rebate will be 0. Your earning in this period will be your value minus your offer.

(Outcome 2) The group offers **do not** allow the project to be implemented.

In this example, your offer will not be collected and you will not receive any additional earnings.

Project Cost (*unknown to you*)	$100.0	
Your Individual Value	$10.0	*Others in your group may have values higher or lower than yours*
Your Offer	$8.0	*Others in your group may offer more or less than you do*
Total Offers of Your Group	$80.0	*Does not meet project cost*
Your Earnings for This Period	$0	*No additional value received*

The project cost is not met, so the project is not implemented. You do not receive your individual value for this period. Your $8.0 offer is not collected.

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Please do not speak to other participants during the experiment. Follow these instructions to the best of your ability. If you have questions, raise your hand and the administrator will assist you.

Instructions At-A-Glance

- You will be asked to decide how much money to offer towards the cost of a project.
- Based on the offers of everyone in your group, the administrator will determine whether the project can be implemented.
- If the total offers of your group **equal** the cost of the project, the project is implemented. Your earnings will be your individual value minus your contribution.
- If the total offers of your group **exceed** the cost of the project, the project is implemented and excess contributions are rebated so that <u>only the exact amount needed</u> for the project is actually collected. Your earnings will be your individual value minus your offer, plus a rebate based upon the proportion of total offers represented by excess funds offered by your group.
- If the group's total offers are not sufficient to implement the project, your offer will not be collected and you will receive no additional earnings.

- If you offer more, in exchange for incurring some of the costs, you increase the chance that the project is implemented.

At the end of the experiment, your earnings will be added across all periods and converted from experimental dollars to real dollars. You will be paid as you leave.

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Treatment 2: Proportional Rebate (D)

Experiment Overview
The overall process for this treatment is the same as for the previous treatment in terms of group size (5-7), range of values (4-12), the rebate rule, and the steps you will take. However, all members (members both in your group and the other group) receive a benefit when a project is implemented (even if implemented by the other group), which occurs <u>when the total offers in a group meets or exceeds the cost of the project for that group.</u>

The Process
Again, you will be asked to decide how much money to offer towards the cost of your group's project.

- If neither of the two group's total offers are **sufficient** for their project to be implemented, so neither project is implemented, your offer will not be collected and you will receive no additional earnings.

- If only one of the two group's total offers are **sufficient** to implement their group's project, then:
    - If it s your group that implemented the project, you will receive your individual value for 1 project, minus a contribution in the amount of your offer, plus your rebate.
    - If it is your group that implemented the project. If it is the other group that implemented the project, you will receive your value for 1 project, without any cost to you.

- If both groups' total offers are **sufficient** to implement the project, you will receive your individual value for 2 projects, minus a contribution in the amount of your offer for your group's project, plus your rebate.

- How is your rebate calculated? If your group's total offers **exceed** the cost of your group's project, that project will be implemented and excess funds will be rebated. Your rebate will be in proportion to the excess funds offered by your group. So, if X% of your group's total offers is not needed, your rebate will be X% of your offer.

Examples

(Outcome 1) Your group's offers **exceed or equal** the project cost and your group's project is implemented.

In this example, total offers of your group exceed the amount needed, so a portion of each offer will be rebated. Your earnings are your individual value for the project, minus your offer, plus your *rebate*. This rebate is based upon the proportion of total offers represented by excess funds offered by your group.

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Project Cost (*unknown to you*)	$100.0	
Your Individual Value for 1 project	$10.0	*Others in your group may have values higher or lower than yours*
Your Individual Value for 2 projects	$16.0	*Others in your group may have values higher or lower than yours*
Your Offer	$8.0	*Others in your group may offer more or less than you do*
Total Offers of Your Group	$200.0	*Exceeds project cost*
Total Excess Contributions	$100.0	*$200 offered - $100 needed*
Your Rebate from Excess Contributions	$4.0	*We need 50% of the money offered by your group, so you get 50% of your money back*
Your Earnings for This Period if the other group did not implement the project	$6.0	$10.0 *Value for 1 project* - $8.0 *Offer* + $4.0 *rebate* =$6.0 *earnings*
Your Earnings for This Period if the other group implemented the project	$12.0	$16.0 *Value for 2 projects* - $8.0 *Offer* + $4.0 *rebate* =$12.0 *earnings*

Your group's project cost is exceeded, so your group's project is implemented. Because we only need 50% of the money offered by your group, you get 50% of your offer back. Your earnings ($6.0) are your individual value ($10.0) minus your offer ($8.0), plus your rebate ($4.0) if the other group did not implement their project. If the other group did implement their project, then your earnings will be $12.0, since your value for 2 projects is $6.0 higher than your value for 1 project, but your costs (and rebate) don't change.

If the total offers from your group equal to your group's project cost, your rebate will be $0.

(Outcome 2) Your group's offers **do not** allow your group's project to be implemented.
In this example, your offer will not be collected.

Project Cost (*unknown to you*)	$100.0	
Your Individual Value for project 1	$10.0	*Others in your group may have values higher or lower than yours*
Your Individual Value for 2 projects	$16.0	*Others in your group may have values higher or lower than yours*
Your Offer	$8.0	*Others in your group may offer more or less than you do*
Total Offers of Your Group	$80.0	*Does not meet project cost*

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Your Earnings for This Period if the other group did not implement their project	$0	*No additional value received*
Your Earnings for This Period if the other group implemented their project	$10.0	*$10.0 Value for 1 project*

Your group's project cost is not met, so you group's project is not implemented. You do not receive your individual value for this period. Your $8.0 offer is not collected. However if the other group implemented the project, you would still receive your value of $10.0 for 1 project without any cost to you.

Please do not speak to other participants during the experiment. Follow these instructions to the best of your ability. If you have questions, raise your hand and the administrator will assist you.

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Instructions At-A-Glance

- You will be asked to decide how much money to offer towards the cost of a project.
- Based on the offers of everyone in your group, the administrator will determine whether your group's project can be implemented.
- If none of the two group's total offers are **sufficient** for their project to be implemented, your offer will not be collected and you will receive no additional earnings.
- If only one of the group's total offers are **sufficient** to implement their project, you will receive your individual value for 1 project, minus a contribution in the amount of your offer, plus a rebate, if it is your group that implemented the project. If it is the other group that implemented the project, you will receive your value for 1 project, without any cost to you.
- If both groups' total offers are **sufficient** to implement their project, you will receive your individual value for 2 projects, minus a contribution in the amount of your offer for your group's project, plus your rebate.
- How is rebate calculated? If your group's total offers **exceed** the cost of your group's project, that project will be implemented and excess funds will be rebated. Your rebate will be in proportion to the excess funds offered by your group. So, if X% of your group's total offers is not needed, your rebate will be X% of your offer.
- If you offer more, in exchange for incurring some of the costs, you increase the chance that your group's project is implemented.

At the end of the experiment, your earnings will be added across all periods and converted from experimental dollars to real dollars. You will be paid as you leave.

Treatment 2-1:

Your Individual value for 2 projects is 220% as much as for 1 project.

Now please make your decisions!

Treatment 2-2:

Your Individual value for 2 projects is 180% as much as for 1 project.

Now please make your decisions!

Treatment 2-3:

Your Individual value for 2 projects is 140% as much as for 1 project.

Now please make your decisions!

Treatment 3: Proportional Rebate (A)

Experiment Overview
All of you will be in a single, large group in this treatment. The large group simply combines the two previous groups into a single group. Individual value range is still the same as before, which is between 4 and 12 experimental dollars for a single project. You will be asked to decide how much money to offer towards the cost of the group's project(s). The combined, large group can provide up to 2 projects. The cost for the 1st project is the same as the cost for the 2nd project. All members of the group receive a benefit if any project is provided.

The Process
Again, you will be asked to decide how much money to offer towards the cost of your group's project(s).

- If the group's total offers are **sufficient** for 1 project to be implemented, while **not sufficient** for 2 projects to be implemented, you will receive your individual value for 1 project, minus a contribution in the amount of your offer, plus your rebate.
- If the group's total offers are **sufficient** for 2 projects to be implemented, you will receive your individual value for 2 projects, minus a contribution in the amount of your offer, plus your rebate.
- If the group's total offers are **not sufficient** to implement 1 project, your offer will not be collected and you will receive no additional earnings.
- How is your rebate calculated? If your group's total offers **exceed** the total cost of the number of projects implemented, either one project or two projects, then excess funds will be rebated. Your rebate will be in proportion to the excess funds offered by your group relative to the total cost of projects implemented. So, if X% of your group's total offers is not needed, your rebate will be X% of your offer.

Examples
(Outcome 1) Your group's offers **only** allow 1 project to be implemented.

Project Cost for 1 project *(unknown to you)*	$100.0	
Project Cost for 2 projects *(unknown to you)*	$200.0	
Your Individual Value for 1 project	$10.0	*Others in your group may have values higher or lower than yours*
Your Individual Value for 2 projects	$16.0	*Others in your group may have values higher or lower than yours*
Your Offer	$8.0	*Others in your group may offer more or less than you do*
Total Offers of Your (Large) Group	$150	*Allow 1 projects provided*
Total Excess Contributions	$50	*$150 offered - $100 needed*

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Your Rebate from Excess Contributions	$3.3	*We need 33.3% of the money offered, so you get 66.7% of your money back*
Your Earnings for This Period if the other group did not implement the project	$5.3	*$10.0 Value for 1 project* - *$8.0 Offer* + *$3.3 rebate* =*$5.3 earnings*

The large group's offers exceed the cost of one project, but not two. A single project is implemented. Because we only need 66.7% of the money offered by the large group, you get 33.3% of your offer back. Your earnings are your individual value for one project ($10.0) minus your offer ($8.0), plus your rebate ($3.3).

(Outcome 2) Your group offers **do** allow 2 projects to be implemented.

Project Cost for 1 project (*unknown to you*)	$100.0	
Project Cost for 2 projects (*unknown to you*)	$200.0	
Your Individual Value for 1 project	$10.0	*Others in your group may have values higher or lower than yours*
Your Individual Value for 2 projects	$16.0	*Others in your group may have values higher or lower than yours*
Your Offer	$8.0	*Others in your group may offer more or less than you do*
Total Offers of Your (Large) Group	$250	*Allows 2 projects to be provided*
Total Excess Contributions	$150	*$250 offered - $200 needed*
Your Rebate from Excess Contributions	$1.6	*We need 80% of the money offered, so you get 20% of your money back*
Your Earnings for This Period if the other group did not implement the project	$9.6	*$16.0 Value for 2 projects* - *$8.0 Offer* + *$1.6 rebate* =*$9.6 earnings*

The large group's offers exceed the cost of both (two) projects. Both projects are implemented. Because we only need 80% of the money offered by the large group, you get 20% of your offer back. Your earnings are your individual value for two projects ($16.0) minus your offer ($8.0), plus your rebate ($1.6).

(Outcome 3) Your group offers **do not** allow any projects to be implemented.
In this example, your offer will not be collected.

Project Cost for 1 project (*unknown to you*)	$100.0	
Project Cost for 2 projects (*unknown to you*)	$200.0	
Your Individual Value for 1 project	$10.0	*Others in your group may have*

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		values higher or lower than yours
Your Individual Value for 2 projects	$16.0	*Others in your group may have values higher or lower than yours*
Your Offer	$8.0	*Others in your group may offer more or less than you do*
Total Offers of Your Group	$90.0	*Does not meet project cost (even for one project)*
Your Earnings for This Period	$0	*No additional value received*

Your group's project cost is not met, even for one project, so none of your group's projects are implemented. You do not receive your individual value (either one or two projects) for this period. Your $8.0 offer is not collected.

Please do not speak to other participants during the experiment. Follow the instructions to the best of your ability. If you have questions, raise your hand and the administrator will assist you.

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Instructions At-A-Glance

- You will be asked to decide how much money to offer towards the cost of your group's project(s).
- Based on the offers of everyone in your (large) group, the administrator will determine how many projects can be implemented.
- If the group's total offers are **not sufficient** to implement 1 project, your offer will not be collected and you will receive no additional earnings.
- If your group's total offers are **sufficient** for 1 project to be implemented, while **not sufficient** for 2 projects to be implemented, you will receive your individual value for 1 project, minus a contribution in the amount of your offer, plus your rebate.
- If your group's total offers are **sufficient** for 2 projects to be implemented, you will receive your individual value for 2 projects, minus a contribution in the amount of your offer, plus your rebate.
- How is your rebate calculated? If your group's total offers **exceed** the total cost of the number of projects implemented, either one project or two projects, then excess funds will be rebated. Your rebate will be in proportion to the excess funds offered by your group relative to the total cost of the projects implemented. So, if X% of your group's total offers is not needed, your rebate will be X% of your offer.
- If you offer more, in exchange for incurring some of the costs, you increase the chance that more projects being implemented.

At the end of the experiment, your earnings will be totaled across all periods and converted from experimental dollars to real dollars. You will be paid as you leave.

Treatment 3-1:

Your Individual value for 2 projects is 220% as much as for 1 project.

Now please make your decisions!

Treatment 3-2:

Your Individual value for 2 projects is 180% as much as for 1 project.

Now please make your decisions!

Treatment 3-3:

Your Individual value for 2 projects is 140% as much as for 1 project.

Now please make your decisions!