Supporting Information A: Statistical Analysis and Tables

The regression models reported in Table A1 support our analysis of group-level outcomes in Experiment 1 (page 13-14). We estimated a regression model (column 1) that included dummy variables for each treatment condition, a time trend (number of Part 2 periods played), interactions between treatments and time, and group random effects. The dependent variable is the proportion of the total endowment contributed to the public good. Model 1 supports our observation that both delegation and communication significantly increase the initial levels of the public good provided, but that there is also no statistical difference between the different treatments. The analysis also supports our observation that contributions in the delegation treatments remain steady over time while there is a significant decrease in contributions when subjects communicate without centralized decision-making. These results also hold when we control for between-group differences measured by the average contributions from Part 1 (model 2). Column 3 shows that low contributors allocate significantly less to the public good when controlling for group Part 1 averages and changes over time.

Table A2 reports group-level details regarding our classification of allocation vectors (pages 14-16). As explained in the text, a FULL contribution vector is one where the allocator chooses $x = 100$ for every group member, a SG (stage game) vector is one where $x = 0$ for the allocator and $x = 100$ for all other group members, and a MWC (minimum winning coalition) vector is one where $x = 100$ for a minority (four members) and $x = 0$ for the majority coalition (including the allocator).

In Table A3 we present estimates from probit models of opt-in decisions from Experiment 2. The dependent variable is whether a subject opted for delegation in a period. The effects of communication on initial opt-in decisions are presented in columns 1 (which controls for individual Part 1 contributions) and 2 (which controls for both individual and group Part 1 contributions). The results show that subjects who voluntarily gave more in Part 1 are more likely to opt-in during the first period of Part 2 (when we control for group averages), but the effect of communication on individual decisions is, at best, weak: the estimate is not significant in column 1 and is significant only at the .10 level when controlling for group averages in column 2. When we look at opt-in decisions over the entire course of play (thus allowing us to account for individual heterogeneity by using random effects), we find that communication has a noticeable, statistically significant effect.

Figure A1 shows group-level outcomes over time for Experiment 2 (analogous to Figure 2 in the main text of the paper for Experiment 1), and Figure A2 shows the proportion of full contribution vectors implemented by treatment.

Table A1. Random effects regression analysis of group contributions in Experiment 1

	All conditions		Delegation conditions only
	(1)	(2)	(3)
Communication	0.82**	0.82**	
	(0.11)	(0.12)	
Delegation	0.79**	0.79**	
	(0.09)	(0.10)	
Delegation with communication	0.82**	0.82**	0.06
	(0.09)	(0.10)	(0.04)
Period (Part 2)	-0.005**	-0.005**	0.003
	(0.002)	(0.002)	(0.002)
Communication x Period	-0.046**	-0.046	
	(0.004)	(0.004)	
Delegation x Period	0.007**	0.007**	
	(0.003)	(0.003)	
Delegation with communication x Period	0.005	0.005	-0.003
	(0.003)	(0.003)	(0.003)
Part 1 average contribution in group		0.04	0.17
		(0.24)	0.11
Allocator high Part 1 contributor			0.05
			(0.03)
Allocator low Part 1 contributor			-0.08**
			(0.03)
Constant	0.12	0.11	0.82**
	(0.08)	(0.10)	(0.05)
σ_{μ}^{2}	0.14	0.15	0.04
σ_{ε}^{2}	0.14	0.14	0.13
R^2 within	0.37	0.37	0.01
R^2 between	0.88	0.88	0.52
R^2 overall	0.79	0.79	0.21
Groups	24	24	16
N	484	484	320

* p < .05, ** p < .01, random effects at the group level.

Table A2. Percentage of observed allocations in delegation groups (Experiment 1)

Hypothesized Allocations					
Group	FULL	SG	MWC	Total Hypothesized	# Periods
D1	100	0	0	100	23
D2	0	34.8	13.0	47.8	23
D3	66.7	11.1	0	77.8	18
D4	88.9	5.6	0	94.5	18
D5	60.9	8.7	0	69.6	23
D6	95.7	4.4	0	100	23
D7	55.6	0	0	55.6	18
D8	77.8	16.7	0	94.5	18
DC1	26.3	0	42.1	68.4	19
DC2	100	0	0	100	19
DC3	42.9	4.8	0	47.6	21
DC4	95.2	0	0	95.2	21
DC5	94.1	5.9	0	100	17
DC6	82.4	11.8	0	94.1	17
DC7	90.5	4.8	0	95.2	21
DC8	95.2	0	0	95.2	21
All D	67.7	10.4	1.8	79.9	164
All DC	78.2	3.2	5.1	86.6	156
Total	72.8	6.9	3.4	83.1	320

Table A3. Probit and random effects probit analysis of opt-in decisions (Experiment 2)

	Initial period		All periods	
	(1)	(2)	(3)	(4)
Communication	0.391	0.489	1.533**	1.921**
	(0.250)	(0.267)	(0.341)	(0.345)
Individual average Part 1 contribution	1.246	1.721*	0.878	2.667**
	(0.667)	(0.791)	(0.833)	(0.933)
Group average Part 1 contributions		-0.002		-0.007**
		(0.002)		(0.002)
Period			-0.072**	-0.072**
			(0.012)	(0.012)
Communication x Period			0.110**	0.109**
			(0.018)	(0.018)
Constant	-0.656***	-0.407	-1.129**	-0.147
	(0.233)	(0.319)	(0.298)	(0.375)
σ_{μ}^{2}			1.47	1.359
			(0.149)	(0.139)
log likelihood	-70.53	-69.881	-635.723	-629.112
N	108	108	1854	1854

* p < .05, ** p < .01; individual level random effects included in (3) and (4)

Figure A1. Public good contributions and opt-in decisions over time in Experiment 2

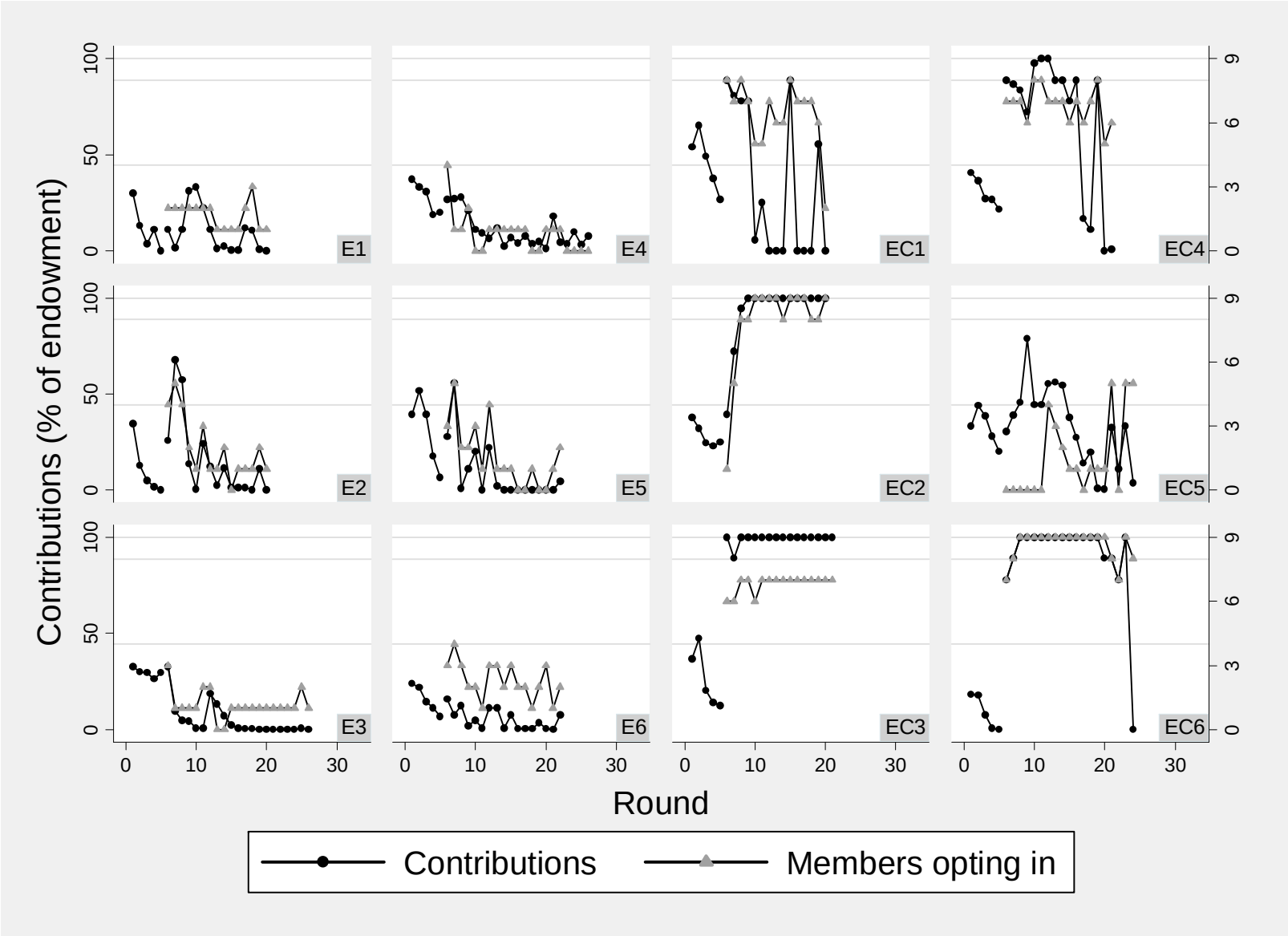
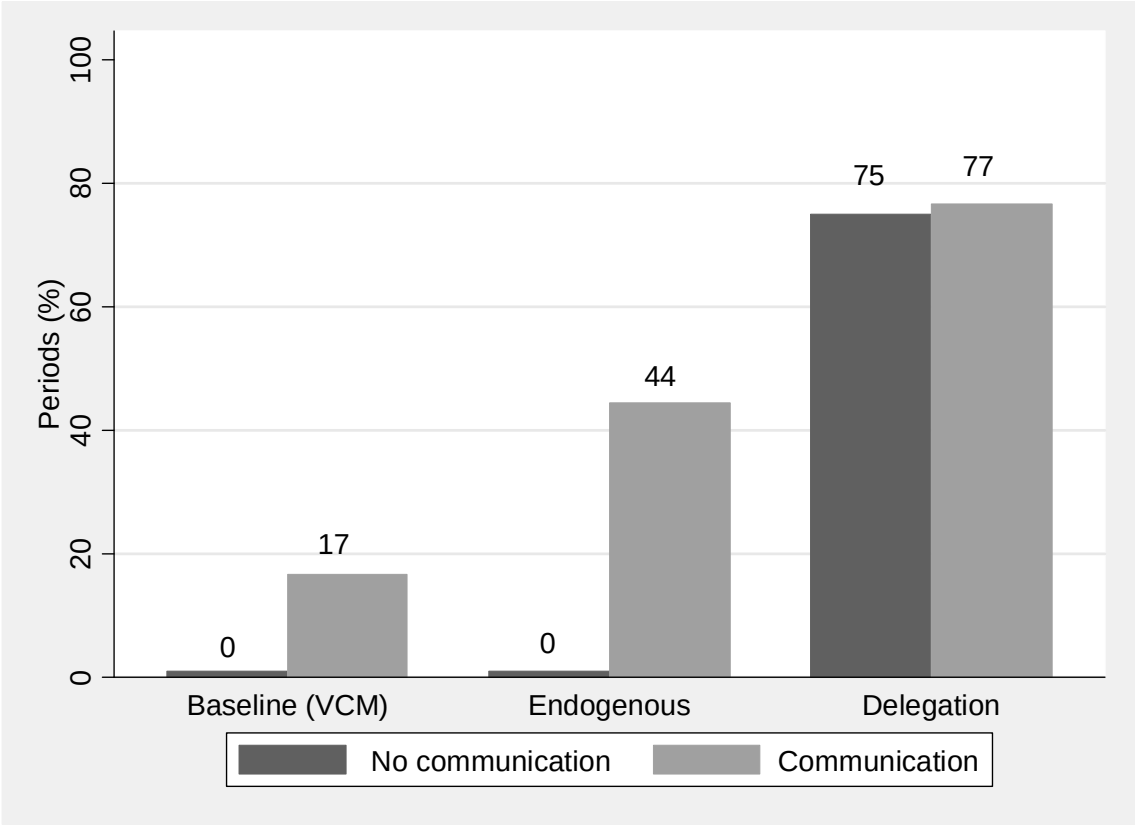


Figure A2. Frequency of full contribution vectors by treatment (periods 6-20)



Supporting Information B: Experiment Instructions

ID Screen

Before starting the experiment, we would like to randomly assign everyone a participant number. Please take an envelope from the experimenter. Inside each envelope is a card with a number from 1 to 20. This number is your participant number for the experiment. Your participant number will be the same for the entire experiment. This number is private and should not be shared with anyone.

Before proceeding, please enter your participant number in the box below. Please enter the number exactly as it appears on your card. One you have entered it and clicked "Continue" you will be asked to confirm your participant number. Please check to make sure you entered the number correctly before clicking again to proceed.

General Information

This is an experiment in decision-making. Several research institutions have provided funds for this research. In addition to a 5 participation fee, you will be paid any additional money you accumulate during the experiment at the conclusion of today's session.

The exact payment you receive will be determined during the experiment and will depend on your decisions and the decisions of others. You will be paid your earnings privately, meaning that no other participant will find out how much you earn.

If you have any questions during the experiment, please raise your hand and wait for an experimenter to come to you. Please do not talk, exclaim, or try to communicate with other participants during the experiment. Participants intentionally violating the rules may be asked to leave the experiment and may not be paid.

Groups, Parts, Rounds, and Payoffs

Groups
For today's experiment you will be placed in groups of 9. You will be grouped with the same eight other participants for all rounds of the experiment.

Parts and Rounds
The experiment is divided into two parts (I and II). Each part consists of a number of rounds. We will first proceed through Part I and you will then receive new instructions for Part II. Part I will last for 5 rounds.

Payoffs
Payoffs during the experiment will be denominated in tokens. Tokens will be converted to cash at the rate of $1 per 200 tokens. You will be paid your earnings totaled over all rounds of the

experiment. At the end of the experiment, you will see a final screen showing your payoffs in each round, your earnings from the game, and your total earnings for the experiment (including the $5 participation fee).

Description of Decision Task

In every round, you will start with 100 tokens. In a round, you must decide how to allocate your tokens between two accounts, account A and account B. Specifically, you will decide how many tokens to allocate to account B and the remainder will be automatically allocated to account A. You may designate any whole number of tokens between 0 and 100 to allocate to account B, and any tokens you choose not to allocate to account B will be placed in account A.

After you have chosen how much to allocate to account B, the computer will add up the total amount allocated to account B by all nine members of your group. This total amount will then be multiplied by 1.35 and divided up equally among all members of the group. We will round any fractions of tokens up to the next highest whole token.

The tokens you earn in each round are computed from the sum of two parts. First, you will receive any tokens you allocated to account A (in other words, those that you did not allocate to account B). Second, you will receive your share of the total earnings from account B (that is, one-ninth of the sum of all group members' allocations to account B multiplied by 1.35.

Are there any questions about the decision task in a round?

Example Payoffs

The table below represents your potential payoffs given possible allocations to account B by you and the allocations to account B by other members of your group. The formula below the table is the actual formula used to calculate your earnings.

Note: The numbers displayed are for illustrative purposes only. Your allocation may be any integer between 0 and 100.

Remember, these numbers above are simply several examples of possible outcomes. You may enter any integer amount of tokens from 0 to 100.

Note that when you make your choice you will not know the choices of other members of your group.

Instructions Conclusion

We are now ready to begin round 1 of the experiment.

Just to remind you: If you have any questions during the experiment, please raise your hand and wait for an experimenter to come to you. Please do not talk, exclaim, or try to communicate with other participants during the experiment.

Part II Instructions – Voluntary contributions without communication

We are now ready to begin Part II.

Part II will proceed for at least 15 rounds (rounds 6-20). After these 15 rounds and any subsequent round, there is a 75 percent chance of the experiment continuing for another round and a 25 percent chance that the experiment will end. That is, after round 20 and for each round that might be played after that, there is a 3 in 4 chance that you will play an additional round and a 1 in 4 chance that the experiment will end. More precisely, after round 20, the computer will randomly select a number from 1, 2, 3, or 4. If the number selected is 4, then the experiment will end. If the number selected is 1, 2, or 3, you will play an additional round (round 21). A new random number will be selected after that round to determine whether the experiment continues (to round 22), and so on.

Other than the difference in the number of rounds, Part II will be exactly the same as Part I.

Are there any questions before we proceed?

Part II Instructions – Voluntary contributions with communication

We are now ready to begin Part II.

Part II will proceed for at least 15 rounds (rounds 6-20). After these 15 rounds and any subsequent round, there is a 75 percent chance of the experiment continuing for another round and a 25 percent chance that the experiment will end. That is, after round 20 and for each round that might be played after that, there is a 3 in 4 chance that you will play an additional round and a 1 in 4 chance that the experiment will end. More precisely, after round 20, the computer will randomly select a number from 1, 2, 3, or 4. If the number selected is 4, then the experiment will end. If the number selected is 1, 2, or 3, you will play an additional round (round 21). A new random number will be selected after that round to determine whether the experiment continues (to round 22), and so on.

Before the decision task each round, you will have the opportunity to communicate electronically with the members of your group. You may enter any message you wish, with two restrictions. First, please do not enter any message that identifies you (eg. age, race, appearance, etc). Second, please avoid using obscene, offensive, or inappropriate language. You will have up to 90 seconds to send messages to others in your group. When your group has finished discussion you may click the "OK" button to proceed. The experiment will continue to the decision task once all groups have finished discussion.

Are there any questions before we proceed?

Part II Instructions – Voting without communication

We are now ready to begin Part II.

Part II will proceed for at least 15 rounds (rounds 6-20). After these 15 rounds and any subsequent round, there is a 75 percent chance of the experiment continuing for another round and a 25 percent chance that the experiment will end. That is, after round 20 and for each round that might be played after that, there is a 3 in 4 chance that you will play an additional round and a 1 in 4 chance that the experiment will end. More precisely, after round 20, the computer will randomly select a number from 1, 2, 3, or 4. If the number selected is 4, then the experiment will end. If the number selected is 1, 2, or 3, you will play an additional round (round 21). A new random number will be selected after that round to determine whether the experiment continues (to round 22), and so on.

As in Part I, each of you will start every round with 100 tokens. At the beginning of the round, instead of choosing your allocations, you will vote for one member of your group to be the allocator during that round. The group member who receives the most votes will be the allocator. In case of ties, one person will be randomly selected from those who received the most votes (with each one equally likely to be selected). After the votes are tallied, you will see the ID number of the allocator and the number of votes each group member received.

The allocator will decide how to allocate the tokens of every group member between the two accounts. Specifically, for each group member the allocator will decide how many tokens to allocate to account B, with the remainder automatically allocated to that group member's account A. The allocator may designate any whole number of tokens between 0 and 100 to allocate to account B for each member, and the allocator may select different allocations for each individual.

Following the allocator's decisions, all members of the group will see a results screen similar to the one in Part I, which will indicate the ID number of the allocator and how much the allocator allocated to account B for every group member.

Are there any questions before we proceed?

Part II Instructions – Voting with communication

We are now ready to begin Part II.

Part II will proceed for at least 15 rounds (rounds 6-20). After these 15 rounds and any subsequent round, there is a 75 percent chance of the experiment continuing for another round and a 25 percent chance that the experiment will end. That is, after round 20 and for each round that might be played after that, there is a 3 in 4 chance that you will play an additional round and

a 1 in 4 chance that the experiment will end. More precisely, after round 20, the computer will randomly select a number from 1, 2, 3, or 4. If the number selected is 4, then the experiment will end. If the number selected is 1, 2, or 3, you will play an additional round (round 21). A new random number will be selected after that round to determine whether the experiment continues (to round 22), and so on.

As in Part I, each of you will start every round with 100 tokens. At the beginning of the round, instead of choosing your allocations, you will vote for one member of your group to be the allocator during that round. The group member who receives the most votes will be the allocator. In case of ties, one person will be randomly selected from those who received the most votes (with each one equally likely to be selected). After the votes are tallied, you will see the ID number of the allocator and the number of votes each group member received.

The allocator will decide how to allocate the tokens of every group member between the two accounts. Specifically, for each group member the allocator will decide how many tokens to allocate to account B, with the remainder automatically allocated to that group member's account A. The allocator may designate any whole number of tokens between 0 and 100 to allocate to account B for each member, and the allocator may select different allocations for each individual.

Before voting, you will have the opportunity to communicate electronically with the members of your group. You may enter any message you wish, with two restrictions. First, please do not enter any message that identifies you (eg. age, race, appearance, etc). Second, please avoid using obscene, offensive, or inappropriate language. You will have up to 90 seconds to send messages to others in your group. When your group has finished discussion you may click the "OK" button to proceed. The experiment will continue to the decision task once all groups have finished discussion.

Following the allocator's decisions, all members of the group will see a results screen similar to the one in Part I, which will indicate the ID number of the allocator and how much the allocator allocated to account B for every group member.

Are there any questions before we proceed?

Part II Instructions – Endogenous delegation

We are now ready to begin Part II.

Part II will proceed for at least 15 rounds (rounds 6-20). After these 15 rounds and any subsequent round, there is a 75 percent chance of the experiment continuing for another round and a 25 percent chance that the experiment will end. That is, after round 20 and for each round that might be played after that, there is a 3 in 4 chance that you will play an additional round and a 1 in 4 chance that the experiment will end. More precisely, after round 20, the computer will randomly select a number from 1, 2, 3, or 4. If the number selected is 4, then the experiment will end. If the number selected is 1, 2, or 3, you will play an additional round (round 21). A new

random number will be selected after that round to determine whether the experiment continues (to round 22), and so on.

As in Part I, each of you will start every round with 100 tokens. At the beginning of the round, instead of choosing your allocations, each of you will first decide whether you want to make your own allocation decision as in Part I or whether you want to vote for one member of your group to make your allocation decisions during that round.

All of you who decide to vote for an allocator in that round (assuming more than one person does so) will then vote for one person among yourselves to make your allocation decisions. The group member who receives the most votes will be the allocator for those group members who choose to select an allocator. In case of ties, one person will be randomly selected from those who received the most votes (with each one equally likely to be selected). For those who vote for an allocator, after the votes are tallied, you will see the ID number of the allocator and the number of votes each group member received.

For those who vote for an allocator, the allocator will decide how to allocate the tokens of every group member between the two accounts. Specifically, for each group member the allocator will decide how many tokens to allocate to account B, with the remainder automatically allocated to that group member's account A. The allocator may designate any whole number of tokens between 0 and 100 to allocate to account B for each member, and the allocator may select different allocations for each individual. The allocator will not make the contribution choice for those individuals who choose to make their own allocation decisions.

If you decide you want to make your own allocation decision then you will not vote for an allocator and you will make your contribution choice just as you did in Part I.

Following the allocator's decisions and the decisions of those who chose to make their own allocation decisions, all members of the group will see a results screen similar to the one in Part I, which will indicate the ID number of the allocator, how many people selected to make decisions through the allocator, the amount allocated to account B for group members by the allocator, and the amount allocated to account B by those who made their own allocation decisions.

Are there any questions before we proceed?