Appendix
(For Online Publication)

Appendix A: Proofs for Section 3

We start by writing the maximization problem of an agent i:

$$\max_{c_i, g_i} u(c_i) + v(G)$$

$$\text{s.t. } c_i = (1-t)(y_i - g_i) + (1-w)\frac{t\sum_{j=1}^{n}(y_j - g_j)}{n} \text{ and } g_i \geq 0.$$

Assuming an interior solution, the first order condition is

$$u'\left((1-t)(y_i - g_i) + (1-w)\frac{t\sum_{j=1}^{n}(y_j - g_j)}{n}\right)\left(1 - \left(1 - \frac{1-w}{n}\right)t\right) = v'(G).$$

Since this equation holds for all agents, in equilibrium, the following should hold:

$$y_i - g_i = y_k - g_k = \frac{Y-G}{n}.$$

Therefore, the FOC simplifies to:

$$u'\left((1-wt)\left(\frac{Y-G}{n}\right)\right)\left(1 - \left(1 - \frac{1-w}{n}\right)t\right) = v'(G).$$

Proof for Theorem 1: Totally differentiating the FOC with respect to the tax rate t, and then solving for $\frac{\partial G}{\partial t}$, we get

$$\frac{\partial G}{\partial t} = -\frac{u''(b)w\left(\frac{Y-G}{n}\right)(1-at) + u'(b)a}{v''(G) + u''(b)\left(\frac{1-wt}{n}\right)(1-at)},$$

where $a = 1 - \frac{1-w}{n}$ and $b = (1-wt)\left(\frac{Y-G}{n}\right)$. Since the denominator is always negative, the sign of the numerator determines the sign of the partial derivative of G with respect to t.

If $w = 0$, the numerator simplifies to $u'(b)a$ and it is easy to see that it is always positive and, therefore, we do not need any additional assumptions about the consumption utility.

Now assume $0 < w < 1$. Note that $a = 1 - \frac{1-w}{n} = \frac{n-1+w}{n} > w$. Hence,

$$u''(b)w\left(\frac{Y-G}{n}\right)(1-at) + u'(b)a >$$
$$> u''(b)w\left(\frac{Y-G}{n}\right)(1-at) + u'(b)w =$$
$$= w\left(u''(b)\left(\frac{Y-G}{n}\right)(1-at) + u'(b)\right).$$

Since $(1-at) < (1-wt)$, we can show that

$$u''(b)w\left(\frac{Y-G}{n}\right)(1-at) + u'(b)a > w\big(u''(b)b + u'(b)\big).$$

This implies that if $u''(b)b + u'(b)$ is nonnegative, $u''(b)w\left(\frac{Y-G}{n}\right)(1-at) + u'(b)a$ has to be positive. In other words, for the numerator to be positive, it is sufficient to have $-\frac{u''(x)x}{u'(x)} \leq 1$.

Finally, if $w = 1$, total public goods provision is still a strictly increasing function of the tax rate if $-\frac{u''(x)x}{u'(x)} < 1$. For the extreme case of $w = 1$ and $-\frac{u''(x)x}{u'(x)} = 1$, public goods provision does not change with the tax rate.

Proof for Theorem 2: Totally differentiating the FOC with respect to the rate of waste, and then solving for $\frac{\partial G}{\partial w}$, we get

$$\frac{\partial G}{\partial w} = -\frac{u''(b)t\left(\frac{Y-G}{n}\right)(1-at)+u'(b)\frac{t}{n}}{v''(G)+u''(b)\left(\frac{1-wt}{n}\right)(1-at)},$$

where $a = 1 - \frac{1-w}{n}$ and $b = (1 - wt)\left(\frac{Y-G}{n}\right)$.

We provide a proof by contradiction. Suppose $\frac{\partial G}{\partial w} > \frac{\partial G}{\partial t}$. We see that in order for $\frac{\partial G}{\partial w}$ to be larger than $\frac{\partial G}{\partial t}$, the following needs to hold:

$$u''(b)w\left(\frac{Y-G}{n}\right)(1-at) + u'(b)a < u''(b)t\left(\frac{Y-G}{n}\right)(1-at) + u'(b)\frac{t}{n}.$$

Rearranging,

$$u'(b)(a - \frac{t}{n}) < u''(b)\left(\frac{Y-G}{n}\right)(1-at)(t-w).$$

We can immediately see that if $t \geq w$, then the previous inequality cannot hold. Instead, let's assume $t < w$. Rearranging one more time, we get

$$\frac{a-\frac{t}{n}}{w-t} < -\frac{u''(b)\left(\frac{Y-G}{n}\right)(1-at)}{u'(b)}.$$

Note that $\frac{a-\frac{t}{n}}{w-t} = \frac{(n-1)+(w-t)}{n(w-t)} > 1$, for any $t > 0$. In addition, the following inequality holds: $-\frac{u''(b)\left(\frac{Y-G}{n}\right)(1-at)}{u'(b)} < -\frac{u''(b)b}{u'(b)}$. Together these imply $1 < -\frac{u''(b)b}{u'(b)}$, which contradicts our initial assumption. Therefore, if $-\frac{u''(b)b}{u'(b)} \leq 1$, then $\frac{\partial G}{\partial t} > \frac{\partial G}{\partial w}$.

Proof for Theorem 3: Recall that

$$\frac{\partial G}{\partial w} = -\frac{u''(b)t\left(\frac{Y-G}{n}\right)(1-at)+u'(b)\frac{t}{n}}{v''(G)+u''(b)\left(\frac{1-wt}{n}\right)(1-at)},$$

where $a = 1 - \frac{1-w}{n}$ and $b = (1 - wt)\left(\frac{Y-G}{n}\right)$. Since the denominator is always negative, the sign of the numerator determines the sign of the partial derivative of G with respect to w.

When $t = 0$, waste does not matter, so we consider $0 < t \leq 1$. Since $(1 - at) < (1 - wt)$ and $u''(b) < 0$, we get

$$u''(b)t\left(\frac{Y-G}{n}\right)(1-at) + u'(b)\frac{t}{n} >$$
$$> u''(b)t\left(\frac{Y-G}{n}\right)(1-wt) + u'(b)\frac{t}{n} =$$
$$= t\left(u''(b)b + u'(b)\frac{1}{n}\right).$$

This implies that if $u''(b)b + u'(b)\frac{1}{n}$ is nonnegative, then $u''(b)t\left(\frac{Y-G}{n}\right)(1-at) + u'(b)\frac{t}{n} > 0$. Therefore, the condition needed is $-\frac{u''(x)x}{u'(x)} \leq \frac{1}{n}$.

Proof for Theorem 4: Assume the agents' consumption preferences are defined by the CRRA utility function $u = \frac{x^{(1-\theta)}}{(1-\theta)}$ for $\theta \neq 1$ and $u = \ln(x)$ for $\theta = 1$. Then the elasticity of marginal utility is given by θ.

We are looking for when donations strictly decrease as the degree of waste increases. In other words, we study when $u''(b)t\left(\frac{Y-G}{n}\right)(1-at) + u'(b)\frac{t}{n} < 0$. Substituting $u = \frac{x^{(1-\theta)}}{(1-\theta)}$ in this previous equation, we get

$$-\theta b^{-\theta-1}t\left(\frac{Y-G}{n}\right)(1-at) + b^{-\theta}\frac{t}{n} < 0.$$

Rearranging, this equation simplifies to

$$\theta > \frac{(1-wt)}{(1-at)n}.$$

It is important to note that $\frac{(1-wt)}{(1-at)n} > \frac{1}{n}$ when $w < 1$, since $(1-at) < (1-wt)$. When $w = 1$, $\frac{(1-wt)}{(1-at)n} = \frac{1}{n}$.

Appendix B: Instructions to the Experiment

Instructions for the *Unequal* Treatment

Thank you for agreeing to participate in this experiment. Your participation is voluntary. In this experiment we want to see the choices that people make. You will be making choices on your own and in private. So it is very important that you remain silent and do not look at other people's choices. If you have any questions, please raise your hand.

The experiment will proceed in four parts. At the beginning of each part you will receive detailed instructions for that part. The earnings that you make will depend on your decisions in each part.

In Part 1, you will take a 20-minute cognitive test containing 10 questions. Upon completion of Part 1 you will earn a certain amount of money. This amount may be the same for everyone in this room or each participant's earnings may depend on their relative performance in the test.

In Part 2, you will be asked to make a series of choices in decision problems. Depending on your choices and chance, you may lose part of the money you earn in Part 1. Your decisions in Part 2 will not affect your earnings from Part 3 and Part 4.

In Part 3, you will be asked to make another series of choices in decision problems. How much money you receive in Part 3 will depend partly on chance and partly on the choices you make.

In Part 4, you will be asked to make one last choice in a decision problem. Again, your decisions from preceding Part 2 and Part 3 will not affect your earnings in Part 4.

In addition, upon completion of the experiment, you will receive a show-up reward of $5. This is yours to keep regardless of the decisions you make in the experiment. After you complete the experiment, you will be asked to fill out a questionnaire while you wait to be paid.

Your computer has been assigned an ID number that you will be informed of. Your decisions and payoffs from the experiment will be recorded with that ID number. At no time your name will be linked to that ID number. At the end of the experiment, you will be paid in private. Your decisions and payoff will not be revealed to anyone during or after the experiment.

Please turn off your cell phones now to avoid any interruption during the experiment.

Part 1 – Cognitive Test

You will now take a 20-minute cognitive test containing 10 questions. You may use the margins of this booklet to work out your answer if needed. You may ONLY use pencil and paper provided. No other aids are permitted. All questions have the following format:

Who is the current President of the United States?
A. Mitt Romney
B. Bill Clinton
C. Barack Obama
D. George W. Bush
E. David Cameron

To correctly answer this example question, you would select C. You will **gain** one point for each **correct** answer and zero for an **incorrect** answer. Try to get as many points as you can. Upon completion of Part 1 you will earn a certain amount of money. This amount may be the same for everyone in this room or each participant's earnings may depend on their relative performance in the test.

You will have 20 minutes to work on the test. You may not be able to finish all the questions in this time.

Part 2 – Donation to a Charity

In Part 2 of the experiment you will be **randomly and anonymously matched** into a group which consists of **3 participants**. Based on the performance on the cognitive test in Part 1, all participants in your group will be ranked, and the **highest ranked participant will earn $45**, the **middle ranked participant will earn $30**, and the **lowest ranked participant will earn $15**. Then, each participant in your group (including you) will have an opportunity to donate **to the same charity**. However, **each group will be randomly assigned to a different charity**.

When Part 2 starts, the name of the charity that your group is assigned to will be given to you on the computer screen. You can donate any amount to this charity from **$0** to the **amount earned** with increments of 5 cents. **The amount you donate will be deducted from the amount you earned**. We will write a check in the total amount that you as well as the other participants in your group chose to donate and send it to the charity (If you want to get a

confirmation about your donation, please include your e-mail address in the sign out sheet and we will have the charity automatically email you the total amount of donation by your group).

Here are several examples:

- The numbers in this example are only for demonstration purposes.
- Suppose you have earned $30 upon completion of Part 1.
- If you donate $0 and 0 cents to the charity then your remaining income is $30.
- If you donate $15 and 45 cents to the charity then your remaining income is $14 and 55 cents.
- If you donate $30 to the charity then your remaining income is $0.

You and the other members of your group will make donations simultaneously. You will learn your group's total donation to the charity only at the very end of the experiment.

After all three participants in your group make their donations, we will apply a **tax rate of x%** (which can be either 0%, 25%, 50%, or 75%) on each participant's **remaining income** and collect the corresponding amount of money. Then we will **evenly redistribute y%** (which can be either 0%, 50%, or 100%) of the collected money among the participants of your group (including you).

Here is an example:

- The numbers in this example are only for demonstration purposes.
- Assume that the tax rate is 25% and the redistribution rate is 50%.
- Next, assume that based on the performance on the cognitive test in Part 1, participant 1 was ranked 3rd earning $15, participant 2 was ranked 2nd earning $30, and participant 3 was ranked 1st earning $45 (see column 2 in the table below).
- Also, assume that participant 1 donated $10 to the charity, participant 2 donated $0, and participant 3 donated $20 (see column 3 in the table below).
- Therefore, we will send a check for $30 ($10 + $0 + $20) to the charity.
- Then, on each participant's remaining pre-tax income (see column 4), we will apply a tax rate of 25% (see column 5), collecting $1.25 from participant 1, $7.5 from participant 2, and $6.25 from participant 3 ($1.25 + $7.5 + $6.25, for a total $15). So, after tax participant 1 will have $3.75 remaining (since participant 1 donated $10 and there was a tax of 25% on the remaining $5, leaving participant 1 with $3.75). Similarly, participant 2's and 3's remaining after-tax income will be $22.5 and $18.75, respectively (see column 6).
- Then, 50% of the total amount of $15, collected as taxes from all three participants, will be evenly redistributed among the three participants. Therefore, each participant will receive a redistribution amount of $2.5 (0.5×$15 divided by 3).
- So, the **final income** of each participant (see column 8) will be the sum of the **after-tax income** (see column 6) and the **redistribution amount** (see column 7). In this example only 50% of the collected taxes were redistributed back. **The amount that has not been redistributed goes back to the experimenter, and not to the charity.**

Table 1

(tax rate = 25% and redistribution rate = 50%)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Participant	Initial income	Charity donation	Pre-tax income, (2) - (3)	Tax, (4)×25%	After-tax income, (4) - (5)	Redistribution amount, 0.5×Total(5)/3	Final income, (6) + (7)
1	$15	$10	$5	$1.25	$3.75	$2.5	$6.25
2	$30	$0	$30	$7.5	$22.5	$2.5	$25
3	$45	$20	$25	$6.25	$18.75	$2.5	$21.25
Total	$90	$30	$60	$15	$45	$7.5	$52.5

We will ask you to make 10 decisions of how much you would like to donate to the assigned charity under different combinations of the **tax rate** and the **redistribution rate**. Specifically, on your computer screen you will see a table with 10 lines (also as shown below). In each line you will state how much you would like to donate to the charity. You should think of each line as a separate decision you need to make. However, **only one line will be the 'line that counts' and will be implemented.**

When tax rate is 0%, no tax will be collected. Therefore, your final income is simply equal to your pre-tax income (initial income – donations to charity). When tax rate is not 0%, your final income may be **lower** or **higher** than your pre-tax income depending on the tax rate, redistribution rate and the donation decisions of group members.

Table 2

Decision Line	Tax rate	Redistribution rate	How much would you like to donate to the charity?
1	0%	N/A	
2	25%	100%	
3	50%	100%	
4	75%	100%	
5	25%	50%	
6	50%	50%	
7	75%	50%	
8	25%	0%	
9	50%	0%	
10	75%	0%	

To facilitate your decisions, we will provide a "**calculator**". You may use the calculator to see your final income for any potential donation plans you have in mind before actually making the donation decision. To use the calculator, first enter the **tax rate**, **redistribution rate** and the **possible donation decisions** by you and the other participants in your group. The calculator will then fill in the numbers in Table 1 for you. You can use the calculator as many times as you like.

At the end of the experiment, the computer will randomly draw one line for payment. We will implement the choices of each participant made in that line and will send the contributed amount to the charity. Also, we will apply the appropriate tax rate and the redistribution rate to compute final income for each participant. You will learn which line was drawn, your earnings corresponding to that line and your group's total donation to the charity at the very end of the experiment.

Your decisions in Part 2 do not have any effect on your earnings in Part 3 or Part 4.

An Understanding Check: (All participants need to pass this before the decision making part of the experiment)

1. Suppose you contribute $15 to your group's assigned charity, and the other group members contributed $5 and $10. How much money will the experimenter send to this charity on behalf of your group? Answer: $30
2. Suppose you have earned $30 upon completion of Part 1. Suppose you contribute $10 to your group's assigned charity, what is your pre-tax income? Answer: $20
3. Suppose you have earned $30 upon completion of Part 1. Suppose you contribute $10 to your group's assigned charity, and the tax rate is 50%, what is your after-tax income? Answer: $10
4. Suppose the total amount of taxes collected from your group is $30 and the redistribution rate is 50%, then how much money will you get back? Answer: $5
5. If your after-tax income is $10 and if you also receive $5 back from the redistribution of tax revenue, what is your final income? Answer: $15

Part 3 – 15 Decision Problems

In Part 3 of the experiment, you will be asked to make choices in 15 decision problems. How much money you receive will depend partly on chance and partly on the choices you make.

On your computer screen you will see a table with 15 lines (as shown below). In each line you will state whether you prefer **Option A** or **Option B**. Option A always offers a 50% chance to get $9 and a 50% chance to get $1, while Option B always offers a certain amount for sure (between $0.50 and $7.50, depending on the line). You should think of each line as a separate decision you need to make. **However, only one line will be the 'line that counts' and will be paid out.**

At the end of the experiment, for each participant, the computer will randomly draw one line for payment. Your earnings for the selected line depend on which option you chose: If you chose A in that line, then the computer will randomly choose either $9 or $1 with equal chances as your payment. If you chose B in that line, then you will receive for sure the exact amount that is specified by Option B in that line.

Your decisions in Part 3 do not have any effect on your earnings in Part 4. The actual earnings for this part will be determined at the end of Part 4.

Table 1

Decision Line	Option A		Option B	Choose A or B
1	$9.00 with 50% chance	$1.00 with 50% chance	$0.50 for sure	
2	$9.00 with 50% chance	$1.00 with 50% chance	$1.00 for sure	
3	$9.00 with 50% chance	$1.00 with 50% chance	$1.50 for sure	
4	$9.00 with 50% chance	$1.00 with 50% chance	$2.00 for sure	
5	$9.00 with 50% chance	$1.00 with 50% chance	$2.50 for sure	
6	$9.00 with 50% chance	$1.00 with 50% chance	$3.00 for sure	
7	$9.00 with 50% chance	$1.00 with 50% chance	$3.50 for sure	
8	$9.00 with 50% chance	$1.00 with 50% chance	$4.00 for sure	
9	$9.00 with 50% chance	$1.00 with 50% chance	$4.50 for sure	
10	$9.00 with 50% chance	$1.00 with 50% chance	$5.00 for sure	
11	$9.00 with 50% chance	$1.00 with 50% chance	$5.50 for sure	
12	$9.00 with 50% chance	$1.00 with 50% chance	$6.00 for sure	
13	$9.00 with 50% chance	$1.00 with 50% chance	$6.50 for sure	
14	$9.00 with 50% chance	$1.00 with 50% chance	$7.00 for sure	
15	$9.00 with 50% chance	$1.00 with 50% chance	$7.50 for sure	

Part 4 – One Decision Problem

In Part 4 of the experiment, you will be randomly matched with another participant in this room. Nobody will ever learn whom they were matched with. You will be asked to choose between the following four options:

Option 1: You will receive $2.00 and your paired participant will receive $2.00.
Option 2: You will receive $1.75 and your paired participant will receive $3.00.
Option 3: You will receive $2.25 and your paired participant will receive $1.00.
Option 4: You will receive $2.00 and your paired participant will receive $1.75.

Similarly your paired participant will decide between these four options.

After you and the other participant make your decisions, the computer will also randomly determine whose decision to implement. If the computer chooses your decision to implement, then the earnings to you and the other participant will be determined according to your choice. If the computer chooses the other participant decision to implement, then the earnings will determined according to the other participant choice.

The actual earnings for this part will be determined after everyone makes their decisions.

Part 5 – Questionnaire

1. How hard did you work in the first part of the experiment in a scale from 1 to 10 where 1 indicates little work and 10 indicates extremely hard work.

2. What is your gender?
   a) male
   b) female

3. What is your age in years?

4. What is your major?

5. Family income:
   a) less than 50,000
   b) between 50,000 and 75,000
   c) between 75,000 and 100,000
   d) between 100,000 and 150,000
   e) between 150,000 and 200,000
   f) more than 200,000

6. What proportion of your own income comes from your own work?
   a) less than 20%
   b) between 20% and 50%
   c) between 50% and 70%
   d) more than 70%

7. What is the importance of religion in your life?
   a) extremely important
   b) very important
   c) important
   d) somewhat important
   e) not very important
   f) not important at all

8. In political matters, people talk of "the left" and "the right." How would you place your views on this scale, generally speaking?
   a) extreme left
   b) left
   c) left-center
   d) center
   e) right-center
   f) right
   g) extreme right

9. How would you place your views on this: “Hard work doesn´t bring success - it´s more a matter of luck and connections”
   a) I completely agree
   b) I agree most of the times
   c) I agree
   d) I am indifferent
   e) I disagree
   f) I disagree most of the times
   g) I completely disagree

10. Which of the following statements do you agree with the most?
   a) Income taxes are annoying and mostly unnecessary
   b) Income taxes are annoying but necessary
   c) Income taxes are necessary and do not bother me

11. How would you place your views on this: “It is very annoying if the tax revenues are used for things I do not care for.”
   a) I completely agree
   b) I agree most of the times
   c) I agree
   d) I am indifferent
   e) I disagree
   f) I disagree most of the times
   g) I completely disagree

12. How would you place your views on this: “It is the government’s job to ensure that everyone is provided for.”
   a) I completely agree
   b) I agree most of the times
   c) I agree
   d) I am indifferent
   e) I disagree
   f) I disagree most of the times

g) I completely disagree

13. If the government had a choice between reducing taxes or spending more on social programs like health care, social security, and unemployment benefits, which do you think it should do?
a) Reduce taxes
b) Spend more on social programs

14. How would you place your views on this: "I often consider what others will think of me before I make a decision in my life."
a) I completely agree
b) I agree most of the times
c) I agree
d) I am indifferent
e) I disagree
f) I disagree most of the times
g) I completely disagree

15. Do you agree with the following statement: "I regularly give to religious organizations."
a) I completely agree
b) I agree most of the times
c) I agree
d) I am indifferent
e) I disagree
f) I disagree most of the times
g) I completely disagree

16. Do you agree with the following statement: "I regularly give to charities (excluding religious organizations)."
a) I completely agree
b) I agree most of the times
c) I agree
d) I am indifferent
e) I disagree
f) I disagree most of the times
g) I completely disagree

17. How well do you know the charity assigned for your group in Part 2? Please rate it in a 1 to 10 scale where 1 indicates little information and 10 indicates a perfect knowledge about this organization.

18. Are you a United States citizen?
a) Yes
b) No

Instructions for the *Robustness Experiment*

(Only the first two parts have some differences and therefore only these are given below.)

Part 1 – Cognitive Test

You will now take a 20-minute cognitive test containing 10 questions. You may use the margins of the booklet to work out your answer if needed. You may ONLY use pencil and paper provided. No other aids are permitted.

All questions have the following format:

Who was the President of the United States during 2009-2017?

A. Mitt Romney
B. Bill Clinton
C. Barack Obama
D. George W. Bush
E. David Cameron

To correctly answer this example question, you would select C. You will **gain** one point for each **correct** answer and zero for an **incorrect** answer. Try to get as many points as you can. Upon completion of Part 1 you will earn a certain amount of money. This amount may be the same for everyone in this room or each participant's earnings may depend on their relative performance in the test.

You will have 20 minutes to work on the test. You may not be able to finish all the questions in this time.

PLEASE WAIT FOR THE FACILITATOR TO TELL YOU WHEN TO BEGIN

Part 2 – Donation to a Charity

In Part 2 of the experiment you will be **randomly and anonymously matched** into a group which consists of **3 participants**. Each group will consist of one participant with **high relative performance** on the cognitive test in Part 1, who will **receive $45**, one participant with **middle relative performance**, who will **receive $30**, and one participant with **low relative performance**, who will **receive $15**. Note that if there are any ties during this process, they will be randomly broken by the computer. At the beginning of Part 2 you will learn how much you earned based on your performance in Part 1. Then, each participant in your group (including you) will have an opportunity to donate **to the same charity**. However, **each group will be randomly assigned to a different charity**.

When Part 2 starts, the name of the charity that your group is assigned to will be given to you on the computer screen. You can donate any amount to this charity from **$0** to the **amount earned** in increments of 5 cents ($0.05). **The amount you donate will be deducted from the amount you earned in Part 1**. We will write a check in the total amount that you (as well as the other participants in your group) chose to donate and send it to the charity. If you want to get a confirmation about your donation, please include your e-mail address and subject ID number in the sign out sheet and we will have the charity automatically email you the total amount of donation by your group.

Here are several examples:

- The donation amounts in this example are only for demonstration purposes.
- Suppose you have earned $30 upon completion of Part 1.
- If you donate $0 and 0 cents to the charity then your remaining income is $30.
- If you donate $15 and 45 cents to the charity then your remaining income is $14 and 55 cents.
- If you donate $30 to the charity then your remaining income is $0.

You and the other members of your group will make donations simultaneously.

After all three participants in your group make their donations, we will apply a **tax rate of x%** (which can be either 25%, 50%, or 75%) to each participant's **remaining income,** and collect the corresponding amount of money. Then we will **evenly redistribute 50%** of the collected money among the participants of your group (including you).

Here is an example:

- The numbers in this example are only for demonstration purposes.
- Assume that the tax rate is 25% and recall that the redistribution rate is 50%.
- Next, assume that based on the performance on the cognitive test in Part 1, participant 1 earned $15, participant 2 earned $30, and participant 3 earned $45 (see column 2 in the table below).
- Also, assume that participant 1 donated $10 to the charity, participant 2 donated $0, and participant 3 donated $20 (see column 3 in the table below).
- Therefore, we will send a check for $30 ($10 + $0 + $20) to your group's assigned charity.
- Then, to each participant's remaining pre-tax income (see column 4), we will apply a tax rate of 25% (see column 5), collecting $1.25 from participant 1, $7.50 from participant 2, and $6.25 from participant 3 ($1.25 + $7.5 + $6.25, for a total $15). So, after taxes, participant 1 will have $3.75 remaining (since participant 1 donated $10 and there was a tax of 25% on the remaining $5, leaving participant 1 with $3.75). Similarly, participant 2's and 3's remaining after-tax income will be $22.5 and $18.75, respectively (see column 6).
- Then, 50% of the total amount of $15, collected as taxes from all three participants, will be evenly redistributed among the three participants. Therefore, each participant will receive a redistribution amount of $2.5 (0.5×$15 divided by 3).
- So, the **final income** of each participant (see column 8) will be the sum of the **after-tax income** (see column 6) and the **redistribution amount** (see column 7). Note that only 50% of the collected taxes were redistributed back. **The amount that has not been redistributed goes back to the experimenter, and not to the charity.**

Table 1
(tax rate = 25% and redistribution rate = 50%)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Participant	Initial income	Charity donation	Pre-tax income, (2) - (3)	Tax, (4)×25%	After-tax income, (4) - (5)	Redistribution amount, 0.5×Total(5)/3	Final income, (6) + (7)
1	$15	$10	$5	$1.25	$3.75	$2.5	$6.25
2	$30	$0	$30	$7.5	$22.5	$2.5	$25
3	$45	$20	$25	$6.25	$18.75	$2.5	$21.25
Total	$90	$30	$60	$15	$45	$7.5	$52.5

There are 15 rounds in Part 2. In each round, we will ask you to make a decision regarding how much you would like to donate to the assigned charity under a given **tax rate**. You should think of each round as a separate decision you need to make. **Only one round, however, will be the 'round that counts,' and will be implemented.**

Note that your final income may be **lower** or **higher** than your pre-tax income depending on the tax rate and the donation decisions of group members.

To facilitate your decisions, we will provide a "**calculator**". You may use the calculator to see your final income for any potential donation plans you have in mind before actually making the donation decision. To use the calculator, first enter the **tax rate given in that round** and the **possible donation decisions** by you and the other participants in your group. The calculator will then fill in the numbers in Table 1 for you. You can use the calculator as many times as you like.

At the end of each round, you will learn your group's total donation to the charity. In addition, you will be provided with information on your pre-tax income, tax payment, after-tax income, redistribution amount and your final income

for that round. The computer will apply the appropriate tax rate and the redistribution rate to compute the final income for each participant in your group, including you.

At the end of the experiment, the computer will randomly select one round for payment. We will implement the choices of each participant made in that round and will send the contributed amount to the charity. Also, each participant will receive earnings corresponding to that round.

Your decisions in Part 2 do not have any effect on your earnings in Part 3 or Part 4.

PLEASE WAIT FOR THE FACILITATOR TO TELL YOU WHEN TO BEGIN

Appendix C: Supplement to Theoretical Predictions

Here, we provide theoretical predictions for our experiment under the following utility functional form: $\frac{{c_i}^{1-\theta}}{1-\theta} + a\frac{G^{1-\theta}}{1-\theta}$. The predictions rely on the assumption that everyone is a contributor. If this assumption does not hold, quantitative results change, but the qualitative results on the effect of the tax rate and the degree of waste do not change. Table C1 shows the predictions when the public goods utility is weighted at a = 1/2, while Table C2 shows the predictions when a = 1/4.

Table C1: Theoretical predictions under specific utility functions with *a* = 1/2

Tax rate, t	Waste, w	$\theta = 1$ (Cobb-Douglas)	$\theta = 3/4$	$\theta = 1/2$	$\theta = 1/4$
0%	-	4.29	3.50	2.31	0.61
25%	0%	5.00	4.33	3.21	1.24
50%	0%	6.00	5.55	4.74	2.86
75%	0%	7.50	7.50	7.50	7.50
25%	50%	4.67	4.09	3.13	1.33
50%	50%	5.29	5.07	4.66	3.57
75%	50%	6.52	7.02	8.11	11.91
25%	100%	4.29	3.81	3.00	1.41
50%	100%	4.29	4.29	4.29	4.29
75%	100%	4.29	5.21	7.50	17.14
Maximum possible donation level for a given preference structure for $0 \leq t \leq 1$ and $0 \leq w \leq 1$		10.00	30.00	30.00	30.00

Table C2: Theoretical predictions under specific utility functions with *a* = 1/4

Tax rate, t	Waste, w	$\theta = 1$ (Cobb-Douglas)	$\theta = 3/4$	$\theta = 1/2$	$\theta = 1/4$
0%	-	2.31	1.50	0.61	0.04
25%	0%	2.73	1.88	0.87	0.08
50%	0%	3.33	2.48	1.34	0.20
75%	0%	4.29	3.50	2.31	0.61
25%	50%	2.53	1.77	0.85	0.09
50%	50%	2.90	2.24	1.32	0.25
75%	50%	3.66	3.25	2.54	1.19
25%	100%	2.31	1.64	0.81	0.09
50%	100%	2.31	1.86	1.20	0.31
75%	100%	2.31	2.31	2.31	2.31
Maximum possible donation level for a given preference structure for $0 \leq t \leq 1$ and $0 \leq w \leq 1$		6.00	30.00	30.00	30.00

Appendix D: Supplementary Analysis and Discussions

Table D1 provides robustness checks related to the discussion in Section 5 and Table 4. For convenience, regression (1) in Table D1 replicates the estimation results of regression (3) in Table 4. Regression (2) adds an additional interaction term $t \times w$. Regression (3) further adds interaction terms $w \times Unequal$, $t \times Unequal$ and $t \times w \times Unequal$. Note that upon adding these controls, the qualitative results originally reported in regression (1) do not change. Giving significantly decreases in the degree of waste w, but it does not change in the tax rate t.

Table D1: Tobit regression of giving

Treatment	*Pooled*	*Pooled*	*Pooled*
Dependent variable, *giving*	(1)	(1)	(2)
t	-0.27	-0.76	0.06
[tax rate]	(0.85)	(0.79)	(1.37)
w	-4.13***	-4.64***	-3.95**
[degree of waste]	(0.79)	(0.94)	(1.33)
Income	0.03	0.03	0.03
[income = $15, $30, $45]	(0.08)	(0.08)	(0.08)
Unequal	1.66	1.66	1.88
[1 if the *Unequal* treatment]	(1.33)	(1.33)	(1.56)
$t \times w$		1.03	-1.57
[interaction term]		(1.84)	(2.88)
$t \times$ *Unequal*			-1.43
[interaction term]			(1.66)
$w \times$ *Unequal*			-1.19
[interaction term]			(1.77)
$t \times w \times$ *Unequal*			4.51
[interaction term]			(3.78)
Constant	-0.30	-0.05	-0.17
[constant term]	(2.79)	(2.76)	(2.76)
Observations	1836	1836	1836
Clusters	204	204	204

Note: * indicates statistical significance at 0.05, ** at 0.01, and *** at 0.001 level. Standard errors in parentheses are clustered at the participant level.

Table D2 provides further robustness checks related to the discussion in Section 5 and Table 4. Here, we focus separately on each income group (*i.e.*, participants who received $15, $30, or $45) in the *Unequal* treatment. Consistent with our previous results, regressions (2) and (3) show that giving of middle income individuals (who received $30) and high income individuals (who received $45) significantly decreases in the degree of waste w, but it does not change in the tax rate t. Regression (1) also shows that giving of low income individuals (who received $15) decreases (although not significantly) when w increases.

Table D2: Tobit regression of giving

Treatment	*Unequal*	*Unequal*	*Unequal*
Income	$15	$30	$45
Dependent variable, *giving*	(1)	(1)	(2)
t	0.11	-2.07	-3.94
[tax rate]	(1.01)	(1.27)	(3.21)
w	-0.77	-7.22***	-10.56*
[degree of waste]	(0.81)	(1.99)	(4.30)
$t \times w$	-3.17	5.26	11.07
[interaction term]	(1.83)	(3.16)	(7.53)
Constant	2.29*	4.52***	-1.68
[constant term]	(1.06)	(1.33)	(3.72)
Observations	342	342	342
Clusters	38	38	38

Note: * indicates statistical significance at 0.05, ** at 0.01, and *** at 0.001 level. Standard errors in parentheses are clustered at the participant level.

Table D3 examines if there is any non-monotonic relationship between giving and income in the *Unequal* treatment (also see Tables D5-D6). Recall that in Table 4 and Table D1 the *Income* coefficient is not significant. It is possible, however, that there is a non-monotonic relationship between giving and income. To examine this, we provide pairwise comparisons of different income individuals. For example, regression (1) uses the data from individuals with low income (who received $15) and middle income (who received $30). As we can see, the *Income* coefficient is not significant. The same is true for regressions (2) and (3).

Table D3: Tobit regression of giving

Treatment	*Unequal*	*Unequal*	*Unequal*
Income	$15 and $30	$15 and $45	$30 and $45
Dependent variable, *giving*	(1)	(1)	(2)
t	-0.71	-0.80	-3.05*
[tax rate]	(0.81)	(1.41)	(1.46)
w	-3.51***	-3.91*	-9.08***
[degree of waste]	(1.00)	(1.70)	(2.20)
Income	0.10	0.01	-0.10
[income = $15, or $30, or $45]	(0.10)	(0.08)	(0.19)
$t \times w$	0.27	1.00	8.22*
[interaction term]	(1.79)	(3.47)	(3.77)
Constant	0.91	0.42	6.17
[constant term]	(2.33)	(2.70)	(7.05)
Observations	684	684	684
Clusters	76	76	76

Note: * indicates statistical significance at 0.05, ** at 0.01, and *** at 0.001 level. Standard errors in parentheses are clustered at the participant level.

Table D4 provides robustness checks for our regressions presented in Table 4. We repeat the same analysis as in Table 4 by running OLS regressions (instead of Tobit regressions). Tables D5 and D6 repeat same regressions as in Table 4 and Table D4, respectively, but instead of using a continuous income variable, they use dummies for high and low income.

Table D4: OLS regressions of giving

	For $t > 0\%$			For all t		
Treatment	*Equal*	*Unequal*	*Pooled*	*Equal*	*Unequal*	*Pooled*
Dependent variable, *giving*	(1)	(2)	(3)	(4)	(5)	(6)
t	0.38	0.76	0.59	0.43	1.02	0.76
[tax rate]	(0.58)	(0.75)	(0.49)	(0.59)	(0.70)	(0.47)
w	-1.84**	-1.43*	-1.61***	-1.83***	-1.37*	-1.57***
[degree of waste]	(0.55)	(0.63)	(0.42)	(0.49)	(0.53)	(0.37)
Income		0.08	0.08		0.08	0.08
[income = $15, $30, $45]		(0.05)	(0.05)		(0.05)	(0.05)
Unequal			0.84			0.77
[1 if the *Unequal* treatment]			(0.65)			(0.65)
Constant	3.76***	1.9	1.23	3.73***	1.67	1.1
[constant term]	(0.60)	(1.26)	(1.51)	(0.53)	(1.16)	(1.46)
Observations	810	1026	1836	900	1140	2040
Clusters	90	114	204	90	114	204

Note: * indicates statistical significance at 0.05, ** at 0.01, and *** at 0.001 level. Standard errors in parentheses are clustered at the participant level.

Table D5: Tobit regression of giving

	For $t > 0\%$			For all t		
Treatment	*Equal*	*Unequal*	*Pooled*	*Equal*	*Unequal*	*Pooled*
Dependent variable, *giving*	(1)	(2)	(3)	(4)	(5)	(6)
t	-0.46	-0.07	-0.27	0.34	1.47	0.95
[tax rate]	(1.11)	(1.23)	(0.85)	(1.09)	(1.20)	(0.83)
w	-4.26***	-3.91***	-4.12***	-4.06***	-3.54***	-3.83***
[degree of waste]	(1.05)	(1.13)	(0.79)	(0.95)	(0.97)	(0.70)
High		-0.91	-0.7		-1.04	-0.82
[1 if income = $45]		(2.61)	(2.53)		(2.55)	(2.49)
Low		-1.41	-1.43		-1.73	-1.73
[1 if income = $15]		(1.88)	(1.78)		(1.85)	(1.76)
Unequal			2.37			2.35
[1 if the *Unequal* treatment]			(1.66)			(1.63)
Constant	1.47	2.24	0.46	0.91	1.32	-0.3
[constant term]	(1.22)	(1.67)	(1.20)	(1.11)	(1.56)	(1.14)
Observations	810	1026	1836	900	1140	2040
Clusters	90	114	204	90	114	204

Note: * indicates statistical significance at 0.05, ** at 0.01, and *** at 0.001 level. Standard errors in parentheses are clustered at the participant level.

Table D6: OLS regression of giving

	For $t > 0\%$			For all t		
Treatment	*Equal*	*Unequal*	*Pooled*	*Equal*	*Unequal*	*Pooled*
Dependent variable, *giving*	(1)	(2)	(3)	(4)	(5)	(6)
t	0.38	0.76	0.59	0.43	1.02	0.76
[tax rate]	(0.58)	(0.75)	(0.49)	(0.59)	(0.70)	(0.47)
w	-1.84**	-1.43*	-1.61***	-1.83***	-1.37*	-1.57***
[degree of waste]	(0.55)	(0.63)	(0.42)	(0.49)	(0.53)	(0.37)
High		0.84	0.84		0.78	0.78
[1 if income = $45]		(1.52)	(1.51)		(1.50)	(1.50)
Low		-1.48	-1.48		-1.58	-1.58
[1 if income = $15]		(0.90)	(0.89)		(0.89)	(0.89)
Unequal			1.06			1.04
[1 if the *Unequal* treatment]			(0.86)			(0.85)
Constant	3.76***	4.43***	3.54***	3.73***	4.29***	3.46***
[constant term]	(0.60)	(0.91)	(0.54)	(0.53)	(0.81)	(0.47)
Observations	810	1026	1836	900	1140	2040
Clusters	90	114	204	90	114	204

Note: * indicates statistical significance at 0.05, ** at 0.01, and *** at 0.001 level. Standard errors in parentheses are clustered at the participant level.

Table D7 provides robustness checks for our regressions presented in Table 5. We repeat the same analysis as in Table 5 by running OLS regressions (instead of Tobit regressions).

Table D7: Giving and the curvature of the utility function (OLS)

	More than 7 safe choices			*Less than 7 safe choices*		
Treatment	*Equal*	*Unequal*	*Pooled*	*Equal*	*Unequal*	*Pooled*
Dependent variable, *giving*	(1)	(2)	(3)	(4)	(5)	(6)
t	0.55	-0.48	-0.04	0.14	3.47	1.81
[tax rate]	(0.84)	(0.71)	(0.54)	(0.84)	(1.76)	(0.99)
w	-1.87*	-2.82**	-2.42***	-1	0.04	-0.48
[degree of waste]	(0.77)	(0.99)	(0.66)	(0.57)	(1.11)	(0.62)
Income		0.03	0.03		0.05	0.05
[income = $15, $30, $45]		(0.08)	(0.08)		(0.06)	(0.06)
Unequal			-0.07			1.38
[1 if the *Unequal* treatment]			(1.05)			(0.94)
Constant	4.19***	4.26*	3.92	2.82**	0.53	0.24
[constant term]	(1.00)	(1.63)	(2.25)	(0.84)	(2.32)	(2.20)
Observations	333	450	783	351	351	702
Clusters	37	50	87	39	39	78

Note: * indicates statistical significance at 0.05, ** at 0.01, and *** at 0.001 level. Standard errors in parentheses are clustered at the participant level.

Table D8 provides robustness checks for our regressions presented in Table 6. We repeat the same analysis as in Table 6 by running OLS regressions (instead of Tobit regressions).

Table D8: The determinants of giving (OLS)

Dependent variable, *giving*	(1)	(2)	(3)	(4)
t	0.59	0.53	0.53	0.53
[tax rate]	(0.49)	(0.49)	(0.49)	(0.49)
w	-1.61***	-1.67***	-1.67***	-1.67***
[degree of waste]	(0.42)	(0.42)	(0.42)	(0.42)
Income	0.08	0.05	0.06	0.05
[income = $15, $30, $45]	(0.05)	(0.04)	(0.04)	(0.04)
Unequal	0.84	0.84	0.91	0.91
[1 if the *Unequal* treatment]	(0.65)	(0.63)	(0.59)	(0.59)
Egalitarian		0.83	0.33	0.31
[1 if ($2.00; $2.00)]		(0.70)	(0.71)	(0.71)
Generous		4.40**	4.35***	4.32**
[1 if ($1.75; $3.00)]		(1.56)	(1.30)	(1.30)
Hardwork			-0.33*	-0.33*
[how hard you worked in part 1]			(0.15)	(0.15)
Female			2.08**	2.09**
[1 if female]			(0.73)	(0.73)
Family income			0.06	0.06
[family income]			(0.16)	(0.16)
Right-wing			0.46	0.45
[right-wing political view]			(0.31)	(0.32)
Unnecessary			-0.71	-0.67
[1 if taxes are annoying and unnecessary]			(1.02)	(1.03)
Necessary			1.06	1.11
[1 if taxes are necessary and do not bother]			(1.56)	(1.59)
Reputation			-0.04	-0.03
[importance of own reputation]			(0.22)	(0.22)
Church			0.25	0.26
[giving to church]			(0.24)	(0.24)
Charity			0.33	0.33
[giving to charities]			(0.29)	(0.30)
Familiar			0.23	0.23
[knowledge of charity]			(0.13)	(0.13)
American			0.06	0.12
[1 if a United States citizen]			(0.85)	(0.88)
Part 1				0.06
[part 1 score]				(0.14)
Constant	1.23	0.91	-2.37	-2.51
[constant term]	(1.51)	(1.43)	(3.05)	(3.09)
Observations	1836	1827	1827	1764
Clusters	204	203	203	196

Note: * indicates statistical significance at 0.05, ** at 0.01, and *** at 0.001 level. Standard errors in parentheses are clustered at the participant level.

Next, we study heterogeneity in individual giving behavior. Although we find that, on average, giving decreases in the degree of waste and it does not change in the tax rate, there is substantial heterogeneity when examining individual behavior. Table D9 shows how different participants change their giving in response to changes in t and w. We categorize each individual by two dimensions: (i) how they respond to changes in t and (ii) how they respond to changes in w. In Table D9, we combine the data from the *Equal* and *Unequal* treatments.

Table D9: Individual giving in response to changes in t and w

Giving response to changes in the tax rate t	Giving response to changes in the degree of waste w					
	Zero giving	Constant	Decreasing	Increasing	Other	Total
Zero giving	56	0	0	0	0	56
Constant	0	18	13	2	0	33
Decreasing	0	1	38	2	8	49
Increasing	0	0	11	13	6	30
Other	0	0	13	0	23	36
Total	56	19	75	17	37	204

Each number in the table indicates the number of participants that fall into one of the categories. For example, there are 38 participants whose giving decreases in t and in w.

Table D9 shows that there are three main types of individuals that account for more than half of all observations (112/204). First, there are 56 participants who always give \$0, independent of t and w. Second, there are 38 participants who weakly decrease their giving in response to an increase in t and w. Third, there are 18 participants who always give the same amount independent of t and w. Summing over each category, we see that the most common types of individuals are those who decrease their giving when w increases (75 participants), those who always give \$0 (56 participants), and those who decrease their giving when t increases (49 participants).

We also make an interesting observation. Not including the participants with inconsistent choices, we see that out of 41 participants who consistently decrease their giving when the tax rate increases, 38 of them also decrease their giving when the degree of waste increases. In contrast, among 24 participants who increase their giving when the tax rate increases, only 13 participants consistently increase their giving when the degree of waste increases, while 11 of these consistently decrease their giving when the degree of waste increases. This observation is consistent with our Hypothesis 2.

Table D10 and Table D11 provide robustness checks related to the previous discussion in Table D9. As in Table D9, we categorize each individual by two dimensions: (1) how they respond to changes in t and (2) how they respond to changes in w. Unlike in Table D9, we split the data by the *Equal* and *Unequal* treatments. Table D10 and Table D11 show that in both treatments there are three main types of individuals that account for more than half of all observations: (1) participants who always give \$0, disregarding t and w, (2) participants who weakly decrease their

giving in response to increases of t and w, and (3) participants who do not change their giving in response to changes in t and w.

Table D10: Individual giving response in the *Equal* treatment

Giving response to changes in the tax rate t	Giving response to changes in the degree of waste w					
	Zero giving	Constant	Decreasing	Increasing	Other	Total
Zero giving	26	0	0	0	0	26
Constant	0	7	4	1	0	12
Decreasing	0	0	17	1	3	21
Increasing	0	0	4	6	4	14
Other	0	0	7	0	10	17
Total	26	7	32	8	17	90

Each number in the table indicates the number of participants that fall into one of the categories. For example, there are 17 participants whose giving decreases in t and in w.

Table D11: Individual giving response in the *Unequal* treatment

Giving response to changes in the tax rate t	Giving response to changes in the degree of waste w					
	Zero giving	Constant	Decreasing	Increasing	Other	Total
Zero giving	30	0	0	0	0	30
Constant	0	11	9	1	0	21
Decreasing	0	1	21	1	5	28
Increasing	0	0	7	7	2	16
Other	0	0	6	0	13	19
Total	30	12	43	9	20	114

Each number in the table indicates the number of participants that fall into one of the categories. For example, there are 21 participants whose giving decreases in t and in w.