Supporting Information

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SI Methods

The supplementary information includes: (*i*) details of behavioral and attitudinal studies conducted inside and outside the scanner, and (*ii*) complete instructions for both studies.

Study Details. ***Pilot study.*** In the "random-income" game player allocations are randomly drawn from the empirical distribution. Our study had different distributions of allocations based or treatments (T1–T3). In the three treatments allocations are shown to each subject. Each subject was given an opportunity to increase or decrease the income of other subjects. Each subject could buy up to 10 "positive" tokens and up to 10 "negative" tokens for each of the other players. Each negative token costs the subject one token and reduces the target's income by three tokens. Each positive token costs the subject one token and increases the target's income by three tokens. One by one, each target's income was highlighted and the subject was asked if he or she wanted to buy tokens. After subjects make their decisions, they saw the results (unless in an intersession group, see below) and then proceeded to the next treatment.

The distribution of allocations were symmetric and varied in the degree of inequality as follows: T1 = (20, 20, 20, 20), T2 = (11, 17, 23, 29), and T3 = (2, 14, 26, 38). In particular, T1 is the perfect equality condition, and served a contrast for the other conditions that exhibit increasing degrees of inequality. Subjects were randomly assigned incomes such that they were the low, middle-low, middle-high, or high earner at different points during the study.

We ran two types of random income games. In the first type, subjects were matched with three subjects from the same session (S) and in the second type subjects were matched with three subjects from other sessions (O). The purpose of the latter-type groups was to be able to match subject responses to subjects who are chosen for the second functional MRI (fMRI) phase of the study. Each subject participated in both types of groups. Subjects were paid for their decisions in S rounds of the random-income treatments following the conclusion of the session because we had complete information about all player choices at that time. For O rounds, they were paid immediately following the fMRI portion of the study.

The order of group types was randomly determined to prevent the group type and time of payment from influencing subject choices. At the conclusion of the punishment and reward stage for each treatment in which the subject has been placed in a same type S treatment, subjects saw their fellow players' decisions and the total income they earned for that treatment. At the conclusion of the punishment and reward stage for each treatment in which the subject was placed in a type O treatment, subjects received a message stating that their decisions for that treatment will be matched with a player in another session and they will be paid at a later time. Subjects did not know at the time of their initial decision which type of round they were in or how many type S and O rounds they would play in total.

In total, each subject played 3 rounds of type S and 18 rounds of type O random-income games. We ran six sessions of the random-income game with a total of 140 subjects.

Subject selection for fMRI study. After the conclusion of the pilot study we chose subjects from the pilot who bought more positive or negative tokens in relatively unequal conditions to complete an fMRI screening questionnaire. Those who were deemed eligible were invited to participate in the neuroimaging phase of the experiment. The final fMRI sample consisted of 10 males and 10 females that were all very similar in age.

Study payment. Pilot subjects were paid a show-up fee of $10. These subjects were paid for all of their S rounds at the conclusion of each session and were paid at the conclusion of the study for the O rounds. The fMRI subjects were paid a show-up fee of $50 and were then paid for their actions in the game at the conclusion of the study.

Dictator game. At the time of final payment subjects were asked to play five rounds of the modified dictator game (1). The dictator game involves two "players." The first player determines a split of some endowment between herself and the other player. In our case, subjects were asked to split 10 lottery tickets between themselves and an anonymous study recipient. The second player simply receives the number of tickets the first player has allocated to her and thus has no strategic role in the game. If the first individual were only concerned with her own well-being, she would keep all of the tickets and pass nothing. Therefore, any positive allocation to the second player is viewed as a revealed-preference measure of altruism.

The modified dictator game (2) enables researchers to distinguish between egalitarian and altruist preference types. Egalitarians prefer to equalize the payoffs to both players in each of the dictator games, whereas altruists simply maximize the amount they give away. In the modified dictator game subjects are asked to play several dictator games in which the price of passing some of the endowment to the other player varies. In our experiment there were five conditions: each ticket kept would yield one chance in lottery for the player originally given the endowment and each ticket passed would yield one chance for the other player (1:1); each ticket kept would yield one chance and each passed would yield two chances (1:2); each ticket kept would yield one chance and each passed would yield three chances (1:3); each ticket kept would yield two chances and each passed would yield one chance (2:1); each ticket kept would yield three chances and each passed would yield one chance (3:1). Egalitarians prefer to equalize the payoffs to both players in each of the dictator games, therefore they should pass 5 tickets in the 1:1 condition, 3.33 tickets in the 1:2 condition, 2.5 tickets in the 1:3 condition, 6.67 tickets in the 2:1 condition, and 7.5 tickets in the 3:1 condition. Tickets were not divisible but the degree to which subjects exhibited egalitarian preferences were determined by how closely they matched this ideal type. Specifically, our measure of egalitarian behavior is equal to the negative of the sum of the square difference in each game between the number of tickets given away and the number an egalitarian would give away.

Subjects were informed that their participation made them eligible to win $100. They were told that a winner would be drawn randomly and that the number of times an individual's name was entered in the draw depended on allocations in the dictator game.

Self-reported egalitarianism. We administered to subjects six questions that have been asked repeatedly in the National Election Studies since 1984 (3) to measure self-reported egalitarianism. Each question included response options of Strong Agree, Agree Somewhat, Neither, Disagree Somewhat, Strongly Disagree. These questions included:

Q1: Our society should do whatever is necessary to make sure that everyone has an equal opportunity to succeed.
Q2: We have gone too far in pushing equal rights in this country.
Q3: One of the big problems in this country is that we don't give everyone an equal chance.
Q4: This country would be better off if we worried less about how equal people are.
Q5: It is not really that big a problem if some people have more of a chance in life than others.

Q6: If people were treated more equally in this country we would have many fewer problems.

A factor analysis showed that these questions all load on the same factor with a Cronbach's $\alpha = 0.88$. The factor from this analysis is treated as the egalitarianism index, with positive values indicating greater self-assessment of egalitarianism. This measure is significantly correlated with the dictator game measure of egalitarianism (Pearson's correlation 0.69, 95% confidence interval 0.23–0.85).

Study Instructions. ***Random-income game subject instructions.*** You are now taking part in an economic experiment, which has been financed by various foundations for research. If you read the following instructions carefully, you can, depending on your decisions, earn a considerable amount of money. It is therefore very important that you read these instructions carefully.

The instructions, which we have distributed to you, are solely for your private information. It is prohibited to communicate with the other participants during the experiment. Should you have any questions please ask us.

During the experiment we will not speak of Dollars but rather of tokens. During the experiment your entire earnings will be calculated in tokens. At the end of the experiment the total amount of tokens you have earned will be converted to Dollars at the following rate:

$$1 \text{ token} = 5 \text{ cents}.$$

The experiment is divided into periods. In total, the experiment has 21 periods. In each period the participants are divided into groups of four. That is, your group has three other participants in it aside from you. Group composition will change in each period. In each of the 21 periods your group of four is composed of different people. Therefore, in each of the 21 periods you will form a group with three different people. For some of the 21 periods your group will be made up of participants from other sessions.

First Stage

At the beginning of each period the computer will randomly choose a number of tokens to give to each person in your group. The income of each group member from the project is calculated in the same way. An income screen will show you how many tokens you and each member of your group have earned at the first stage.

After the first stage concludes, we will begin the second stage.

Do you have any questions?

Second stage

You will see how much the individual group members have earned in the first stage. Please note that who is in your group is randomly determined in each period; the individuals in your group are likely to change over the course of the experiment.

You will now have the opportunity to change or leave unchanged the income of each of the other group members. You can either decrease their income by allocating negative tokens or you can increase their income by allocating positive tokens. The other group members can also reduce or increase your income, if they so wish.

You must decide how many negative or positive tokens to give to each of the other three group members and then move the slider to either the left to give negative tokens or to the right to give positive tokens. If you do not want to change the income of a particular group member, simply do not move the slider. Once you have made a decision regarding a member of your group, hit the Allocate button to move to the next group member.

If you distribute negative tokens, you must pay a cost for each of the negative tokens you allocate. Negative tokens are integers between 0 and 10. The more negative tokens you allocate, the higher your costs. The following formula indicates how much it costs to allocate negative tokens:

$$\text{Cost of negative tokens} = \text{Sum of allocated negative tokens}.$$

Each negative token therefore costs you 1 token. If, for instance, you allocate 2 negative tokens to one group member, you must pay a cost of 2 tokens. If you allocate 9 negative tokens to another member, it will cost you an additional 9 tokens; if you allocate 0 negative tokens to the last group member, there will be no additional cost. Therefore, you have allocated a total of 11 negative tokens and your total costs are 11 tokens (2+9+0).

Each negative token you allocate to a group member reduces his or her income by 3 tokens. If you allocate 0 tokens to a certain group member, you do not change the income of this group member. If, however, you allocate one negative token to a group member, you reduce his or her income by 3 tokens. If you allocate 2 negative tokens to a group member, you reduce his or her income by 6 tokens.

If you distribute positive tokens, you must pay a cost for each of the positive tokens you allocate. Positive tokens are integers between 0 and 10. The more positive tokens you allocate, the higher your costs. The following formula indicates how much it costs to allocate positive tokens:

$$\text{Cost of positive tokens} = \text{Sum of positive tokens}.$$

Each positive token therefore costs you 1 token. If, for instance, you allocate 2 positive tokens to one group member, you must pay a cost of 2 tokens. If you allocate 9 positive tokens to another member, it will cost you an additional 9 tokens; if you allocate 0 positive tokens to the last group member, there will be no additional cost. Therefore, you have allocated a total of 11 positive tokens and your total costs are 11 tokens (2+9+0).

Each positive token you allocate to a group member increases his or her income by 3 tokens. If you allocate 0 positive tokens to a certain group member, you do not change the income of this group member. If, however, you allocate one positive token to a group member, you increase his or her income by 3 tokens. If you allocate 2 positive tokens to a group member, you increase his or her income by 6 tokens.

Whether or by how much the income at the end of the period is in total increased or decreased depends on the total of the received positive or negative tokens. If somebody receives a total of 3 negative tokens (from all other group members in this period), then his or her income would be decreased by 9 tokens. If somebody receives a total of 4 negative tokens, his or her income is reduced by 12 tokens. Likewise, if somebody receives a total of 3 positive tokens (from all other group members in this period), then his or her income would be increased by 9 tokens. If somebody receives a total of 4 positive tokens, his or her income is increased by 12 tokens. Your total income from the two stages is therefore calculated as follows:

$$\begin{aligned}
&\text{Total income(in tokens)at the end of the period} = \text{period income} \\
&= \text{income from first stage } (1) \\
&\quad -3\text{*(sum of received negative tokens)}(2) \\
&\quad +3\text{*(sum of received positive tokens)}(3) \\
&\quad -\text{costs of your negative tokens allocated to others}(4) \\
&\quad -\text{costs of your positive tokens allocated to others}(5) \\
&\quad \text{if } (1)+(2)+(3)+(4)+(5) \geq 0; \\
&= 0 - \text{costs of your distributed tokens} \\
&\quad \text{if } (1)+(2) < 0
\end{aligned}$$

Please note that your income in tokens at the end of the period can be negative, if the costs of your distributed (negative or positive) tokens exceed your income in tokens minus the cost of received negative tokens plus the cost of received positive tokens. You can, however, avoid such losses with certainty through your

own decisions! After all participants have made their decision, your income from the period will be displayed on the screen.

Do you have further questions?

Modified dictator game instructions. (Subjects read the following instructions)

At the conclusion of this study we will award a $100 prize. You have received a set of envelopes from the study supervisor. Five WHITE envelopes have tickets in them. One BROWN envelope has no tickets in it. Each ticket gives between 1 and 3 chances to win the $100 prize. At the end of the study, we will complete a draw. With each chance you have to win the prize, your name will be entered into the draw once. We will notify all participants of the winner's name by e-mail.

Some of the tickets we give you have a higher chance of winning the prize.

A **REGULAR TICKET** has 1 chance of winning the prize.

A **DOUBLE TICKET** has 2 chances of winning the prize.

A **TRIPLE TICKET** has 3 chances of winning the prize.

This means a **DOUBLE TICKET** is twice as likely to win as a **REGULAR TICKET** and a **TRIPLE TICKET** is three times as likely to win as a **REGULAR TICKET**.

Your name will be entered into the draw the same number of times if you hold 1 **TRIPLE TICKET** or 3 **REGULAR TICKETS**.

When you have completed all five questions, please return all envelopes to the study administrator. Another person will later count the tickets and assign you the appropriate number of chances to win the prize.

(Subjects were then handed one page of instructions for each envelope, labeled B, R, O, W, and G. The order of pages was randomly determined).

[B; R; O; W; G] Envelopes: Please read these instructions carefully. Find the white envelope marked with the letter "[B; R; O; W; G]." This envelope has 10 prize tickets in it. You may keep all of the tickets in this envelope, or you can place some or all of them in the brown envelope. Tickets placed in the brown envelope will give chances to win to a randomly chosen anonymous individual. You will never be able to find out the identity of the anonymous individual, and the anonymous individual will never be able to find out your identity.

You must choose how to divide the 10 tickets between yourself and the anonymous individual. You may keep all, none, or some of the tickets—the decision is up to you and will be completely anonymous.

Each ticket you keep will be a [REGULAR; REGULAR; REGULAR; DOUBLE; TRIPLE] ticket, giving you [1; 1; 1; 2; 3] chance(s) to win the prize

Each ticket you give away will be a [REGULAR; DOUBLE; TRIPLE; REGULAR; REGULAR] ticket, giving the anonymous individual [1; 2; 3; 1; 1] chance(s) to win the prize.

If you choose to share some tickets, take that number of tickets out of the "[B; R; O; W; G]" envelope and put them in the brown envelope. Seal the envelopes and set them aside.

1. Andreoni J, Miller J (2002) Giving according to GARP: An experimental test of the consistency of preferences for altruism. *Econometrica* 70:737–753.
2. Andreoni J, Harbaugh WT, Vesterlund L (2008) *The New Palgrave Dictionary of Economics*, eds Durlauf SN, Blume L (Palgrave Macmillan, Basingstoke, Hampshire, New York).
3. The National Election Study 1984–2004, Available at www.electionstudies.org.