

APPENDIX B
SUMMARY AND ANALYSIS OF BOLTON AND KATOK (1998) TAX EXPERIMENT

TABLE B1
SUMMARY OF TAX TREATMENTS

<u>Treatment</u>	<u>ENDOWMENTS</u>		<u>PERMISSIBLE</u>	<u>RECIPIENT</u>
	<u>Dictator</u>	<u>Recipient</u>	<u>GIFT RANGE</u>	<u>IDENTITY</u>
15/5 Tax treatment	\$15	\$5	[0, 15]	Student
18/2 Tax treatment	\$18	\$2	[0, 18]	Student

TABLE B2
THEORETICAL PREDICTIONS FOR MEAN GIFTS
(COL. 1 VS. COL. 2)

<u>TREATMENT</u>		<u>UNCONDITIONAL ALTRUISM</u>			<u>CONDITIONAL ALTRUISM</u>
		<u>Pure Altruism</u>	<u>Impure Altruism</u>	<u>Warm Glow</u>	
<u>(1)</u>	<u>(2)</u>	<u>(3)</u>	<u>(4)</u>	<u>(5)</u>	<u>(6)</u>
Tax 18/2	Tax 15/5	>	>	>	> ($\frac{1}{2}c_t < c_s$)
Tax 15/5	Shifted Tax 18/2	=	>	>	>

TABLE B3
AVERAGE GIFTS

<u>Treatment</u>	<u>ALL DICTATORS</u>		<u>GIVERS</u>		
	<u>Mean Gift</u>	<u>N</u>	<u>Mean Gift</u>	<u>Modal Gift</u>	<u>N</u>
<u>(1)</u>	<u>(2)</u>	<u>(3)</u>	<u>(4)</u>	<u>(5)</u>	<u>(6)</u>
Tax 15/5	2.62	73	4.79	5.00	40
Tax 18/2	3.48	42	6.08	8.00	24

TABLE B4
ZERO ADJUSTED MEAN GIFTS

<u>TREATMENT</u>		<u>ZERO ADJUSTED MEAN GIFTS</u>		<u>ONE -TAIL P-VALUES $H_0: (1) > (2)$</u>		
		<u>OF (1)</u>	<u>OF (2)</u>	<u>DIFFERENCE IN MEANS</u>	<u>MANN-WHITNEY</u>	<u>KOLMOGOROV -SMIRNOV</u>
<u>(1)</u>	<u>(2)</u>	<u>(3)</u>	<u>(4)</u>	<u>(5)</u>	<u>(6)</u>	<u>(7)</u>
18/2	15/5	6.08	4.65	< .01	< .01	< .01
15/5	Shifted 18/2	4.79	3.35	< .01	< .01	.23

NOTE.- To test whether crowding out is complete, the distribution of gifts in the Shifted 18/2 treatment has been shifted down by the \$3 difference in endowments for comparison with the 15/5 treatment.

THEORY AND PROOFS FOR TAX EXPERIMENT

Crowding out in the Tax experiment

The donor's endowment, E , varies with the recipient's endowment, e , but the sum of the two, $E + e = \bar{M}$, is fixed. Specifically, $(E, e) \in \{(\$15, \$5), (\$18, \$2)\}$ and $\bar{M} = \$20$. Consider the case of an impurely altruistic taxed dictator, who faces the following maximization problem:

$$\begin{aligned} \text{Max}_x U(X, x, e) &\equiv u(X) + f(e + x) + g(x) \\ \text{subject to } X + x &= E, E + e = \bar{M}. \end{aligned} \quad (4)$$

PROPOSITION B1: *Under unconditional altruism, crowding out in the Tax experiment is partial or complete. Specifically, crowding out varies with the specific altruistic preference as follows:*

$$-1 = c_p < c_i < c_w < 0.$$

PROOF:

Substituting the constraints into the utility function above, we solve the first order condition with respect to x

$$\frac{dU}{dx} = -u'(\bar{M} - e - x) + f'(e + x) + g'(x) = 0.$$

Applying the implicit function theorem, substituting and differentiating with respect to e :

$$u'' + u''c_i + f''c_i + f'' + g''c_i = 0.$$

Rearranging, we arrive at the following expression

$$c_i = \frac{-u'' - f''}{u'' + f'' + g''} < 0.$$

For pure altruism, $g = 0$ and $c_p = \frac{-u'' - f''}{u'' + f''}$, and for warm glow, $f = 0$ and $c_w = \frac{-u''}{u'' + g''}$. ■

The Tax experiment is reformulated below in terms of conditional altruism. The maximization problem is

$$\begin{aligned} \text{Max}_x U(X, x, \phi) &\equiv u(X) - f(x - \phi) + g(x) \\ \text{subject to } X + x &= E, E + e = \bar{M}, \phi = \frac{1}{2}\bar{M} - e. \end{aligned} \quad (6)$$

The salient norm is the equal splits case of equity. Thus, the total amount, \bar{M} , should be divided equally, $\frac{1}{2}\bar{M}$, which requires that the dictator's gift ϕ be adjusted downward by e , the share of the total the recipient already possesses, i.e., $\phi = \frac{1}{2}\bar{M} - e$. This leads to Proposition B2 about crowding out in the Tax experiment, c_i .

PROPOSITION B2: *Under conditional altruism, crowding out in the Tax experiment is partial, i.e., $-1 < c_i < 0$.*

PROOF:

Substituting the constraints into the utility function, the first order condition with respect to x is

$$\frac{dU}{dx} = -u'(\bar{M} - e - x) - f'(x - \frac{1}{2}\bar{M} + e) + g'(x) = 0.$$

Solving $x^*(e)$, substituting and differentiating with respect to e gives

$$u'' + u''c_i - f''c_i - f'' + g''c_i = 0.$$

Rearranging, we arrive at the following

$$-1 < c_i = \frac{-(u'' - f'')}{u'' - f'' + g''} < 0. \quad \blacksquare$$

APPENDIX C
DETAILED ANALYSIS OF ΔSRA

TABLE C1
CHANGE IN SHORT RUN AFFECT (ΔSRA)

Treatment	MEAN ΔSRA		DIFFERENCES IN MEANS		
	(STANDARD ERRORS)		T-STATISTICS (P-VALUES)		
	Low Gifts	High Gifts	High-Low	Low-Control	High-Control
	(1)	(2)	(6)	(7)	(8)
Standard	2.41 (0.41)	1.06 (0.49)	2.11 (0.02)	.78 (0.22)	-.96 (0.17)
Subsidy	1.24 (0.35)	.20 (0.29)	-2.20 (0.02)	-.96 (0.17)	-2.37 (0.01)
Charity – All	.68 (0.48)	1.74 (0.53)	1.46 (0.08)	-1.62 (0.06)	-.15 (0.44)
$\kappa=1$.80 (0.44)	2.00 (0.51)	1.76 (0.04)	-1.33 (0.09)	.14 (0.44)
$\kappa=4$.38 (1.31)	1.00 (1.48)	.31 (0.38)	-1.15 (0.13)	-.55 (0.29)

NOTE.- The mean ΔSRA for the Control treatment is 1.87 (standard error 0.50, $N=45$). Tests are one-tail t-tests that follow from Propositions 4 and 5.

DISCUSSION OF NONLINEAR REGRESSIONS IN FIGURE C1

This discussion contains conjectures that account for nonlinear patterns in the data in Figure C1 (added here to Figure 3 in the paper), but a formal test of these conjectures goes beyond the scope of the current study and the capabilities of the data it has produced. Returning to the $f(\cdot)$ term, as formulated gift giving can at best reduce the negative impact on short run feelings of deviations from ϕ . In Figure C1, the lighter lines are fitted lines for nonlinear regressions motivated by this conjecture. Given the rather noisy data, the small number of observations (especially away from hypothesized ϕ values) in the partitioned subsets, and the additional independent variable in the nonlinear regressions, the coefficients of these regressions are not significant at conventional levels. Nevertheless, by their consistency with the hypotheses about conditional altruism, they suggest a way to reconcile enigmatic results and an avenue for future investigations.

This reconciliation relies on findings and stylized facts from previous experiments. Specifically, the results of many dictator experiments reveal that most transfers cluster around two values: zero gifts and ones that correspond to the norm, which, in most studies, is equal splits. The results from Konow (2000) show that most dictators transfer an amount close to what they believe is the right norm, but that most dictators are split into those who have impartial beliefs about the norm and those who have biased beliefs close to zero. Letting ϕ represent dictator beliefs about the norm, ΔSRA should, therefore, be greatest around zero and the impartial norm specified in the paper. This is largely consistent with the ΔSRA patterns in the treatments.

Beginning with the Subsidy treatment in Figure C1a, $f(\cdot)$ represents a nonlinear relationship between gifts and feelings, so a regression was conducted that added a squared gift term to the right hand side. This produces the lighter, concave line in the graph. f is maximized at the mean donor's belief of the right gift, the upper bound of which is the impartial ϕ of \$3. Due to biased beliefs, the average ϕ should be lower, between \$0 to \$3. Since plausible beliefs are all very close in this treatment, the data are not partitioned by different values of ϕ .

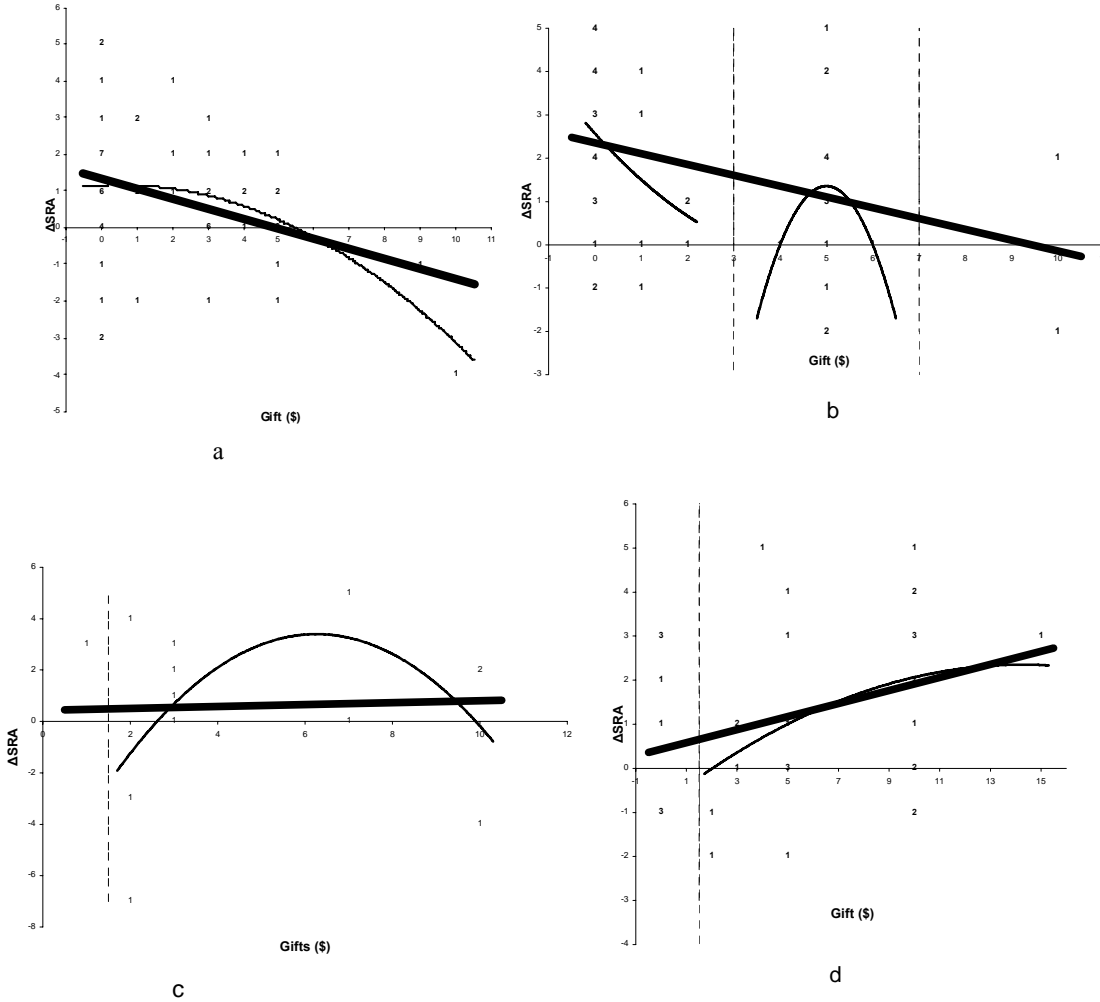


FIGURE C1.—Regressions of short run change in affect (ΔSRA) on gifts. Overlapping observations are indicated by numbers, linear regressions on complete data sets by dark lines, nonlinear regressions on partitioned sets by lighter curves and partitions by dotted vertical lines. a, Subsidy sessions. b, Standard sessions—An outlier at $(x, \Delta SRA) = (2, 8)$ has been omitted from the first partitioned regression: an examination of this subject's questionnaire suggests non-responsive behavior (there are runs of same choices). c, Charity $\kappa=4$ sessions—These include all dictators who gave to Childreach under the matching grant version. d, Charity $\kappa=1$ sessions—These include all Charity dictators except those who gave to Childreach under the matching grant version.

The story is perhaps more suggestive, albeit more complex, in the case of the Standard treatment, illustrated in Figure C1b. Remember we assume beliefs cluster around two values: zero and the impartial ϕ . The reasons given for decisions in the questionnaires of the current study corroborate that different dictators have very different concepts of ϕ in the Standard treatment. Therefore, the observations are partitioned in Figure C1b, as indicated by vertical

dashed lines. The partition at \$3 suggests a separation of beliefs about the right gift between \$0 versus \$5, and the partition at \$7 separates beliefs of \$5 from those of two dictators who gave \$10. The light lines are fitted lines for nonlinear regressions over the observations in the first two partitions. Of the group giving less than \$3 for which there are answers, 64% explained their decision based on their own need or unfortunate circumstances and none based on equity. Of the available \$3 to \$7 group, on the other hand, 89% referred to fairness and none to need. These reasons are consistent with the motives proposed by conditional altruism, and the fitted lines suggest ϕ values at the salient points of \$0 and \$5. The first line has the predicted slope, although it is not concave, whereas the second line has both the predicted slopes and concavity.

Finally, consider the Charity treatment. According to Proposition 5, a matching grant changes the optimal gift, specifically, it should lower giving under the parameters of this experiment. Thus, we separate the subjects who donated a positive amount to Childreach under the matching grant program (Charity $\kappa = 4$) from all other dictators in the Charity treatment (Charity $\kappa = 1$) in Figures C1c and C1d, respectively. Both of these groups are also partitioned into dictators who gave less than \$2 and those who gave \$2 or more. For the Charity $\kappa = 4$ group, the linear regression indicates no relationship between ΔSRA and giving, whereas the nonlinear regression suggests ΔSRA is a concave function of gifts among more generous Givers that is maximized at \$6.25. For the Charity $\kappa = 1$ group, the linear regression produces a positive slope and the nonlinear regression among more generous Givers a concave function that peaks at around \$14.25 (this provides an additional explanation for the two dictators not only gave more than their \$10 endowments). These results are consistent with beliefs about the right gift at \$0 and at positive values that vary with κ in the manner predicted by conditional altruism. In addition to the reasons for gifts summarized already on Table 10, there is a shred of evidence on efficiency: 86% of the dictators who gave to Childreach in the matching grant version pointed in the post-experimental questionnaire to the increased benefit as a reason for choosing that charity.

The maxima of the nonlinear regressions, then, are all consistent with the hypotheses of conditional altruism about ϕ , and four out of five even display the predicted concavity. Now, if we examine the relationship between the fitted linear regression lines to the hypothesized underlying nonlinear functions, the changing slopes of the former can be explained by what I will call a “lever effect.” That is, think of the concave function around the average ϕ as the fulcrum and the linear regression as a lever arm at rest. Then the fulcrum is moving progressively from left to right as ϕ increases in Figures C1a through C1d, and the slope of the “lever arm” changes from negative to zero to positive. Of course, there are “mini-fulcrums” around the biased beliefs, mostly at \$0, that reinforce the slope for the Subsidy and Standard cases and offset it somewhat for the Charity $\kappa = 1$ case. In fact, if one removes the \$0 observations from the latter case, the slope of the linear regression becomes steeper (.22) and borderline significant ($P=.06$), despite the small number of remaining observations ($N=26$). Thus, the shift of the right gift, and the $f(\cdot)$ term with it, suggest a means of accounting for the mixed feelings observed in different treatments of this experiment.

APPENDIX D
COMPOSITE EXPERIMENTAL PROTOCOL
ROOM A

The key to passages specific to the four different conditions is as follows:

[brackets]: standard
{braces}: subsidy
<chevron>: charity
(parentheses) matching grant version
«chevrons»: control

All other passages appeared in all versions.

You have been asked to participate in an economics experiment. Please note that your participation is voluntary. You have the right to withdraw at any time and forfeit all payments you have received and will receive from your participation.

[{«One-half of the subjects is now going to leave and participate in the experiment in another room. Who stays and who leaves is decided randomly based the slips of paper you drew when you entered the room. You may now open your slips of paper. If you drew a slip with an A on it, keep your slip and remain in this room. If you drew a slip with a B on it, take your slip, collect your belongings, and go to the other room with my assistant.»}]

You will now collect your materials for the experiment in the random order determined by the numbers on your slips of paper. Each of you will go individually to the study carrel at the side of the room where there is a box with packets containing your materials. You may select any one packet you wish and then proceed to your seat. Please keep your packet closed until you are told to open it.

Please now open your packet and remove the sheet that states “General Instructions” at the top. Leave the other materials in the packet. I will now go over those instructions, which you may read along with me.

General Instructions

Room A

The people in this room, which we will call Room A, are being asked to answer a series of questions on a variety of topics. These include a main questionnaire as well as some brief follow-up questions. For this you will be paid \$10 in cash later in the experiment. This is in addition to the \$5 you already received.

We are employing a number of measures to guarantee your anonymity, that is, to ensure that no one, including me, the experimenter, will ever be able to trace any specific response or decision to you: your seating was determined randomly, you chose your own packet confidentially, and you are seated at private study carrels that shield your actions from the view of others. The packet you now have contains materials that must be completed and returned to the packet. Then you will return your packets to the box from which you took them one at a time and confidentially.

Are there any questions? Please return the General Instructions to your packet, but you may review them at any time.

Please now remove envelope number 1 from your packet. Leave the other envelopes in the packet. Take the form out of envelope number 1, but do not go beyond the cover page that states “Main Questionnaire” at the top. I will now go over the instructions, which you may read along with me.

Main Questionnaire

Please take the time to consider and answer all of the questions carefully. We cannot use questionnaires that are incomplete or do not conform to the format provided. You will have twenty minutes to complete this form. When you are finished, check to see that you have responded to every question, then return this form to envelope number 1 and seal it.

Please remain seated without talking at all times, but if there are any questions, you may ask them now.

You may now turn over the cover page and begin answering the survey.

Time is up! Please put your Main Questionnaire in envelope number 1, and make sure you seal the envelope. Place envelope number 1 in your packet.

[{<Please now remove two envelopes, one labeled Keep and the other Return, from your packet.>}]
«Please now remove the envelope labeled Keep from your packet.» Leave the remaining envelopes in the packet.

Take the form out of the Keep envelope that states “Payment Information” at the top. I will now go over that information, which you may read along with me.

Payment Information

Room A

You will now be paid \$10 for completing the questionnaires. [{{«The subjects who are seated in the other room, which we will call Room B, are completing the same questionnaires as the people here in Room A.»}}] [{{«For this, Room B subjects receive no compensation beyond the \$5 they received at the start.»}}] [{{«For this, Room B subjects receive \$4 as compensation beyond the \$5 they received at the start.»}}] [{{«You may now pocket your Keep envelope, which contains your \$10 payment.»}}] [{{«Each of the subjects in this room, however, may give some of his or her earnings to>}}] [{{a subject in Room B.}}] <one of two organizations.>

[{{<Your Keep envelope contains>}}] <a Decision Form,> [{{<10 one dollar bills and 10 blank slips of paper. Each person in Room A must decide how many dollar bills (if any) and how many slips of paper to put in the Return envelope. The number of dollar bills plus the number of slips of paper must add up to 10. This envelope is then returned to your packet and, after all Room A subjects have completed the experiment and have departed, any money in your Return envelope will be given to>}}] [{{a randomly chosen subject in Room B.}}] <the organization you choose. Before you begin, read the information about the two organizations on the Decision Form found in your Keep envelope. Indicate to which organization you wish your donation to go, or to neither if you are not donating any money. Note that you can choose at most one organization and cannot split up a donation between the two. When you have made your decision, add the Decision Form with the dollar bills and/or slips of paper you wish to donate to your Return envelope.> [{{<You put the remaining bills and slips of paper in the Keep envelope, which you pocket. This is done in private, and we ask that you tell no one of your decision. Also note that no one else, including the experimenter, will know the personal decisions of people in this room. You will have>}}] [{{five}}] <six> [{{<minutes to make your decision.>}}] When you are finished, place this Payment Information sheet in your packet separate from any other materials.

[{{<If there are any questions, please ask them now.

Please continue to maintain silence throughout the experiment. You may start.

Time is up! Please make sure you place your Return envelope and separately your Payment Information sheet in the packet. Pocket your Keep envelope.>}}]

Please now remove envelope number 2 from your packet. Leave the other envelopes in the packet. Take the form out of envelope number 2, but do not go beyond the cover page that states “Follow-up Questions” at the top. I will now go over the instructions, which you may read along with me. They are the same as for the Main Questionnaire except for the time allowed.

Decision Form (for Charity sessions)

Below you will find information about two organizations, Children International and Childreach, based on their publications. Please read this information, and answer the question that follows.

Children International

Children International is a non-profit organization dedicated to improving the quality of life and meeting the needs of poverty-stricken children, widows and families throughout the world. Children International makes careful business decisions so that the contributors’ dollars provide the maximum help to their programs in the field that assist the needy.

Childreach

Childreach is a non-profit organization whose mission is to achieve lasting improvements in the quality of life of deprived children by enabling them, their families, and their communities to meet their basic needs. (Every \$1 you donate to Childreach makes available an additional \$3 from a matching grant, all of which will go to their programs in the field.) Childreach is committed to efficient operations and strives toward the most effective delivery of the resources to their programs in the field.

To which organization do you want your donation to go? Note that you can choose at most one organization and cannot split up a donation between the two (indicate Neither if you are not donating any money).

- 1 Children International
- 2 Childreach
- 3 Neither

Place this Decision Form in the envelope labeled “Return” with the combination of dollar bills and/or slips you have chosen to donate, and seal the envelope.

Follow-up Questions

Please take the time to consider and answer all of the questions carefully. We cannot use questionnaires that are incomplete or do not conform to the format provided. You will have five minutes to complete this form. When you are finished, check to see that you have responded to every question, then return this form to envelope number 2 and seal it.

Time is up! Please put your Follow-up Questions in envelope number 2, and make sure you seal the envelope. Place envelope number 2 in your packet.

Now you may proceed individually to the box on the table at the side and deposit your packet anywhere in that box.

Questionnaires

See Appendix to Konow and Earley (2008) for the complete questions. Of those questions, only the Batson Mood Index, from which ΔSRA is calculated, was repeated after the allocation decision.

Room B

The instructions for Room B are equivalent except for necessary changes.