Are Dictators Averse to Inequality?*

Oleg Korenok[a], Edward L. Millner[a], and Laura Razzolini[a°]

June 2011

Abstract: We present the results of an experiment designed to identify more clearly the motivation underlying dictators' behavior. In the typical dictator game, recipients are given no endowment. We give an endowment to the recipient as well as the dictator. This new dimension allows us to test directly for inequality aversion. Our results confirm that the inequality between dictator's and recipient's endowment is a key determinant of the dictator's giving. As we increase the recipient's endowment from 0 to an amount equal to the dictator's endowment, the mean amount passed drops from 30% to less than 12% of the dictator's endowment, and the proportion of dictators who pass positive amounts falls from 75% to 26%. Thus the majority of dictators exhibit behavior consistent with inequality averse preferences. On the other hand, only 24% of dictators split payoffs equally suggesting that maximin preferences are less important drivers of dictators' giving.

Keywords: Dictator game, Other-regarding preferences, Maximin, Altruism
JEL Classifications: C91, D63, D64

* We would like to thank James Cox, Rachel Croson, Shakun Datta, Doug Davis, Asen Ivanov, Vjollca Sadiraj, Roger Sherman, participants at University of Richmond seminar and at the June 2009 meeting of Economic Science Association and Co-Editor Catherine Eckel for providing helpful and insightful comments on the paper. Research support provided by NSF grant SES-9973731 to Razzolini is gratefully acknowledged. Any remaining errors are our own.
[a] Virginia Commonwealth University, West Main Street, Richmond VA 23284-4000. Email addresses: okorenok@vcu.edu, emillner@vcu.edu, lrazzolini@vcu.edu.
° Corresponding author.

1. Introduction

In the standard dictator game the dictator receives an endowment that she allocates between herself and the recipient. A selfish dictator should keep the entire endowment leaving the recipient with nothing. However, many experimental studies find that, on average, only 30% of the dictators pass nothing. The remaining 70% pass at least a portion of their endowment.[1] Thus, dictators appear to be motivated by considerations beyond their own personal payoffs. The question is: "What exactly are these additional considerations?"

A traditional explanation rests on the idea of inequality aversion suggested by Fehr and Schmidt (1999) and Bolton and Ockenfels (2000). Inequality aversion implies that individuals dislike differences in final payoffs and are willing to sacrifice their own payoffs to achieve more equal outcomes. Fehr and Schmidt and Bolton and Ockenfels show that inequality aversion can explain outcomes that are not consistent with purely selfish behavior in a variety of settings, including the standard dictator game. In the standard dictator game, inequality is at its maximum, as dictators receive an endowment while recipients get nothing. By passing at least a portion of their endowment, dictators can move the final outcome toward a more equal distribution.

Charness and Rabin (2002) and Engelmann and Strobel (2004) compare the predictive ability of inequality aversion, efficiency concerns, and maximin preferences in the context of multiple one-shot distribution experiments. Efficiency preferences require maximizing the sum of final payoffs, while maximin preferences require maximizing the smallest payoff among subjects. Both studies find that efficiency and maximin preferences are important for subjects when choosing among different final allocations and that the role of inequality aversion has been exaggerated in explaining subjects' choices. However, whether these results have similar implications for dictator games is not clear.[2]

In this paper, we present the results of an experiment designed to identify more clearly the motivation underlying dictators' behavior. In the typical dictator game, the recipient's payoff is completely determined by the amount passed. We give an endowment to the recipient as well as the dictator. The maximin model predicts that the amount passed should equalize the final

[1] See, for a discussion, the excellent survey by Camerer (2003).

[2] Engelmann and Strobel state that their results do "not necessarily imply that [efficiency concerns and maximin preferences] are equally important in other classes of games…" (2004, pp. 857-8).

payoffs. The inequality aversion model gives a more general prediction that the amount passed should fall to zero as the recipient's endowment approaches the dictator's.

Our results confirm that the inequality between the dictator's and the recipient's endowments is a key determinant of the dictator's giving. As we increase the recipient's endowment from 0 to an amount equal to the dictator's endowment, the mean amount passed drops from 30% to less than 12% of the dictator's endowment, and the proportion of dictators who pass positive amounts falls from 75% to 25%. Thus the majority of dictators exhibit behavior consistent with inequality averse preferences. On the other hand, only 24% of dictators split payoffs equally suggesting that maximin preferences are less important drivers of dictators' giving.

A number of recent experiments include treatments in which the recipient's endowment is positive. None examine directly whether giving is motivated by inequality aversion and, therefore, the details of their designs differ from ours. We vary only the recipient's endowment in an otherwise standard dictator game. On the other hand, Bardsley (2008) and List (2007) add an option to "take" from the recipient's endowment; Bolton and Katok (1998) and Eckel, Grossman and Johnston (2005) simultaneously vary the endowments to both the dictator and the recipient; and in Crumpler and Grossman (2008) the dictator's pass does not change the recipient's final payoff. In our design dictators may only pass; the recipient's endowment changes while the dictator's endowment is constant; and the amount passed affects the recipient's final payoff. Finally, Konow (2010), as part of a study on altruism, designed a "subsidy" treatment in which the recipients are given a positive endowment independent of the dictators' endowment. Konow tests the competing theories of pure altruism, warm glow giving, and impure altruism. His design is the closest to ours. Unlike all previous experiments, our experiment has a within-subject design which allows us to compare choices of the same subjects across multiple budget sets.

Three sections follow. Section 2 describes the experimental design. In Section 3 we report the results and discuss whether the behavior of individual dictators is consistent with various types of preferences. Section 4 concludes.

2. Experimental Design

The dictator is given an endowment $Ed>0$ and chooses from it a discrete amount, P, to pass to the recipient, subject to $0 \leq P \leq Ed$. Let Er denote the endowment given to the recipient.

In the standard dictator game, $Er = 0$. In our experiment, the recipient may also be given a positive endowment. That is, $Er \geq 0$. The final payoffs to the dictator and to the recipient, π_d and π_r, are, therefore, given by

$$\pi_d = Ed - P \qquad \text{and} \qquad \pi_r = Er + P.$$

Each dictator completes a total of eight decisions for different values of the endowments, *Er* and *Ed*:

$$Er \in \{\$0, \$2, \$4, \$6\} \quad \text{when} \quad Ed = \$6,$$
$$Er \in \{\$0, \$4, \$8, \$12\} \quad \text{when} \quad Ed = \$12.^{3}$$

A particular level of inequality between the dictator and the recipient characterizes each decision. We define inequality as $i = \frac{E_d - E_r}{E_d}$, and it ranges from 0, when the two endowments are equal, to 1 when, as in the standard game, the recipient's endowment is \$0.[4]

The experiments were conducted in the Experimental Laboratory for Economics and Business Research at Virginia Commonwealth University, with student volunteers recruited from basic and intermediate economics courses. We conducted 4 sessions with a total of 68 subjects, 34 dictators and 34 recipients. Subjects earned an average of \$11.21. The procedure follows.

Recruited subjects enter the lab and are randomly divided into two groups. The groups sit facing each other on opposite sides of the room. The monitor reads the instructions aloud.[5] The instructions conclude with a quiz designed to help the participants become familiar with the type of choices involved in the dictator game. The monitor checks the quiz to confirm that all subjects clearly understand the nature of the choices. After the quiz, a common and public toss of a die determines which of the two groups contain the dictators (Blue players) and which contains the recipients (Green players).

The dictator makes all eight decisions simultaneously. Soliciting all eight decisions simultaneously has at least two advantages. First, making all decisions simultaneously prevents any learning that may occur if subjects repeat the same decision over time. Second, choices may

[3] We did not allow for the recipient's endowment to be greater than the dictator's because neither inequality aversion nor maximin predicts positive pass beyond this point.

[4] Compared to the design by Konow (2010), we systematically vary the recipient's endowment over a wider range of inequality values. He compares the amount passed under *Er*=\$0 and *Ed*=\$10 with the amount passed under *Er* =\$4 and *Ed*=\$10.

[5] Instructions are available at http://www.people.vcu.edu/~lrazzolini/dictator.pdf.

be more consistent because subjects can easily compare each setting and the impact of each choice. The dictator completes her Decision Record Sheet, shown in the Appendix.[6]

The dictator records these decisions on her personal record sheet. Next, the dictator's decisions are transmitted anonymously to the recipient randomly paired with that dictator (single-blind design). After the recipient records the eight decisions on his own personal record sheet, the monitor collects the Decision Record Sheets and then publicly and randomly determines which of the eight decisions will be implemented and paid out. The subjects record their payoffs in personal logs and complete a questionnaire. They then proceed to be paid privately by an assistant not involved with the experiment. At this time, the subjects also receive a $3 participation fee.

3. Experiment Findings

Descriptive statistics of the dictators' choices are reported in Table 1. For each of the eight different scenarios in the experiment, Table 1 reports the proportion of dictators who pass a positive amount, and the mean and median dollar amounts passed. The table also reports the pass that equalizes final payoffs, means and medians of the pass rates, defined as the ratio of the amount passed to the dictator's endowment (*P/Ed*). Finally, for each allocation we report the inequality in initial endowments defined as $(1 - E_R/E_D)$.

	Dictators' Endowment *Ed=$6*				Dictators' Endowment *Ed=$12*			
	Er=$0	*Er=$2*	*Er=$4*	*Er=$6*	*Er=$0*	*Er=$4*	*Er=$8*	*Er=$12*
Positive Pass, %	79	82	65	26	82	82	79	24
Pass to Equalize Payoffs, $	3	2	1	0	6	4	2	0
Mean Pass, $	1.97	1.47	0.88	0.71	3.62	2.68	1.94	0.79
Median Pass, $	2.00	2.00	1.00	0.00	4.00	3.00	2.00	0.00
Standard Deviation Pass, $	1.31	0.86	1.01	1.53	0.20	0.14	0.18	0.19
Mean Pass / E_D, %	33	25	15	12	30	22	16	7
Median Pass / E_D, %	33	33	17	0	33	25	17	0
Inequality, %	100	67	33	0	100	67	33	0

Table 1: Summary Statistics

[6] In one of the four sessions (with N=20 subjects) order of the eight decisions was reversed so that the recipient's endowment decreased. The allocation decisions were, however, similar. For each of the eight choices, we could not reject the hypothesis that the order of decisions had an effect on the amount passed (Fisher test, 5% level). Therefore, we report all results as a joint sample.

The mean and median amounts passed fall as the recipient's endowment increases. The mean pass rate falls from about 30% when the recipient's endowment is $0 and inequality is at its maximum, to around 10% when endowments are equal. The median pass rate falls to zero when endowments are equal, as 74% of the dictators choose to pass nothing. The percentage of dictators who pass a positive amount is relatively constant, falling only when the endowments are equal.

Figure 1 reports median pass rates, which decline as the recipient's endowment rises and inequality falls from 100% to 0. The median pass rates do not differ much as the dictator's endowment rises from $6 to $12 when the level of inequality is held constant. The downward trend in the median amount passed by a dictator as the recipient's endowment rises, holding the dictator's endowment constant, is statistically significant.[7]

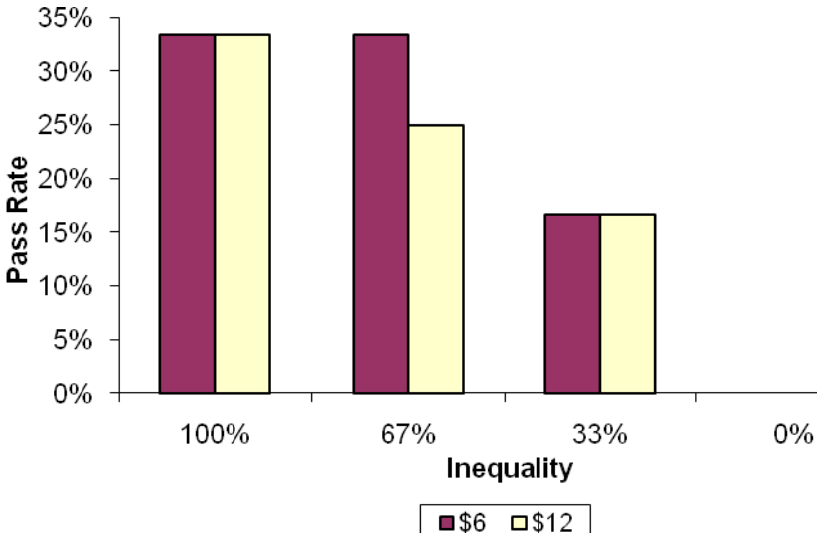

Figure 1: Median Pass Rates

The majority of our dictators are not purely selfish; that is, they appear to be motivated by something other than their own payoff. Only 12% of the dictators choose to pass zero in all eight decisions, while 88% pass a positive amount in at least one decision.

[7] Keeping E_D constant, we test the twelve differences between the median amounts passed as inequality falls. Using the Wilcoxon signed-rank test, nine differences are significant at the 1% level, two at the 5% level, and one (E_D=$6 and E_R changing from $6 to $4) is not significant.

Is dictator giving consistent with inequality averse preferences? The models of inequality aversion assume that the dictators' utility takes the form $U = U(\pi_D, \pi_R)$, and satisfies the following general property: utility increases as the difference in final payoffs decreases up to the point where the final payoffs are equal. In particular, the inequality aversion models imply that

$$0 \leq P \leq \frac{Ed - Er}{2}, \qquad (1)$$

where P denotes the optimal amount passed.[8, 9] Thus, as the difference between the endowments decreases, the range for the optimal amount passed falls. Also, the optimal amount passed should equal zero when the dictator's and the recipient's endowments are equal.

The median amount passed is consistent with the predictions of the inequality aversion model. As Table 1 shows, the median amount passed is between zero and half of the difference between the dictator's and the recipient's endowments in all eight choices. Note that the median behavior satisfies the strictest prediction of zero pass in the two decisions in which the dictator's and the recipient's endowments are equal; 76% of the dictators with \$6 endowment and 74% of the dictators with \$12 endowment pass zero.

An examination of all eight choices made by each individual also indicates that inequality aversion has strong predictive power. All eight choices satisfy equation (1) for 60% of the non-selfish dictators. Thus, the behavior of 60% of the non-selfish dictators is consistent with inequality aversion.

Charness and Rabin (2002) and Engelmann and Strobel (2004) find that maximin preferences can explain behavior in the context of multiple one-shot distribution experiments. Our results indicate that maximin preferences are less important drivers of behavior in the dictator game. In our design, maximin predicts that the optimal pass should equalize final payoffs.[10] The median amount passed is not consistent with the predictions of maximin preferences. Even though Table 1 shows that the median amount passed equalizes final payoffs

[8] A proof by contradiction establishes the result. Suppose that $P > (Ed - Er)/2$. This can be rewritten as $(Ed - P) = \pi_d < (Er + P) = \pi_r$. Since $\pi_d < \pi_r$, a decrease in P unambiguously increases utility. This decrease both increases π_d and decreases inequality, and both effects increase utility.

[9] Both Bolton and Ockenfels (2000) and the concave version of Fehr and Schmidt (1999, p. 848) inequality aversion models predict that the amount passed belongs to the interval bounded by zero and the amount necessary to equalize final payoffs. A piece-wise linear version of Fehr and Schmidt predicts that, depending on the disutility from inequality, the amount passed will be either zero or the amount that equalizes final payoffs.

[10] The Fehr and Schmidt (1999) piece-wise linear inequality averse utility function gives this prediction when the coefficient for disutility from inequality exceeds one-half.

in five out of eight choices, the median pass is significantly below the pass predicted by the maximin model in all choices in which inequality is greater than zero.[11] At the individual level eight dictators equalize final payoffs in all decisions. Thus, the maximin model explains giving for only 27% of the non-selfish dictators.

Engelmann and Strobel (2004) point out that maximin and inequality averse choices are confounded in many games. However, in the dictator game, choices are confounded only for subjects who equalize final payoffs. Even with this confound, we find that at least 33% of non-selfish dictators are inequality averse, while at most 27% of non-selfish dictators have maximin preferences.

A comparison of choices made when the dictator's endowment is $12 and the recipient's is $0 with those made when both endowments equal $6 provides indirect evidence of warm glow giving. Andreoni (1989) suggests that individuals may derive a positive utility not only from final payoffs, but also from the very act of giving (warm glow preferences). In our experiment, 30% of the non-selfish dictators pass a positive amount when both the dictator's and the recipient's endowments equal $6. If the dictator's utility depends on only the final payoffs, then each of these dictators should increase the amount passed by exactly $6 when the dictator's endowment is $12 and the recipient's is $0; the final payoffs to both players would be constant. However, consistent with warm glow preferences, each of these dictators increases the amount passed by less than $6. Thus, in addition to concerns over final payoffs, warm glow considerations appear to motivate a significant minority of our dictators.[12] However, the fact that pass falls as recipients' endowment increases suggests that dictators must care both about recipients' gains and recipients' initial endowment. This result contrasts with a number of well established experimental results in choice under uncertainty (see Battalio et al. (1990) and other citations in Neilson (1993)), which indicate that individuals make decisions over gains rather than gains and endowment.

4. Conclusions

We design an experiment to measure how changes in the recipient's endowment affect the dictator's giving. We find that the recipient's endowment plays an important role in dictator's

[11] Using the Wilcoxon signed-rank test, four tests are rejected at 1% level, one rejected at 5% level, and one at 10% level.

[12] See Bolton and Katok (1998) and Eckel, Grossman, and Johnston (2005) for direct evidence on warm glow preferences.

giving. As the recipient's endowment increases from zero to the size of the dictator's endowment, the average amount passed falls from 30% to 10% of the dictator's endowment, while the median pass rate falls from 33% all the way to 0%. The percentage of dictators passing a positive amount decreases from 75%, when their endowments exceed the recipients' endowments, to 25% when both endowments are equal. This reduction in giving is consistent with inequality aversion. Indeed, the majority of dictators makes choices which do not violate the predictions of the inequality aversion model.

In the traditional dictator game, the recipient's endowment is zero. We conclude that most dictators pass positive amounts in this setting because of the implicit extreme inequality present in the design. This paper shows that most dictators stop giving when the endowments are equal and inequality is reduced to zero. Thus, the majority of dictators are generous only with the less fortunate.

Appendix A

Decision	*Ed*	*Er*	Proposed Amount	
			Kept by Blue Player	Passed to Green Player
A	$6	$0		
B	$6	$2		
C	$6	$4		
D	$6	$6		

Decision	*Ed*	*Er*	Proposed Amount	
			Kept by Blue Player	Passed to Green Player
E	$12	$0		
F	$12	$4		
G	$12	$8		
H	$12	$12		

Decision Record Sheet

Bibliography

Andreoni, J., 1989. Giving with impure altruism: Applications to charity and Ricardian equivalence. The Journal of Political Economy 97(6), 1447-1458.

Bardsley, N., 2008. Dictator game giving: altruism or artifact? Experimental Economics 11, 122-33.

Battalio, R.C., Kagel J.H., and Jiranyakul, K., 1990. Testing between alternative models of choice under uncertainty: Some initial results. Journal of Risk and Uncertainty 3, 25-50.

Bolton, G.E., and Katok, E., 1998. An experimental test of the crowding out hypothesis: The nature of beneficent behavior. Journal of Economic Behavior and Organization 37(3), 315-31.

Bolton, G.E., and Ockenfels, A., 2000. ERC: A theory of equity, reciprocity, and competition. The American Economic Review 90(1), 166–93.

Camerer, C. F., 2003. Behavioral game theory: experiments in strategic interaction. Princeton: Princeton University Press.

Charness, G. and Rabin, M., 2002. Understanding social preferences with simple tests. Quarterly Journal of Economics 117, 817-69.

Crumpler, H., and Grossman, P. J. (2008). An experimental test of warm glow giving. Journal of Public Economics 92, 1011-21.

Eckel, C.C., Grossman, P.J., and Johnston R.M., 2005. An experimental test of the crowding out hypothesis. Journal of Public Economics 89, 1543-60.

Engelmann, D. and Strobel, M., 2004. Inequality aversion, efficiency, and maximin preferences in simple distribution experiments. The American Economic Review 94(4), 857–69.

Fehr, E., and Schmidt, K. M., 1999. A theory of fairness, competition and cooperation. Quarterly Journal of Economics 114, 817–68.

Konow, J., 2010. Mixed feelings: Theories and evidence on giving. Journal of Public Economics 94, 279-297.

List, J. A., 2007. On the Interpretation of Giving in Dictator Games. Journal of Political Economy 115(3), 482-93.

Neilson, W.S., 1993. An expected utility-user's guide to nonexpected utility experiments. Eastern Economic Journal 19(3), 257-74.