Differences in Inequality Aversion

and Destructive Reciprocity by Gender

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Abstract: We estimate a Charness-Rabin social preference model using experimental responses to several dictator and response games. All subjects display destructive reciprocity; men display significantly more. Women's (men's) disadvantaged inequality aversion parameter is negative and significant (insignificant). Men's altruism appears independent of relative payment but conditional on partners' past behavior.

Key Words: Fairness, gender differences, inequality aversion, reciprocity, social preferences

JEL Codes: D31, D63, D64, J16

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1. Introduction

In response to a growing body of experimental and field studies documenting deviations from the neoclassical assumption of pure self interest, a number of researchers have advanced models of social preferences, i.e., models where individual utility is a function of the outcomes and actions of others (see Sobel 2005 for a thorough review). A smaller body of research has documented how social preferences differ across distinct sub-populations of subjects, such as economists versus non-economists (Carter and Irons 1991), older versus younger subjects (List 2004) and men versus women (Eckel and Grossman, 1996, 1998; Andreoni and Vesterlund, 2001).

We refine the view of how social preferences differ by gender by fitting experimental data gathered from a sequence of binary dictator and response games to a model of social preferences forwarded by Charness and Rabin (2002) and by exploring for differences in the estimated preference parameters by gender. Direct estimates of differences in conditional altruism and destructive reciprocity are made.

2. Social Preference Model

We assume subjects hold Charness-Rabin (hereafter CR) preferences:

$$U(\pi, \pi') \equiv (\rho r + \sigma s + \theta q)\pi' + (1 - \rho r - \sigma s - \theta q)\pi, \qquad (1)$$

where π is own payment; π' is the payment of another; $r = 1$ if $\pi > \pi'$, and zero otherwise; $s = 1$ if $\pi < \pi'$, and zero otherwise; and $q = -1$ if the other person has misbehaved, and zero otherwise. If more than two players are involved, π' represents the payment of the other player with the lowest payment. We define misbehavior as in CR – scenarios where a first mover greatly reduces the second-mover's maximum payment in order to increase the first-mover's payment.

The neoclassical model implies $\rho = \sigma = \theta = 0$; only own payment drives utility. Unconditional altruism results when $\rho = \sigma > 0$ and $\theta = 0$; a positive weight is placed on the other person's payment regardless of relative payment and past behavior. Disadvantaged (advantaged) inequality aversion is captured by $\sigma < 0$ ($\rho > 0$), i.e., the weight placed on the other person is diminished (augmented) if the subject is to receive the smaller (larger) payment. Negative reciprocity results when $\theta > 0$, i.e., when the other person misbehaves ($q = -1$), the weight on the other person's payment is reduced.

3. The Experiment

A protocol adapted from CR is generates the data used to fit the social preferences model. We anonymously pair subjects and require each subject to make a decision that affects the monetary payoffs of both pair members. No pairing is repeated during the course of the experiment, and all subjects are told this prior to participation. Subjects are physically isolated from one another by dividers while completing questionnaires, minimizing the effects that visualizing potential partners has been shown to have in other contexts.[1] Each game allows subjects to alter the pair member's payment, usually by reducing own payment. The set of games administered includes both dictator and response games, and allows sufficient variation to estimate the model.

The CR protocol provides intentional or 'cold' measures of social preferences. When the subject is a second mover in a particular game, the decision impacting the first mover is made

[1] For example, Eckel and Grossman (2001) study behavior during ultimatum games where proposers and responders see the pool of subjects from which potential partners are drawn, but are not told which subjects form proposer-responder pairs. The gender composition of the proposer and responder pools are experimentally manipulated, and these manipulations affected behavior in Eckel and Grossman's experiment with offers being rejected less often when the proposer pool consists of all women versus all men.

prior to the revelation of the first mover's action, without knowledge of the first mover's identity, and with no opportunity to identify the first mover on subsequent occasions. CR recognize that 'hot' social preference protocols, those that allow for response to specific actions and remove anonymity, may result in different estimates of social preference parameters. Furthermore, because pairings are not repeated, we ensure that we are identifying intrinsic or 'strong' reciprocity rather than instrumental reciprocity, which arises in repeated settings where reputation formation is possible.

One hundred eighty-two subjects participated in one of thirteen experimental sessions that featured eight social preference games. Subject demographics and characteristics are listed in Table 1. Each subject played both roles within each game. Social preference questions were divided into two packets of four games; the order of the packets and the order of games within packets were counterbalanced across subjects and across experiments. Subjects were students recruited via e-mail and newspaper from various academic departments on campus. At the end of the session, one role from one game is chosen via a public die roll to determine which of the decisions cast result in the subjects' take-home payment, and all subjects are made aware of this payment scheme prior to decision making.[2]

In the course of participating in the eight games described in Table 2, each subject cast thirteen decisions (three games were dictator games and featured a decision for only one role). All dictator and second-mover decisions are used in estimation.[3]

[2] Subjects also receive a $5 show-up fee plus receipts from another, unrelated set of games played during the same session.

[3] Twelve subjects cast only four rather than eight dictator and second-mover decisions in one experimental session, lowering the total number of decisions cast from 1,456 to 1,408.

4. Results

Parameter estimates of several utility models along with robust standard errors are presented in Table 3. A random-effects probit estimator is used to account for the panel nature of the binary decisions. The first two columns present separate models for women and men. In both cases $\sigma < 0 < \rho < 1$. Subjects display inequality aversion, though the disadvantaged inequality aversion parameter, σ, is only significantly different from zero for women. This suggests that women reduce the weight placed on an anonymous partner's payment when the partner is receiving the higher payment, while men do not. Note there is little difference in the ρ parameter by gender. Both genders exhibit similar degrees of advantaged inequality aversion or simple charity for those receiving lower payments.

Reciprocity also differs by gender, with men displaying a greater tendency to lower the weight placed on an anonymous partner's payment in response to a previous misbehavior by that partner. Women also display a significant level of reciprocity as a group, though the mixed model reveals a difference between men and women that is statistically significant at the five percent level.

Table 1 reveals that class rank and major are also significantly associated with gender, leaving open the possibility that our results may reflect a confounding of gender with other characteristics. Alternative models are estimated that allow for systematic differences in preference parameters by class rank and major - no statistically significant differences are found between these groups nor are there statistically significant interaction terms between gender and either class rank or major.[4]

[4] Model results are not reported but are available from the lead author upon request.

5. Discussion and Conclusion

The role of individual differences in decision making is an emerging area of interest for economists, with gender being an important trait analyzed in several experimental and field settings. Several previous studies have tested for differences in the context of social preferences, with mixed results.

To the best of our knowledge, we provide the first estimate of a disadvantaged inequality aversion parameter by gender and to analyze gender differences using a mixture of dictator and response games. The finding that the women in our sample exhibit disadvantage inequality aversion – reduce the utility weight placed upon the anonymous partner's payment when positioned to receive the lower relative payment – provides a potential refinement to the emerging picture of differences in social preferences between men and women.

Our result of no difference in advantaged inequality aversion, i.e., men being as charitable as women when receiving the higher payment, contradicts several findings in the literature. For example, Eckel and Grossman (1998) find women give about twice as much to an anonymous partner than do men in a dictator game, while Selten and Ockenfels (1998) find women give significantly more to disadvantaged, anonymous group members than did men. In a field setting List (2004) found that women were more likely than men to donate during a charitable fund drive and that resulting donations were larger than men's, though these gender differences disappeared for older subjects. In an ultimatum setting, Eckel and Grossman (2001) find that women make more generous offers when in the role of proposer. The authors admit

that this finding may stem from gender-based differences in risk aversion rather than altruism as the proposer must act first and risk drawing a partner who will not reciprocate.[5]

Other results confirm our finding of no difference in advantaged inequality aversion. Bolton and Katok (1996) find no differences in dictator game behavior between men and women while Solnick (2001) finds no difference in offers made by males and females in an ultimatum game. Other researchers have found mixed results with respect to gender and advantaged inequality aversion. Andreoni and Vesterlund (2001) found that, during a sequence of dictator games, the gender showing greater altruism depended upon the relative cost of altruistic transfers with men (women) showing greater altruism when transfers were relatively inexpensive (expensive). Croson and Buchan (1999) found that, in a proposer-responder 'trust' experiment, women made initial offers no more generous than men, but returned more of the money in the responder role, where the responder was often in a position to receive the greater payment if no money was returned to the proposer.

With regard to destructive reciprocity, our results can be viewed as consistent with several ultimatum game results in the literature. In ultimatum games, a low offer from the first mover may be construed by the second-mover as misbehavior. Eckel and Grossman (2001) found men in the second-mover role were less likely to accept low offers than women; Solnick (2001) found a similar result, though the magnitude of difference bordered on insignificant. However, Eckel and Grossman (1996) find opposite results with regard to destructive reciprocity and gender: women are more likely to inflict costly punishment on a 'bad actor' than are men

[5] All findings in the current study stem from second-mover or dictator responses; hence even if risk aversion were correlated to gender, it would be irrelevant.

when punishment is less costly, though this tendency is ameliorated as the cost of punishment increases.

As a side note, we found that social preferences are not associated with subject major in our sample, which contradicts some past research. Carter and Irons (1991), for example, found economics majors to offer and accept less generous offers in ultimatum games; Marwell and Ames (1981) found more free-riding by economists during a public goods game; and Selten and Ockenfels (1998) find male economists to be less generous than males of other majors.

Refining the differences in social preferences between men and women continues to be an important task for economists. As economists attempt to build and validate models of social preferences using experimental and field data, identifying gender differences emerge as a practical necessity: if social preferences vary according to observable characteristics like gender, researchers must recruit panels of subjects with appropriate representation before drawing broad conclusions. Furthermore, gender differences in social preferences may allow researchers to formulate insights into the implicit contracts, negotiation tactics and customs that emerge within markets and institutions where one gender may currently dominate or historically held disproportionate influence.

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Table 1. Descriptive Statistics (N = 182)

	Mean	Std. Dev.	Min	Max
Male	0.60	0.49	0	1
Age	20.88	3.31	17	38
Men	20.90	3.35	18	38
Women	20.85	3.31	17	35
White	0.72	0.45	0	1
Men	0.72	0.45	0	1
Women	0.72	0.45	0	1
Junior Class Rank or Higher	0.48	0.50	0	1
Men	0.43[a]	0.50	0	1
Women	0.57[a]	0.50	0	1
Business or Economics Major	0.49	0.50	0	1
Men	0.56[b]	0.50	0	1
Women	0.39[b]	0.49	0	1
Grade Point Average	3.22	0.50	2.0	4.0
Men	3.19	0.49	2.0	4.0
Women	3.26	0.53	2.0	4.0
Currently Employed	0.59	0.49	0	1
Men	0.55	0.50	0	1
Women	0.65	0.48	0	1
Felt Procedures Maintained Subject Anonymity[c]	1.66	0.94	1	5
Men	1.62	0.93	1	5
Women	1.71	0.95	1	5

a – Fisher's exact test reveals the difference between men and women is significant at the seven percent level.
b - Fisher's exact test reveals the difference between men and women is significant at the two percent level.
c - Response to exit survey asking if "The procedures followed in this experiment maintained your anonymity." Responses ranged from '1' – Strongly Agree to '5' – Strongly Disagree.

Table 2. Percent of Subjects Choosing Left Response to Social Preference Questions (N = 182)

Game[a]	Options (π, π')	% Chose Left Option All	M	F	First-mover Misbehavior
1B[b]	(400, 400) v. (750, 375)	85	79	94	--
2A	(100, 1000) v. let B choose	30	33	25	Right
2B[b]	(75, 125) v. (150, 125)	39	39	38	--
3A	(700, 200) v. let B choose	83	81	86	None
3B[b]	(200, 700) v. (600, 600)	60	58	62	--
4A	(375, 1000) v. let B choose	26	30	19	Right
4B[b]	(400, 400) v. (350, 350)	97	97	97	--
5B[b]	(300, 600) v. (700, 500)	82	81	84	--
6A	(750, 0) v. let B choose	74	73	77	None
6B[b]	(400, 400) v. (750, 375)	79	75	84	--
7A	(500, 500) v. let B choose	60	61	58	Right
7B[b]	(800, 200) v. (0, 100)	82	82	83	--
8A[b]	(550,550,550) v. (600,300, 900)	35	33	39	--

a – The letter 'A' ('B') refers to the first-mover (second-mover) role in the game.

b – Represents a game where the subject is the last mover or only mover; these games are used in subsequent analysis.

Table 3. Regression Estimates for Social Preference Structure

Parameter	Male	Female	Mixed
ρ - Charity	0.426**	0.426**	0.426**
	(0.0384)	(0.0516)	(0.0308)
σ - Behindness Aversion	-0.0214	-0.138*	-0.138**
	(0.0291)	(0.0398)	(0.0401)
θ - Reciprocity	0.257**	0.153*	0.153**
	(0.0449)	(0.0709)	(0.0539)
σ * Male	--	--	0.117*
			(0.0514)
θ * Male	--	--	0.105*
			(0.0539)
PsuedoLL	-458.760	-267.382	-726.149
χ^2	228.37**	220.35**	450.44**
N	852	556	1408

Robust standard errors are in parentheses. **, * denote statistical significance at the one and five percent levels. χ^2 is the test statistic for the null hypothesis that the parameters are jointly equal to zero.