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Fairness and Accountability: Testing Models of Social Norms in Unequal Communities

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Fairness and Accountability: Testing Models of Social Norms in Unequal Communities

Martine Visser*

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Abstract

We examine behavioral models involved in the provision of public goods when income inequality exists within groups. Our sample consists of individuals from urban and rural South African fishing communities. We find that behavior observed in unequal groups does not accord with models of inequality aversion or egocentric altruism which require an equal distribution of final payoffs. On the other hand it is also not the case that individuals completely discount differences in initial allocations of wealth, as proposed by our absolute reciprocity model. Instead our empirical results lends support to a reciprocal model which requires that individuals contribute a proportional share of their initial endowments. Accordingly individuals are only partly held responsible for exogenous differences in initial wealth.

Keywords: Social Norms, Inequality Aversion, Altruism, Reciprocity, Public goods
JEL classification: C9, C72, D63, D64, H41, Z13

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1 Inequality and the Provision of Public Goods

Fairness is a moral concept that strongly motivates an individuals' response to social interactions, legal institutions, international disputes, etc. Yet how norms for fairness are defined or what level of inequality is considered as acceptable may differ substantially based on the political institutions (Alesina and Angeletos 2005), cultural norms and social conditions (Henrich 2001, 2005) an individual has experienced.

In this study we investigate how inequality is perceived within communities and the notions of fairness that drives provision of public goods when there is inequality within groups. We specifically focus on the extent to which individuals holds others in their community or group accountable for differences in exogenous levels of wealth, when deciding how much of their endowment to contribute to the public good. To this end we use public good experiments where individuals within groups receive unequal endowments. Instead of assuming individuals to be purely rational, selfish utility maximizers, we consider various models of behavior where we allow different attitudes or preferences for fairness to enter the individual's utility function.

We use a unique sample of participants from nine different fishing communities along the west coast of South Africa. In subsistence communities normative rules of behavior can be crucial for sustaining a resource, but also for weaving the fabric of social institutions that influence the functioning of such communities. An advantage of our subject pool is that everyone in these communities have direct or indirect experience of social dilemmas. This facilitates the testing of our models with regard to whether individual behavior in the experiment is also a function of prior or experiential norms of fairness that individuals bring with them from the community or social context in which they live.

Behavior in social dilemmas with heterogeneity, be it in terms of income, race or gender, have been studied in some depth in the experimental literature. Common pool resource experiments that have dealt with income heterogeneities among subjects within groups include Walker, Gardner and Ostrom (1990) who use treatments with high and low endowment players within groups and Hacket, Schlager and Walker (1994) who introduce treatments with varying endowments and communication. Cardenas, Strandlund and Willis (2002) explore the same subject but change the context somewhat — in their experiments, subjects face varying pay-off tables and communication.

Both non-linear and linear public goods experiments have been employed to study the effects of inequality in endowments on public good provision. The social-psychological literature dealing with this issue includes Van Dijk and Wilke (1994), as well as, Van Dijk and Grodzka (1992) who study the implication earned versus random inequality for cooperation and also the effects of information on distributional outcomes. Chan et al., (1997, 1999) study the interaction of endowments and information in a non-linear context. Linear public goods designs with varying show-up fees have been used by Anderson, Mellor and Milyo (2004) whereas Cherry, Kroll and Shogren (2005) and Buckley and Croson (2006) used varying endowments in their experimental design.

Very few papers that we know of have tried to explain contribution towards public goods in groups with unequal wealth allocations by formalizing models of behavior that account for fairness or distributive preferences. In a thought-provoking paper on public goods provision in unequal groups, Buckley and Croson (2006) test and reject both altruist and inequality aversion models in explaining behavior observed in their experiments. They go on to suggest, using empirical estimation, that behavior in their study is consistent with a form of reciprocity that requires all individuals to make the same absolute contributions to the public pool, irrespective of their endowments.

In this paper we extend this work by advancing generalized models for inequality aversion, for egocentric altruism, and for absolute and proportional reciprocity. Our empirical results are consistent with the predictions for proportional reciprocity which only holds individuals partly accountable for non-discretionary differences in income.

2 Experimental Design

2.1 Public Goods Experiment — Basic Design

Our experiment uses a linear public goods (PG) framework. The design we use is similar to that of Fehr and Gächter (2000) and Carpenter (2007). We choose a linear design to keep the experimental framework as cognitively simple as possible 1) given that the majority of participants are semi-literate and numeracy skills are low and 2) the effect of inequality on cooperation in a linear setting can be interpreted more clearly. Individual instructions are included in Appendix D.

The experiment consists of two treatment conditions. In the first treatment, each of four group members receive an equal endowment of 40 tokens each. In the second treatment, two individuals in each group receive high endowments (50 ECUs), while 2 receive low endowments (30 ECUs).

The procedure is as follows: 569 individuals are randomly assigned to groups of four and remain in the same group for the entire session (fixed matching). Seventy groups are used in the baseline treatment where all players receive equal endowments (40 tokens). Seventy-three groups receive the unequal treatment where two players are randomly assigned lower endowments (30 tokens) and two players are assigned higher endowments (50 tokens) in every round. Once assigned a lower (or higher) endowment, that endowment is allocated in each of the 6 rounds of the experiment. A "poor" individual therefore remains "poor" throughout both sessions of the experiment.

2.2 Pay-off structure of the VCM treatment

In every round, each of $n = 4$ subjects receives a fixed endowment of E Experimental Currency Units (ECUs) of which they may invest g_i tokens in a public account. The investment decision is made simultaneously by all players. The pay-off function used in the VCM treatment can be expressed as

$$\Pi_i = (E_i - g_i) + a \sum_{j=1}^{n} g_j \tag{1}$$

for each round, where a is the marginal per capita return (MPCR) from public good contributions and is equal to 0.5. The total payoff from the VCM treatment is the sum of the pay-off for each round for 6 rounds of the game.

In the equal treatment, E is fixed for all players such that $E = 40$ ECUs[1]. In the unequal treatment 2 players each receive E_l (=30 ECUs) and 2 players receive E_h (=50 ECUs). The pay-off function for a high endowment player h_i is

$$\Pi_{hi} = (E_h - g_{hi}) + a[g_{hi} + g_h + 2\bar{g}_l], \tag{2}$$

and similarly the pay-off function for a low endowment player l_j is

$$\Pi_{lj} = (E_l - g_{lj}) + a[g_{lj} + g_l + 2\bar{g}_h]. \tag{3}$$

The Nash equilibrium in a one-shot public goods game is for individuals with self-interested preferences to contribute none of their respective tokens to the public good, and to free-ride on the contributions of others. In a repeated game with a finite horizon (as is the case here), where there are only 6 rounds and no incentives to cooperate in the final round, backward induction leads to Nash behavior in every round.

2.3 Field setting

Our study focuses on rural fishing communities in nine different villages along the west coast of South Africa. In total, 569 individuals participated in both the survey and the experiments, of which about 60% were male and 70.9% were involved in fishing activities. The experiments where conducted in each of the communities in a community center or local school.

[1]Given that the focus of this paper is on behavior in unequal groups, we will not discuss the results of behavior in equal groups further.

The experiment reported here was one of three that were conducted during the session. The experimental sessions lasted for 1 hour. In some communities two or three sessions were scheduled per day[2]. Each experimental token earned the participant 10 cents (US 2 cents) and on average participants earned about 110 South African Rands (US$22) for the entire session which lasted 2–3 hours.

3 Predictions

In the following section we formulate different models that incorporate other-regarding preferences into the individual's utility function. This allows us to make predictions for contribution behavior of low versus high endowment players in public goods experiments where individuals are endowed unequally. Our aim is to illustrate how behavioral models can be adjusted to reflect different preferences for distributional fairness, giving rise to different best response contribution functions based on the set of possible actions of other players.

In an interesting overview of theoretical and experimental work on interdependent preferences, Sobel (2005) points to conceptual difficulties in distinguishing between models with other-regarding preferences. He argues that often linguistic nuances distinguish these models from each other and that on the whole it is not immediately evident how and which arguments should enter the utility function when preferences are interdependent.

We link a model of inequality aversion and egocentric altruism with two models for reciprocity, assuming preferences for similar absolute contributions and relative contributions respectively. We adopt consistent notation between models wherever possible, in order to show that the underlying structure that connects these models with different distributive outcomes relies on the weighting individuals assign to differences in unearned wealth. Predictions are made for optimal behavior (or contributions) given the fairness norms individuals ascribe to.

3.1 Inequality aversion

The first model we use is based on the inequality aversion model of Fehr and Schmidt (1999), which assumes an individual's utility is increasing with own pay-off but decreasing with the deviation between own and another's pay-off. Here individual i's utility, U_i, is a function of individual i's pay-off, $\Pi_i = E_i - g_i + a\sum_{j=1}^{n} g_j$, with two terms for aversion to disadvantageous and advantageous inequality in income respectively. Hence the individual obtains disutility from either negative or positive

[2]We control for spill-over effects by randomly allocating sessions as equal or unequal for the public goods experiments. We also test for spill-over effects in the regression analysis that follows.

deviation in pay-offs from another group member j[3]. Importantly, the individual weights inequality with respect to each member in the group and not with respect to the group average as in Bolton and Ockenfels (2000). Inequality aversion as formulated by Fehr and Schmidt refers to differences in absolute wealth or pay-offs, placing emphasis on ex-post distributional equity rather than accounting for differences in wealth ex-ante or effort exerted in the production of the common good[4]. In this sense the model reflects a strict egalitarian attitude to distributional justice (Cappelen et al., 2006a&*b*).

Consider the utility function for individual i:

$$U_i = \Pi_i - \frac{\alpha}{n-1}\sum_{j=1}^{n}[\max(\Pi_j - \Pi_i, 0)] - \frac{\beta}{(n-1)}\sum_{j=1}^{n}[\max(\Pi_i - \Pi_j, 0)]. \quad (4)$$

The parameters α and β indicate the intensity of the aversion the individual experiences when player j's pay-off is greater than that of player i, and vice versa, where $\alpha > \beta$[5]. Also $\alpha > 0$ and $0 < \beta < 1$.

Predictions for our model can be derived keeping the same piecewise linear format, but for purposes of comparison with the other models we test, we assume a utility function that is linear in individual payoff and strictly convex in other-regarding preferences such that $U_i'(\Pi_i - \bar{\Pi}) < 0$ and $U_i''(\Pi_i - \bar{\Pi}) > 0$.

We reformulate the utility function shown in equation 4 according to our design and modify the inequality aversion term as stated above. The utility function of a low endowment player U_{lj} who is inequality averse is then:

$$\begin{aligned} U_{lj} = E_l - g_{lj} + a(g_{lj} + g_l + 2\bar{g}_h) \\ - \frac{\alpha}{n-1}[[(E_l - g_l + a\sum_{i=1}^{n} g_i - (E_l - g_{lj} + a\sum_{i=1}^{n} g_i)] \\ + 2[(E_h - \bar{g}_h + a\sum_{i=1}^{n} g_i) - (E_l - g_{lj} + a\sum_{i=1}^{n} g_i)]]^2. \quad (5) \end{aligned}$$

The first term therefore describes the pay-off for a low endowment player j who obtains income from a private account (the difference between his endowment E_l and his contribution to the public good g_{lj}) and his pay-off from the public account (the sum of his contribution, the contribution of the other low endowment player in

[3]In the application of their model to a public goods experiment (see Appendix, p.18) Fehr and Schmidt (1999) formulates aversion in terms of *differences in contributions*. *Pay-offs* and *contributions* are equivalent in a treatment with equal groups, but clearly not in the context of unequal groups. Hence we express the model explicitly in terms of individual *pay-offs* of low and high endowment players respectively.

[4]For a good overview see Roemer, 1993.

[5]Note that in the formulation of our model where inequality aversion is expressed as a quadratic term, we do not distinguish between α and β.

his group, g_l, and the average contribution of the two high endowment players, $2\bar{g}_h$, multiplied with the marginal per capita return a from the public good)[6].

> ***Proposition 1***: *To equalize pay-offs, an inequality averse high endowment player should contribute exactly the same on average as a low endowment player plus an additional amount equal to the difference in their endowments.*

Proposition 1 implies that both the absolute and proportional contributions of high endowment players are higher than those of low endowment players.

Proof: Low endowment player j's optimal contribution, assuming utility maximizing behavior, can be derived from first principles:

$$\frac{\partial U_{lj}}{\partial g_{lj}} = 0 \quad \Longrightarrow \quad \frac{1-a}{2\alpha} = g_l - 3g_{lj} - 2E_h + 2\bar{g}_h + 2E_l. \tag{6}$$

Similarly the utility function U_{hi} for high endowment player i who is inequality averse in terms of pay-offs is

$$\begin{aligned} U_{hi} = E_h - g_{hi} + a(g_{hi} + g_h + 2\bar{g}_l) - \frac{\alpha}{n-1}\Bigg[(E_h - g_h + a\sum_{i=1}^{n} g_i) \\ -(E_h - g_{hi} + a\sum_{i=1}^{n} g_i) + 2\left((E_l - \bar{g}_l + a\sum_{i=1}^{n} g_i) - (E_h - g_{hi} + a\sum_{i=1}^{n} g_i)\right)\Bigg]^2. \end{aligned} \tag{7}$$

Again by solving $\partial U_{hi}/\partial g_{hi} = 0$ the utility maximizing contribution for player i is found to be

$$\frac{1-a}{2\alpha} = g_h - 3g_{hi} + 2E_h + 2\bar{g}_l - 2E_h. \tag{8}$$

From equations 6 and 8 we are able to derive the best response function of player j assuming that he knows the best strategies of others in the group, and visa versa:

$$-3g_{lj}^* + g_l - 2\bar{g}_l + 2E_l - 2E_h = -3g_{hi}^* + g_h + 2E_h - 2E_l. \tag{9}$$

$$g_{lj}^* + E_h - E_l = g_{hi}^*. \tag{10}$$

Further generalization of equation 10 for the average high and low endowment player yields

$$\bar{g_h^*} = \bar{g_l^*} + E_h - E_l. \tag{11}$$

Q.E.D.

By using the same formulation as in Buckley and Croson (See Appendix A) we can verify these findings.

[6]In our design a is set equal to 0.5.

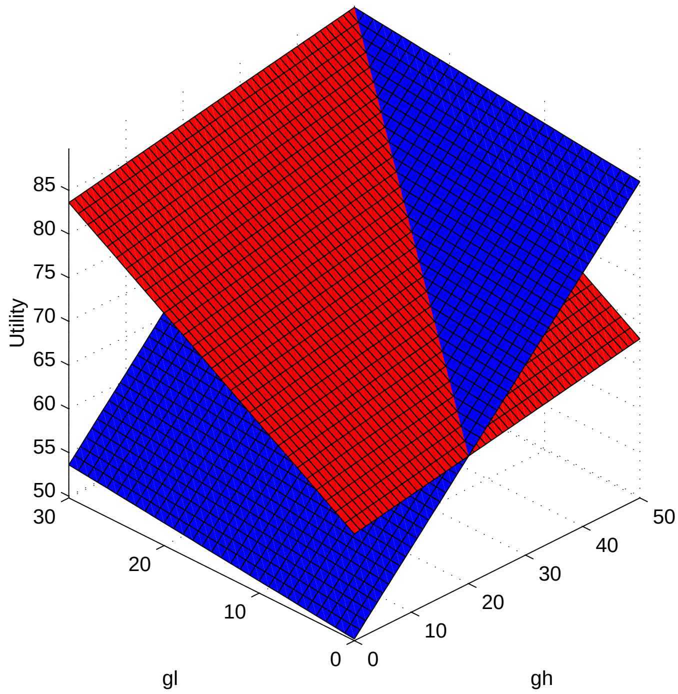
By formulating the individual's utility function in terms of egocentric altruist preferences, we obtain exactly the same predictions as for our inequality aversion model. This is perhaps not surprising given that inequality aversion as formulated by Fehr and Schmidt (1999) is just a more specific case of altruism.

The common premise of models that assume altruistic preferences is that an individual's utility increases in the material consumption or pay-offs of others. Becker (1974) shows that by maximizing utility subject to an individual's budget constraint it can be inferred that individuals' utility functions exhibit constant elasticity of substitution between own and other's income. Individuals are therefore willing to give up one unit of consumption in order to increase their opponent's consumption by one unit at the equilibrium. The intuitive implication for provision of public goods in unequal groups are therefore that individuals will seek to equalize pay-offs between low and high endowment players on average, which is what the inequality aversion model also predicts for our experiment. A number of theoretical models for altruism have added further specificity by assuming additive separability for own and other's utilities or pay-offs (Levine, 1998; Cox and Sadiraj, 2006; Buckley and Croson, 2006 and also see Sobel, 2005). We use the model of Cox and Sadiraj (2006) to derive the best response functions for low and high endowment players. Our derivations for the altruism models are shown in Appendix B.

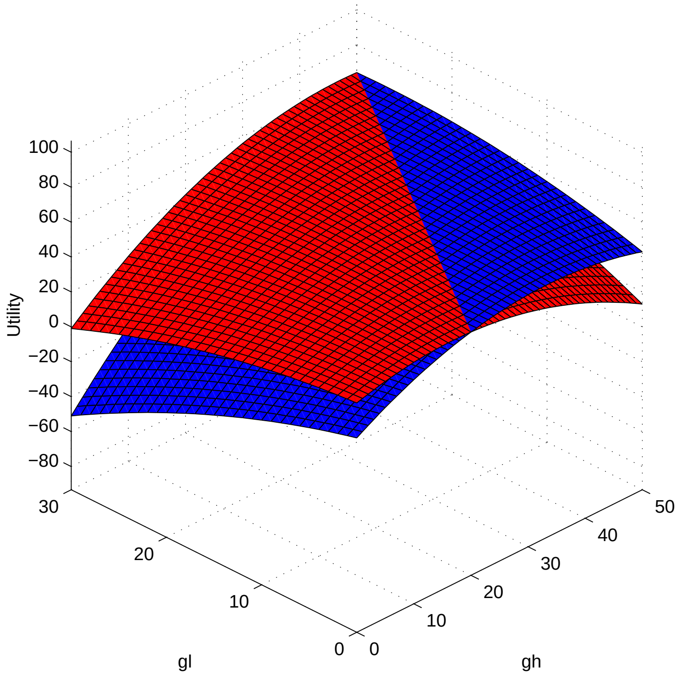
Figure 1 illustrates the contribution surfaces for high and low endowment players on average, for both inequality aversion and altruist models as discussed here. The lighter surface illustrates the utility obtained by the average high endowment player with a) inequality averse and b) altruist preferences, for all possible contributions given the corresponding action set of the average low endowment player. Similarly the dark surface depicts the utility obtained by the average low endowment player. The intersection of these surfaces shows the best response function with the utility maximizing contribution levels for each player. The contribution surfaces for high and low endowment players respectively can be seen to intersect at that point where the average contribution for a high endowment player should always be exactly 20 ECUs (the difference in their endowments) higher than that of a low endowment player. At this point, pay-offs are equalized.

3.2 Reciprocity

In the next section we propose two different models with reciprocal preferences — the first assuming that individuals follow an absolute contribution norm while the second assumes that contributions are considered as fair if players contribute in proportion to their respective endowments. The difference between these two models therefore relies on how individuals perceive fair entitlements and to what extent they adjust for unearned differences in initial endowments between them, with the absolute contribution norm taking a libertarian perspective on distributive justice (see Cappelen 2006a). Both models are formulated in terms of utility functions of high and low endowment players respectively.



[Egocentric Altruism]



[Inequality Aversion]

Figure 1: Contribution surfaces for high and low endowment players on average.

3.2.1 Absolute Reciprocity

We start with the simplest possible version of absolute reciprocity — consistent with the formulation of the inequality aversion model put forth earlier.

A high endowment player's utility function is then expressed as

$$U_{hi} = [E_h - g_{hi} + a(g_{hi} + g_h + 2\bar{g}_l)] - \beta(\bar{g}_{-hi} - g_{hi})^2, \tag{12}$$

where the first term indicates that the individual's utility is increasing in his payoff, and the second term expresses the individual's aversion to positive or negative deviation in absolute contribution from the rest of the group. As with the inequality aversion model we specify that $0 < \beta < 1$, where the parameter β indicates the intensity of the individual's aversion to deviation from the norm. Within the second term $\bar{g}_{-hi}$ represents the individual's belief about the rest of the group's behavior in this round. Given that all individuals have access to information about the rest of the group's average contribution in the last round, we assume this value to be representative of expectations in the present round.

> ***Proposition 2:*** *If individuals in unequal groups ascribe to reciprocal preferences based on an absolute contribution norm, the best reply correspondence of high and low endowment players are to contribute exactly the same in absolute terms.*

Proof: From first order conditions we can derive utility maximizing contribution levels from both high and low endowment players. For a high endowment player

$$\frac{\partial U_{hi}}{\partial g_{hi}} = 0 \quad \Longrightarrow \quad \frac{1+a}{2\beta} = \frac{g_h}{3} - g_{hi} + \frac{2\bar{g}_l}{3}, \tag{13}$$

and for a low endowment player

$$\frac{\partial U_{lj}}{\partial g_{lj}} = 0 \quad \Longrightarrow \quad \frac{1+a}{2\beta} = \frac{g_l}{3} - g_{lj} + \frac{2\bar{g}_h}{3}. \tag{14}$$

Solving for the Cournot equilibrium we can derive the best reply correspondence of both a high and low endowment player as

$$-4g^*_{hi} = -4g^*_{lj}, \tag{15}$$

which can be generalized such that on average:

$$\bar{g}^*_h = \bar{g}^*_l. \tag{16}$$

Q.E.D.

Contributions of high endowment players should therefore on average be the same in absolute terms as for low endowment players, implying that the distribution in income remains exactly the same ex-post contribution stage as ex-ante. Once again we present contribution surfaces for high and low endowment players adhering to such preferences (See Figure 2). Although the high endowment players obtain greater utility by playing in accordance with their best reply strategies, the utility maximizing contribution levels for both low and high endowment players, when all players have complete knowledge of the set of strategy profiles available to themselves and other players, are exactly equal.

We add further specificity to this model for our empirical estimation, in line with reciprocity models of Frot (2005) and also that of Akpalu and Johansson-Stenman (2006) who describe the individual's norm in terms of a combination of the individual's intrinsic norm as well as the norm they infer from the group's expected behavior or their behavior in the last round. We use a similar specification, but where the norm is a weighted function of the intrinsic norm g^{ϕ} and that inferred by the group's average contribution in the last round $\bar{g}_{-i}$. We assume that individuals brings with them experiences from the community where they live, the family they grew up in or other morals based on fairness concerns that guide their day to day behavior. Once they enter the game they adjust their beliefs based on their interaction with the rest of the group from round to round. Both parameters γ and ρ take values between 0 and 1, such that $\rho = (1 - \gamma)$.

A high endowment player's utility function is then expressed as

$$U_{hi} = [E_h - g_{hi} + a(g_{hi} + g_h + 2\bar{g}_l)] - \beta(\gamma g^{\phi} + \rho\bar{g}_{-hi} - g_{hi})^2. \tag{17}$$

The strategy set for a high endowment player who optimizes his utility over such preferences can be derived as

$$g_{hi} = \gamma g^{\phi} + \frac{-1 + a}{2\beta} + \rho\bar{g}_{-hi}, \tag{18}$$

which is an increasing function of β (the aversion parameter), g^{ϕ} (the individual's intrinsic norm), and $\bar{g}_{-hi}$ (the rest of the group's average contribution in the last round).

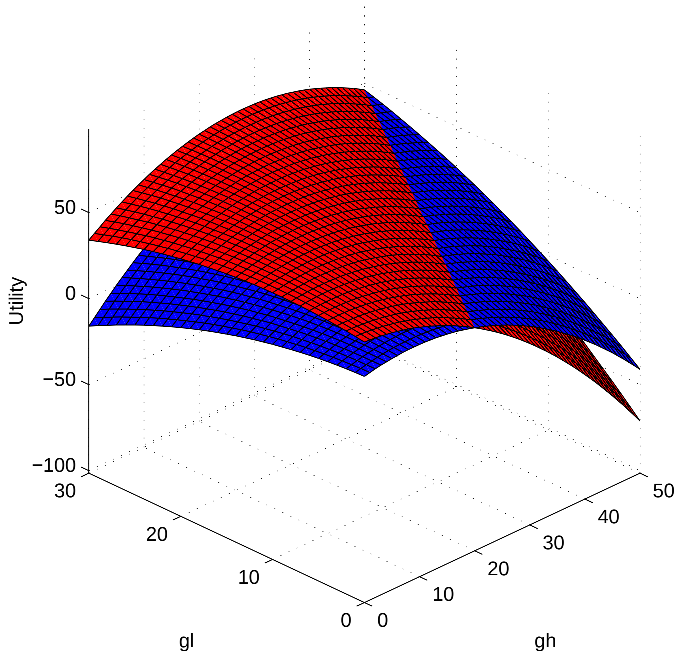
3.2.2 Proportional Reciprocity

In the second formulation of social preferences for reciprocal contributions, we assume that the fairness norm maintains each individual making a contribution in proportion to his/her endowment. The utility function of a high endowment player with preferences for proportional contributions can be expressed as

$$U_{hi} = [E_h - g_{hi} + a(g_{hi} + g_h + 2\bar{g}_l)] - \beta(\frac{\bar{g}_{-hi}}{\bar{E}_{-hi}} - \frac{g_{hi}}{E_h})^2. \tag{19}$$

> ***Proposition 3***: *If individuals in unequal groups ascribe to a proportional contribution norm, the equilibrium condition is for high endowment players to contribute exactly the same share of their endowment as low endowment players.*

[Absolute Reciprocity.]



[Proportional Reciprocity.]

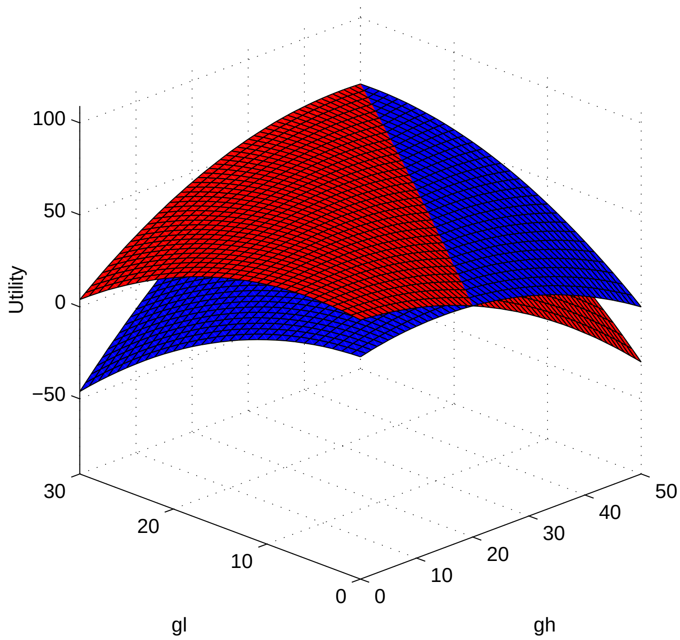


Figure 2: Contribution surfaces for high and low endowment players on average.

Proof: The contribution function that describes the best action set of a high endowment player when considering all possible actions of other groups members is

$$\frac{\partial U_{hi}}{\partial g_{hi}} = 0 \quad \Longrightarrow \quad \frac{g_{hi}}{E_h} = -\frac{1-a}{2\beta}E_h + \frac{\bar{g}_{-hi}}{\bar{E}_{-hi}}, \tag{20}$$

and similarly for a low endowment player:

$$\frac{\partial U_{lj}}{\partial g_{lj}} = 0 \quad \Longrightarrow \quad \frac{g_{lj}}{E_l} = -\frac{1-a}{2\beta}E_l + \frac{\bar{g}_{-lj}}{\bar{E}_{-lj}}. \tag{21}$$

When each player has full knowledge of the set of best actions of other players in his/her group, the best reply correspondences at equilibrium can be derived from equations 20 and 21:

$$\left(\frac{\bar{g}_h}{\bar{E}_h}\right)^* = \left(\frac{\bar{g}_l}{\bar{E}_l}\right)^*. \tag{22}$$

Q.E.D.

Figure 2 maps the best reply correspondences for low (darker surface) and high (lighter surface) endowment players. As is evident from this figure, utility for both players is maximized when the contribution share of each player in relation to the others is constant.

As with the absolute reciprocity model we extend the proportional model to differentiate between the intrinsic norm with which the individual enters the game and the rest of the group's average contribution in the previous round. A high endowment player's utility function is refined so that

$$U_{hi} = [E_h - g_{hi} + a(g_{hi} + g_h + 2g_l)] - \beta\left(\gamma(\frac{g}{E})^{\phi} + \rho\frac{\bar{g}_{-hi}}{\bar{E}_{-hi}} - \frac{g_{hi}}{E_h}\right)^2. \tag{23}$$

The reaction function for a high endowment player in an environment with incomplete information is then

$$\frac{\partial U_{hi}}{\partial g_{hi}} = 0 \quad \Longrightarrow \quad g_{hi}/E_h = E_h\frac{-1+a}{2\beta} + \gamma(\frac{g}{E})^{\phi} + \rho\frac{\bar{g}_{-hi}}{\bar{E}_{-hi}}. \tag{24}$$

The model predicts that contributions as a fraction of the endowment are increasing in β but decreasing in the individual's endowment. This implies that high endowment players will contribute a lower percentage of their endowment to the public good than low endowment players, if the contribution share of the rest of the group in the last round remains constant. This is important given that both the theoretical model defined here and also the empirical estimation thereof assume that individuals' beliefs about the actions of others are at least partly informed by observing their behavior in the last round. In the event that full information exists, the rest of the group knowing player i's best reply function will also update their behavior in the next round so that the Nash equilibrium emerges from the best reply correspondences as defined in equation 22.

4 Results of the Experiments

This section we use the experimental data obtained from nine South African fishing communities to test our predictions for each of the models described.

> ***Result 1****: High endowment players contribute more in absolute terms in provision of the public good.*

Panel A in Table 1 shows mean and median absolute levels of contribution for high and low endowment players respectively for each round. The Wilcoxon ranksum test indicates that high endowment players contribute significantly more than low endowment players ($z = -14.287; p < 0.0001$) on average. This result is also verified by Ordinary Least Squares (OLS) and Multilevel Hierarchical Model (MLHM)[7] estimations in Table 2, and is therefore not consistent with predictions for an absolute model of reciprocity as outlined in *proposition 2*. This contrasts with the findings of Buckley and Croson (2006) that for unequal groups contributions of high and low endowment players are the same in absolute terms. Even though high endowment players contribute more than low endowment players on average, as predicted by the inequality aversion and altruism models, the average difference between high and low endowment players is no more than 9.06 tokens (see round 3). An absolute difference of 20 tokens between high and low endowment players is required in order to be consistent with pure inequality aversion (or ego-centric altruism).

> ***Result 2****: Individuals contribute a proportional share of their endowment to the public account.*

It is very clear from Table 1 (Columns 1 and 3 of Panel B) that on average the fraction of the endowment contributed by low and high endowment players is very similar. In round 1, low endowment players are contributing 50% of their endowment and high endowment players are contributing 47%. While contributions decrease somewhat over rounds, the relative ratio between low and high endowment players remains more or less the same. In the final round low endowment players' contributions have dropped to 43% of their endowment, whereas those of high endowment players have dropped to 41%. Although none of the players can directly observe the contributions of other players in their group, the total contribution in the pool in the previous round is known to all.

In Panel C of the same table we express the average contributions of low and high endowment players (30 and 50 tokens) as a fraction of the total contributions in the public pool for that round. If players are only concerned with absolute contributions to the public pool and do not consider differences in endowments between players,

[7] Multilevel Hierarchical models control for individual nesting within groups over repeated rounds.

Table 1: Mean and median contributions.

		Panel A: Absolute Contributions		Panel B: Number of tokens contributed as fraction of endowment		Panel C: Number of tokens contributed as fraction of tokens in pool	
Round		Player allocated 30 tokens	Player allocated 50 tokens	Player allocated 30 tokens	Player allocated 50 tokens	Player allocated 30 tokens	Player allocated 50 tokens
Round 1	Mean	15.14	22.79	0.50	0.46	0.20	0.30
	Std. Dev	(7.30)	(10.71)	(0.23)	(0.21)	(0.10)	(0.12)
	Median	15	25	0.50	0.50	0.20	0.29
Round 2	Mean	14.40	21.81	0.48	0.44	0.20	0.30
	Std. Dev	(7.31)	(11.13)	(0.24)	(0.22)	(0.11)	(0.13)
	Median	15	20	0.50	0.40	0.19	0.30
Round 3	Mean	13.89	22.95	0.46	0.46	0.19	0.31
	Std. Dev	(8.13)	(12.42)	(0.27)	(0.25)	(0.12)	(0.17)
	Median	15	25	0.50	0.50	0.19	0.30
Round 4	Mean	13.89	21.26	0.46	0.43	0.20	0.30
	Std. Dev	(8.29)	(12.27)	(0.28)	(0.25)	(0.11)	(0.16)
	Median	15	20	0.50	0.40	0.20	0.31
Round 5	Mean	13.86	22.10	0.46	0.44	0.19	0.31
	Std. Dev	(8.42)	(12.46)	(0.28)	(0.25)	(0.12)	(0.17)
	Median	14	22	0.47	0.44	0.18	0.32
Round 6	Mean	12.83	20.86	0.43	0.42	0.19	0.31
	Std. Dev	(8.45)	(13.79)	(0.28)	(0.28)	(0.12)	(0.19)
	Median	10.5	20	0.35	0.40	0.19	0.32

then the contribution rule for a group of 4 should be that each individual contributes 25% of what is in the pool. While this is the case in our equal treatments where every player received 40 tokens as endowment, for low and high endowment players in unequal groups this rule does not hold.

Instead, low and high endowment players follow a proportional rule, according to which a fair contribution implies that each player's contribution share as a fraction of total contributions in the pool should be equal to that player's endowment as a fraction of the sum of all players' endowments: $\frac{g_{hi}}{g_{hi}+g_h+2g_l} = \frac{E_{hi}}{E_{hi}+E_h+2E_l}$. Such a heuristic would imply that high endowment players contribute $\frac{5}{16}$ (31.25%) of the pool share and low endowment players contribute $\frac{3}{16}$ (18.75%). Panel B (Columns 1 and 3) indicates that on average low and high endowment players start very close to these respective shares in the first round and converge on these shares over 6 rounds of the game.

It is trivial to show that if all players contribute the same share of their endowment, g_i/E_i, it is analogous to all players contributing their proportional share of what is in the pool[8]: $\frac{g_{hi}}{G} = \frac{E_{hi}}{2E_h+2E_l}$.

The histograms in Figure 3 show the density functions for average contributions as a fraction of total contributions in the pool for low and high endowment players respectively. The red lines in each figure indicate the 3/16 and 5/16 fair share contributions discussed previously.

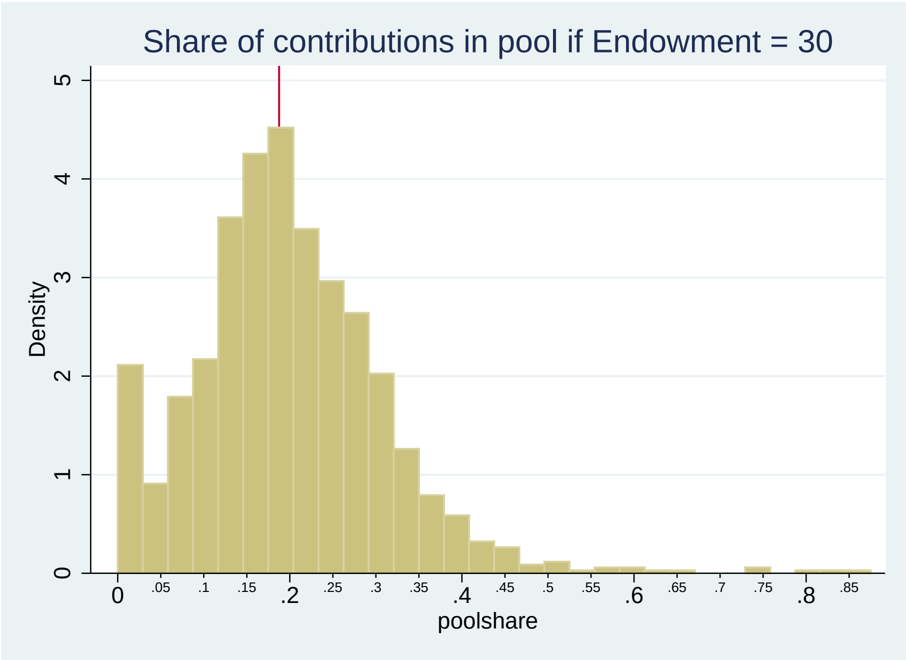
> ***Result 3***: *Empirical estimation lends further support to proposition 3, such that contributions in unequal groups are consistent with a proportional rather than an absolute reciprocity model of behavior.*

In Tables 2 and 3 we present estimates for models that assume absolute and proportional reciprocal norms respectively. In Table 2, for the OLS model specification we find that absolute contributions of the other group member in the last round are not significant. While the parameter is significant at the 10% level for the MLHM specification, the size of the parameters (0.09 and 0.089) is in both instances negligible compared to the constant term (16.07 and 18.85). The constant term, which is highly significant, is a combination of two parameters in our model comprising most of the explanatory power. Including an additional dummy for Endowment (see Columns 1 and 3), which should not have any explanatory power according the the absolute formulation of the model (for either the first order condition (equation 17) or the best response function (equation 18)), indicates the contrary. High endowment players contribute significantly more than low endowment players in absolute terms. This refutes the predictions of the absolute reciprocity model (*proposition 2*).

[8]See Appendix C

.

[Low endowment players.]



[High endowment players.]

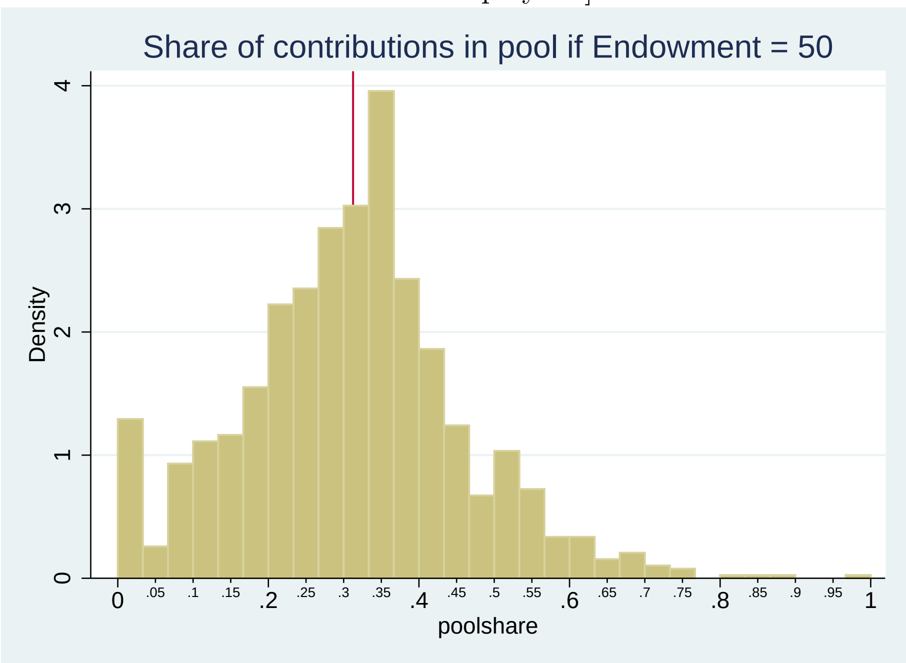


Figure 3: Average contributions of players as percentage of total contributions.

Table 2: Average Absolute Contributions

Absolute Contribution to the Public Account	OLS (1)	OLS (2)	MLHM (3)	MLHM (4)
Player allocated 50 tokens	8.22 ***		7.95 ***	
	(.505)			
Average Absolute Contribution the rest in last round	0.20 ***	0.06	0.09 **	0.086 *
	(.041)	(.043)	(.044)	(.044)
Constant	12.07 ***	19.45 ***	16.07 ***	18.85 ***
	(1.62)	(1.67)	(2.51)	(2.66)
n	1702	1702	1710	1702
R 2	0.17	0.03		
AdjR2	0.16	0.02		
Wald chi2(20)			119.3	32.2
Log restricted-likelihood			-6143 ***	-6150 **
LR test vs. linear regression:			439.42 ***	614 ***

All regressions include controls for round, community, age, gender and race which are not reported.
MLHM (Multilevel Hierarchical Models) control for individual nesting within groups.
Standard errors in parenthesis.
*** = 1% significance; ** = 5% significance; * = 10% significance.

Table 3: Average Proportional Contribution

Fraction of Endowment Contributed to the Public Account	OLS (1)	MLHM (2)
Player allocated 50 tokens	-0.04 ***	-0.04 *
	(.012)	(.021)
Average Fraction of Endowment Contributed by the rest in last round	0.20 ***	0.09 **
	(.041)	(.044)
Constant	0.50 ***	0.49 ***
	(.043)	(.061)
n	1702	1702
R 2	0.05	
AdjR2	0.041	
Wald chi2(20)		35.27
Log restricted-likelihood		101.07 **
LR test vs. linear regression:		432.45 ***

All regressions include controls for round, community, age, gender and race which are not reported.
MLHM (Multilevel Hierarchical Models) control for individual nesting within groups.
Standard errors in parenthesis.
*** = 1% significance; ** = 5% significance; * = 10% significance.

The estimates for our proportional contribution model shown in Table 3 provide strong support in favor of *proposition 3* as predicted by the proportional reciprocity model. All parameters are significant: 1) the constant term representing the intrinsic norm in the community (or some pre-conceived notion by this individual); 2) the endowment term; and 3) the term reflecting the rest of the group's contribution as a share of endowment in the last round.

For both model specifications, the constant term (what we infer to be the intrinsic contribution norm from our model specification) accounts for about 50% of contributions, indicating that the individual brings into the game preconceived notions of fairness that are independent of the behavior of other players.

The endowment term is significant and negative as predicted by the first order conditions (equations 22 and 23) in our proportional model, rather than by the best response function that requires full information of all strategies of other players. We find that low endowment players contribute a greater share of their endowment to the public good than high endowment players. These results are significant according to the two sample Wilcoxon ranksum test for both treatments (VCM: $z = 1.86$; $p < 0.07$).

> ***Result 4***: *Our inferred intrinsic contribution norm differs across communities and is typically higher than the norm established by the rest of the group.*

Estimation of contributions across communities (see Table 5) yields differing average intrinsic norms (as inferred from our model). In each of the communities the parameters for the intrinsic norm as well as the rest of the group's contributions are highly significant.[9] The endowment term is only significant for one community. Given that limited data for each community does not allow the use of MLHM, these models might be less accurate as they do not account for individual fixed effects or nesting within groups.

Table 4: Absolute, Proportional and Intrinsic Contribution Norm by Community

	COM1 (OCV)	COM2 (KLB)	COM3 (LBTS)	COM4 (ELDS)	COM5-7 (PSVSH)	COM8 (VLDF)
Intrinsic Contribution Norm in Community (g*/E*)	0.51	0.46	0.52	0.54	0.24	0.35
Average Relative Share - Low Endowment Players (gl/El)	0.52	0.46	0.46	0.44	0.49	0.45
Average Relative Share - High Endowment Players (gh/Eh)	0.45	0.496	0.42	0.493	0.45	0.45
Average Absolute Contribution - Low Endowment Players (gl)	15.38	13.9	14.05	13.9	14.8	13.54
Average Absolute Contribution - High Endowment Players (gh)	22.66	24.83	21.2	22.45	23.19	22.5

Communities 5-7 have been pooled due to proximity and small sample size

[9]Note that the model allows for this term to be positive or negative depending on how the individual adjusts between the intrinsic and group norm.

Table 5: Proportional Contributions by Community

	COM1 (OCV)	COM2 (KLB)	COM3 (LBTS)	COM4 (ELDS)	COM7 (PSVSH)	COM8 (VLDF)
Fraction of Contribution Contributed to the Public Account	OLS	OLS	OLS	OLS	OLS	OLS
Round	-0.007	-0.005	-0.012	-0.002	-0.004	-0.016 *
	(0.008)	(0.011)	(0.008)	(0.008)	(0.009)	(0.008)
Player allocated 50 tokens (Endowment)	-0.088 ***	-0.014	-0.013	-0.02	-0.033	-0.016
	(0.028)	(0.038)	(0.028)	(0.029)	(0.032)	(0.031)
Rest-of-group share contributed	0.394 ***	0.057	0.273 ***	-0.138	0.219 **	0.075
	(0.077)	(0.135)	(0.089)	(0.119)	(0.106)	(0.095)
Constant (g*/E*)	0.545 ***	0.47 ***	0.605 ***	0.52 ***	0.277 ***	0.454 ***
	(0.091)	(0.130)	(0.094)	(0.094)	(0.100)	(0.113)
n	354	186	305	270	252	335
R 2	0.109	0.141	0.147	0.012	0.104	0.034
Adj R2	0.091	0.106	0.126	-0.014	0.078	0.013

All regressions include controls for age, gender and race which are not reported.
Standard errors in parenthesis.
*** = 1% significance; ** = 5% significance; * = 10% significance.

5 Discussion

We consider four different models of behavior that incorporate into the utility framework the cognitive dissonance an individual experiences when deviating from an internal or social norm. We distinguish between models of inequality aversion, egocentric altruism (although the predictions for this model turn out to be equivalent to the inequality aversion model), absolute reciprocity, and proportional reciprocity.

In an interesting experimental study by Buckley and Croson (2006) which uses an unequal public goods design similar to ours,[10] no significant difference in absolute contributions of low and high endowment players is observed. This implies that individuals in their sample are only concerned with absolute investments in the public good.

What are considered to be fair contribution to the public good may however be context dependent. Novel work by Van Dijk and Grodzka (1992) found in public goods experiments with heterogenous endowments that subjects informed about inequality between them preferred a proportional distribution of the contributions, while uninformed subjects preferred an equal distribution.

This raises the question as to what fairness norms hold when exogenous differences in wealth exist, and whether the public good mechanism indeed functions as an indirect means of redistribution as claimed out by many authors (Van Dijk and Wilke, 1994; Van Dijk and Grodzka, 1992; Alessina and Angeletos, 2005). While an egalitarian view of fairness would yield predictions similar to our inequality aversion and altruism models, a more libertarian approach to social outcomes would perceive an absolute reciprocity model as fair. Equity theory in turn states that individuals deserve social payments that are proportional to their contribution to society

[10]The subject pool comprised 24 American university students, with groups also consisting of four members (2 high and 2 low endowment players). In their unequal treatment low endowment players receive 25 tokens and high endowment players each receive 50 tokens.

(Walster et. al, 1978; Homans, 1958; Adams, 1965; Selten, 1978), although it does not clearly provide a definition of the nature of inputs to production or contribution. Konow (1996, 2000) extends this concept with the Accountability Principle, by differentiating between discretionary variables that an individual can influence (e.g., work effort) and exogenous variables that an individual does not have control over (e.g., physical handicap) but which affects the perceived fair allocation between individuals[11]. He further proposes an Entitlement Formula that applies when the allocable variable is not produced but rather endowed, such as in our experiments. This formula allows an individual's entitlement to vary in direct proportion to the individual's relevant discretionary variables, while it adjusts for differences in the values of exogenous variables (Konow 2001).

The fixed marginal per capita return in our (and most standard) public goods games does not allow for adjustments in pay-offs to account for deservingness of each member based on his or her contributions, unless punishment is introduced in the second stage of the game. This accords with social preference models that are outcomes-based (like the inequality aversion model of Fehr and Schmidt (1999) and also Bolton and Ockenfelds (2000)) rather than intentions-based (Rabin 1993)

The only way in which all individuals would attain fair entitlements (or adjusted pay-offs) that does not hold one another accountable for exogenous differences in endowments would be if high endowment players contribute the same as low endowment players plus the absolute difference in endowments: $\bar{g}_h = \bar{g}_l + (E_h - E_l)$. In contrast, a contribution norm that holds individuals fully accountable for differences in endowments would require that all players contribute the same absolute amount to the public good irrespective of their endowment: $\bar{g}_h = \bar{g}_l$.

Another possible interpretation of "fair entitlements" may be that the relative wealth difference between low and high endowment players (E_l/E_h) should also be reflected in final pay-offs. This would require that $\frac{g_h}{E_h} = [\frac{g_l}{E_l} - aG\frac{(E_h - E_l)}{E_h E_l}]$, which would also account for the significant difference in contribution shares of low and high endowment players. However, if we consider final pay-offs over the entire experiment for low and high endowment players on average, the ratio of relative wealth for these two groups is 0.8 compared to the ratio of their relative initial endowments, which is 0.6. This indicates that individuals do not expect that the status quo be maintained in terms of a relative distribution of wealth, but that the public goods mechanism is indeed used as a way of redistributing wealth.

Figure 4 represents a mapping of best reply correspondences for low on to high endowment players, for each of the models we outlined. It is clear the the proportional reciprocity model links the inequality aversion and absolute reciprocity models. At low levels of contributions, the proportionality rule converges on the absolute reciprocity model whereas at high levels of contributions it results in the same outcome as the inequality aversion model.

[11]See also Capellen (2005) and (2006a&b) for an interesting discourse and novel experiments covering this subject.

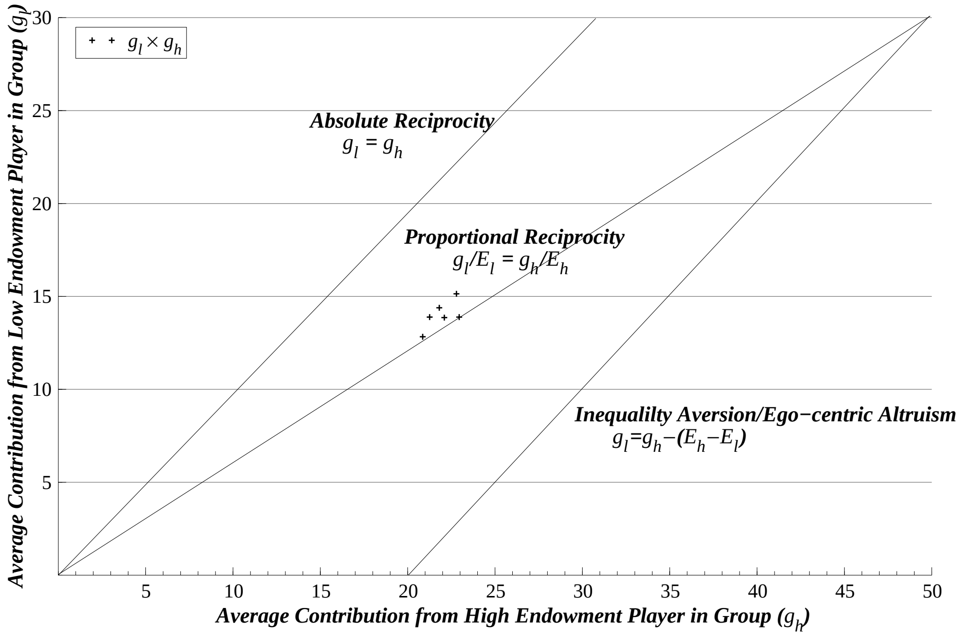


Figure 4: Best reply correspondences for inequality aversion and reciprocity models.

The average contributions for high and low endowment players in each group are plotted on the graph for all six rounds. From this, as well as from our earlier empirical estimations, it is clear that the average tendency within these groups is to follow a proportional rule. Empirical estimation shows that behavior in unequal groups accords with the reaction functions of utility maximizing individuals with incomplete information, rather than with the best response correspondences predicted in theory, that require full information regarding the profile of best reply strategy sets of all other players. An individual therefore infers beliefs about the behavior of other group members by observing their contributions in the previous round, without assuming that other players will also adjust their behavior given full information of his/her own set of best actions. As Aumann and Maschler (1995) point out: "*Unlike the situations treated in classical game theory, a participant in real life conflict situations usually lacks information of the strategies that are available to him and his opponent, on the actual outcomes and their utility to each of the participants and on the amount of information that other participants possess.*"

One criticism of the work we present here may be that we do not discriminate between different behavioral types, given that we consider average behavior of low and high endowment player across groups. We agree that one may observe vast heterogeneity with respect to perceptions of fairness within groups. Disentangling different types of players in this context is however problematic given that the definition of a player's type can only be deduced from his position with respect to other players who decide on their respective contributions simultaneously.

Our model allows us to identify the average intrinsic norm for each of the communities we worked with. It is clear that while individuals are affected by the behavior of others in a group they encounter, they also bring an intrinsic norm of fairness into each situation. This norm is based on historical interaction within a community or family context. What is considered to be fair across all communities in our sample is not a notional or normative concept of fairness in the Rawlsian sense (1971), but rather an experiential or positivist form of justice based on the more immediate behavior of group members, and also on previous experience with inequality in their communities. There is certainly an element of self serving bias allowing the rich to justify their differences in endowments, which accords with status value theory (Cook, 1975, Harrod, 1980, Moore, 1991). On the part of the poor, the fact that their marginal utility from income is higher than that of the rich may account for their acceptance of a certain level of inequality. It may also be that individuals partly accept such differences in endowments randomly bestowed upon them, given their familiarity with such situations in real life.

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Appendix A: Alternative formulation for inequality aversion model

Using the Buckley and Croson (2006) formulation of inequality aversion: assume player i optimizes her utility by equalizing her pay-off (Π_{hi}) with that of the rest of the group (Π_{-hi}). Player i expects the other high endowment player to contribute $X\%$ of his endowment and the low endowment players to contribute a share of $Y\%$ on average. The pay-off of player i and that of the rest group is

$$\Pi_{hi} = E_h - 1/2g_{hi} + 1/2XE_h + E_l = \Pi_{-hi} = [E_h + 1/2XE_h + 2E_l + YE_l + 3/2g_{hi}]/3$$
$$g_{hi} = 2E_h + XE_h - 2E_l + YE_l + 3/2g_{hi}.$$

The percentage of player i's endowment contributed is then

$$\begin{aligned} p_{lj} &= \left[2 + X - 2\left(\frac{3}{5}\right) + 2Y\left(\frac{3}{5}\right)\right]/3 \\ &= \frac{-6}{5} + X + \frac{6}{5}Y. \end{aligned}$$

Similarly the percentage contribution of low endowment player j is

$$\begin{aligned} p_{hi} &= \left[2 + Y - 2\left(\frac{5}{3}\right) + 2Y\left(\frac{5}{3}\right)\right] \\ &= \frac{-10}{3} + Y + \frac{10}{3}X. \end{aligned}$$

We can show for all possible X and Y we can show that in almost all cases $p_{hi} > p_{lj}$ to be in line with inequality aversion. *Q.E.D.*

Appendix B: Altruism

As discussed in earlier parts of this paper we are particularly interested in which fairness norms are applicable in shaping what individuals perceive as fair entitlements, motivating contribution levels in groups with pre-existing wealth heterogeneities. Given that fairness norms are often subject to egocentric biases (Babcock and Loewenstein, 1997; Konow 2000), it may be useful to consider models with egocentric altruism such as that put forward by Cox and Sadiraj (2006). They assume a utility function with the conventional regularity properties of strict quasi-concavity and positive monotonicity in own income Π_i and income of another, Π_j, $j \in \{1, \ldots, n\} / \{i\}$:

$$\begin{aligned} U_i &= 1/\alpha(\Pi_i^\alpha + \theta\Pi_j^\alpha) \qquad \alpha \in (-\infty, 1)/\{0\} && (25) \\ &= \Pi_i\Pi_j \qquad \alpha = 0. && (26) \end{aligned}$$

The altruism parameter θ determines how much an individual weights the utility of another. In their case the boundary value for θ is assumed to be zero, and hence reverts to a model of self-regarding preferences. Clearly by allowing θ to take values less than zero it is possible to model spiteful preferences as proposed by Levine (1998).

Egocentric bias in Cox and Sadiraj's model is defined such that a person, when faced with two allocations of money (a,b) and (b,a), prefers that allocation which gives them a larger pay-off, so that $u(b,a) > u(a,b)$ for $b > a \geq 0$. We therefore also restrict θ to be less than 1. The utility function of a high endowment player is

$$U_{hi} = 1/\alpha(\Pi_{hi}^\alpha + \theta\bar{\Pi}_{-hi}^\alpha). \tag{27}$$

By solving the utility maximizing contributions for high and low endowment players and then finding each player's best response function at the Cournot equilibrium, we can prove *proposition 1* for this model with altruist behavior as well.

Proof: From first order conditions we find that for a high endowment player

$$\partial U_{hi}/\partial g_{hi} = 0 \quad \Longrightarrow \quad \left(\frac{1-a}{-\theta a}\right)^{\frac{1}{1-\alpha}} = \frac{\bar{\Pi}_{-hi}}{\Pi_{hi}} \tag{28}$$

and for a low endowment player

$$\partial U_{lj}/\partial g_{lj} = 0 \quad \Longrightarrow \quad \left(\frac{1-a}{-\theta a}\right)^{\frac{1}{1-\alpha}} = \frac{\bar{\Pi}_{-lj}}{\Pi_{lj}}. \tag{29}$$

From equations 28 and 29 we find that

$$\frac{\bar{\Pi}_{-hi}}{\Pi_{hi}} = \frac{\bar{\Pi}_{-lj}}{\Pi_{lj}}, \tag{30}$$

or

$$\Pi_{lj}(2\Pi_l + \Pi_h) = \Pi_{hi}(2\Pi_h + \Pi_l). \tag{31}$$

For the case of the average high and low endowment players we can simplify this to

$$2\bar{\Pi}_l^{\,2} + \bar{\Pi}_l\bar{\Pi}_h = 2\bar{\Pi}_h^{\,2} + \bar{\Pi}_h\bar{\Pi}_l, \tag{32}$$

which simply reduces to

$$\bar{g_h}^* = \bar{g_l}^* + E_h - E_l. \tag{33}$$

Q.E.D.

This prediction is therefore consistent with the intuition provided by Becker's more generalized model and is the same as that derived for the inequality aversion model discussed earlier.

Appendix C: Fairshares

Proposition 1: *For an individual using a heuristic for a contribution norm, such that "my share of the total in the public pool should equal my share of the total endowments in the group" is equivalent to a proportional share rule with respect to individual endowment.*

Proof:

$$\frac{g_{hi}}{g_{hi} + g_h + 2g_l} = \frac{E_{hi}}{E_{hi} + E_h + 2E_l}$$
$$g_{hi} = E_{hi} * \frac{g_{hi} + g_h + 2g_l}{E_{hi} + E_h + 2E_l}$$
$$g_{hi} = \frac{E_{hi} * g_{hi}}{2E_h + 2E_l} + E_{hi} * \frac{g_h + 2g_l}{E_{hi} + E_h + E_l}$$
$$g_{hi} * [1 - \frac{E_h}{2E_h + 2E_l}] = E_{hi} * \frac{g_h + 2g_l}{2E_h + 2E_l}$$
$$g_{hi} = \frac{2E_h/2E_l}{E_h + 2E_l} * E_{hi} \frac{g_h + 2g_l}{2(E_h + 2E_l)}$$
$$g_{hi} = E_{hi} * \frac{g_h + 2g_l}{E_h + 2E_l} \frac{g_{hi}}{E_{hi}} = \frac{g_h + 2g_l}{E_h + 2E_l}$$

Q.E.D.

Appendix D: Individual Instructions

Player Instructions for Exercise 2

In this exercise, you will have the chance to earn money based on the decisions you and the three other players in your group make. Any decision you make will never be revealed to anyone, and nobody will know what you have decided to do.

Please do not talk to anyone in your group while we do this exercise. If you have any questions or if anything is unclear, please raise your hand

Two of you have each been given 30 COINS to play with and the other two of you have received 50 COINS to play with. In each round, you must decide how many COINS to put into a Private Account, and how many to put into a Public Account.

Any COINS you put into the Private Account, you will keep for yourself. Keep a record of your decision on your Personal Record Sheet.

You will also earn COINS from the Public Account. At the end of each round, the number of COINS in the Public Account will be added up.

This number will be DOUBLED, and we will then divide this equally amongst everyone in the group, irrespective of how many COINS you put into the Public Account.

Your total earnings from the round will be equal to the number of COINS in the Private Account + the COINS you get from the Public Account.

We will repeat this exercise 6 times. If you received 30 COINS in the beginning of the exercise, you start each round with 30 COINS. If you received 50 COINS, you start each round with 50 COINS.

For example: In this group, two of you have been given 30 COINS to play with, and two of you have been given 50 COINS to play with. Suppose you all decide to put all your COINS into the Public Account and keep nothing in your Private Account. At the end of the round, there will be 160 COINS in the Public Account. This amount will be doubled, to give 320 COINS, and then will be divided equally amongst everyone in the group. So you would each receive 80 COINS. We will then repeat the exercise, and you will be given another 40 COINS to make a decision with.

Suppose instead, that you each decided to put zero COINS into the Public Account and keep all your COINS in your private account. At the end of the round, there would be 0 COINS in the Public Account, so there would be nothing to double. Your earnings for that round would be the COINS you put in your Private account that is 30 or 50 COINS. Remember, each token is worth 10 cents, so in that round, two of you would earn r3 and the other two would earn R5. We will then repeat the exercise, and you will be given another set of either 30 or 50 COINS to make a decision with.

We will repeat this 6 times. At the end of the 6 rounds, we will add up all the COINS you have earned during each round of the game, and this will tell us how much to pay you. Each token you earn is worth ten cents. For example, if you earn 500 COINS, you will be paid R50.

Is this clear? We will now do some practice examples all together to make sure that everyone understands. If you have any questions, please raise your hand and I will help you.

Player Instructions for Exercise 3

This is a new exercise. In this exercise, you will have the chance to earn money based on the decisions you and the three other players in your group make. Any decision you make will never be revealed to anyone, and nobody will know what you have decided to do.

Please do not talk to anyone in your group while we do this exercise. If you have any questions or if anything is unclear, please raise your hand.

Two of you have each been given 30 COINS to play with and the other two of you have received 50 COINS to play with. In each round, you must decide how many COINS to put into a Private Account, and how many to put into a Public Account.

We will repeat this exercise 6 times.

Keep a record of your decision on your Personal Record Sheet.

Any COINS you put into the Private Account, you will keep for yourself.

You will also earn COINS from the Public Account. At the end of each round, the number of COINS in the Public Account will be added up.

This number will be DOUBLED, and we will then divide this equally amongst everyone in the group, irrespective of how many COINS you put into the Public Account.

Your earnings from the round will be equal to the number of COINS in the Private Account + the COINS you get from the Public Account.

However, there is a second part to this exercise. Once everyone in the group has made their decision about how many COINS to put into their Private Account, and how many to put into the Public Account, we will show you the number of COINS that each person in the group received, and we will tell you how many COINS they decided to put into the Public Account.

Nobody will be identified by name.

You can then decide if you want to take an action to reduce the earnings of other people in your group.

To reduce the earnings of someone in your group, you must allocate points to them.

Each point that you allocate to a person will reduce their number of COINS by 5 COINS.

e.g. if someone has 20 COINS, and if 3 points are allocated to them, they will lose 15 COINS. They now only have 5 COINS left.

BUT each time you allocate a point, it will cost you one COIN.

e.g. if you have 30 COINS, and you allocate 3 points to someone in your group, you will lose 3 COINS. You will now have 27 COINS left. But remember, the person you allocated the points to will lose 15 COINS from their earnings.

Each of you will come up to the Point Allocation Board, and write down how many points you want to allocate to others in your group.

If you do not want to send any points, you must write a zero in the spaces.

We will add up the points that you sent, and add up the total number of points sent to you by others in the group.

We will record this information, and give you back a sheet that will tell you your final earnings from the round.

No player can lose more COINS than they have. In other words, the maximum number of COINS you can lose is the number of COINS you earned during the first stage of this exercise. For example, if you had 20 COINS after the first stage of this exercise, you can never lose more than 20 COINS in the round.

Also, the number of fine points you assign to others in your group cannot be larger than the number of COINS you have. For example, if you have 40 COINS, you cannot assign more than 40 fine points to others in your group.

Is this clear? We will now do some practice examples all together to make sure that everyone understands. If you have any questions, please raise your hand and I will help you.

southern africa labour and development research unit

The Southern Africa Labour and Development Research Unit (SALDRU) conducts research directed at improving the well-being of South Africa's poor. It was established in 1975. Over the next two decades the unit's research played a central role in documenting the human costs of apartheid. Key projects from this period included the Farm Labour Conference (1976), the Economics of Health Care Conference (1978), and the Second Carnegie Enquiry into Poverty and Development in South Africa (1983-86). At the urging of the African National Congress, from 1992-1994 SALDRU and the World Bank coordinated the Project for Statistics on Living Standards and Development (PSLSD). This project provide baseline data for the implementation of post-apartheid socio-economic policies through South Africa's first non-racial national sample survey.

In the post-apartheid period, SALDRU has continued to gather data and conduct research directed at informing and assessing anti-poverty policy. In line with its historical contribution, SALDRU's researchers continue to conduct research detailing changing patterns of well-being in South Africa and assessing the impact of government policy on the poor. Current research work falls into the following research themes: post-apartheid poverty; employment and migration dynamics; family support structures in an era of rapid social change; public works and public infrastructure programmes, financial strategies of the poor; common property resources and the poor. Key survey projects include the Langeberg Integrated Family Survey (1999), the Khayelitsha/Mitchell's Plain Survey (2000), the ongoing Cape Area Panel Study (2001-) and the Financial Diaries Project.

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