



Faculty Research Working Papers Series

Is There Reciprocity in a Reciprocal Exchange Economy? Evidence from a Slum in Nairobi, Kenya

Fiona Greig and Iris Bohnet

July 2005

RWP05-044

Is there Reciprocity in a Reciprocal-Exchange Economy?

Evidence from a Slum in Nairobi, Kenya

Fiona Greig[#] and Iris Bohnet

(Kennedy School of Government, Harvard University)

Norms of reciprocity contribute to the enforcement of cooperative agreements in bilateral sequential exchange. This paper examines the norms that apply in a reciprocal-exchange economy and what effect on trust, trustworthiness and efficiency they have. In our one-shot investment game experiments with Nairobi slum dwellers, people generally adhered to the norm of “balanced reciprocity”, which obligates quid-pro-quo returns for any level of trust. This norm differs from “conditional reciprocity,” prevalent in developed countries, according to which higher trust levels are rewarded with proportionally larger returns. Which norms prevail has implications for the gains from trade realized in bilateral exchange.

Key Words: Reciprocity, trust, development, gender, cross-cultural experiments. (JEL C72, C91)

[#]Corresponding author: Fiona Greig, 79 John F. Kennedy Street, Cambridge, MA 02138, tel: (617) 645-0987, fax: (617) 496-5747, email: fiona_greig@ksgphd.harvard.edu.

I. Introduction

Norms of reciprocity induce people to voluntarily cooperate with each other. Reciprocity helps explain why people respond to above-market clearing wages with above-standard effort (e.g., Akerlof, 1982; Fehr et al., 1998), contribute to public goods (e.g., Ledyard, 1995; Croson, 2000) and reward trust with trustworthiness even in one-shot interactions (e.g., Berg et al., 1995; Ashraf et al., 2004). The norm of reciprocity helps parties achieve efficient outcomes even if contracts are incomplete and legal enforcement is absent (Fehr et al., 1997; Ostrom 1998).

Reciprocal behavior is not motivated by concerns for material benefits. It differs fundamentally from cooperation in repeated games where reputational concerns can enforce “cooperation” (e.g., Kreps et al., 1982; Fudenberg and Maskin, 1986). Reciprocity is an internalized norm, inducing people to respond to kindness with kindness and to unkindness with unkindness, even if it is not in a person’s material self-interest to do so.¹ Many believe that reciprocity is a universal social norm. For example, Gouldner, one of the first to point out the importance of this norm, wrote: “A norm of reciprocity is, I suspect, no less universal and important an element of culture than the incest taboo...” but its “concrete formulations may vary with time and place,” (Gouldner, 1960, pp.171).

We examine what role reciprocity plays in a context different from the typical environment studied so far, a slum in Nairobi, Kenya,² and what efficiency implications the existence or absence of such norms might have. Our context is characterized by informal enforcement due to repeated interactions typical of “reciprocal-exchange economies.” In a reciprocal-exchange economy, people exchange goods, services or money in repeated

¹ A number of recent theoretical models in economics suggest proximate mechanisms driving such behavior (e.g., Rabin 1993, Fehr and Schmidt 1999, Bolton and Ockenfels 2000, Charness and Rabin 2002, Dufwenberg and Kirchsteiger 2004, Falk and Fischbacher forthcoming). Evolutionary models of reciprocity include, for example, Gintis (2000) and Bowles and Gintis (2000).

² Carpenter, Daniere and Taskahashi (2004) conducted public goods games in urban slums in Thailand and Vietnam.

interactions in order to insure against income and cost shocks and smooth consumption over time (e.g., Rosenzweig, 1988; Rosenzweig and Stark, 1989; Kranton, 1996). If the environment shapes norms of reciprocity, we might expect Nairobi slum dwellers to adhere to different norms than the person typically studied in the developed world. Evolutionary theories of cultural transmission suggest that such processes are self-enforcing as people adopt the norms and preferences most frequently held in a given environment (e.g., Boyd and Richerson, 1985; Bowles and Gintis, 1998).³

To measure reciprocity and distinguish it from behavior motivated by repeated game incentives, we focus on one-shot interactions between strangers. We employ a one-shot investment game between anonymous parties to represent a bilateral sequential exchange situation (Berg et al., 1995). If people have internalized a norm of reciprocity, it should apply even without the shadow of the future. We purposely exclude important contextual features that may affect behavior in naturally occurring settings in order to measure the internalized norm of reciprocity as precisely as possible.⁴

In the investment game, a first and a second mover are endowed with a certain amount of money, S . The first mover can send any amount $X \leq S$ to the second mover. X is multiplied by $k > 1$ by the experimenter to capture the efficiency increasing potential of this transaction. Second movers thus receive kX and then decide how much of it, $Y \leq S + kX$, to return to their first mover. The final payoffs are $S - X + Y$ for the first mover and $S + kX - Y$ for the second mover. X is commonly referred to as “trust”, while Y/X measures “trustworthiness” (trustworthiness is precluded when first movers send zero). A second mover is said to behave according to a norm

³ Bohnet et al. (2001) present a theoretical model of how environmental characteristics may affect behavior by influencing norms of reciprocity.

⁴ A large number of experimental studies have shown that additional considerations come into play when, e.g., the social distance between the parties is decreased (e.g., Roth, 1995; Bohnet and Frey, 1999) or when the game is played repeatedly (e.g., Bohnet and Huck, 2004; Engle-Warnick and Slonim, 2004).

of *conditional reciprocity* if trustworthiness increases with trust – i.e., if the return ratio Y/X is increasing in X (e.g., Camerer and Fehr, 2004). A second mover is said to behave according to a norm of *balanced reciprocity* if trustworthiness does not vary with trust, i.e., if the return ratio $Y/X=1$ for all values of X .

Investment game experiments conducted in the developed world typically find support for conditional reciprocity: the more trust second movers are offered, the higher the return ratio. Thus, often the money-maximizing strategy is to send everything (e.g., Pillutla et al., 2003 for American subjects). The relationship between trust and the return ratio is often concave with diminishing marginal increases in the return ratio as more trust is offered (e.g., Ashraf et al. 2004 for Russian and Bellemare and Kröger 2004 for Dutch subjects).

Based on our understanding of informal contract enforcement in reciprocal exchange economies, we expect not to observe a norm of conditional reciprocity in the Nairobi slums. Rather, in reciprocal-exchange economies, contracts are informally enforced by norms of balanced reciprocity, which obligate future quid-pro-quo repayment of (often interest-free) loans (e.g., Platteau, 1997; Thomas and Worrall, 2002). If this norm were internalized, trust and trustworthiness should not be related in the investment game. Second movers should return exactly what was sent, making the first mover whole independent of how much was sent, and first movers should anticipate this. Given the concavity of the reciprocity function in investment games run in developed countries, we may even see a slightly negative relationship between trust and trustworthiness. The more expensive compliance is, the more people tend to deviate from the norm. This is often referred to as “temptation” in the literature. Temptation has been found to decrease trustworthiness in binary-choice trust games (e.g., Snijders and Keren, 2001; Malhotra, 2004). If Nairobi slum dwellers adhere to (expectations of) the norm of balanced reciprocity in

our one-shot “investment game”, the game we use is clearly a misnomer in this context because the expected return on trust is zero.

The norm of balanced reciprocity, and expectations thereof, leaves amounts sent completely up to first movers’ risk and other-regarding preferences.⁵ In fact, people have been found to be more likely to enter an implicit inter-temporal exchange contract, the needier and the more familiar their counterpart is (e.g., Foster and Rosenzweig, 2001; Fafchamps and Lund, 2003; Platteau and Abraham, 1987). In many of these economies, including in our sample, women are substantially needier than men (e.g., Central Bureau of Statistics, Kenya 2000). We introduced a gender treatment to capture such dynamics: everyone was confronted with either someone from their own or the opposite gender. The gender combination of a pair may help explain variation in trust and trustworthiness. Due to gender differences in need, in general we expect people to be more generous towards women than towards men.

Which norms prevail has implications for the gains from trade realized in bilateral exchange. If social concerns do not compensate for the lack of expected material returns under the norm of balanced reciprocity and if the return ratio Y/X is monotonically increasing in X and greater than one for some value of X under the norm of conditional reciprocity, then the norm of balanced reciprocity induces less trust than the norm of conditional reciprocity. Indeed, low levels of trust have been shown to be associated with high transaction costs (e.g., North, 1990; Fafchamps and Minten, 2001), low levels of social capital (Putnam 1993, 2000) and economic stagnation (e.g., La Porta et al., 1997; Knack and Keefer, 1997; Zak and Knack, 2001).

The paper is organized as follows. In Section II, we describe the experimental context and the design. Section III introduces a conceptual framework. Section IV presents our

⁵ See Fehr and Schmidt (2002) for a survey of the literature on other-regarding or social preferences.

experimental results. Section V compares our results with similar studies around the world and discusses the implications of these results for development. Section VI concludes.

II. Experimental Context and Design

We conducted our study in the Kwa Reuben area of the Embakasi slum in Nairobi, Kenya, in July of 2004. In 2000 the population of Kwa Reuben was estimated to be approximately 25,000 but is said to have doubled since then. Slum residents have limited access to basic health and education facilities and report employment and water to be their two most important needs (APHRC, 2000). Those who have a job earn very low incomes with most earning between \$30 and \$90 per month (Mitullah, 2003).

The Kwa Reuben slum can be characterized as a “reciprocal exchange economy”. Informal transfers and loans are an important source of support for slum residents. In the pre-experimental household survey 71 percent of our sample reported having received transfers from family, friends or neighbors in the previous month, and about 44 percent of the sample reported having borrowed or received money from an individual the last time they were in need of money. Formal lending is not widely practiced: 87 percent of the sample reported that they have never borrowed money from a bank, micro-credit institution or local commercial moneylender (shylock).

In our sample, women earn \$35 (Ksh 2721) per month and men \$55 (Ksh 4351) per month from employment, on average. Women are on average supporting 1.68 children compared to only 1.22 children supported by men. This difference is significant even when controlling for marital status ($p < .05$).⁶ Thus, as in Kenya generally, not only are women’s incomes lower, but

⁶ Unless otherwise specified, we use non-parametric Mann-Whitney U tests to examine differences in means.

the demands on that income are higher (e.g., Anderson and Baland, 2002; Hoddinott and Haddad, 1996). To explore to what extent such gender differences in income and need carry over into the laboratory, we informed our subjects on the sex of their counterpart and studied all four possible sex combinations.

270 subjects participated in our study. Subjects were randomly recruited from one household every five structures within all of the neighborhoods of Kwa Reuben. Subjects first completed a pre-study questionnaire on demographic characteristics, then participated in our experiments and finally, completed a post-experimental questionnaire on social norms.⁷ We conducted 10 sessions, two with all-female pairs, two with all male-pairs, three with a female first and a male second mover and three with a male first and a female second mover.⁸ Each experimental session lasted approximately two hours.

In the investment game, both first and second movers, were endowed with S=50 Kenyan Shilling (Ksh), which they received in ten Ksh 5 coins. This corresponded to about one-quarter to one-third of a day's income, \$0.65, or approximately \$1.70 in purchasing power parity.⁹

Our intention was to adhere to the experimental economics research norm of compensating people for the opportunity cost of their time. However, we acknowledge that especially for those who have no income, Ksh 50 may not be a trivial endowment.¹⁰ Any amount

⁷ Upon invitation to participate in the research, each respondent was asked to provide oral consent for both the surveys as well as the experimental session in which they would participate. Upon completion of the pre-experimental survey, each respondent was invited to a "workshop" a couple of days later at the Kwa Reuben Community Center. Ninety-three percent of people surveyed participated in one of our workshops.

⁸ Our initial goal was to run 16 sessions, but due to security issues our research had to be stopped prematurely.

⁹ Based on a real exchange rate of Ksh 79 per 1 USD and purchasing power adjusted exchange rate of Ksh 30 per 1 International Dollar (World Bank, 2003).

¹⁰ Johansson-Stenman et al (2004) vary endowments to first movers between 3 and 80 USD in purchasing power parity among household heads in Bangladesh and find that amounts sent decrease monotonically as the endowment increases, but the fraction returned declines only for very high stakes. Sutter and Kocher (2004) vary endowments to first movers between 2 and 8 Euros among university students in Austria and find no effect of scale on amounts sent or fractions returned.

X sent by the first mover was doubled by the experimenter. Final investment game earnings thus were Ksh $50-X+Y$ for the first mover and Ksh $50+2X-Y$ for the second mover.¹¹

The experiment was run as follows: At the beginning of the experiment, participants were randomly assigned to the role of first or second mover. All participants received an “endowment envelope” containing the endowment of ten Ksh 5 coins and their code number slip, and first (second) movers received a “transfer envelope” (“return envelope”) containing just their code number slip.¹² They were seated in two rows facing each other with first movers in one row and second movers in the other row. Thus in mixed gender sessions, participants would find themselves seated in a row of members of their own sex, facing a row of members of the opposite sex.

The experiments were conducted in Swahili and run single blind.¹³ Upon completing tests of understanding, participants made their decisions one at a time by entering a private office in which the experimenter was located. In the office, each first mover placed the amount $X \leq 50$ she wanted to send to her second mover in the transfer envelope and handed it to the experimenter. She was instructed to put the remaining money in her endowment envelope, $50-X$, in her pocket so as to prevent other participants from discerning how much money she had sent to her counterpart.¹⁴ The experimenter recorded the amount sent in the transfer envelope and doubled it.

When all of first movers had made their decisions, second movers entered the office one at a time to receive their respective transfer envelope with the doubled amount $2X$ sent by their

¹¹ We also conducted a public goods game (not reported here). We varied the order in which the games were played and controlled for order in our regressions. First movers were only informed of the results and received their combined earnings after both games had been completed.

¹² Note that in the experiment, the envelopes were not labeled. We only use labels here for ease of understanding.

¹³ The instructions are available from the authors upon request.

¹⁴ Because the experiments were run using coins (Ksh 5 pieces are quite large), pilot session participants reported being able to discern first movers' decisions by looking at their envelopes as they returned to their seats.

first mover. The first mover's code number slip was removed from the transfer envelope before being handed to the second mover, in order to maintain the anonymity of the second mover's partner. Second movers then placed $Y \leq 50 + 2X$ in their return envelope and handed it to the experimenter to be returned to the first mover. They were instructed to consolidate the remaining money $50 + 2X - Y$ from their endowment and transfer envelopes and hide it in their pockets.

After second movers made their decision, but before the amount Y was returned to the first movers, all participants filled out the post-experimental questionnaire, which we used to collect additional information on what subjects perceived to be the social norm and how norm compliance was related to individual and session characteristics. We employed the "strategy method" (e.g., Brandts and Charness, 2000) hypothetically: first movers were asked to indicate their expected returns for each amount sent, and second movers were asked to report their intended amounts returned for each possible amount sent.¹⁵ The questionnaire also asked people how many participants in a given session they knew by name. While an imperfect measure of social distance, given that we wanted to preserve subjects' anonymity, this variable may help us understand the extent to which familiarity with others affected norm compliance.

After completing the post-experimental questionnaire, subjects collected their earnings in the experimenter's office by presenting their code number slip. On average, first movers earned Ksh 47 (94% of the endowment) and second movers earned Ksh 68 (136% of the endowment) in the investment game. Thus on average trust did not pay.

¹⁵ This method differs from the "strategy method" in that none of the participants' responses are realized. Since first movers had not yet received Y from their counterpart their expectations were not informed by second mover actual behavior. Second movers, having already made their decision, knew their actual behavior for one value of X , but were not bound to calibrate their answers to be consistent with their actual behavior for the amount X they received.

III. Conceptual framework

Trust is defined as the amount sent X , and trustworthiness as the amount returned divided by the amount sent for positive amounts sent, Y/X . The relationship between X and Y/X gives us the degree of reciprocity. Our null hypothesis results from traditional economics: assuming selfish money-maximizing preferences and common knowledge of rationality, we should observe zero returns $Y^*=0$ and no trust $X^*=0$, which precludes any trustworthiness and reciprocity.

In the case that the null hypothesis is rejected, we explore two possible norms of reciprocity. There may be conditional reciprocity exhibited by a positive relationship between trustworthiness and trust, $\partial(Y/X)/\partial X > 0$, or balanced reciprocity if we observe no relationship between trustworthiness and trust, $\partial(Y/X)/\partial X = 0$. A negative relationship may result if temptation decreases norm compliance as trust levels increase.¹⁶ Assuming common knowledge of the social norm, first movers anticipate these relationships. Their expectations of trustworthiness may either be positively related, $\partial[E(Y/X)]/\partial X > 0$, or not related, $\partial[E(Y/X)]/\partial X = 0$, to trust, if second movers adhere to a norm of conditional reciprocity or balanced reciprocity respectively.

In accordance with the literature, we examine a reduced-form regression model:

For second movers: $Y/X = \alpha_2 + \beta_2 * X + \gamma_2 * \text{female} + \zeta_2 * \text{femalepartner} + \eta_2 * \text{female} * \text{femalepartner} + \theta_2 * \text{controls}$.

¹⁶ Alternatively, a negative relationship may be due to negative reciprocity: second movers punish first movers for their willingness to take risk and be generous. While punishment of generosity is not unheard of (e.g., in the ultimatum game, see Henrich et al., 2004), it does not strike us as a plausible explanation in this context.

For first movers: $E(Y/X) = \alpha_1 + \beta_1 * X + \gamma_1 * \text{female} + \zeta_1 * \text{femalepartner} + \eta_1 * \text{female} * \text{femalepartner} + \theta_1 * \text{controls}$.

In order to address the potential problem of correlated errors with X being on both sides of the equation, we also estimate the following equations as a robustness check:

For second movers: $Y = \delta_4 * X + \beta_4 * X^2 + \gamma_4 * \text{female} + \zeta_4 * \text{femalepartner} + \eta_4 * \text{female} * \text{femalepartner} + \theta_4 * \text{controls}$.

For first movers: $E(Y) = \delta_3 * X + \beta_3 * X^2 + \gamma_3 * \text{female} + \zeta_3 * \text{femalepartner} + \eta_3 * \text{female} * \text{femalepartner} + \theta_3 * \text{controls}$.¹⁷

Hypothesis 1 (conditional reciprocity) predicts that all $\beta > 0$. Hypothesis 2 (balanced reciprocity) predicts that all $\beta = 0$ (and $\delta = 1$). A decrease in norm compliance due to increased cost of compliance can still result in $\beta > 0$ in a conditional reciprocity environment. For balanced reciprocity, it implies that $\beta < 0$.

H1: A positive relationship between amounts sent and (expected) return ratio is the typical result in developed countries for second (first) movers. It suggests *conditional reciprocity* and expectations thereof: second movers reward the first mover's willingness to trust not only by returning larger amounts, Y, (which could just be a mechanical correlation due to the increased size of the pie available) but by returning larger fractions of the amount sent, Y/X. First movers anticipate this conditional reciprocity and condition their expectations on amount sent.

H2: No relationship between amounts sent and (expected) return ratio indicates that second movers do not condition fractions returned on amounts sent (and first movers do not condition expected fractions returned on amount sent). According to the *balanced reciprocity norm*, fractions returned are not related to the amount received, but second movers just return the

¹⁷ These regressions are run without a constant because the returns are zero in the absence of any amount sent.

amount sent, and first movers anticipate this. The balanced reciprocity norm leaves amounts sent up to first movers' other-regarding preferences.

A person's gender was the only information subjects had on their counterparts. Thus, one's own and one's counterpart's gender are our most important control variables. Gender may have been a proxy for need, but it is unlikely that it proxied need perfectly, given the many channels of influence through which gender might come into play. The correlation between being female and monthly income is significant but small, $r=-0.27$ for first movers and $r=-0.28$ for second movers. Tests revealed that own and other gender (or the gender composition of an exchange pair) cannot serve as an instrument for (difference in) need. Additional channels of influence include statistical discrimination based on expected gender differences in trustworthiness and tastes for discrimination unrelated to need (e.g., chivalry for male-female pairs or solidarity for same-gender pairs). We are able to exclude the first alternative explanation by examining first movers' expectations. We cannot rule out the second motivation. In previous experiments in developed countries, people tended to behave more pro-socially towards needier counterparts (e.g., Eckel and Grossmann, 1998) and towards women (e.g., Eckel and Grossman, 2001).

Additional control variables included the fraction of participants a person knew by name and general demographic characteristics. We used the fraction of people a person knew by name in a given experimental session to measure familiarity. Clearly, this is an imperfect measure but probably the best one available, since we did not want to reveal our subjects' identities. The more people one knows, the more one might care about their well-being. Experimental results suggest that a decrease in social distance increases other-regarding behavior (e.g., Bohnet and Frey, 1999). We can rule out the possibility that first movers become more optimistic about second movers' likely returns, the more people they know, by examining expectations. Finally,

we control for two individual characteristics that may have shaped (expected) trustworthiness – income and whether a person has lived most of his or her life in a slum.

Assuming that gender is a proxy for need, we expect more trustworthiness towards female first movers than towards male first movers. Accordingly, female first movers should expect to be rewarded with more trustworthiness than male first movers. (Expected) trustworthiness should also be higher, the larger the fraction of people a person knows. Given that the slum is known to be quite an unsafe, hostile environment with rampant theft and gang activity, we might also predict (expected) trustworthiness to be lower among those who have spent most of their lives in the slum. We do not make any specific predictions regarding income as previous evidence, mostly from the developed world, is mixed (e.g., for a discussion, see Ashraf et al., 2004).

IV. Experimental Results

We first present average results, compare them with other findings in the literature and then proceed to testing our hypotheses. Table 1 in the Appendix presents the summary statistics of both the experimental data and the demographic characteristics. On average, first movers sent Ksh 15 or 30 percent of their endowment of Ksh 50 to their second movers (N=134). Second movers returned Ksh 12.32 on average, which corresponds to 82% of the amount sent (N=134). Men sent more and returned higher fractions than women ($p < 0.05$). This difference is due to men sending and returning more to women than to other men ($p < 0.05$). Women sent similar amounts to men and women but returned significantly higher fractions to women than to men ($p < 0.05$).¹⁸

¹⁸ This result is only marginally significant ($p < 0.15$) according to the parametric t-test.

In sum, female first movers sent less but were rewarded with more trustworthiness than male first movers. Female second movers returned less but received more, particularly from male first movers. These gender differences are consistent with the prediction that more would be sent and returned to the needier counterparts, i.e. women.

Thirteen percent of the first movers sent nothing, conforming to H0. The modal amount sent, chosen by 25 percent of the first movers, was Ksh 5, closely followed by Ksh 10, chosen by 19 percent. The modal response was to return 100 percent of the amount sent. Among the second movers who received positive amounts, 12 percent returned nothing, conforming to H0. The remaining 88 percent returned 98 percent of the money sent to them on average (N=115). Figures 1 and 2 present the distribution of choices graphically.

< Figures 1 and 2 here >

Even though our data generally do not support the null hypothesis of no trust (X) and no returns (Y), the mean amounts sent are substantially lower than the standard results in investment games run with student subjects in developed countries. Camerer (2003) reports in his survey of experimental results that typically first movers send about 50 percent of their endowment. Cardenas and Carpenter (2005) survey the evidence for developing countries. Trust levels so far reported in African countries are generally between 40 and 50 percent. For example, members of the Orma tribe in Kenya sent 44 percent of their endowment (Ensminger, 2000), villagers in Zimbabwe sent 43 percent of their endowment (Barr, 2003), Ghanaian manufacturing employees sent 45 percent of their endowment (Barr, 2004), and South-African university students sent 43 percent of their endowment (Ashraf et al., 2004). In a recent study with a younger cohort of subjects, high school pupils in South Africa sent similarly low amounts as the Nairobi slum

dwellers, namely 32 percent of their endowment (Burns, 2004).¹⁹ If we compare our results with studies in which amount sent was doubled ($k=2$), members of micro-lending groups in Peru sent 46 percent (Karlan, forthcoming), university students in Brazil sent 56 percent (Lazzarini et al. 2003), a representative sample of Dutch citizens sent 44 percent (Bellemare and Kröger 2004), and American university students sent 83 percent (Glaeser et al. 2000). The level of trust in Nairobi slums is among the lowest ever reported.

Average trustworthiness levels in Nairobi slums differ less from other findings. There is no clear trend in trustworthiness between developed and developing countries, but our findings fall within the normal range. On average, second movers typically return about the amount sent (Camerer, 2003). However, looking at the distribution of choices, in addition to returning what was sent, a return fraction equalizing the payoffs is a commonly observed response in most samples (e.g., Buchan et al., 2003; Ashraf et al., 2004). If our second movers had wanted to split the pie equally, they would have had to return $Y/X=1.5$, a strategy chosen only by three percent of second movers. In experiments in Africa, villagers in Zimbabwe have been found to be among the most trustworthy subjects examined so far: they returned 128 percent of the amount sent (Barr, 2003). South African students returned basically the same fraction of the amount sent as our sample here, 82 percent (Ashraf et al., 2004). Members of the Orma Tribe in Kenya returned only 54 percent, and South African pupils returned 70 percent (Cardenas and Carpenter, 2005).

Our gender findings are in line with Barr's (2003) results for Zimbabwe, where women also returned lower proportions than men, but differ from the typical results in developed countries. Studies report either no gender differences in trust and trustworthiness (e.g., Croson and Buchan, 1999 for the US, Fehr et al., 2002 for Germany) or women being more trustworthy but less trusting than men (e.g., Buchan et al., 2003 for the US). Buchan et al. (2003) also

¹⁹ Note that trust tends to increase with age (e.g., Sutter and Kocher, 2004).

examined the effect of gender interactions but, in contrast to our results, found that in the United States trust and trustworthiness were not related to one's counterpart's gender.

In order to distinguish between hypotheses H1 and H2, we perform ordinary least squares regressions of the (expected) return ratios on the amounts sent, controlling for gender compositions, social distance, the log of previous month's income, and whether one has spent most of his or her life living in a slum. We focus on the 116 first mover-second mover pairings in which the second mover received a positive amount and thus had a decision to make. We first present second mover results, then analyze first mover expectations and finally focus on first mover behavior.

Result 1: Balanced reciprocity, mitigated by temptation

Trustworthiness (fraction returned) is negatively related to trust (amount sent).

Figure 2 showed that the modal response for second movers was to adhere to the norm of balanced reciprocity. However, Figure 3 suggests that the relationship between amounts sent and fractions returned is negative, with second movers returning slightly more than the amount sent for small amounts and significantly less than the amounts sent for large amounts sent. Figure A.1 in the Appendix shows that the downwards-sloping reciprocity curve is mainly due to second movers paired with male first movers. The relationship between fractions returned and amounts sent is linear, and the relationship between amounts sent and amount returned is concave.

< Figure 3 here >

Table 2 reports the correlation coefficients and Table 3 the results of the trustworthiness ordinary least squares regressions (Appendix). Standard errors have been adjusted for session level heteroskedasticity. Column 1 of Table 3 shows that the fraction returned is significantly declining in the amount sent. For every additional Shilling sent, second movers returned about

1.8 percentage points less. The negative relationship remains robust when including additional control variables in Columns 2 through 6. Controlling for amount sent, we see that generally female second movers returned smaller fractions than male second movers and female first movers were rewarded with more trustworthiness than male first movers.

In Column 4, we add social distance, measured as the percentage of people a subject knew by name in a given session, and a small set of demographic controls.²⁰ Social distance and log of previous month's income did not affect return ratios. Whether a person has spent most of her life in the slum (rather than in non-slum parts of Nairobi or outside of Nairobi) is our most relevant control variable. People who have spent most of their lives in a slum returned approximately 40 percentage points less than people who have recently moved to the slum. This suggests that the experience of living in a slum may either condition people to be less trustworthy or that our finding is due to a selection effect, with the less trustworthy ending up in slums and staying there longer than others. Column 5 controls for order effects and Column 6 adds session dummies. Controlling for order, both gender effects become significant at the 5%-level: Women returned less to first movers but received more from second movers than men.

In Column 7, we regress absolute amounts returned, Y , on X and X^2 , otherwise replicating the regression in Column 4. The results are not affected – the coefficient on X is not significantly different from 1, the coefficient on X^2 is significantly negative. Our gender controls have the same sign as before but are no longer significant while slum is still significantly negatively associated with returns.²¹

²⁰ In other specifications without clustering at the session level, we included age, education, and ethnicity, but none of these controls are significant, and our main results do not change.

²¹ In other specifications using a Tobit model with left censoring, we find similar results. Trustworthiness is negatively associated with trust, and this result is robust to all of our controls. People return more to women than to men, and having spent most of one's life in a slum is negatively associated with trustworthiness.

Given the relevance of first mover gender for trustworthiness and Figure A.1 suggesting that mainly male first movers experienced a downwards-sloping reciprocity curve, we run our regressions by first mover gender in Table 4 (Appendix). Due to our small sample size we restrict our controls to gender and experience in a slum. Our results are robust to the inclusion of these controls. While trustworthiness and trust are negatively correlated for male but not female first movers, the slopes of the reciprocity curves do not significantly differ from each other.

Our results reject H1. They provide tentative support for H2. The modal amount returned was exactly the amount sent, but overall we find a negative relationship between trust and trustworthiness. The negative relationship is significant for male but not for female first movers. One interpretation of this finding is that second movers were more tempted to deviate from the norm, the costlier norm compliance was (Snijders and Keren, 2001; Malhotra, 2004).

An alternative possible interpretation of our reciprocity result is that second movers responded according to perceptions of need, which were based on two pieces of information – the gender of the counterpart and the amount the first mover sent. Second movers may have (correctly) assumed that women are needier than men and taken amounts sent to indicate how much money the first mover has to spare, thus returning higher fractions when confronted with a woman and when sent smaller amounts. Barr (2003), in explaining her finding that in Zimbabwe women returned lower proportions than men, also alluded to a “differential income effect”. She claimed that women typically have less cash on their hands and found it more difficult to part with money especially when paired with men because they believed their male counterpart would spend his earnings on beer.

Note that our regressions exclude second movers who did not receive any money. Comparing second movers who were sent nothing (N=18) with second movers who were sent positive amounts (N=116), we find no significant differences between the two sub-samples for

most of our control variables. The most notable exception is gender. Men were more likely than women to receive nothing—especially men paired with male first movers. Female second movers paired with men were the least likely to receive nothing. Because the gender distribution in our full sample slightly over-samples men, the exclusion of second movers who received zero serves to balance the gender distribution.

Result 2: Expectations of balanced reciprocity

Expected trustworthiness (return ratio) is not related to trust (amount sent).

Figure 4 shows the distribution of expected return ratios and compares it with the distribution of observed fractions returned (as in Figure 2). A majority expected second movers to adhere to the norm of balanced reciprocity: they expected to be made whole. While this in fact was the second movers' modal response, first movers were too optimistic about amounts returned, particularly for large amounts sent. Still, of the first movers sending a positive amount, only 20 percent expected to get back more than they sent, 60 percent expected to break even, and another 20 percent expected less than they sent. This is a remarkable result. Of those who sent a positive amount, only one-fifth expected to make money in this game. All others, 80 percent, were willing to transfer money at no or some cost to themselves, suggesting that they did not perceive this to be an individual investment decision.

< Figure 4 here >

Expectations did not take the negative relationship between trust and trustworthiness accurately into account. Table 5 (Appendix) reports the amounts sent, expected returns and actual returns for the amounts that were exchanged. Generally, first movers were better at estimating the return ratio for amounts sent smaller than Ksh 25 than for amounts sent equal to or larger than Ksh 25. Their expectations differed from the actual return ratios by only 3 percentage

points when they sent less than Ksh 25 (n.s.), but when they sent Ksh 25 or more, on average, expectations were 32 percentage points higher than the actual fraction returned ($p < .01$). The majority of the first movers, 75 percent, had fairly accurate expectations of their counterpart's behavior because only 25 percent of first movers sent Ksh 25 or more.

Table 6 reports the correlation coefficients and Table 7 the regression results for expectations of return (Appendix). In support of H_2 , balanced reciprocity, expected trustworthiness is generally not related to amount sent. We find a weak positive relationship, significant at the 10%-level, in Columns 4 and 5. Women expected to get back more than men (particularly from men). Social distance is negatively associated with expectations but only marginally significant ($p < .10$).²²

When we use expected absolute amounts returned, $E(Y)$, as dependent variable in Column 7, the coefficient on X is not significantly different from 1 and the coefficient on X^2 is zero. In other words, first movers expected that a one Shilling increase in amounts sent would yield a return of about one additional shilling, which would make them whole irrespective of how much they sent. In addition, female first movers expected higher returns from male second movers than male first movers. With this estimation strategy our other controls remain insignificant, with the exception of social distance – those recognizing more people in the session by name expected lower returns – but this relationship is only marginally significant.

Result 3: Reported balanced reciprocity

Reported trustworthiness and reported expectations of trustworthiness are not related to trust.

²² Estimating the same equations using a Tobit model with left censoring produces similar results. Expected trustworthiness is not related to trust. Women expect higher fractions returned than men ($p < .10$).

Table 8 in the Appendix shows average hypothetical return ratios reported by second movers and the expected return ratios reported by first movers for each possible amount sent, using the strategy method in a post-experimental questionnaire. It shows a striking regularity between first movers' expectations of return and second movers' stated willingness to return: first movers expected to get back and second movers indicated that they would return about the amount sent. People's responses almost perfectly conformed to the norm of balanced reciprocity.

Returning to Table 1, we see that there are significant differences in second movers' stated hypothetical responses according to the gender composition of the pair. In accordance with experimental behavior, men and women indicated that they would return higher fractions to women than to men ($p < 0.05$). As in the experiment, according to hypothetical strategy expectations, male first movers correctly anticipated the gender difference in men's return ratios but did not expect female second movers to also discriminate against them.

Figure 5 compares strategy responses to observed behavior and first movers' expectations. Strategy responses are similar to first movers' expectations for the amounts they sent in the experiment but differ from second mover's return ratios for large amounts sent. Thus, first movers' expectations and strategy responses almost perfectly conform to the norm of balanced reciprocity. Second movers revealed, through their strategy responses, an *intention* to adhere to the balanced reciprocity norm, but, especially when paired with male first movers, their actual return ratios exceeded the norm when it was cheap to do so and fell below the norm when it was costly to comply with it. The changing adherence to the norm according to the cost of adherence is reflected in the slope of the actual return ratio line.

< Figure 5 here >

V. Implications for Development

A review of the literature on investment games in developing and in developed countries provides suggestive evidence that we may have discovered differences in norms of reciprocity that apply more generally. Table 9 in the Appendix summarizes the evidence. Despite significant differences in experimental procedures (strategy method versus real exchange, endowments, price of giving, etc.), there appears to be a pattern in norms of reciprocity across countries: conditional reciprocity, i.e., a positive relationship between trust (amounts sent) and trustworthiness (fractions returned), is the typical finding in richer countries, and balanced reciprocity (a flat relationship) or mildly inverse reciprocity (a negative relationship) are typical for poorer countries.

Theoretically, a norm of conditional reciprocity where Y/X monotonically increases in X , induces higher levels of trust and efficiency than the norm of balanced reciprocity, if we assume that $Y/X > 1$ for some value of $X \leq Ksh50$, and the norms are common knowledge. We assume that we have selfish and other-regarding subjects in the population of first movers and that these types are equally distributed in conditional-reciprocity and balanced-reciprocity environments. In this case, rational, risk-neutral money-maximizing first movers should send everything to maximize their earnings in a conditional-reciprocity environment. With a norm of balanced reciprocity where $Y/X = 1$ and $E(Y/X) = 1$ for positive amounts sent, selfish money-maximizers should send nothing (or be indifferent between sending something or nothing). Other-regarding first movers send a positive amount in both environments, depending on the specific preferences they have. Thus, it is the selfish money-maximizers who are responsible for our prediction: they should send everything when conditional-reciprocity norms apply but nothing in balanced-reciprocity environments, leading to higher levels of trust and efficiency in the former than the latter environment.

In our experiments, efficiency increases by 15 percentage points compared to the equilibrium prediction of no trade. In equilibrium, both, first and second movers leave the experiment with their endowment of Ksh 50 each. In our experiments, first movers earned Ksh 47 and second movers Ksh 68, on average, increasing the size of the pie from Ksh 100 to Ksh 115.

Comparing to other investment game experiments, where the amount of money sent, X , was doubled and both players were endowed, this efficiency gain is smaller than what has been realized elsewhere. With representative samples of Germans and Dutch, for example, Fehr et al. (2002) and Bellemare and Kröger (2004) found respectively an efficiency increase of 22 percentage points. In Peru, Karlan (forthcoming) reported an increase of 23 percentage points with a sample of members of micro finance groups. The most striking efficiency gain of 83 percentage points was found in the US with Harvard undergraduates (Glaeser et al., 2000), although the experimental conditions were quite different from ours (e.g., people knew who their counterpart was).

VI. Conclusions

Our paper makes three main contributions. First it provides evidence for the importance of the social norm of balanced reciprocity in bilateral sequential exchange among slum dwellers in Nairobi, Kenya. All interactions are one-shot and take place between anonymous individuals, suggesting that people have internalized the norm. One might have expected that Nairobi slums constitute an environment where it is too costly to be reciprocally minded. Given the severe poverty, high crime rates and the lack of law enforcement in the slums, residents could have converged on the no reciprocity-no trust equilibrium. Indeed among our sample having spent most of one's life in the slum is associated with returning lower proportions of the amount sent.

However, a norm of balanced reciprocity, little known in high-enforcement environments, helps cope with the mere prospects of this bad equilibrium (North, 1990).

Second, we find that the balanced reciprocity norm is gendered and that adherence decreases as the cost of compliance increases. People were more likely to adhere to this norm when they were dealing with women than with men. Women experienced more trustworthiness but offered less trust than men. While the gender pattern may partly be due to a taste for discrimination, gender differences in income suggest that it may also be related to differences in perceived need. Women are poorer than men in our sample and in Kenya more generally and thus are treated more generously (particularly by male counterparts) while they themselves behave less other-regardingly (particularly when confronted with men).

Third, comparing reciprocal behavior in Nairobi with the typical pattern of behavior found elsewhere, balanced reciprocity produces less trust and smaller efficiency gains than the norm of conditional reciprocity prevalent in developed countries. This finding is consistent with the empirical evidence of correlations between trust (measured using World Values Survey questions) and economic growth, per capita income and investment (e.g., Knack and Keefer, 1997; Zak and Knack, 2001; Narayan and Pritchett, 1997; Haddad and Maluccio, 2003). The norm of balanced reciprocity may have been a response to the need to insure against income and cost shocks. When people's basic needs are not met, assistance is provided according to need rather than for investment purposes, and balanced rather than conditional reciprocity is expected. Sub-optimal outcomes result because people are poor and have to rely on reciprocal exchange based on balanced reciprocity norms to meet their needs.

References

- Akerlof, G.A., 1982. Labor Contracts as Partial Gift Exchange. *The Quarterly Journal of Economics*, 97 (4), 543-69.
- African Population and Health Research Center (APHRC), 2000. The Nairobi Slum Cross-Sectional Survey (NCSS). APHRC, Nairobi. Kenya.
- Anderson, S., Baland, J., 2002. The Economics of ROSCAS and Intra-household Resource Allocation. *The Quarterly Journal of Economics*, 117, 963-996.
- Ashraf, N., Bohnet, I., Piankov, N., 2004. Decomposing Trust and Trustworthiness. Working Paper, Kennedy School of Government, Harvard University.
- Barr, A., 2003. Trust and expected trustworthiness: experimental evidence from Zimbabwean villages. *Economic Journal*, 113, 614-30.
- Barr, A., 2004. Rational and Biased Trust. Working Paper CSAE WPS/2004-22, University of Oxford.
- Bellemare, C., Kröger, S., 2004. On Representative Trust. Working paper, Humboldt University Berlin.
- Berg, J., Dickhaut, J., McCabe, K.A., 1995. Trust, Reciprocity, and Social History. *Games and Economic Behavior*, 10, 290-307.
- Bohnet, I., Frey, B.S., 1999. Social Distance and Other-Regarding Behavior in Dictator Games: Comment. *American Economic Review*, 89(1), 335-39.
- Bohnet, I., Frey, B.S., Huck, S., 2001. More Order With Less Law: On Contract Enforcement, Trust and Crowding. *American Political Science Review*, 95(1), 131-144.
- Bohnet, I., Huck, S., 2004. Repetition and Reputation: Implications for Trust and Trustworthiness When Institutions Change. *American Economic Review*, 94(2), 362-366.
- Bolton, G., Ockenfels, A., 2000. A theory of equity, reciprocity and competition. *American Economic Review*, 90, 166-93.
- Bowles, S., Gintis, H., 2000. The Evolution of Reciprocal Preferences. Working Papers 00-12-072, Santa Fe Institute.
- Bowles, S., Gintis, H., 1998. The Evolution of Strong Reciprocity. Research in Economics 98-08-073e, Santa Fe Institute.
- Boyd, R., Richerson, P.J., 1985. Culture and the Evolutionary Process. University of Chicago Press.
- Brandts, J., Charness, G., 2000. Hot vs. Cold: Sequential Responses and Preference Stability in Experimental Games. *Experimental Economics*, 2, 227-38.
- Buchan, N., Croson, R., Solnick, S., 2003. Trust and Gender: An Examination of Behavior, Biases, and Beliefs in the Investment Game. Working paper, The Wharton School, University of Pennsylvania.
- Burns, J., 2004. Race and trust in post Apartheid South Africa. Paper presentation, Social Dynamics Working Group, Cape Town, South Africa, January 13-16, 2005.
- Camerer, C., 2003. Behavioral Game Theory. Princeton: Princeton University Press.
- Camerer, C.F., Fehr, E., 2004. Measuring Social Norms and Preferences Using Experimental Games: A Guide for Social Scientists, in: Henrich, J., Boyd, R., Bowles, S., Camerer, C., Fehr, E., Gintis, H. (Eds.). *Foundations of Human Sociality*. Oxford: Oxford University Press, pp. 55-96.
- Cardenas, J.C., Carpenter, J., 2005. Experimental Development Economics: A review of the Literature and Ideas for Future Research. Working paper, Middlebury College.

- Carpenter, J.P., Daniere, A.G., Takahashi, A.G., 2004. Cooperation, trust, and social capital in Southeast Asian urban slums. *Journal of Economic Behavior and Organization* 55(4), 533-552.
- Central Bureau of Statistics (CBS) [Kenya], Human Resources and Social Services Department 2000. Second report on poverty in Kenya. Ministry of Finance and Planning, Kenya.
- Charness, G., Rabin, M., 2002. Understanding Social Preferences With Simple Tests. *Quarterly Journal of Economics*, 117, 817-69.
- Danielson, A., Holm, H.J., 2003. "Tropic Trust versus Nordic Trust: Experimental Evidence from Tanzania and Sweden," Working Paper, Lund University.
- Croson, R., 2000. Theories of altruism and reciprocity: evidence from linear public good games. Working paper. The Wharton School, University of Pennsylvania.
- Croson, R., Buchan, N., 1999. Gender and Culture: International Experimental Evidence from Trust Games. *American Economic Review* 89(2), 386-391.
- Dufwenberg, M., Kirchsteiger, G., 2004. A Theory of Sequential Reciprocity. *Games and Economic Behavior* 47, 268-298.
- Eckel, C.C., Grossman, P., 1998. Are Women Less Selfish than Men? Evidence from Dictator Experiments. *Economic Journal*, 108, 726-35.
- Eckel, C.C., Grossman, P.J., 2001. Chivalry and Solidarity in Ultimatum Games. *Economic Inquiry*, 39(2), 171-88.
- Eckel, C.C., Wilson, R.K., 2004. Is Trust a Risky Decision? *Journal of Economic Behavior and Organization*, 55(4), 447-466.
- Engle-Warnick, J., Slonim, R.L., 2004. The Evolution of Strategies in a Repeated Trust Game. *Journal of Economic Behavior and Organization* 55(4), 553-574.
- Ensminger, J., 2000. Experimental Economics in the Bush: How Institutions Matter, in: Menard, C. (Ed.), *Institutions and Organizations*. London: Edward Elgar.
- Fafchamps, M., Lund, S., 2003. Risk-Sharing Networks in Rural Philippines. *Journal of Development Economics*. 71(2), 261-87.
- Fafchamps, M., Minten, B., 2001. Property Rights in a Flea Market Economy. *Economic Development and Cultural Change* 49(2), 229-267.
- Falk, A., Fischbacher, U., forthcoming. "A Theory of Reciprocity". *Games and Economic Behavior*.
- Fehr, E., Schmidt, K., 1999. A Theory of Fairness, Competition and Cooperation. *Quarterly Journal of Economics*, 114, 817-68.
- Fehr, E., Schmidt, K., 2002. Theories of Fairness and Reciprocity -- Evidence and Economic Applications, in: Dewatripont, M., Hansen, L., Turnovsky, St. (Eds.). *Advances in Economics and Econometrics - 8th World Congress, Econometric Society Monographs*. Cambridge: Cambridge University Press.
- Fehr, E., Kirchsteiger, G., Riedl, A., 1998. Gift exchange and reciprocity in competitive experimental markets. *European Economic Review*, 42(1), 1-34.
- Fehr, E., Gächter, S., Kirchsteiger, G., 1997. Reciprocity as a Contract Enforcement Device: Experimental Evidence. *Econometrica*, 64(4), 833-860.
- Fehr, E., Fischbacher, U., von Rosenblatt, B., Schupp, J., Wagner, G.G., 2002. A Nation-Wide Laboratory-Examining Trust and Trustworthiness by Integrating Behavioral Experiments into Representative Surveys. *Schmollers Jahrbuch*, 122, 519-42.
- Foster, A.D., Rosenzweig, M.R., 2001. Imperfect Commitment, Altruism, and the Family: Evidence from transfer behavior in low-income rural areas. *The Review of Economics and Statistics*, 83(3), 389-407.

- Fudenberg, D., Maskin, E., 1986. The Folk Theorem for Repeated Games with Discounting and Incomplete Information. *Econometrica*, 54, 533-54.
- Gintis, H., 2000. Strong Reciprocity and Human Sociality. Working Papers 2000-02, University of Massachusetts Amherst, Department of Economics.
- Glaeser, E.L., Laibson D.I., Scheinkman, J.A., Soutter, C.L., 2000. Measuring Trust. *Quarterly Journal of Economics*, CXV, 811-46.
- Gouldner, A., 1960. The Norm of Reciprocity. *American Sociological Review* 25, 161-178.
- Haddad, L., Maluccio, J., 2003. Trust, membership in groups, and household welfare: Evidence from KwaZulu-Natal, South Africa. *Economic Development and Cultural Change*, 51(3), 573-601.
- Haile, D., Sadrieh, K., Verbon, H., 2004. Trust in a segmented South African society: an experimental investigation. Presented at WIDER Development Conference, June 4-5, 2004.
- Henrich, J., Boyd, R., Bowles, S., Camerer, C., Fehr, E., Gintis, H., McElrath, R., 2004. Overview and Synthesis, in: Henrich, J., Boyd, R., Bowles, S., Camerer, C., Fehr, E., Gintis, H. (Eds.). *Foundations of Human Sociality*. Oxford: Oxford University Press, pp. 8-54.
- Hoddinot, J., Haddad, L., 1996. Does female income share influence household expenditures? Evidence from Côte d'Ivoire. *Oxford Bulletin of Economics and Statistics*, 57, 77-96.
- Johannsson -Stenman, O., Mahmud, M., Martinsson, P., 2004. Does stake size matter in trust games? Working Paper No. 140, Department of Economics, Goeteborg University.
- Karlan, D., forthcoming. Using Experimental Economics to Measure Social Capital and Predict Financial Decisions. *American Economic Review*.
- Knack, S., Keefer, P., 1997. Does Social Capital Have an Economic Payoff? A Cross-Country Investigation. *Quarterly Journal of Economics*, 112, 1251-88.
- Koford, K., 2001. An Experimental Test of the Degree of Trust in Bulgaria: Some Results and Some Conjectures, in: *Economy and Development of Society: Varna University of Economics 80th Jubilee, Volume 2*, Varna Economics University Publishers, Varna, Bulgaria.
- Kranton, R.E., 1994. Reciprocal Exchange: A Self-Sustaining System. *The American Economic Review*, 86(4): 830-851.
- Kreps, D.M., Milgrom, P., Roberts, J., Wilson, R., 1982. Rational Cooperation in the Finitely Repeated Prisoners Dilemma. *Journal of Economic Theory*, 27, 245-252.
- LaPorta, R., Lopez-de-Silanes, F., Shleifer, A., Vishny, R.W., 1997. Trust in Large Organizations. *American Economic Review*, 87, 333-38.
- Lazzarini, S.G., Madalozzo, R.C., Artes, R., Siqueira, J.O., 2004. Measuring trust: An experiment in Brazil, *Ibmec Working Papers wpe_40*, Ibmecc Working Paper, Ibmecc Business School, São Paulo.
- Ledyard, J.O., 1995. Public Goods: A Survey of Experimental Research, in: Kagel, J., Roth, A., (Eds.), *Handbook of Experimental Economics*. Princeton: Princeton University Press, pp. 111-194.
- Malhotra, D., 2004. Trust and Reciprocity Decisions: The Differing Perspectives of Trustors and Trusted Parties. *Organizational Behavior and Human Decision Processes*, 94, 61-73.
- Mittulah, W., 2003. Urban Slums Reports: the case of Nairobi, Kenya, in: *Understanding Slums: Case studies for the Global Report on Human Settlements*, Development Planning Unit, University College London, London.

- Mosley, P., Verschoor, A., 2004. The development of trust and social capital in rural Uganda: An experimental approach. Paper presentation, Royal Economic Society Conference, Swansea, April 7-9, 2004.
- Narayan, D., Pritchett, L., 1999. Cents and Sociability: Household Income and Social Capital in Rural Tanzania. *Economic Development and Cultural Change*, 47 (4), 871-97.
- North, D.C., 1990. *Institutions, Institutional Change and Economic Performance*. Cambridge University Press: Cambridge, U.K.
- Ostrom, E., 1998. A Behavioral Approach to the Rational Choice Theory of Collective Action: Presidential Address, American Political Science Association, 1997. *American Political Science Review*, 92(1), 1-22.
- Pillutla, M.M., Malhotra, D., Murnighan, J.K., 2003. Attributions of Trust and the Calculus of Reciprocity. *Journal of Experimental Social Psychology*, 39(5), 448-455.
- Platteau, J., 1997. Mutual Insurance as an Elusive Concept in Traditional Rural Communities. *The Journal of Development Studies*, 33, 764-796.
- Platteau, J., Abraham, A., 1987. An inquiry into quasi-credit contracts: the role of reciprocal credit and interlinked deals in small-scale fishing communities. *Journal of Development Studies*, 23(4), 461-490.
- Putnam, R., 2003. *Making Democracy Work: Civic Traditions in Modern Italy*, Princeton University Press, Princeton, NJ.
- Putnam, R., 2000. *Bowling Alone: the collapse and revival of American community*. New York: Simon & Schuster.
- Rabin, M., 1993. Incorporating Fairness into Game Theory and Economics. *American Economic Review*, 83, 1281-1302.
- Rosenzweig, M.R., 1988. Risk, Implicit Contracts and the Family in Rural Areas of Low-Income Countries. *Economic Journal*, 98(393), 1148-1170.
- Rosenzweig, M.R., Stark, O., 1989. Consumption Smoothing, Migration and Marriage: Evidence from Rural India. *Journal of Political Economy*, 103, 905-926.
- Roth, A., 1995. Bargaining Experiments, in: Kagel, J., Roth, A., (Eds.), *Handbook of Experimental Economics*. Princeton: Princeton University Press, pp. 253-348.
- Schechter, L., 2005. Traditional Trust Measurement and the Risk Confound: An Experiment in Rural Paraguay. Working Paper, University of California, Berkeley.
- Snijders, C., Keren, G., 2001. Do you trust? Whom do you trust? When do you trust?, in: Thye, S.R., Lawler, E.J., Macy, M.W., Walker, H.A., (Eds.), *Advances in Group Processes* 18. Amsterdam: JAI, Elsevier Science, pp. 129-160.
- Sutter, M., Kocher, M., 2004. Age And The Development Of Trust And Reciprocity. *Royal Economic Society Annual Conference 2004*, 105, Royal Economic Society.
- Thomas, J.P., Worrall, T., 2002. Gift-giving, Quasi-credit and Reciprocity. *Rationality and Society*, 14: 308-352.
- Willinger, M., Keser, C., Lohmann, C., Usunier, J., 2003. A Comparison of Trust and Reciprocity Between France and Germany: Experimental Investigation Based on the Investment Game. *Journal of Economic Psychology*, 24(4), 447-466.
- World Bank, 2003. GNI Per Capita 2003, Atlas Method and PPP. World Bank. Available at <http://www.worldbank.org/data/databytopic/GNIPC.pdf>.
- Zak, P., Knack, S., 2001. Trust and Growth. *Economic Journal*, 111, 295-321.

Figures

Figure 1: Trust: Distribution of amounts sent by first movers

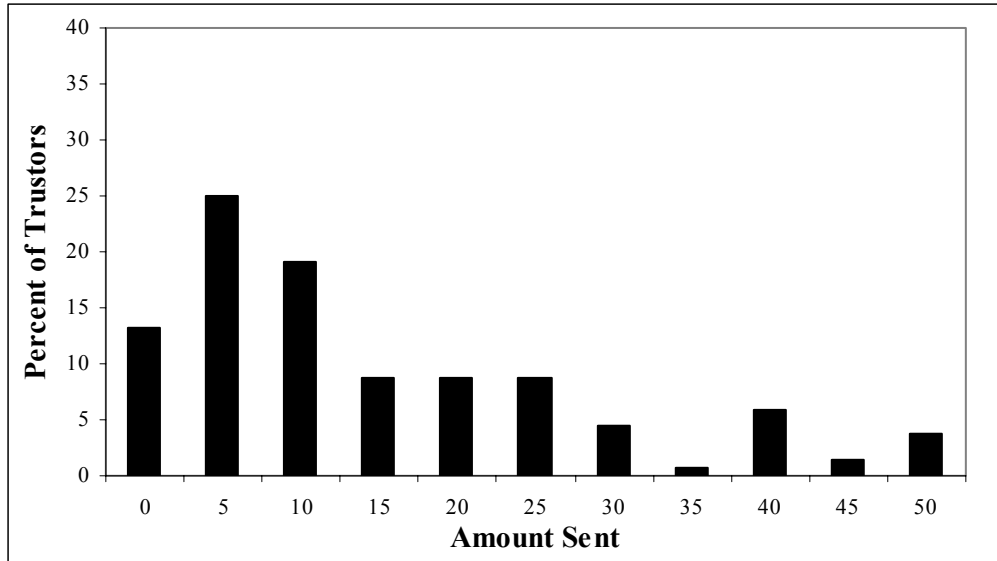


Figure 2: Trustworthiness: Distribution of second movers' return ratios

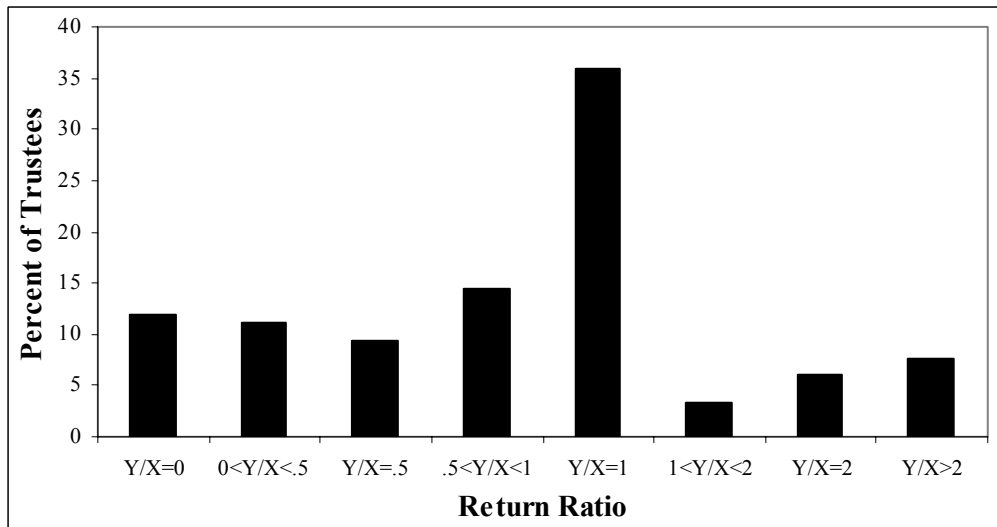


Figure 3: Returns (Y/X and Y) by amount sent (X)

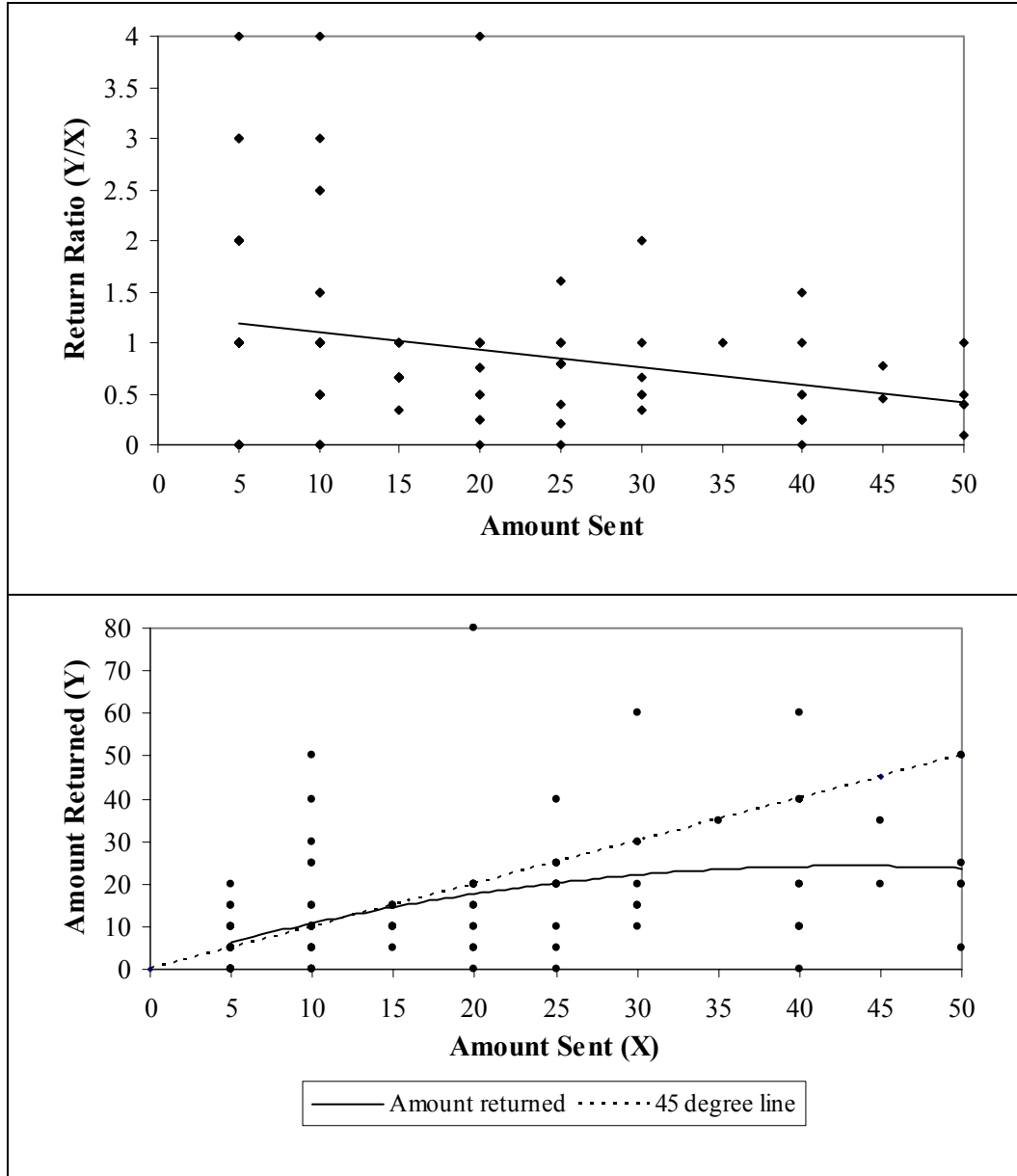


Figure 4: Distribution of expected and actual return ratios

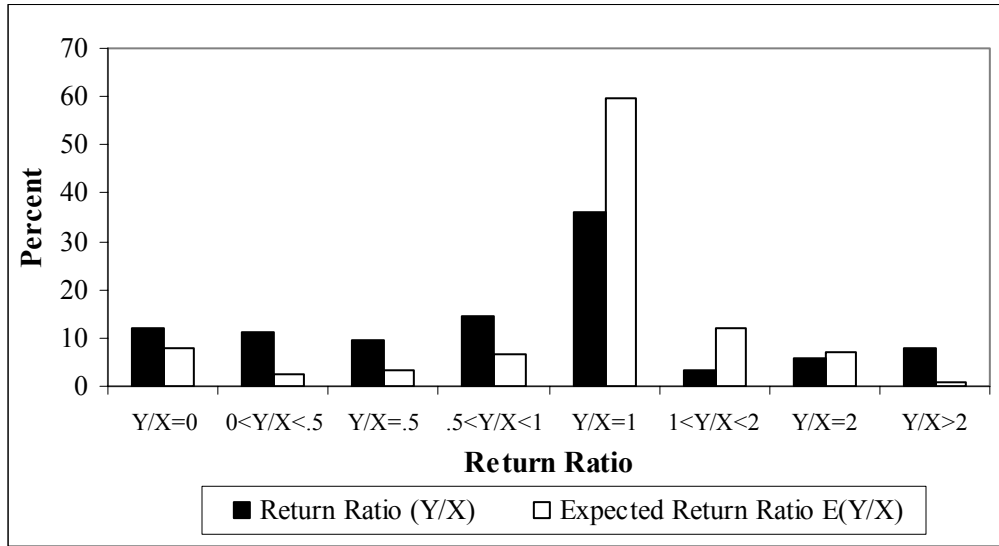
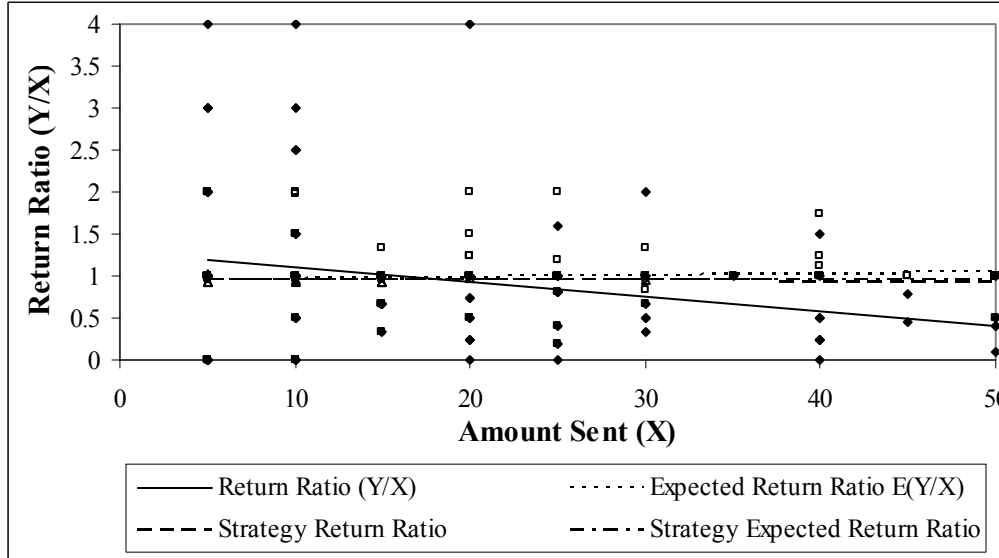


Figure 5: Average strategy return ratio (\hat{Y}/X) versus actual return ratio (Y/X) and strategy expected return ratio $E(\hat{Y}/X)$ versus actual expected return ratios $E(Y/X)$ by amounts sent



Appendix

Table 1: Summary statistics – mean, (standard deviation), and [N] reported

	ALL	MALE	FEMALE	Female 1 st mover Female 2 nd mover	Female 1 st mover Male 2 nd mover	Male 1 st mover Female 2 nd mover	Male 1 st mover Male 2 nd mover
Amount Sent (X)	15.00 (13.48) [134]	16.90 (14.88) [63]	13.31 (11.95) [71]	13.39 (10.46) [28]	13.26 (12.95) [43]	20.29 (14.60) [35]	12.68 (14.37) [28]
Expected Amount Returned E(Y)	15.04 (14.97) [133]	16.75 (16.44) [63]	13.50 (13.44) [70]	12.86 (11.58) [28]	13.93 (14.67) [42]	20.86 (16.82) [35]	11.61 (14.66) [28]
Expected Return Ratio E(Y/X)	98.31% (0.45) [115]	95.08% (0.38) [51]	100.89% (0.49) [64]	95.13% (0.53) [26]	104.82% (0.47) [38]	101.14% (0.35) [33]	83.98% (0.41) [18]
Amount Returned (Y)	12.32 (13.41) [134]	13.61 (16.14) [71]	10.87 (9.36) [63]	10.89 (10.37) [28]	16.63 (19.05) [43]	10.86 (8.62) [35]	8.96 (8.61) [28]
Return Ratio (Y/X)	98.05% (0.90) [116]	118.73% (1.09) [57]	78.07% (0.59) [59]	88.40% (0.41) [26]	134.81% (1.16) [39]	69.93% (0.70) [33]	83.89% (0.85) [18]
Strategy Amount Expected Returned E(Y)	24.04 (9.81) [133]	23.35 (7.75) [63]	24.65 (11.38) [70]	24.43 (10.36) [28]	24.79 (12.13) [42]	24.48 (7.58) [35]	21.95 (7.87) [28]
Strategy Expected Return Ratio E(Y/X)	96.35% (0.39) [133]	93.42% (0.31) [63]	98.60% (0.46) [70]	97.73% (0.41) [28]	99.18% (0.49) [42]	97.92% (0.30) [35]	87.79% (0.31) [28]
Strategy Amount Returned (Y)	23.67 (8.91) [134]	24.09 (7.97) [71]	23.20 (9.91) [63]	26.20 (9.15) [28]	25.19 (8.13) [43]	20.81 (9.97) [35]	22.39 (7.53) [28]
Strategy Return Ratio (Y/X)	94.78% (0.36) [134]	97.40% (0.33) [71]	91.84% (0.40) [63]	104.10% (0.35) [28]	102.22% (0.33) [43]	82.03% (0.41) [35]	90.00% (0.32) [28]
Income (Ksh)	3536.16 -2954.87 [268]	4351.05 -3096.87 [134]	2721.27 -2568.95 [134]				
Lived most of life in the slum	27.00% -0.44 [268]	25.00% -0.44 [134]	28.00% -0.45 [134]				
Session participants recognized by name	6.00% -0.06 [268]	5.00% -0.05 [134]	7.00% -0.07 [134]				

Table 2: Second mover correlations

	Y/X	Y	X	X ²	Female 2nd Mover	Female 1st Mover	Names	Log Income	Slum
Y	0.579 ***								
X	-0.254 ***	0.524 ***							
X ²	-0.238 **	0.441 ***	0.950 ***						
Female 2 nd Mover	-0.228 **	-0.102	0.156 *	0.099					
Female 1 st Mover	0.230 **	0.163 *	-0.134	-0.149 *	-0.161 *				
Names	0.026	-0.003	0.077	0.083	0.052	0.096			
Log Income	0.074	0.006	-0.138	-0.127	-0.274 ***	-0.108	-0.157 *		
Slum	-0.146	-0.123	-0.050	-0.058	-0.031	0.200 **	0.018	-0.019	
Order	-0.039	-0.097	-0.070	-0.092	0.373 ***	-0.279 ***	-0.201 **	-0.079	0.048

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 3: Predicting trustworthiness

Dependent Variable: Y/X in Columns 1-6 and Y in Column 7							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Amount Sent	-0.018 (0.005)***	-0.014 (0.004)***	-0.014 (0.004)***	-0.015 (0.004)***	-0.013 (0.004)**	-0.018 (0.007)***	1.194 (0.252)***
Amount Sent ²							-0.014 (0.004)***
Female 1 st		0.246	0.435	0.428	0.565		8.203
Mover		(0.129)*	(0.198)*	(0.218)*	(0.208)**		(4.556)
Female 2 nd		-0.316	-0.114	-0.187	-0.19		-4.004
Mover		(0.141)*	(0.091)	(0.100)*	(0.079)**		(2.237)
Female 1 st X Female 2 nd			-0.353 (0.236)	-0.206 (0.258)	-0.356 (0.215)		-2.129 (4.399)
Names known (%)				0.522 (1.702)	0.931 (1.773)	0.186 (1.428)	-13.514 (18.548)
Log income				0.004 (0.019)	0.006 (0.020)	0.010 (0.025)	0.034 (0.205)
Slum				-0.386 (0.076)***	-0.401 (0.076)***	-0.498 (0.188)***	-5.400 (1.051)***
Order	NO	NO	No	NO	YES	NO	NO
Session	NO	NO	No	NO	NO	YES	NO
Constant	1.284 (0.118)***	1.25 (0.150)***	1.124 (0.111)***	1.182 (0.158)***	0.991 (0.211)***	0.939 (0.344)***	
Observations	116	116	116	116	116	116	116
R-squared	0.06	0.12	0.13	0.17	0.18	0.24	0.70

Robust standard errors in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%

Table 4: Predicting trustworthiness by first mover gender

Dependent Variable: Y/X in Columns 1 and 3 and Y in Columns 2 and 4				
	Male first movers		Female first movers	
	(1)	(2)	(3)	(4)
Amount Sent	-0.020 (0.004)***	1.058 (0.166)***	-0.008 (0.007)	1.811 (0.431)**
Amount Sent ²		-0.015 (0.004)**		-0.021 (0.008)*
Female 2 nd mover	-0.199 (0.093)*	-1.253 (2.074)	-0.404 (0.235)	-5.896 (3.627)
Slum	-0.512 (0.114)**	-4.333 (1.078)**	-0.347 (0.126)*	-4.782 (2.371)
Constant	1.385 (0.109)***		1.566 (0.311)***	
Observations	51	51	65	65
R-squared	0.19	0.74	0.10	0.71

Note: Robust standard errors in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%

Table 5: Expected vs. actual responses and total earnings by amount sent (X)

Amount sent (X)	N	Expected amount returned E(Y)*	Amount returned (Y)	Expected return ratio E(Y/X)	Return ratio (Y/X)	1st mover mean earnings (50-X+Y)	2nd mover mean earnings (50+2X-Y)
0	18	0.00	1.17			51.17	48.83
5	33	4.55	5.76	90.91%	115.15%	50.76	54.24
10	25	10.83	13.20	108.33%	132.00%	53.20	56.80
15	12	12.50	10.83	83.33%	72.22%	45.83	69.17
20	12	21.67	18.33	108.33%	91.67%	48.33	71.67
25	12	24.17	19.17	96.67%	76.67%	44.17	80.83
30	6	29.17	25.00	97.22%	83.33%	45.00	85.00
35	1	35.00	35.00	100.00%	100.00%	50.00	85.00
40	8	45.63	21.25	114.06%	53.13%	31.25	108.75
45	2	45.00	27.50	100.00%	61.11%	32.50	112.50
50	5	45.00	24.00	90.00%	48.00%	24.00	126.00
Total Sample Means							
15.00	134	15.04	12.32	98.31%	98.05%	47.32	67.68

Table 6: First mover correlations

	E(Y/X)	E(Y)	X	X ²	Female 1st Mover	Female 2nd Mover	Names	Log Income	Slum
E(Y)	0.394 ***								
X	0.051	0.912 ***							
X ²	0.035	0.860 ***	0.950 ***						
Female 1st Mover	0.065	-0.109	-0.134	-0.149 *					
Female 2nd Mover	0.004	0.144 *	0.156 *	0.099	-0.161 *				
Names	-0.069	0.138	0.196 **	0.159 *	0.270 ***	-0.017			
Log Income	-0.111	0.026	0.070	0.101	-0.167 *	-0.023	-0.136		
Slum	0.028	-0.098	-0.088	-0.100	0.099	-0.031	-0.080	-0.013	
Order	-0.049	-0.076	-0.070	-0.092	-0.279 ***	0.373 ***	-0.297 ***	0.075	-0.234 ***

Note: * significant at 10%; ** significant at 5%; *** significant at 1%

Table 7: Predicting expected trustworthiness

Dependent Variable: E(Y/X) in Columns 1-6 and E(Y) in Column 7							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Amount Sent	0.002 (0.001)	0.002 (0.002)	0.002 (0.002)	0.004 (0.002)*	0.004 (0.002)*	0.004 (0.004)	1.143 (0.140)***
Amount Sent ²							-0.002 (0.003)
Female 1 st Mover		0.077 (0.086)	0.219 (0.085)**	0.222 (0.111)*	0.22 (0.117)*		2.307 (1.423)
Female 2 nd Mover		0.017 (0.082)	0.168 (0.087)*	0.145 (0.093)	0.145 (0.095)		1.476 (1.246)
Female 1 st X Female 2 nd			-0.264 (0.122)*	-0.23 (0.147)	-0.227 (0.160)		-2.750 (2.061)
Names known (%)				-0.799 (0.640)	-0.808 (0.712)	-1.344 (0.806)*	-15.200 (6.921)*
Log income				-0.014 (0.014)	-0.014 (0.014)	-0.013 (0.011)	-0.220 (0.140)
Slum				-0.005 (0.073)	-0.007 (0.078)	-0.052 (0.103)	-1.333 (1.321)
Order	NO	NO	NO	NO	YES	NO	NO
Session	NO	NO	NO	NO	NO	YES	NO
Constant	0.953 (0.055)***	0.89 (0.101)***	0.797 (0.097)***	0.912 (0.163)***	0.915 (0.193)***	1.084 (0.183)***	
Observations	115	115	115	115	115	115	115
R-squared	0.000	0.010	0.030	0.050	0.050	0.09	0.92

Standard errors in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%

Table 8: Strategy method behavior by amount sent (X)

Amount Sent (X)	Strategy Expected Return $E(\hat{Y})$	Strategy Return (\hat{Y})	Strategy Expected Return Ratio $E(\hat{Y}/X)$	Strategy Return Ratio (\hat{Y}/X)
0	0.08	1.80		
5	4.85	5.07	96.99%	101.49%
10	9.81	9.81	98.12%	98.13%
15	14.51	13.99	96.74%	93.28%
20	19.10	18.58	95.49%	92.91%
25	24.10	23.13	96.39%	92.54%
30	28.72	27.99	95.74%	93.28%
35	33.57	32.65	95.92%	93.28%
40	38.42	37.57	96.05%	93.94%
45	43.05	42.43	95.66%	94.28%
50	48.20	47.35	96.39%	94.70%
Mean	24.04	23.67	96.35%	94.78%
N	133	134	133	134

Table 9: Relationship between amount sent and percent returned across countries ranked by GNI per capita²³

Country	Author [Table: column]	GNI per cap (PPP) 2003	Method	Population	Endowment (S)	Price of giving (1/k)	Reciprocity: β sign sig. level	Measure
Tanzania	Danielson & Holm (2003) [Figure 3a]	610	Strategy	University students	Sender and Receiver	0.33	–	Regression Y/X on X
Uganda	Mosley & Verschoor (2003) [4:3]	1,440	Real Exchange	Villagers	Sender	0.33	– **	Regression Y/X on X
Bangladesh	Johansson -Stenman et al (2004) [2:3]	1,870	Real Exchange	Household heads	Sender	0.33	–	Regression Y/X on X/S
Zimbabwe	Barr (2003) [2:4]	2,180	Real Exchange	Villagers	Sender and Receiver	0.33	–	Regression Y/X on X
Peru	Karlan (forth- coming) [4:3]	5,090	Real Exchange	Micro- lending group members	Sender and Receiver	0.5	–	Regression Y/X on X
Brazil	Lazzarini et al (2003) [4:4]	7,480	Strategy	University students	Sender	0.5	+ **	Regression Y/X on X
Bulgaria	Koford (2001) [3]	7,610	Real Exchange	University students	Sender	0.33	–	Rank order test of Y/X vs. X
Russia	Ashraf et al (2004) [A.5:7]	8,920	Strategy	University students	Sender	0.33	+ ***	Regression Y/X on X
South Africa	Ashraf et al (2004) [A.5:7]	10,270	Strategy	University students	Sender	0.33	+ ***	Regression Y/X on X
South Africa	Haile, Sadrieh & Verbon [C.1:6]	10,270	Strategy	University students	Sender and Receiver	0.33	+ ***	Regression Y/(S+kX) on (kX+S)
Sweden	Danielson & Holm (2003) [Figure 3b]	26,620	Strategy	University students	Sender and Receiver	0.33	+ **	Regression Y/X on X
Germany	Willinger, et al (2002) [pg 461]	27,460	Real Exchange	University students	Sender and Receiver	0.33	0	Correlation Y/X and X

²³ We cannot report efficiency gains here because they depend on the multiplier k and on whether the second mover was endowed or not.

Country	Author [Table: column]	GNI per cap (PPP) 2003	Method	Population	Endowment (S)	Price of giving (1/k)	Reciprocity: β sign sig. level	Measure
France	Willinger, et al (2002) [pg 461]	27,460	Real Exchange	University students	Sender and Receiver	0.33	0	Correlation Y/X and X
Netherlands	Bellemare & Kröger (2004) [3:3]	28,600	Strategy	Representati ve sample of household	Sender and Receiver	0.5	+ ***	Regression Y/(kX+S) on X
USA	Berg, Dickhaut, McCabe (1995) [pg 132]	37,500	Real Exchange	University students	Sender and Receiver	0.33	+	Correlation Y/X and X
USA	Buchan, Croson and Solnik (2003) [pg 15]	37,500	Real Exchange	University students	Sender and Receiver	0.33	+ ***	Regression Y/X on X.
USA	Ashraf et al (2004) [A.5:7]	37,500	Strategy	University students	Sender	0.33	+ ***	Regression Y/X on X
USA	Glaeser et al (2000) [7:1]	37,500	Strategy	University students	Sender	0.5	+ **	Regression Y/X on X

Figure A.1: Returns (Y/X and Y) by amount sent (X), by first mover gender

