Bridging the gender divide: An experimental analysis of group formation in African villages*

by

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Abstract:

In an experiment, African villagers could form groups to share risk in a gamble choice game. We exogenously varied the extent to which grouping arrangements were enforced and, hence, the importance of trust and social enforcement as supports for group formation. Gender assorting was significant and considerable when grouping was perfectly enforced or depended on social enforcement. There was significantly less gender assorting when grouping depended on trust. Exploratory analysis suggests that this reduction in gender assorting may be owing to family ties and co-memberships in gender-mixed religions.

Keywords: Group formation, Field Experiment, Social Networks

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1 Introduction

People tend to interact with others who are similar to themselves. This tendency, called assortative matching by social scientists, has been observed along many different dimensions and in many different networking and group formation contexts. The dimensions studied include race, religion, age, education, occupation and sex.[1] Assortative matching is a potential cause for concern as it "limits people's social worlds in a way that has powerful implications for the information they receive, the attitudes they form, and the interactions they experience" (McPherson, Smith-Lovin and Cook, 2001: p. 415). Despite these concerns, very little is known about the determinants of assortative matching.

The aim of this paper is to shed some light on assortative matching by gender when economically useful groups are being formed in African villages. To our knowledge, assortative matching by gender has not been studied in Africa. In the countries where it has been studied, it is not generally as prevalent as assorting based on race, education, and age (McPherson, Smith-Lovin and Cook, 2001). However, it has been found to vary markedly according to the context, being weaker among kin (Marsden, 1987) and stronger in more sex segregated environments such as the workplace and, in the US, voluntary organizations (Bielby & Baron 1986, Kalleberg et al 1996, McPherson & Smith-Lovin 1982, 1986, 1987, Popielarz 1999). Other variations relate to the type of individual being studied, being stronger among young children (Smith-Lovin and McPherson 1993, Maccoby 1998), less educated individuals, and, in the US, among African Americans and Hispanics as compared to Anglo Saxons (Marsden 1987, Blau et al 1991, Verbragge, 1977). Extrapolating from these regularities, one might expect assorting on gender to be common in African and other developing country villages.

[1] The types of ties that have been investigated include acquaintanceship, friendship, co-membership in voluntary organizations, advice seeking, and support. And the contexts include whole nations, communities, workplaces, and school classes. See for instance the evidence cited in McPherson, Smith-Lovin and Cook, 2001, Hitsch et al. 2005, Belot and Francesconi 2006, Fisman et al. 2008, Goyal 2007, and Jackson 2009.

This expectation is supported by casual empiricism. Anyone who has convened meetings in African villages has witnessed men and women sorting into single-sex clusters before taking their seats. This pattern is reflected in the way group-oriented development interventions are presented. Women and men are often separated during participatory research exercises on the grounds that they talk more freely (see, e.g., Chambers, 1994 and Welbourn, 1991). Micro finance similarly tends to be offered to single sexed – most often all female – groups on the grounds that it is empowering (Pitt et al, 2006) and that women are more responsive to social sanctions (Murdoch, 1999 and Rahman, 1998). However, given the potential constraints that assorting places on information flows, attitudes, and aspirations and the evidence indicating that assortative matching is cumulative (Fischer 1982), reinforcing emergent gender assorting may be ill advised and, in the long run, disempowering.

So, why do people assort? Assortative matching can be driven by homophyly, i.e., the desire to interact with similar people. It can also result from equilibrium sorting on certain attributes, as in Becker's (1973) model of the marriage market. Some evidence supports the idea that opportunity matters, noting that matches depend on the distribution of types in the population under study. Zipf (1949) and Gans (1968), for instance, found that geographical proximity explains much of the observed assorting on race, ethnicity, class, education, and occupation. Each of these mechanisms may play a role in African villages. However, they do not explicitly account for several important factors. In African villages, as in villages throughout the developing world, groups are often formed in order to address shared problems or take advantage of collective opportunities. Put another way, villagers face returns to group formation relating to economies of scale and the creation and management of local public goods and common pool resources. However, with these returns come challenges relating to free-riding and the enforcement of collective agreements in the absence of the formal rule of law. Under these circumstances, group formation and maintenance relies on trust and informal social enforcement. But how do these factors affect or relate to gender assorting? Is trust stronger within as compared to between the sexes? If it is, we would see more assorting when trust is important. And is social enforcement easier within single-sex as compared to mixed-sex groups? If it is, we would see more assorting when social enforcement is important.

We contribute to the literature on assortative matching by addressing these questions using an experiment conducted in 14 Zimbabwean villages. Within the experiment, the villagers played a game in which group formation was beneficial as it allowed group members to share risk. This in turn enabled them to take on more risk and thereby secure higher expected experimental payoffs. To investigate the effects of trust and social as opposed to formal enforcement on assorting by gender three treatments were applied, with each village being randomly assigned to one of these treatments.

In the first treatment (Treatment 1), the risk sharing group formation agreements were perfectly enforced by the experimenter. In the analysis, this treatment serves as the control. In the second treatment (Treatment 2), the group formation agreements were supported only by trust. Participants could secretly leave their groups if it was in their own self interest to do so. However, such defectors were likely to be leaving their co-groupers with greater exposure to risk and, this being the case, less group formation was expected under Treatment 2 as compared to Treatment 1. At the same time, if trust is stronger within as compared to between the sexes, we would expect to observe more assorting by gender under Treatment 2 as compared to Treatment 1. On the other hand, if trust is embodied within or information about the trustworthiness of others flows via some form of social tie that tends not to be gender assortative then we would expect to observe less assorting by gender under Treatment 2 as compared to Treatment 1. Marsden (1987) found less assorting on gender in contexts where ties of kinship were important, although he did not account for trust in his analysis. Fershtman and Gneezy (2001) found a strong association between affiliation to the same religious community and trust, although they did not account for gender in their analysis. Barr, Dekker, and Fafchamps (2009) found weak evidence that, in this experiment, co-memberships in voluntary community-based-organizations (CBOs) serving an economic purpose support grouping based on trust. However, they did not link this to gender assorting.

In the third treatment (Treatment 3), if participants wished to leave their groups, they had to do so in public. Thus, under Treatment 3, the formation of groups within the experiment was effectively inserted into the ongoing series of village-based interactions. Under these circumstances defection could have been deterred through social enforcement and this could have made grouping more attractive under Treatment 3 than Treatment 2. However, if social enforcement is costly not only to a defector but also to an enforcer, possibly because it disrupts and jeopardizes valuable but vulnerable ongoing series of interactions, group formation may have been less attractive under Treatment 3. Barr and Genicot (2008) demonstrated this theoretically and found, using this experiment, that there was indeed less group formation under Treatment 3. Later, Barr, Dekker and Fafchamps (2009) showed that pairs of individuals who were engaged in more valuable but vulnerable ongoing series of interactions (proxied by the number of voluntary CBOs serving an economic purpose that they both belonged to) were less likely to group together under Treatment 3. So, if valuable but vulnerable ongoing series of interactions are more likely to exist within as compared to between the sexes, we would expect less assorting by gender under Treatment 3 than under either Treatment 1 or 2.

We analyze the data from the experiment in conjunction with data from surveys and genealogical mapping exercises. Applying a dyadic approach, we find that under Treatment 1 (control) there was significant and considerable, though not perfect, assorting into groups by gender. There was significantly less assorting into groups on the basis of gender in Treatment 2 (trust) as compared to Treatment 1 (control) and neither more nor less assorting into groups on the basis of gender in Treatment 3 (social enforcement) as compared to Treatment 1 (control).

Turning our attention to why there is less assorting into groups on the basis of gender when group formation depends on trust we find that the effect is concentrated within religious groups and family networks. In the absence of religious co-memberships and family ties, people are no less likely to assort under Treatment 2 as under Treatment 1. However, despite religious co-members and relatives being just as likely as others to shy away from grouping under Treatment 2, when they do group that do it less assortatively on gender. This is consistent with trustworthiness being unrelated to gender and religious and family networks facilitating flows of information about individuals' trustworthiness and, hence, more discerning decision-making about who and who not to trust.

The paper is arranged as follows. In Section 2 we present our experimental design. The empirical formulation is discussed in Section 3 and the data in Section 4. Section 5 provides summary statistics and the empirical results are presented in Section 6. In Section 7 we conclude.

2 Experimental design

The experiment involves a simple gamble choice game. One series of two rounds of this game was played in each of 14 villages. The rounds took between one and two hours each and were held on consecutive days. The day before the experiment started in each of the selected villages, each household was visited and invited to send an adult of a specific gender to take part in the experimental series in their village. To facilitate the deductive element of our analysis below, whether a given household was invited to send a man or a woman was randomly determined. However, to preserve our ongoing relationships with these villagers, if none of the specified gender was present, a member of the other was accepted. The householders were also told that either the household head or their spouse would be the preferred representative.

In the first round, played the day after the recruitment, each participant was interviewed privately and asked to select one of six possible gambles g, ranked from the least (1) to the most risky (6). The gamble choice set was the same for all participants with equally likely high and low earnings. Riskier gambles had higher expected returns. After selection of the gamble choice the game was played and realized gains were paid to the participants in private. This game structure was originally used by Binswanger (1980) to elicit risk preferences: the choice of gamble implies a range of possible values for the individual's coefficient of relative risk aversion. The gambles used in our experiment are presented in Table 1 together with the implied ranges of the risk aversion coefficient.[2]

Once the first round of gamble choices was complete the participants were invited to return and play the gamble choice game again the next day. Participants were then given the opportunity to form 'sharing groups' with other participants from the same village. They were told that, within 'sharing groups', second round winnings would be pooled and shared equally.[3]

Each village was randomly assigned to one of three different institutional environments. In Treatment 1, equal sharing of winnings among group members was exogenously enforced by the experimenter: having joined a sharing group, the members could not subsequently change their mind. So, regardless of gamble outcomes, winnings were pooled and shared equally.

In Treatment 2, each member of a sharing group could separately and secretly leave their

[2] The gambles are expressed in Zimbabwean \$. The official exchange rate at the time of the experiment was around Z\$55 for US\$1 while the black market rate was around 2.5 times that amount. In the areas where the experiment was conducted and at the time of the experiments, the daily wage for a farm labourer was around Z\$200. This is similar in magnitude to average experimental winnings of Z\$158 in round 1 and Z\$172 in round 2.

[3] The verbal framing of the game was kept to a minimum and, as a consequence, the game can be likened to a variety of natural situations, including informal risk sharing, which has been extensively studied in village communities (e.g., Udry 1994, Ligon, Thomas and Worrall 2001, and Fafchamps and Lund 2003), and group lending with joint liability (e.g., Karlan 2007, Besley and Coate 1995, Ghatak 1999 and 2000). There is no lending in the game, but participants de facto invest a sure amount (gamble 1) in various risky investments (gambles 2 to 6).

groups after finding out the outcome of their gamble. In this case, they kept their winnings but received no share of the winnings of others in the group. In this treatment, the benefits associated with joining a group depended on the level of trust.

Treatment 3 differed from Treatment 2 in that individuals who chose to leave their groups had to publicly confirm that they were doing so in front of all the other participants in their village. In this treatment, the benefits associated with group formation depended on the ease with which social enforcement could be applied and the potential damage that its application might do to ongoing valuable but vulnerable series of interactions.

Under each treatment, the consequences of and rules relating to risk sharing group formation and defection were explained to the participants at the end of the session on the first day. The participants were then given approximately 24 hours to form a group. If they chose to do so they had to register together on the second day of the game. The second round gamble choices were made during private interviews and no rules were applied to or recommendations made concerning gamble choices within groups. Under Treatment 2, decisions to leave groups and, under Treatment 3, intentions to leave groups were also expressed and recorded during these interviews. Under Treatment 3, decisions to leave groups had to be confirmed by the leavers revealing themselves to all present when invited to do so after all participants had made their decisions in private interviews. Finally, under all treatments, each participant received their winnings during a second, brief, private interview just prior to being dismissed.

3 Empirical formulation

Building on the work of Barr, Dekker and Fafchamps (2009), our empirical analysis starts with the estimation of a dyadic model as follows. Let $m_{ij} = 1$ if i joins a risk sharing group with individual j, and 0 otherwise. The network matrix $M \equiv [m_{ij}]$ is symmetrical since $m_{ij} = m_{ji}$

by construction. As noted by Fafchamps and Gubert (2007), this implies that the explanatory variables must enter the model symmetrically. So, the first model that we estimate is:

$$\begin{aligned} m_{ij} &= \beta_0 + \beta_1|f_i - f_j| + \beta_2(f_i + f_j) + \beta_3 d_{ij} + \beta_4(t_{ij} * d_{ij}) \\ &\quad + \beta_5|z_i - z_j| + \beta_6(z_i + z_j) + t_{ij} + u_{ij} \end{aligned} \tag{1}$$

where f_i indicates the sex of i, equaling 1 if i is female and zero if i is male, d_{ij} is a vector of the characteristics of the pre-existing relationship between individuals i and j, t_{ij} is a vector of dummy variables indicating which treatment individuals i and j played under, z_i is a vector of other relevant characteristics of individual i including their gamble choice in the first round, v_{ij} are village fixed effects, u_{ij} is the error term, and β_0 to β_6 are the coefficients to be estimated.

A negative and significant coefficient β_1 indicates assortative matching by gender in the group formation process. A positive (negative) β_2 indicates that women engage in more (less) grouping activity than men. Coefficients β_3 and β_4 capture the effects of pre-existing network ties and variations in those effects across treatments.[4] Coefficients β_5 and β_6 capture the effects of a number of other individual characteristics that serve as controls.

We then expand the model to include two additional sets of interaction terms:

$$\begin{aligned} m_{ij} &= \beta_0 + \beta_1|f_i - f_j| + \beta_2(f_i + f_j) + \beta_3 d_{ij} + \beta_4(t_{ij} * d_{ij}) \\ &\quad + \beta_5|z_i - z_j| + \beta_6(z_i + z_j) + \gamma_1(t_{ij} * |f_i - f_j|) \\ &\quad + \gamma_2(t_{ij} * (f_i + f_j)) + t_{ij} + u_{ij} \end{aligned} \tag{2}$$

A significant positive (negative) coefficient γ_1 indicates that assortative matching by gender

[4] The interaction effects between pre-existing network ties and the experimental treatments were the focus in Barr, Dekker, and Fafchamps (2009).

is lower (higher) in the corresponding treatment, while coefficient γ_2 picks up the differential effects of the treatments on grouping by women and men.

Models (1) and (2) are estimated using a Logit. When estimating these models it is essential to correct standard errors for non-independence arising because residuals from dyadic observations involving the same individual i may be correlated, negatively or positively, with each other. Here, we correct the standard errors by clustering by dyad, as proposed by Fafchamps and Gubert (2007).[5]

4 The data

The experiment was conducted in 23 Zimbabwean villages in 2001. However, in this paper we use the data from only 14 of these villages. Of the remaining 9, 3 made up a control sample in which no group formation was allowed and 6 were not fully enumerated during the various surveys and mapping exercises upon which we draw. Of the 14 villages in our sample, 10 were established in the early 1980s as result of land redistribution. These resettled villages are relatively small and geographically concentrated. They have a strong agricultural focus and a stable composition. Most heads of households and their spouses have resided in the village for at least one decade. Due to the random selection of settlers, the adult inhabitants of these villages are less likely to be genetically related to each other compared to members of the non-resettled villages. However, they engage more in associational activity and have more marriage ties within the villages (see Barr (2004) and Dekker (2004) for details).

Data on the participants' individual characteristics, including their sex, age, education, and their position within the household, were collected at the time of the experiment. These were

[5] Ideally we would have clustered by village, thereby, accounting for non-independence across all dyads within the same experimental session as well. However, we have data from only 14 village sessions and Nichols and Zeckhauser (2004) argue that when the number of clusters is less than 50, clustering may result in inconsistent standard errors. The main findings presented below hold if one clusters by village.

combined with data from other sources collected prior to the experiment. The combined dataset provides an exceptionally rich description of the economic and social contexts of the participants. Data on household incomes and holdings of livestock wealth were obtained from the Zimbabwe Rural Household Dynamics Study (ZRHDS), collected by Bill Kinsey and his team of field researchers in 1999 and constructed by Trudy Owens and Hans Hoogeveen. Kinsey et al. (1998), Gunning et al. (2000) and Hoogeveen and Kinsey (2001) discuss this dataset in detail.

In the analysis we make use of information relating to three types of pre-existing ties. Data on kinship ties are drawn from specifically designed social mapping exercises. These were conducted in 1999 and 2001 by village focus groups involving one representative from each household residing in each village (Dekker 2004). The data on memberships in religious congregations and CBOs are drawn from a survey conducted by Barr in 2000 (see Barr 2004 for details). For the purpose of the analysis presented here, CBOs include only those that have an explicit economic purpose – e.g., micro-finance, mutual insurance, funeral societies, irrigation and livestock rearing cooperatives.

5 Summary statistics

Table 2 presents the characteristics of the 382 participants who took part in both rounds of the experiment in the 14 villages.[6] These observations form the basis for our analysis. Just over half of the participants (52 percent) were women. The average participant is middle-aged and has slightly more than primary education. Two thirds of the sample are married and are either a household head or a spouse of a household head. Annual household monetary income and livestock wealth are approximately log-normally distributed and are incorporated into the

[6] Of the participants in the first round, 19 did not turn up on the second day, sending a replacement from the same household in their stead. Because we do not have first round gamble choice data for the replacements, they are excluded from the analysis. However, if we do not control for gamble choice in the group formation regressions and include the replacements, the other findings remain qualitatively unchanged.

analysis in log form.[7] The majority of the participants have a religious affiliation – most often with one of the many apostolic churches existing in Zimbabwe. On average, participants belong to between two and three CBOs with an economic purpose.

Also reported in Table 2 is the proportion of the sample playing under each of the treatments, the proportion who joined groups, the average gamble choices (where the gamble choice identifier is treated as being cardinal for brevity), and the average winnings per subject in each round of the experiment.[8] Treatment 2 is under-represented in the sample. This is the result of having to drop a number of villages owing to incomplete data. However, there remain sufficient observations under each treatment to make meaningful comparisons. Gamble choices in round 1 are included in the logit regressions to control for attitudes towards risk. Winnings in round 1 are included to control for income effects – and for the possibility that individuals take high winnings in the first round as indication that their luck is in and that, as a consequence, they have no need for insurance in the form of risk sharing. Grouping decisions are the focus of our analysis: just under half of the participants joined sharing groups in the second round of the experiment and the average group size was just over 3 members.

Turning to the characteristics of the relationships between participants, we use the kinship data to construct a variable indicating whether a dyad is related either by blood or marriage.[9] When interpreting results relating to this variable, it is important to recall that each household was invited to send only one representative to the experimental session in their village. So, husbands and wives are never present together, and people are in the same experiment as their

[7] log(crop income+1) and log(livestock wealth+1). Livestock wealth is measured in money terms using local market prices for trained oxen, household data on numbers of livestock of different types, and applying the following weights: trained oxen 1.00; cow 0.71; bull 0.83; young oxen 0.59; calf 0.18; sheep 0.08; goat 0.06; pig 0.06 (Hoogeveen and Kinsey 2001).

[8] Descriptive statistics on winning rates support the randomness of the lottery in the experiment: (1) the overall winning rate was 48% in round 1 and 46% in round 2; (2) winning is independent of gamble choice in both rounds; and (3) winning is independent between rounds 1 and 2.

[9] Barr et al. (2008) separated out genetic relatedness and marriage ties. Here, because we wish to interact elements of d_{ij} with other variables and because genetic relatedness is rare in the dataset, we collapse the two types of family ties into one.

children or siblings only if they live in separate households. Furthermore, most villages in the study were made up of stranger households at the time of their resettlement in the early 1980s. As a consequence the majority of the kinship ties in the dataset are between in-laws. Religious co-membership is captured by a dummy variable indicating that members i and j of a dyad belong to the same religious congregation and a count variable is used to capture the number of CBOs (serving an economic purpose) in which both i and j are members.

Table 3 summarizes the dyadic sample containing each possible pair of participants within each of the 14 villages. Because the average group size in the experiment is small, only 7 percent of all within-village dyads are in the same group. As the sample participants was nearly equally divided between male and female participants, just under half of all dyads are made up of one female and one male. The average dyad contains just over one female.

Although almost nine out of every ten participants belong to a religious congregation, only 19 percent of the dyads belong to the same congregation. This reflects the diversity of faiths present in each of the studied villages. The average dyad share memberships in just under one CBO. Table 3 also summarizes the dyadic control variables used in the analysis.

6 Empirical results

6.1 Group formation and gender

We begin our analysis with a simple cross-tabulation of the data. As well as revealing the overall level of gender assorting in the data, cross-tabulation alerts us to small cell sizes which can lead to spurious findings in multivariate analysis.

The cross tabulations are reported in Table 4 in the form of a 4×4 matrix. The top left-hand cell relates to the full dyadic sample described in Table 3. All the other cells relate to sub-samples variably defined. In the top row of the matrix, the full sample, pooled across treatments, is divided into sub-samples with respect to dyad type: in the second column all female dyads are considered; in the third all male dyads are considered; and in the fourth mixed gender dyads are considered. The number of dyadic observations in each cell is listed at the top of the cell. Mixed gender dyads represent roughly half in each treatment.

The top right-hand cell shows that, across all treatments only 2.1 percent of mixed gender dyads co-group whereas 14 percent of female dyads and 10 percent of male dyads co-group. The differences in co-grouping between mixed gender dyads and both types of same-gender dyad are statistically significant and indicate assortative matching by gender: participants in the experiment are much more likely to form a group with individuals of the same sex. This is also illustrated by the gender composition of the groups. Of the 47 groups formed during the experiment, 17 groups (36 percent) were male only, 21 (45 percent) were female only and 9 (19 percent) were mixed. The difference in co-grouping between female dyads and male dyads, however, is not statistically significant suggesting that the assorting is not driven by everyone, male and female, wishing to group only with women or men.

The second, third, and fourth rows of the table split the sample by treatment. In the first column of Table 4 we see that, while between 11 and 12 percent of dyads co-grouped under Treatment 1 (control: externally enforced contracts), only 9 percent co-grouped under Treatment 2 (trust), and just two percent co-grouped under Treatment 3 (social enforcement).

The fourth column of Table 4 is the most interesting for our purpose. While only two percent of mixed-gender dyads co-grouped under Treatment 1, over five percent co-grouped under Treatment 2. The opposite pattern is observed for male and female dyads: in both cases, the proportion of dyads that co-grouped was smaller under Treatment 2 than Treatment 1. In Treatment 3 not even one percent of mixed gender dyads co-grouped.[10] These differences in

[10]This needs to be born in mind when, later on, we consider further sub-divisions of the cells in this matrix.

treatment effects on same- and mixed-gender dyads are presented graphically in Figure 1. The full heights of the columns in the histogram indicate the proportion of dyads co-grouping under each treatment. Each column is divided into same-gender (teal green) and mixed-gender (orange) segments. The Figure shows clearly the overall decline in co-grouping and the simultaneous increase in mixed-gender grouping as we move from Treatment 1 to Treatment 2.

Table 4 also shows that female dyads are more likely than male dyads to share a family tie and/or a religious co-membership. They are also more likely than male dyads to belong to the same CBO. In contrast, mixed gender dyads resemble the full sample in terms of family ties and religious and CBO co-memberships. The differences between all female and all male dyads justify moving to multivariate analysis.

Coefficient and standard error estimates for model (1) are presented in column 1 of Table 5.[11] In column 2 the treatment dummies are replaced by a full set of village dummies. These control for any village-level unobservables. However, they also introduce a confound with respect to co-memberships in economic CBOs as these vary considerably and significantly across villages. Coefficient and standard error estimates for model (2) are presented in column 3 of Table 5. Then, in column 4, the treatment dummies are replaced by a full set of village dummies once again. In all models, the additional controls include family ties, religious co-membership, co-memberships in CBOs, and interaction terms between these network variables and Treatments 2 and 3. We see in model (1) (columns 1 and 2) that, even with the controls, the mixed gender dyad dummy has a highly significant negative coefficient. This confirms the result reported in Table 4. The marginal effect that can be derived from the estimated coefficient indicates that mixed gender dyads are five percentage points less likely to co-group than same-gender dyads.

Columns 3 and 4 of Table 5 report results for model (2) which contains interaction terms

[11] Only the coefficients on the variables of specific interest are reported. See Appendix Table A1 for the full set of estimates.

between the ‘Mixed gender dyad dummy and indicator variables for Treatments 2 and 3.[12] The results indicate that the patterns reported in Table 4 and Figure 1 are robust and significant. The coefficient on ‘T2 x Mixed gender dyad’ is positive and significant in both models, while the coefficient on ‘T3 x Mixed gender dyad’ is not significantly different from zero. The coefficient on the ‘Mixed gender dyad’ dummy is much larger in model (2) as compared to model (1); according to model (2), under Treatment 1 mixed gender dyads are eight percentage points less likely to co-group than same-sex dyads, whereas under Treatment 2 they are less than one half of a percentage point less likely to co-group. This seems to suggest that, under Treatment 2, there is no gender assorting. However, the linear restriction tests reported at the bottom of the table indicate that gender assorting, while minimal, is statistically significant under Treatment 2.

6.2 Gender assorting and trust

In this section, we present an analysis aimed at identifying the causal mechanism behind the finding that gender assorting is less pronounced when trust is important. In the introduction, we conjectured that this would occur if either trust is embodied within some form of social tie that is not highly gender assortative or trustworthiness varies across individuals and is not gender differentiated and knowledge of the trustworthiness of others is enhanced by social ties that are not highly gender assortative.

The results presented in Table 5 provide no evidence of trust being embodied within either family networks or the networks associated with belonging to the same religious congregation and only weak evidence that co-memberships in economic CBOs embody trust (column 2). However, they do not exclude the possibility that such ties afford individuals greater knowledge

[12] Treatment 1 is the basis for comparison.

about who they may or may not be able to trust within the context of the experiment.

We do not have data on who knows what about whose trustworthiness. However, as a first step towards identifying this mechanism, we can conduct a reduced form analysis by cautiously introducing additional interaction terms into model (2).[13]

The first step is to establish whether and to what extent each of the social tie types for which we have data is gender assortative. Table 4 shows that mixed gender dyads are less likely than same-sex dyads to belong to the same family network, be members of the same religious congregation, and to belong to the same economic CBOs. However, according to simple dyadic regression analyses, it is only in the case of the latter that the difference is significant, i.e., that there is evidence of significant gender assorting and, even here, the assorting is considerably less marked than in the experimental group formation.[14]

The next step is to investigate whether villagers sharing each of the social tie types for which we have data are less likely to assort under Treatment 2 as compared to villagers with no such ties. To do this we augment model (2) by including additional interaction terms of the form 'T2 x Mixed gender dyad x CBO co-memberships', 'Mixed gender dyad x CBO co-memberships', 'T2 x Mixed gender dyad x Religious co-membership', 'Mixed gender dyad x Religious co-membership', 'T2 x Mixed gender dyad x Family' and Mixed gender dyad x Family'. However, owing to small cell sizes, we investigate only one type of social tie at a time and we do not include interactions between Treatment 3 and the social ties at the same time.[15] If the coefficient on 'T2 x Mixed gender dyad x Family' is positive and/or the linear combination of this coefficient and the coefficients on 'Mixed gender dyad', 'T2 x Mixed gender dyad' and 'Mixed gender dyad x

[13] Caution is required because some cell sizes are already very small. Specifically, recall that less than one percent of mixed gender dyads chose to group togenter in the experiment under Treatment 3.

[14] See Appendix Table A2 for

[15] To avoid spurious inference, we have to include either 'T2 x Number of females in dyad x CBO co-memberships' and 'Number of females in dyad x CBO co-memberships', 'T2 x Number of females in dyad x Religious co-membership' and 'Number of females in dyad x Religious co-membership', or 'T2 x Number of females in dyad x Family' and 'Number of females in dyad x Family'depending on the model.

Family' is insignificant, while the linear combination of the coefficients on 'Mixed gender dyad' and 'T2 x Mixed gender dyad' is negative and significant, it can be taken as evidence that, within family networks, individuals know who they can and cannot trust, trustworthiness is not gender differentiated and, as a consequence, gender has no effect on who groups with whom. The sign and significance of the coefficients and relevant linear combinations of coefficients on terms relating to the other types of social tie can be interpreted similarly.[16]

Table 6 presents the results. Columns 1 and 2 present the key coefficient and standard error estimates from the models focusing on the possible role of family networks and do and do not included village dummy variables respectively. Columns 3 and 4 present key the coefficient and standard error estimates from the models focusing on the possible role of religious co-membership and do and do not included village dummy variables respectively. And columns 5 and 6 present the key coefficient and standard error estimates from the models focusing on the possible role of CBO co-memberships and do and do not included village dummy variables respectively.[17] For each model we also present both the results of the linear restriction tests described above and a corresponding set of tests focusing on Treatment 1. This second set of tests can be viewed as placebo tests in the following sense – if the value of the social ties relates specifically to access to knowledge about others' trustworthiness, gender assorting should be similarly significant within and outside the social tie networks under Treatment 1.

Across all six models only one of the newly introduced interaction terms, 'T2 x Mixed gender dyad x Religious co-membership' bears a significant positive coefficient (columns (3) and (4)).

[16] An alternative to the linear restriction tests invovling interaction terms would be to run the estimations on sub-samples. However, it would not be possible to apply Fafchamps and Gubert's (2007) method for adjusting the standard errors to these sub-sample estimations unless one assumed interdependence only across dyads sharing a common element within families, or religions or CBOs. The linear restriction test approach allows us to use the method to correct for all possible interdependence across all dyads sharing a common element within the same village, i.e., it is a much more comprehensive adjustment.

[17] The full sets of estimated coefficients and standard errors for each set of models are presented in Appendix tables A3, A4, and A5.

This is consistent with gender assorting in the experiment being significantly less pronounced within networks of religious co-membership under Treatment 2 as compared to outside such networks under the same treatment. This is also reflected in the results of the linear restriction tests for Treatment 2; outside the networks of religious co-membership gender assorting is significant under Treatment 2, whereas inside the networks it is insignificant. Further, note that no such pattern is observed under Treatment 1. There, gender assorting is just as significant within as compared to outside the networks.

The new interaction terms relating to family networks are never significant. However, the linear restriction tests reveal a story similar to that relating to religious co-membership. Outside family networks gender assorting is significant under Treatment 2, whereas inside the networks it is insignificant. Further, no such pattern is observed under Treatment 1. There, gender assorting is just as significant within as compared to outside the networks.

For the networks of co-memberships in CBOs the results are less conclusive. When the village dummies are excluded from the model, dyads with two or more CBO co-memberships appear less likely to group assortatively on gender as compared to dyads with no or only one co-membership. However, this finding is not robust to the introduction of the village dummies.

7 Summary and conclusion

Assortative matching has been observed in many social contexts. Using an experiment we examine assorting on gender when economically useful groups are formed in developing-country villages. Assorting on gender, while only occasionally observed in developed-country studies, has been casually observed by many in developing countries and is now systematically being built into many group-oriented development interventions. And yet, very little is known about the mechanisms underlying the emergent gender assorting in developing countries, while studies base elsewhere have led to concerns about, first, the cumulative effects of assorting and, second, the constraints that assorting places on information flows, attitudes, and aspirations.

The formation and maintenance of economically, socially and politically useful groups in developing countries relies on trust and social enforcement. So, our experiment was designed to explore the interplay between trust and social enforcement on the one hand and gender assorting into groups on the other. Analyzing the data resulting from this experiment we found less gender assorting when group formation depended on trust compared to when no trust was required.

In addition, by analyzing the experimental data in conjunction with data on pre-existing social ties and individual characteristics, we found evidence that this reduction in gender assorting when trust was important was owing to trustworthiness not being gender differentiated combined with social ties that were not gender assortative providing access to information about who was and was not trustworthy. Family ties and religious co-membership appeared to be particularly important here. However, it is important to remember that these effects were identified using a relatively small subject sample and, this being the case, a replication using a larger sample would be useful.

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Figure 1: Co-grouping by different dyad types

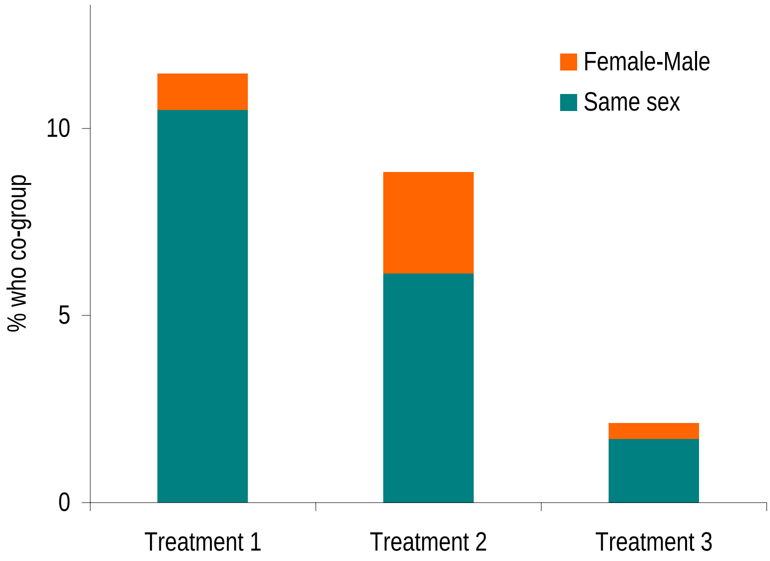

Table 1. Gamble choices in Z$ and implied relative risk aversion coefficients

Choice	High payoff	Low payoff	EV	RA class	RA coeff.
1	100	100	100	Extreme	infinity to 7.51
2	190	90	140	Severe	7.51 to 1.74
3	240	80	160	Intermediate	1.74 to 0.81
4	300	60	180	Moderate	0.81 to 0.32
5	380	20	200	Slight-neutral	0.32 to 0.00
6	400	0	200	Neutral-negative	0 to -ve infinity

Table 2. Characteristics of participants

	Percentage or mean	Std. Dev.
Subject Characteristics		
Female	52.1%	
Age	41.971	17.750
Years of schooling	6.762	3.207
Household head	41.9%	
Spouse of household head	21.5%	
Married	66.5%	
Annual household income (1,000sZim$)	2.562	3.374
Ln(Annual household income + 1)	7.185	1.418
Houeshold livestock wealth (1,000sZim$)	11.656	10.124
Ln(Household livestock wealth + 1)	8.195	2.902
Belongs to a religious community	87.7%	
Memberships in CBOs	2.30	2.29
Resettled household	75.9%	
Experimental variables		
Played under treatment 1	41.6%	
Played under treatment 2	23.3%	
Played under treatment 3	35.1%	
Joined a group in round 2	48.7%	
Size of group joined (=1 for singletons)	3.168	3.011
Gamble choice in round 1	3.231	1.170
Gamble choice in round 2	3.589	1.130
Winnings in round 1 (Zim$, 2001)	157.13	106.60
Winnings in round 2 (Zim$, 2001)	169.65	121.71
Observations	382	

Table 3. Summary statistics for the dyadic sample

	Percentage or mean	Std. Dev.
Dyadic variables of specific interest		
Join same group in experiment	7.3%	
Mixed gender dyad	49.3%	
Number of females in dyad	1.073	0.708
Family (genetically related or related by marriage)	21.4%	
Religious co-membershipgroup	19.3%	
Co-memberships in CBOs	0.940	1.134
Control variables: Dyadic differences		
Difference in Round 1 gamble choice	1.230	1.066
Difference in Round 1 winnings	116.457	95.794
Difference in age	19.400	14.105
One a household head, one not	44.8%	
Difference in years of schooling	3.545	2.720
Difference in ln(annual household income + 1)	1.171	1.301
Difference in household livestock wealth	2.288	3.143
Control variables: Dyadic sums		
Sum of Round 1 gamble choices	6.466	1.621
Sum of Round 1 winnings	323.597	150.778
Sum of ages	84.029	24.842
Number of household heads in dyad	1.289	0.685
Sum of years of schooling	13.819	4.527
Sum of ln(annual houehold incomes + 1)	14.477	2.147
Sum of household livestock wealth	16.601	4.085
Observations	10470	

Table 4. Dyadic Cross-tabulations

	All dyads		Female dyads		Male dyads		Mixed gender dyads	
All treatments	N= 10470		N= 3032		N= 2272		N= 5166	
	mean	*non zero*	*mean*	*non zero*	*mean*	*non zero*	*mean*	*non zero*
Mixed gender dyads	0.493	49.3%						
Join same group in exp.	0.073	7.3%	0.139	13.9%	0.102	10.2%	0.021	2.1%
Family	0.214	21.4%	0.270	27.0%	0.165	16.5%	0.203	20.3%
Religious co-membership	0.193	19.3%	0.229	22.9%	0.176	17.6%	0.180	18.0%
Co-mememberships in CBOs	0.940	57.8%	1.431	73.4%	0.653	43.3%	0.779	55.0%
Treatment 1	N= 4532		N= 1486		N= 840		N= 2206	
	mean	*non zero*	*mean*	*non zero*	*mean*	*non zero*	*mean*	*non zero*
Mixed gender dyads	0.487	48.7%						
Join same group in exp.	0.115	11.5%	0.214	21.4%	0.188	18.8%	0.020	2.0%
Family	0.196	19.6%	0.234	23.4%	0.181	18.1%	0.177	17.7%
Religious co-membership	0.186	18.6%	0.209	20.9%	0.171	17.1%	0.176	17.6%
Co-mememberships in CBOs	0.980	58.6%	1.584	76.6%	0.564	41.7%	0.732	52.9%
Treatment 2	N= 1698		N= 354		N= 488		N= 856	
	mean	*non zero*	*mean*	*non zero*	*mean*	*non zero*	*mean*	*non zero*
Mixed gender dyads	0.504	50.4%						
Join same group in exp.	0.088	8.8%	0.164	16.4%	0.094	9.4%	0.054	5.4%
Family	0.221	22.1%	0.316	31.6%	0.148	14.8%	0.224	22.4%
Religious co-membership	0.199	19.9%	0.333	33.3%	0.131	13.1%	0.182	18.2%
Co-mememberships in CBOs	0.718	51.9%	1.085	74.6%	0.479	34.0%	0.703	52.8%
Treatment 3	N= 4240		N= 1192		N= 944		N= 2104	
	mean	*non zero*	*mean*	*non zero*	*mean*	*non zero*	*mean*	*non zero*
Mixed gender dyads	0.496	49.6%						
Join same group in exp.	0.021	2.1%	0.037	3.7%	0.030	3.0%	0.009	0.9%
Family	0.230	23.0%	0.302	30.2%	0.159	15.9%	0.221	22.1%
Religious co-membership	0.199	19.9%	0.223	22.3%	0.203	20.3%	0.183	18.3%
Co-mememberships in CBOs	0.986	59.2%	1.342	69.1%	0.822	49.6%	0.858	58.0%

Notes: 'Female-male dyads', 'Join same group', Same religious group', and 'Family' are all dichotomous (0,1) variables, so their means and percentages of non-zeros are equivalent; 'Comememberships. in CBOs' is a count variable, so the means and percentages of non-zeros are not identical.

Table 5. Dyadic analysis of treatment responses by different dyad types

	(1)			(2)			(3)			(4)		
	coeff.	s.e.		coeff.	s.e.		coeff.	s.e.		coeff.	s.e.	
Mixed gender dyad (MG)	-1.914	0.344	***	-1.954	0.340	***	-2.529	0.513	***	-2.530	0.521	***
T2 x Mixed gender dyad (T2 x MG)							1.609	0.709	**	1.521	0.729	**
T3 x Mixed gender dyad (T3 x MG)							1.075	0.771		1.015	0.776	
Number of females in dyad	0.110	0.143		0.020	0.154		0.063	0.178		0.028	0.182	
T2 x Number of females in dyad							0.118	0.359		-0.020	0.380	
T3 x Number of females in dyad							0.085	0.277		-0.073	0.286	
T2 (Treatment 2)	-0.534	0.462					-0.984	0.516	*			
T3 (Treatment 3)	-1.935	0.372	***				-2.222	0.440	***			
Family (blood or marriage)	-0.036	0.246		-0.095	0.257		-0.060	0.249		-0.119	0.263	
Religious co-membership	0.049	0.190		0.061	0.185		0.056	0.197		0.071	0.196	
CBO co-mememberships	0.108	0.074		0.134	0.074	*	0.097	0.077		0.112	0.076	
T2 x Family	-0.139	0.546		-0.394	0.565		-0.144	0.542		-0.348	0.541	
T2 x Religious co-membership	-0.198	0.515		0.338	0.531		-0.127	0.476		0.415	0.471	
T2 x CBO co-mememberships	0.408	0.203	**	0.167	0.209		0.377	0.190	**	0.155	0.196	
T3 x Family	1.090	0.529	**	1.120	0.583	*	1.091	0.513	**	1.128	0.572	**
T3 x Religious co-membership	0.881	0.414	**	1.063	0.424	**	0.875	0.414	**	1.047	0.422	**
T3 x CBO co-mememberships	-0.488	0.196	**	-0.346	0.188	*	-0.471	0.191	**	-0.301	0.197	
Village dummies included	no			yes			no			yes		
Significance of assorting on gender under T2#							*			**		
Significance of assorting on gender under T3##							**			***		
Observations	10470			10470			10470			10470		

Notes: Estimated Logit coefficients presented; corresponding standard errors (in parentheses) adjusted to account for non-independence across dyads with a common element; all models also contain absolute differences in and sums of age, household headship dummies, years of schooling, log household income, log livestock wealth, 1st round gamble choices, and 1st round winnings; # - F-test applied to the linear restriction Mixed gender dyad + (T2 x Mixed gender dyad); ## F-test applied to the linear restriction Mixed gender dyad + (T3 x Mixed gender dyad); *** - significant at 1%; ** - significant at 5%; * significant at 10%.

Table 6. Dyadic analysis exploring the role of social ties

	(1)		(2)		(3)		(4)		(5)		(6)	
	coeff.	s.e.	coeff.	s.e.	coeff.	s.e.	coeff.	s.e.	coeff.	s.e.	coeff.	s.e.
Mixed gender dyad	-2.674	0.568 ***	-2.666	0.570 ***	-2.455	0.538 ***	-2.446	0.538 ***	-2.192	0.600 ***	-2.122	0.616 ***
T2 x Mixed gender dyad	1.755	0.751 **	1.634	0.770 **	1.373	0.755 *	1.299	0.773 *	1.117	0.796	1.014	0.826
T3 x Mixed gender dyad	0.882	0.736	0.816	0.753	1.145	0.752	1.101	0.758	1.003	0.769	0.930	0.771
Mixed gender dyad x Family	0.725	0.489	0.714	0.496								
T2 x Mixed gender dyad x Family	-0.841	0.932	-0.721	0.913								
Sig. of gender assorting under T2 among those who are not family comems[1]	*		**									
Sig. of gender assorting under T2 among those who are family comems[2]	insig.		insig.									
Sig. of gender assorting under T1 among those who are not family comems[3]	***		***									
Sig. of gender assorting under T1 among those who are family comems[4]	***		***									
Mixed gender dyad x Religious co-membership					-0.413	0.446	-0.474	0.422				
T2 x Mixed gender dyad x Religious co-membership					1.290	0.680 *	1.275	0.671 *				
Sig. of gender assorting under T2 among those with no relig. comem.[1]					**		**					
Sig. of gender assorting under T2 among those with a regil. comem[5]					insig		insig.					
Sig. of gender assorting under T1 among those with no relig. comem.[3]					***		***					
Sig. of gender assorting under T1 among those with a relig. comem[6]					***		***					
Mixed gender dyad x CBO co-membership									-0.465	0.472	-0.559	0.523
T2 x Mixed gender dyad x CBO co-memberships									0.571	0.533	0.648	0.548
Sig. of gender assorting under T2 among those with no CBO comems.[1]									**		**	
Sig. of gender assorting under T2 among those with one CBO comems[7]									**		**	
Sig. of gender assorting under T2 among those with two CBO comems[8]									insig.		*	
Sig. of gender assorting under T1 among those with no CBO comems.[3]									***		***	
Sig. of gender assorting under T1 among those with one CBO comems[9]									***		***	
Sig. of gender assorting under T1 among those with two CBO comems[10]									***		***	
Village dummies included	no		yes		no		yes		no		yes	

Notes: Logit coefficients and standard errors presented; standard errors adjusted to account for non-independence across dyads with common elements; n = 10470; all models also contain No. females in dyad, T2 x No. females in dyad, T3 x No. females in dyad, Family, Relig. co-mems, CBO co-mememems, T2 x Family, T2 x Relig. co-mem., T2 x CBO co-mems, T3 x Family, T3 x Relig. co-mem., T3 x CBO co-mems, and absolute differences in and sums of age, hh headship, schooling, log hh income, log livestock wealth, 1st round gamble choices and winnings; models (1) and (2) also contain No. females in dyad x Family and T2 x No. females in dyad x Family; models (3) and (4) also contain No. females in dyad x Relig. co-mem. and T2 x No. females in dyad x Relig. co-mem; models (5) and (6) also contain No. females in dyad x CBO co-mems and T2 x No. females in dyad x CBO co-mems; *** - significant at 1%; ** - significant at 5%; * significant at 10%.

1 - F-test applied to linear restriction MG + (T2 x MG), where MG=Mixed gender dyad;
2 - F-test applied to linear restriction MG + (T2 x MG) + (MG x Family) + (T2 x MG x Family);
3 - sig. of coefficient on MG;
4 - F-test applied to linear restriction MG + (MG x Family);
5 - F-test applied to linear restriction MG + (T2 x MG) + (MG x Relig) + (T2 x MG x Relig);
6 - F-test applied to linear restriction MG + (MG x Relig);
7 - F-test applied to linear restriction MG + (T2 x MG) + (MG x CBO) + (T2 x MG x CBO);
8 - F-test applied to linear restriction MG + (T2 x MG) + (MG x 2 x CBO) + (T2 x MG x 2 x CBO);
9 - F-test applied to linear restriction MG + (MG x CBO);
10- F-test applied to linear restriction MG + (2 x CBO);

Table A1. Dyadic analysis of treatment responses by different dyad types all estimates

	(1)			(2)			(3)			(4)		
Mixed gender dyad	-1.914	0.344	***	-1.954	0.340	***	-2.529	0.513	***	-2.530	0.521	***
T2 x Mixed gender dyad							1.609	0.709	**	1.521	0.729	**
T3 x Mixed gender dyad							1.075	0.771		1.015	0.776	
Number of females in dyad	0.110	0.143		0.020	0.154		0.063	0.178		0.028	0.182	
T2 x Number of females in dyad							0.118	0.359		-0.020	0.380	
T3 x Number of females in dyad							0.085	0.277		-0.073	0.286	
T2 (Treatment 2)	-0.534	0.462					-0.984	0.516	*			
T3 (Treatment 3)	-1.935	0.372	***				-2.222	0.440	***			
Family (blood or marriage)	-0.036	0.246		-0.095	0.257		-0.060	0.249		-0.119	0.263	
Religious co-membership	0.049	0.190		0.061	0.185		0.056	0.197		0.071	0.196	
CBO co-mememberships	0.108	0.074		0.134	0.074	*	0.097	0.077		0.112	0.076	
T2 x Family	-0.139	0.546		-0.394	0.565		-0.144	0.542		-0.348	0.541	
T2 x Religious co-membership	-0.198	0.515		0.338	0.531		-0.127	0.476		0.415	0.471	
T2 x CBO co-mememberships	0.408	0.203	**	0.167	0.209		0.377	0.190	**	0.155	0.196	
T3 x Family	1.090	0.529	**	1.120	0.583	*	1.091	0.513	**	1.128	0.572	**
T3 x Religious co-membership	0.881	0.414	**	1.063	0.424	**	0.875	0.414	**	1.047	0.422	**
T3 x CBO co-mememberships	-0.488	0.196	**	-0.346	0.188	*	-0.471	0.191	**	-0.301	0.197	
Dyadic difference in												
Round 1 gambel chocie	0.042	0.082		-0.010	0.087		0.048	0.083		-0.005	0.088	
Round 1 winnings	0.000	0.001		0.000	0.001		0.000	0.001		0.000	0.001	
Age (years)	-0.014	0.009		-0.017	0.009	*	-0.015	0.009	*	-0.018	0.009	*
Househodl head	-0.211	0.175		-0.184	0.177		-0.194	0.176		-0.172	0.178	
Schooling (years)	0.019	0.030		0.026	0.030		0.018	0.030		0.027	0.029	
ln(household income)	0.091	0.087		0.067	0.062		0.087	0.086		0.064	0.061	
ln(livestock wealth)	0.023	0.045		0.008	0.042		0.022	0.045		0.005	0.042	
Dyadic sum of												
Round 1 gambel chocie	0.067	0.055		0.051	0.056		0.066	0.056		0.045	0.056	
Round 1 winnings	-0.001	0.001	**	-0.001	0.001		-0.001	0.001	**	-0.001	0.001	
Age (years)	0.004	0.007		0.000	0.007		0.004	0.007		0.000	0.007	
Househodl head	-0.105	0.195		0.125	0.198		-0.097	0.192		0.124	0.198	
Schooling (years)	0.034	0.031		0.063	0.032	*	0.035	0.031		0.063	0.031	*
ln(household income)	-0.056	0.074		-0.016	0.064		-0.058	0.074		-0.015	0.066	
ln(livestock wealth)	0.047	0.047		0.003	0.043		0.049	0.047		0.003	0.043	
Constant	-2.377	1.518		-2.251	1.335	*	-2.223	1.503		-2.159	1.341	
Village dummies included	no			yes			no			yes		

Notes: Estimated Logit coefficients presented; corresponding standard errors (in parentheses) adjusted to account for non-independence across dyads with a common element; n=10470 throughout; *** - significant at 1%; ** - significant at 5%; * significant at 10%.

Table A2. Dyadic analysis exploring the role of CBOs all estimates

	Religious co-membership (logit)	CBO co-memberships (linear regression)	Related genetically or by marriage (logit)
Mixed gender dyad	-0.137	-0.263 ***	-0.060
	(0.095)	(0.059)	(0.085)
Number of females in dyad	0.164	0.389 ***	0.316 **
	(0.116)	(0.088)	(0.136)
Constant	-1.543 ***	0.653 ***	-1.624 ***
	(0.163)	(0.088)	(0.176)
Observations	10470	10470	10470

Table A3. Dyadic analysis exploring the role of CBOs all estimates

	(1)			(2)			(3)			(4)		
Mixed gender dyad	-2.529	0.513	***	-2.530	0.521	***	-2.192	0.600	***	-2.122	0.616	***
T2 x Mixed gender dyad	1.609	0.709	**	1.521	0.729	**	1.117	0.796		1.014	0.826	
T3 x Mixed gender dyad	1.075	0.771		1.015	0.776		1.003	0.769		0.930	0.771	
Mixed gender dyad x CBO co-membership							-0.465	0.472		-0.559	0.523	
T2 x Mixed gender dyad x CBO co-memberships							0.571	0.533		0.648	0.548	
Number of females in dyad	0.063	0.178		0.028	0.182		0.027	0.197		-0.016	0.209	
T2 x Number of females in dyad	0.118	0.359		-0.020	0.380		0.398	0.434		-0.104	0.470	
T3 x Number of females in dyad	0.085	0.277		-0.073	0.286		0.085	0.280		-0.070	0.289	
No. females in dyad x CBO co-membership							0.028	0.105		0.035	0.102	
T2 x No. females in dyad x CBO co-membership							-0.254	0.200		0.091	0.217	
T2 (Treatment 2)	-0.984	0.516	*				-1.190	0.602	**			
T3 (Treatment 3)	-2.222	0.440	***				-2.245	0.437	***			
Family (blood or marriage)	-0.060	0.249		-0.119	0.263		-0.053	0.250		-0.112	0.262	
Religious co-membership	0.056	0.197		0.071	0.196		0.062	0.198		0.076	0.197	
CBO co-mememberships	0.097	0.077		0.112	0.076		0.063	0.192		0.067	0.196	
T2 x Family	-0.144	0.542		-0.348	0.541		-0.129	0.534		-0.379	0.547	
T2 x Religious co-membership	-0.127	0.476		0.415	0.471		-0.029	0.493		0.395	0.492	
T2 x CBO co-mememberships	0.377	0.190	**	0.155	0.196		0.589	0.340	*	0.025	0.383	
T3 x Family	1.091	0.513	**	1.128	0.572	**	1.079	0.516	**	1.121	0.575	*
T3 x Religious co-membership	0.875	0.414	**	1.047	0.422	**	0.869	0.416	**	1.041	0.426	**
T3 x CBO co-mememberships	-0.471	0.191	**	-0.301	0.197		-0.429	0.191	**	-0.252	0.203	
Dyadic difference in												
Round 1 gambel chocie	0.048	0.083		-0.005	0.088		0.053	0.083		-0.003	0.089	
Round 1 winnings	0.000	0.001		0.000	0.001		0.000	0.001		0.000	0.001	
Age (years)	-0.015	0.009	*	-0.018	0.009	*	-0.015	0.009	*	-0.018	0.009	**
Househodl head	-0.194	0.176		-0.172	0.178		-0.187	0.174		-0.180	0.178	
Schooling (years)	0.018	0.030		0.027	0.029		0.017	0.030		0.027	0.029	
ln(household income)	0.087	0.086		0.064	0.061		0.086	0.086		0.062	0.061	
ln(livestock wealth)	0.022	0.045		0.005	0.042		0.021	0.045		0.006	0.042	
Dyadic sum of												
Round 1 gambel chocie	0.066	0.056		0.045	0.056		0.066	0.056		0.047	0.057	
Round 1 winnings	-0.001	0.001	**	-0.001	0.001		-0.001	0.001	*	-0.001	0.001	
Age (years)	0.004	0.007		0.000	0.007		0.004	0.007		0.001	0.007	
Househodl head	-0.097	0.192		0.124	0.198		-0.084	0.191		0.140	0.200	
Schooling (years)	0.035	0.031		0.063	0.031	**	0.032	0.031		0.064	0.031	**
ln(household income)	-0.058	0.074		-0.015	0.066		-0.059	0.074		-0.014	0.065	
ln(livestock wealth)	0.049	0.047		0.003	0.043		0.051	0.047		0.002	0.043	
Constant	-2.223	1.503		-2.159	1.341		-2.194	1.521		-2.182	1.348	
Village dummies included	no			yes			no			yes		

Notes: Estimated Logit coefficients presented; corresponding standard errors (in parentheses) adjusted to account for non-independence across dyads with a common element; n=10470 throughout; *** - significant at 1%; ** - significant at 5%; * significant at 10%.

Table A4. Dyadic analysis exploring the role of religion all estimates

	(1)			(2)			(3)			(4)		
Mixed gender dyad	-2.529	0.513	***	-2.530	0.521	***	-2.455	0.538	***	-2.446	0.538	***
T2 x Mixed gender dyad	1.609	0.709	**	1.521	0.729	**	1.373	0.755	*	1.299	0.773	*
T3 x Mixed gender dyad	1.075	0.771		1.015	0.776		1.145	0.752		1.101	0.758	
Mixed gender dyad x Religious co-membership							-0.413	0.446		-0.474	0.422	
T2 x Mixed gender dyad x Religious co-membership							1.290	0.680	*	1.275	0.671	*
Number of females in dyad	0.063	0.178		0.028	0.182		0.042	0.179		0.012	0.181	
T2 x Number of females in dyad	0.118	0.359		-0.020	0.380		0.102	0.351		-0.021	0.378	
T3 x Number of females in dyad	0.085	0.277		-0.073	0.286		0.064	0.283		-0.095	0.288	
No. females in dyad x Religious co-membership							0.103	0.206		0.092	0.220	
T2 x No. females in dyad x Religious co-membership							0.239	0.387		0.196	0.422	
T2 (Treatment 2)	-0.984	0.516	*				-0.923	0.500	*			
T3 (Treatment 3)	-2.222	0.440	***				-2.226	0.435	***			
Family (blood or marriage)	-0.060	0.249		-0.119	0.263		-0.060	0.250		-0.112	0.264	
Religious co-membership	0.056	0.197		0.071	0.196		-0.043	0.340		-0.004	0.335	
CBO co-mememberships	0.097	0.077		0.112	0.076		0.096	0.078		0.110	0.077	
T2 x Family	-0.144	0.542		-0.348	0.541		-0.143	0.544		-0.373	0.535	
T2 x Religious co-membership	-0.127	0.476		0.415	0.471		-0.766	0.424		-0.183	0.373	
T2 x CBO co-mememberships	0.377	0.190	**	0.155	0.196		0.387	0.190	**	0.173	0.193	
T3 x Family	1.091	0.513	**	1.128	0.572	**	1.085	0.519	**	1.116	0.580	*
T3 x Religious co-membership	0.875	0.414	**	1.047	0.422	**	0.933	0.426	**	1.112	0.430	***
T3 x CBO co-mememberships	-0.471	0.191	**	-0.301	0.197		-0.469	0.191	**	-0.301	0.196	
Dyadic difference in												
Round 1 gambel chocie	0.048	0.083		-0.005	0.088		0.050	0.083		-0.003	0.088	
Round 1 winnings	0.000	0.001		0.000	0.001		0.000	0.001		0.000	0.001	
Age (years)	-0.015	0.009	*	-0.018	0.009	*	-0.015	0.009	*	-0.018	0.009	*
Househodl head	-0.194	0.176		-0.172	0.178		-0.201	0.177		-0.174	0.179	
Schooling (years)	0.018	0.030		0.027	0.029		0.019	0.030		0.028	0.029	
ln(household income)	0.087	0.086		0.064	0.061		0.084	0.086		0.064	0.061	
ln(livestock wealth)	0.022	0.045		0.005	0.042		0.022	0.045		0.005	0.042	
Dyadic sum of												
Round 1 gambel chocie	0.066	0.056		0.045	0.056		0.066	0.056		0.045	0.056	
Round 1 winnings	-0.001	0.001	**	-0.001	0.001		-0.001	0.001	**	-0.001	0.001	
Age (years)	0.004	0.007		0.000	0.007		0.004	0.007		0.000	0.007	
Househodl head	-0.097	0.192		0.124	0.198		-0.093	0.189		0.129	0.196	
Schooling (years)	0.035	0.031		0.063	0.031	**	0.036	0.031		0.064	0.032	
ln(household income)	-0.058	0.074		-0.015	0.066		-0.062	0.075		-0.017	0.066	
ln(livestock wealth)	0.049	0.047		0.003	0.043		0.050	0.047		0.004	0.043	
Constant	-2.223	1.503		-2.159	1.341		-2.185	1.505		-2.183	1.362	
Village dummies included	no			yes			no			yes		

Notes: Estimated Logit coefficients presented; corresponding standard errors (in parentheses) adjusted to account for non-independence across dyads with a common element; n=10470 throughout; *** - significant at 1%; ** - significant at 5%; * significant at 10%.

Table A5. Dyadic analysis exploring the role of family all estimates

	(1)		(2)		(3)		(4)	
Mixed gender dyad	-2.529	0.513 ***	-2.530	0.521 ***	-2.674	0.568 ***	-2.666	0.570 ***
T2 x Mixed gender dyad	1.609	0.709 **	1.521	0.729 **	1.755	0.751 **	1.634	0.770 **
T3 x Mixed gender dyad	1.075	0.771	1.015	0.776	0.882	0.736	0.816	0.753
Mixed gender dyad x Family					0.725	0.489	0.714	0.496
T2 x Mixed gender dyad x Family					-0.841	0.932	-0.721	0.913
Number of females in dyad	0.063	0.178	0.028	0.182	0.045	0.179	0.008	0.183
T2 x Number of females in dyad	0.118	0.359	-0.020	0.380	0.343	0.360	0.227	0.386
T3 x Number of females in dyad	0.085	0.277	-0.073	0.286	0.081	0.277	-0.095	0.286
No. females in dyad x Family					0.091	0.211	0.140	0.232
T2 x No. females in dyad x Family					-1.007	0.471 **	-1.029	0.511 **
T2 (Treatment 2)	-0.984	0.516 *			-1.252	0.561 **		
T3 (Treatment 3)	-2.222	0.440 ***			-2.168	0.440 ***		
Family (blood or marriage)	-0.060	0.249	-0.119	0.263	-0.265	0.271	-0.392	0.325
Religious co-membership	0.056	0.197	0.071	0.196	0.061	0.197	0.075	0.197
CBO co-memememberships	0.097	0.077	0.112	0.076	0.100	0.077	0.115	0.076
T2 x Family	-0.144	0.542	-0.348	0.541	1.116	0.749	0.905	0.864
T2 x Religious co-membership	-0.127	0.476	0.415	0.471	-0.120	0.478	0.429	0.470
T2 x CBO co-memememberships	0.377	0.190 **	0.155	0.196	0.393	0.188 **	0.193	0.196
T3 x Family	1.091	0.513 **	1.128	0.572 **	1.028	0.517 **	1.073	0.591
T3 x Religious co-membership	0.875	0.414 **	1.047	0.422 **	0.865	0.409 **	1.036	0.420 **
T3 x CBO co-memememberships	-0.471	0.191 **	-0.301	0.197	-0.475	0.187 **	-0.304	0.195
Dyadic difference in								
Round 1 gambel chocie	0.048	0.083	-0.005	0.088	0.043	0.084	-0.011	0.089
Round 1 winnings	0.000	0.001	0.000	0.001	0.000	0.001	0.000	0.001
Age (years)	-0.015	0.009 *	-0.018	0.009 *	-0.015	0.009 *	-0.018	0.009 **
Househodl head	-0.194	0.176	-0.172	0.178	-0.183	0.176	-0.159	0.178
Schooling (years)	0.018	0.030	0.027	0.029	0.016	0.030	0.025	0.030
ln(household income)	0.087	0.086	0.064	0.061	0.086	0.085	0.066	0.060
ln(livestock wealth)	0.022	0.045	0.005	0.042	0.021	0.045	0.004	0.042
Dyadic sum of								
Round 1 gambel chocie	0.066	0.056	0.045	0.056	0.068	0.055	0.046	0.056
Round 1 winnings	-0.001	0.001 **	-0.001	0.001	-0.001	0.001 **	-0.001	0.001
Age (years)	0.004	0.007	0.000	0.007	0.004	0.007	0.000	0.007
Househodl head	-0.097	0.192	0.124	0.198	-0.093	0.194	0.130	0.201
Schooling (years)	0.035	0.031	0.063	0.031 **	0.033	0.031	0.062	0.031 **
ln(household income)	-0.058	0.074	-0.015	0.066	-0.057	0.074	-0.010	0.065
ln(livestock wealth)	0.049	0.047	0.003	0.043	0.049	0.047	0.002	0.043
Constant	-2.223	1.503	-2.159	1.341	-2.139	1.505	-2.157	1.335
Village dummies included	no		yes		no		yes	

Notes: Estimated Logit coefficients presented; corresponding standard errors (in parentheses) adjusted to account for non-independence across dyads with a common element; n=10470 throughout; *** - significant at 1%; ** - significant at 5%; * significant at 10%.