Reciprocated Versus Unreciprocated Sharing in Social Networks*

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Abstract

We recognize that some sharing relationships in social networks are reciprocated, while others are unreciprocated. Previous survey evidence has shown that relationships are more likely between households of differing wealth and education levels while experimental evidence has shown the opposite. We find that differing households are only more likely to be linked in unreciprocated relationships. Reciprocated risk-sharing relationships are actually more likely between households of similar wealth and education levels. Our data suggests that both reciprocated and unreciprocated sharing are motivated by risk sharing and confirms predictions of models that differing levels of inequality lead to differing forms of risk-sharing. The results do not change when extending our analysis to indirect relationships.

1 Introduction

While informal insurance and social networks are important in all societies, networks are particularly critical in rural villages of developing countries. In these areas people know each other well and interact over several generations. Many formal institutions, such as health insurance and old age support, are lacking. Townsend (1994), Jalan & Ravallion (1999), and Ligon et al. (2002), among others, document the importance of informal risk-sharing within villages. More recently, theorists have begun to model the sharing that takes place within a network, rather than within the village as a unified whole (Bramoullé & Kranton 2007, Bloch et al. 2008, Ambrus et al. 2010). These papers show that sharing may be local since the architecture may inhibit full risk sharing.

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As researchers gain access to data sets with more detailed information about transfers between specific households, studies are beginning to show the importance of risk-sharing within these social networks. Rosenzweig (1988), Udry (1994), Fafchamps & Lund (2003) and De Weerdt & Dercon (2006) all give evidence of the prevalence of network-level sharing. These papers tend to find that households exhibit greater gift giving and informal lending following the negative income shock of a fellow network member.[1] Given this local nature of risk-sharing within networks, it is important to analyze who forms links with whom and the types of relationships formed. The effects of development policies will depend on the operation of social networks and the features that cause individuals to form links.

Recent research looking at the determinants of risk-sharing links between households has found contradictory results. There seems to be a disconnect between experimental and survey-based studies of risk-sharing. Experimental studies of risk-sharing, such as Attanasio et al. (2009), find that risk-sharing groups are assortative on consumption. Survey-based evidence, such as De Weerdt (2004) and Fafchamps & Gubert (2007), find that individuals are more likely to be linked when wealth differences between them are greater. Our results suggest that this contradiction can be resolved by noting that the two literatures often make different assumptions about the nature of links. The experimental literature looks at reciprocated risk-sharing, which we find takes place between individuals of similar wealth levels, while the survey literature has combined reciprocated and unreciprocated links.

A main contribution of this paper is that we distinguish between those links which are reciprocated and those which are unreciprocated. We find that dyad characteristics affect the likelihood of reciprocated and unreciprocated links differently. Both links are more likely to be present when two households are related or live closer to one another. But unreciprocated relationships are more likely to exist when one household is wealthier and more educated than the other. Reciprocated links do not depend on wealth differences and instead are more likely to occur between two similarly wealthy households.

The fact that wealth differences predict unreciprocated links may be a sign of altruism, patron-client relationships, intergenerational transfers, or inequality in risk-sharing. Our results suggest that both reciprocated and unreciprocated sharing are forms of risk-sharing. We verify the prediction from models of risk-sharing with limited commitment (Genicot 2006, Munshi & Rosenzweig 2009). These models claim that inequality leads to relationships which resemble pure lending rather than the typical image of mutual risk-sharing. This prediction agrees with our empirical findings.

Most of our analysis centers around the hypothetical question regarding to whom a household can turn for help in times of need. We also look at actual loans and gifts in the previous year and find similar results. We find evidence that households have potentially reciprocated relationships with one another as defined by the hypothetical questions, but that in any given year transfers may not actually flow in both directions. This suggests a disadvantage of using data on actual rather than potential transfers.

A second contribution of this paper is that we look at both direct and indirect relationships. Previous work (Leider et al. 2009, Ambrus et al. 2010, Niehaus 2010) has shown that

[1] Although this is often interpreted as evidence of risk-sharing, it might also be evidence of altruism.

the viability of collective punishment and diffusion of transfers depends not only on the direct links a household has, but on its indirect links as well. In order to capture this, we consider an extension in which a link is considered reciprocated if it exists as part of a continuous ring of households. We compare these reciprocated rings to unreciprocated chains of comparable sizes. We find that under any possible size of ring and chain, the correlates of the two types of relationships continue to be distinctly different from each other.

The rest of the paper is organized as follows. In Section 2 we discuss the previous literature regarding sharing in networks. Section 3 gives the details regarding the data used in the analysis. Section 4 explains how we define bilateral links, reciprocated lending rings, and unreciprocated lending chains. Section 5 lays out the estimation strategy used while Section 6 presents the results. Section 7 concludes.

2 Sharing in Networks

The experiment-based and survey-based literatures on sharing in networks have come to different conclusions regarding whether similar individuals are more or less likely to be linked. We claim that these different conclusions may be a result of differences in how experiment-based and survey-based studies classify links. Specifically, the experimental literature often constrains links to be reciprocated, while many influential survey instruments do not differentiate between the direction in which funds flow.

Attanasio et al. (2009) use data from experiments in which individuals are allowed to form groups for the specific purpose of sharing risk within the experiment. They find that individuals who have similar levels of consumption are more likely to share risk with one another. The rules of the experiment only allow for reciprocated sharing.

Although the exact survey question used and the definition of a risk-sharing link differ across papers in the survey literature, there are similarities. Fafchamps & Gubert (2007) ask households who they could rely on in case of need or to whom they give help when called upon to do so. Note that this is asked as one question, not two separate questions. Similarly, De Weerdt (2004) asked "Can you give a list of people, who you can personally rely on for help and/or that can rely on you for help in cash, kind or labour". These questions do not allow the researcher to differentiate giving help from receiving help, and so the analyses necessarily combine reciprocated and unreciprocated sharing.

The cited papers use the existence of a link as the dependent variable, but each defines a link differently. Fafchamps & Gubert (2007) say that a directional link exists, or $l_{ij} = 1$, if household i says it would either give help to or receive help from household j. Otherwise, l_{ji} is set to 0. De Weerdt (2004) says a non-directional link exists if either household says it would give help to or receive help from the other. The value of the link is $l_{ij} = l_{ji} = 1$ if only one household claims there is a relation and $l_{ij} = l_{ji} = 2$ if both households claim the existence of a link.

Fafchamps & Gubert (2007) find that wealth differences and geographic proximity are good predictors of the existence of a link between two individuals. Links are more common between households which are more different in terms of wealth. Poorer households are more

likely to mention households that are richer than themselves. De Weerdt (2004) finds that when two households live closer to one another, are related, or are of the same religious affiliation, they are more likely to be linked. Households are also more likely to be linked when household wealth is more dissimilar.

Both of these papers assume one underlying structure for all links within the network. This is largely driven by the survey questions asked to determine links. Fafchamps & Gubert (2007) and De Weerdt (2004) do not ask respondents to differentiate between links for which they expect only to give, links in which they expect only to receive, and links for which they expect to do both. Instead, the basis for link direction or magnitude is based on which household listed the other on the survey. It is difficult to interpret this type of directionality since we do not know why a household would or would not choose to list another household. However, it is possible that the direction transfers flow and whether or not they are reciprocated identify different types of relationships within a network.

While reciprocated relationships may be a signal of risk-sharing relationships, it is less clear what is signaled when households make unreciprocated transfers. This unreciprocated sharing may be a signal of intergenerational transfers. Unreciprocated relationships may also be a sign of a patron-client relationship in which a wealthier household helps a poorer household in exchange for labor and status (Fafchamps 1992). Another possibility is that unreciprocated relationships are used to discourage the recipient from stealing from the giver (Schechter 2007). Unreciprocated relationships may also be motivated by altruism. Foster & Rosenzweig (2001) present evidence that as altruism increases, more transfers flow from rich to poor. However, they also show theoretically that although altruism tends to increase risk-sharing, if altruism is high enough risk-sharing may break down.

Many other papers have investigated the multiple purposes of transfers including altruism and risk-sharing. Lucas & Stark (1985) and Barr & Genicot (2008) find that both risk-sharing and altruism influence remittances in Botswana and risk sharing in Zimbabwe respectively. Leider et al. (2009) and Ligon & Schechter (2010) find that both directed altruism and reciprocity are important determinants of transfers. Most of these consider all relationships to be homogeneous and do not allow for heterogeneous relationships, some with pure altruism and others with self-interested risk-sharing.

In addition to altruism, theft prevention, patron-client relationships, and intergenerational transfers, unreciprocated relationships may actually be a signal of risk-sharing. Genicot (2006) shows that with decreasing absolute risk aversion, risk sharing becomes more like a credit relationship as inequality increases. The poor individual receives a transfer when he gets a bad shock and he repays when he gets a good shock. The fluctuations in the rich individual's income matter very little since he is less risk averse. (See also Munshi & Rosenzweig (2009).) This would appear in our data as unreciprocated relationships, since we are looking at lending and not at repayment.

We use data on altruism, risk aversion, and family relations to shed light on three of these explanations.[2] We find evidence that even unreciprocated relationships from rich to poor are motivated by risk-sharing rather than altruism or intergenerational transfers. However,

[2]We lack the data necessary to test the patron-client hypothesis and the crime-prevention hypothesis.

we also find that the household characteristics underlying the two types of relationships are different, suggesting different types of risk-sharing arrangements.

3 Data

In 1991, the Land Tenure Center at the University of Wisconsin in Madison and the Centro Paraguayo de Estudios Sociológicos in Asunción worked together in the design and implementation of a survey of 300 rural Paraguayan households in fifteen villages in three departments (comparable to states) across the country. The households were stratified by land-holdings and chosen randomly. The original survey was followed up by subsequent rounds of data collection in 1994, 1999, 2002, and 2007. All rounds include detailed information on production and income.

In 2007, new households were added to the survey in an effort to interview 30 households in each of the fifteen randomly selected villages. Villages ranged in size from around 30 to 600 households. In one small village only 29 households were surveyed. This round added many questions measuring social networks.

The process undertaken in each village was the following. We arrived in a village and found a few knowledgeable villagers to collect a list of the names of all of the household heads in the village. We then randomly chose new households to be sampled to complete 30 interviews in the village. (This meant choosing between 6 and 24 new households in each village in addition to the original households.)

These villages are mostly comprised of smallholder farmers. These Paraguayan villages do not involve any tribes or castes. There are no village chiefs and government is at the municipal level which is larger than the village. There are no major moneylenders. In our sample, 42% of households lent money in the past year (to anyone inside or outside the village) but only 4% lent to three or more households. Additionally, of the 30% of households which borrowed money in the past year, 62% also lent money. In terms of income dispersion, the ratio of the income of the second richest person in the village to the median ranges between 7.1 and 1.8 in the fifteen villages. There are no large plantation owners.

Our survey asks respondents from which households they would ask to borrow 20,000 Gs (approximately $4) if they had a personal problem, and then asks separately which households would ask to borrow 20,000 Gs from them if they had a personal problem. In order to make it easier for respondents to understand the question and so that all respondents interpreted it in the same way, we asked about this one very specific interaction. This amount is much smaller than that which formal institutions will lend. The lowest amount lent to a survey respondent by a formal institution is 100,000 Gs while the median is 2,500,000 Gs. Many authors have shown that such informal credit is a form of risk-sharing, as lending and repayment often depend on shocks received by both borrower and lender (Platteau & Abraham 1987, Udry 1994, Ligon et al. 2002). Note that although loans, by nature, involve reciprocal transfers, the hypothetical question we use in our analysis only asks about the initial loan transfer, and not the repayment transfer.

Respondents could list as many households as they wanted. They listed anywhere from

0 to 14 to whom they would go (with a median of 2) and anywhere from 0 to 32 (also with a median of 2) who would go to them. There are 1113 total instances of another household being listed as a source to borrow from, and 1086 total instances of another household being listed as a possible recipient of lending. Of the households listed as potential lenders, 48.9% of them were also listed as potential borrowers by the listing household. Of those listed as potential borrowers, 50.1% were also listed as potential lenders by the listing household.

There are 947 unique households mentioned by respondents as either a potential borrower or a potential lender. Adding in the 188 survey respondents who are not themselves mentioned by someone else (but may have mentioned someone), we have 1135 potential network members. We have survey data on 39.6% of these network members.[3] Since the relevant unit of observation is the dyadic link between households, our sample will consist of all potential links between those households for which we have survey data.

4 Defining Links

In this paper we look at three types of links between households. We call the first a standard link (S-link). We consider $S_{ij} = 1$ if household i either lists household j as a source to borrow from or lists household j as a household it would lend to. This is the type of link which was analyzed in Fafchamps & Gubert (2007). The direction of this link is determined by which household lists the other, not the direction of possible transfers. Of the 2199 links listed by respondents, 661 are between two households who have both been surveyed. Of these 661, 227 indicate that i would both borrow from and lend to j, 183 indicate only that i would lend to j, and 251 indicate only that i would borrow from j. The S-links do not distinguish between these different types of relationships.

We also look at two types of links we call lending links (L-links). In this case $L_{ij} = 1$ if household i says it would lend to j, *or* household j says it would borrow from i. The direction of this link is determined by the direction in which households expect transfers to flow, regardless of which household mentions that the link exists. We divided these L-links into reciprocated and unreciprocated links. Reciprocated lending links (LR-links) are those for which $L_{ij} = L_{ji} = 1$ while unreciprocated lending links (LU-links) are those for which $L_{ij} = 1$ while $L_{ji} = 0$. Of the 748 links for which $L_{ij} = 1$, 434 links (217 pairs) are reciprocated while 314 are unreciprocated.

4.1 Lending Rings and Chains

Direct links between households do not provide a full picture of the sharing network that exists within a community. In fact, Bala & Goyal (2000) show that when link formation is costly and benefits flow without frictions, no direct links will form between individuals who are already indirectly connected. In addition, Karlan et al. (2009) show that direct and

[3]The 449 survey respondents listed 947 unique households. 261 of the households listed were themselves survey respondents. This is similar to the results of Fafchamps & Gubert (2007) who survey 206 respondents reporting 939 unique households, of which 189 were themselves survey respondents.

indirect links have similar effects on the borrowing of residents of Peruvian shantytowns. Thus, the amount of credit available through a network will depend on the nature not just of a household's immediate links but on the overall network architecture. If a household's immediate network is not able to provide sufficient lending, then that household's friends may in turn use their own friends to gather funds. Thus, households may be helped by friends of friends. The assistance may take the form of one household explicitly taking out a loan on behalf of another. Households may also use their own reputation to vouch for the trustworthiness of a borrower. In either case, the value of a link includes not just the physical resources of the link partner but also the access it provides to other households in the network. The mechanics of such risk-sharing networks are discussed in Leider et al. (2009) and Ambrus et al. (2010). We apply these ideas of indirect relationships as follows.

Suppose individual i wishes to borrow money from individual k. However, i and k do not know each other well, and so k is not willing to make the loan. This can be resolved by an intermediary j who is willing to vouch for i and whom k trusts. As long as j values his friendship with k, and i values his friendship with j, the contract may be self-enforcing. That is, if k does not recover the loan from i, he will sever his ties with j. Individual j would in turn sever his ties with i. Knowing this, k no longer fears that i will abscond with the money and is willing to agree to the transaction. Under similar conditions, the loan could also be arranged by j borrowing the amount from k (not necessarily disclosing the reason why) and in turn creating a new loan from j to i. Again, this system works because k trusts j to pay back the loan and j trusts i, making it unnecessary for k to directly trust i.

A situation in which i has a unidirectional link to j, and j has a unidirectional link to k, allowing i access to the resources of k, would be analogous to our unreciprocated link in the bilateral setup. Household i would expect to be able to borrow from k, while k would not expect to borrow from i, thus meeting our requirements for an LU-link. If k in addition linked to i, or if the links between i, j, and k were all reciprocated rather than one-way, k could also expect to have access to the resources of household i. This would then meet our requirements for an LR-link. We can in the same way generalize these links to rings and chains of any size, in each case satisfying our definitions of both unreciprocated and reciprocated links.

In these examples, individuals i, j, and k are involved in an unreciprocated chain of size 3 or a reciprocated ring of size 3. Specifically, we define two households i and j to share an LR-link in a ring of size N if we can trace a path from i to j to i that consists of no more than N links. We define the unreciprocated chain in such a way that it allows for a direct comparison to rings of equal size. A link from i to j is classified as an LU-link in a chain of size N if we can trace some path from i to j consisting of no more than $N-1$ links and if i and j are not part of an LR-link of size N. Subtracting 1 is necessary to limit chains to those that could potentially have become rings if one or more links had taken on a different value.

Because we do not have a census of all households, we can not perfectly capture all rings and chains. We have data on 40% of households residing in the villages who were either surveyed or mentioned as potential partners and data on 19% of all households residing in

the villages. We make use of those households that are listed as a potential borrowing or lending partner but are not directly surveyed. If i lends to j and j lends to k, we include the link between i and k even if we do not have survey information on j.[4] The number of pairs of households in LR-links in rings of size $N = 2$ (bilateral relationships) is 217. The number of pairs of households in LR-links in rings of size $N = 3$ is 326, and the number increases up to a maximum of 1625 pairs of households in LR-links in rings of size $N = 15$.[5] Increasing rings to sizes larger than this does not increase the number of links.

There are 314 LU-links of size $N = 2$. The number of LU-links is 1479 under chains of size $N = 3$, and 1612 under chains of size $N = 12$. Unlike LR-links, the number of LU-links does not necessarily increase with chain size, since increasing N may cause us to reclassify an unreciprocated link as a reciprocated link. The maximum number of LU-links occurs at $N = 5$, with 2229 links. There are no additional changes in the number of LU-links past chains of size 12.

5 Empirical Estimation

In this section we model the prediction of the existence of standard links and both reciprocated and unreciprocated lending links. From the 445 observations[6] there are 12,762 possible relationships. This is fewer than the 197,580=445*444 we would obtain if we allowed for every possible link between households. Because the 15 villages are not close to one another and so households in a village do not know households in the other villages, we do not include these as potential links.

In all regressions we include the geographic distance between the two households and whether the two households are immediate relatives (that is, parents, children, or siblings but not uncles, cousins, or grandparents). These are characteristics of the relationship between the pair of individuals, not household-level characteristics.

We also make use of some household-level characteristics. For directional links (the standard links and the unreciprocated links) we include the sum $(x_i + x_j)$ and the difference $(x_i - x_j)$ of each of the household characteristics as explanatory variables.[7] For the reciprocated links, symmetry implies that the absolute value of the difference $(|x_i - x_j|)$ must be used rather than the difference itself.[8]

[4]This will lead to some selection issues in the larger rings. Since we surveyed 30 households in each village, we will be less likely to find lending rings in the larger villages due to the larger number of unsampled households. However, restricting the econometric analysis to the two villages with fewer than 40 households produced similar results.

[5]Keep in mind that 1625 pairs of households means 3250 links.

[6]Four of the 449 households are dropped from estimation due to negative agricultural income, making it impossible to estimate agriculture's share in total income.

[7]We also ran our regressions with the squared value of each of these terms. However, the squared terms were almost never significant and did not have qualitative impacts on the other regression coefficients.

[8]Inclusion of these sums and differences makes it impossible to include individual fixed effects. Since there is no variation in a household's individual characteristics, it is impossible to identify an individual-invariant effect as well as the effect of both the sum and difference of household characteristics.

The household characteristics which we include are the maximum years of education in the household, the age of the household head, the number of working age people in the household, the share of income coming from agriculture, the number of disabled people in the household, the number of days anybody over 10 years old and not disabled was sick enough to miss school or work, and the log of wealth (which includes the value of land, animals, and tools owned but not consumer durables or education). We also include village fixed effects. Table 1 shows summary statistics of household characteristics, while Table 2 shows summary statistics of dyad characteristics.

The standard errors of the regressions must take into account that dyadic observations are not independent due to individual-specific factors common to all observations involving that household. One option would be to use the dyadic standard errors suggested by Fafchamps & Gubert (2007).[9] A different option would be to correct both for the non-independence of dyads sharing a common member and for the non-independence of all observations within the same village. To do this one can allow for any arbitrary correlation between observations in the same village by clustering standard errors at the village level. This formulation of standard errors allows us to account for both heteroskedasticity and cross-observation correlation.

Our main analysis focuses on the determinants of reciprocated and unreciprocated links. For every directed relationship (i, j), there is either an unreciprocated link from i to j, a reciprocated link from i to j, or no link at all from i to j. This would suggest that we should estimate the correlates of unreciprocated and reciprocated links jointly using the multinomial logit. But, we would like to use differences $(x_i - x_j)$ to explain unreciprocated links and the absolute value of the difference $(|x_i - x_j|)$ to explain reciprocated links. Because of this, we constrain the coefficients of the differences to be 0 in the reciprocated regressions and the coefficients of the absolute differences to be 0 in the unreciprocated regressions.

6 Results

We first look at the three types of bilateral links. Table 3 shows the correlates of the three types of links: the standard links (S), the unreciprocated lending links (LU), and the reciprocated lending links (LR). Our results obtained using S-links appear to generally agree with those found by Fafchamps & Gubert (2007). Like them, we find that households which live closer to one another or are directly related to one another are more likely to be linked.

[9] Fafchamps & Gubert (2007) assume that $E[u_{ij}, u_{ik}] \neq 0 \forall k$ and $E[u_{ij}, u_{kj}] \neq 0 \forall k$. Likewise, $E[u_{ij}, u_{jk}] \neq 0$ and $E[u_{ij}, u_{ki}] \neq 0$. The formula they suggest for the network-corrected covariance matrix is

$$\text{AVar}(\hat{\beta}) = \frac{D}{D-K}(X'X)^{-1}\left(\sum_{v=1}^{V}\left(\sum_{i=1}^{N_v}\sum_{j=1}^{N_v}\sum_{k=1}^{N_v}\sum_{l=1}^{N_v} m_{ijkl}^{v} X_{ij}^{v'} u_{ij}^{v} u_{kl}^{v} X_{kl}^{v}\right)\right)(X'X)^{-1}$$

where $m_{ijkl} = 1$ if $i = k$, $j = l$, $i = l$, or $j = k$, and 0 otherwise. There are K regressors and D dyadic observations on pairs of households. There are N_v households observed in each village v. All observations where $i = j$ or $k = l$ are omitted.

This may be due to the lowering of informational asymmetries in risk-sharing and altruistic relationships when households live closer and are related. Monitoring is less costly among such households. On the other hand, correlated risks are probably larger when households live closer to one another. But since we look only at networks within villages, we are unlikely to see households diversifying risk over large distances in our data.

We use the share of agricultural income in total income to test whether households which are more or less dependent on agriculture as their main source of income are more or less likely to be linked. Theory would predict that households will want to reduce correlated risk by linking with households which have different earning portfolios. On the other hand, it may be easier for a farmer to monitor another farmer than for a farmer to monitor a brickmaker. We find that households which depend more on agriculture are more likely to be linked. But we don't find a tendency for diversification with agricultural households linking to non-agricultural households.[10] Likewise, Fafchamps & Gubert (2007) find that links are not more likely between households with lower income correlations. Perhaps most importantly, like De Weerdt (2004) and Fafchamps & Gubert (2007), we also find that wealth differences have a significant negative impact on the probability of an S-link.

We can see from the second and third columns of Table 3 that distinguishing between reciprocated and unreciprocated links is important. While reciprocated links are more likely between individuals of similar levels of wealth, the unreciprocated link is instead more likely between households with large wealth differences.[11] While the coefficient on sum of wealth remains positive for both types of links, the t-statistic is higher in the LR regression than in the LU regression. Taken together, this would mean that the typical reciprocated relationship would be between two wealthy households of similar wealth levels. The typical unreciprocated relationship, though, would consist of a wealthy household making transfers to a poorer household.

Additionally, educational differences have no effect on the likelihood of standard links, yet we find that more educated households are more likely to have unreciprocated relationships being willing to lend money to less educated households. Households with more similar and higher education are more likely to have reciprocated relationships.[12] This suggests that the conflation of different kinds of links can have a strong effect on what is considered an important determinant of the existence of links. Previous results in the survey-based literature finding that households of different wealth and education levels are more likely to be linked may be concentrating on unreciprocated relationships. The bigger the difference in wealth level between the two households, the less likely they are to have a reciprocated risk-sharing relationship.

[10] We tried separating agricultural income into that which comes from crops and that which comes from animals, but found no significant relationship.

[11] We can reject the hypothesis that the effect of wealth differences is the same in the LU and LR models at the 1% level and that the effect of wealth sums is the same in the LU and LR models at the 5% level.

[12] We can reject the hypothesis that the effect of education differences is the same in the LU and LR models at the 5% level and that the effect of education sums is the same in the LU and LR models at the 10% level.

6.1 Lending Rings and Chains

By examining the evolution of regression coefficients as we allow for rings or chains of increasing size, we can recover new information about the functioning of the network. In our data, increasing the possible size of rings reveals a very rich structure within villages, with new relationships appearing and old relationships changing their nature up to rings of size 15. Tables 4 and 5 present the regression coefficients for reciprocated rings and unreciprocated chains of sizes 3, 6, and 9. These results are largely representative of the changes in coefficients with the general progression of changes in ring sizes.

Focusing first on the differences between rings and chains of equal N, we continue to find that reciprocated and unreciprocated links have very different determinants. The effects of family relationships, geographic distance, and sum of wealth are always more pronounced in the reciprocated links regressions.[13] The effects of differences in education and wealth are always more pronounced in the unreciprocated links regressions. For any possible ring and chain size chosen, it is clear that these two types of relationships are different.[14]

In addition to examining differences between unreciprocated and reciprocated links, we can also examine link types of different sizes to make claims about the layout of the network. Once two households are in a reciprocated sharing relationship, an increase in ring size will not change this. That is, the set of household pairs with reciprocated sharing for a ring of size N is always a subset of those with reciprocated sharing for ring size $N + 1$. However, as chain size increases, households with unreciprocated sharing may change their status to reciprocated sharing, and so the set of unreciprocated sharing links may be more volatile than the set of reciprocated links.

As we increase N, the set of reciprocated links strictly increases. This means that when comparing the reciprocated links regression for different values of N, any differences in coefficients are driven by those links that exist in larger rings that did not exist in smaller rings. Consider the "Immediate Family" variable in Table 5. The coefficients decrease slowly from a reciprocated ring size of 3 to a ring size of 9. This suggests that not only are small rings largely dominated by family members, but that large rings are as well. One implication of this would be that families are not only tightly clustered, but that these family arrangements do not connect to each other in a significant way. Conversely, notice that the reduction in the magnitude of the coefficient on the "Distance in Km" variable is much faster. From this we can infer that while small reciprocated rings may form locally, these rings are in turn very connected to other rings. Given enough indirect links, reciprocated paths can be traced between farmers who live very far away from each other. It is much more difficult to trace reciprocated paths between members of different families no matter how many indirect links are allowed.

[13]For the models with $N = 3$, we can reject the hypotheses that the effects are the same in the LU and LR models for wealth differences, wealth sums, education differences, distance, and family relationships all at the 1% level. When N=6 or N=9, we are able to reject these hypothesis at similar or slightly lower significance levels.

[14]It is for this reason we are able to remain agnostic regarding the maximum plausible choice of N, although sharing across a ring or chain of 12 households seems unlikely.

As we broaden our definition of what is considered a reciprocated relationship in Table 5, we do not see large changes in what factors are considered important. Wealthier households continue to be more likely to be involved in reciprocated relationships, and distance and family relations are considered significant throughout.

Unreciprocated links are somewhat more difficult to analyze. This is because, unlike reciprocated links, the set of these links does not strictly increase in N. While links can be created with an increase in chain size, what had previously been classified as an unreciprocated link could also be re-classified as a reciprocated link at a larger value of N.

Table 4 also shows that the coefficient on geographic distance becomes less significant as N increases. This would make sense if everyone has an unreciprocated link with one of his neighbors. As chain length increases, the average distance between linked households will increase. The coefficient on wealth differences, however, continues to not only remain highly significant, but stays of a similar magnitude as chain size increases. Unreciprocated relationships involve richer households transferring money to poorer households. The effect of difference in education also remains significant and of stable coefficient. So, as chain size increases, we still find our main result that unreciprocated relationships are more likely to flow from rich households to poor households, while reciprocated relationships are more likely between richer households.

Whether or not lending rings and chains are useful for making economic transfers is an open question. The costs of sending transfers from one individual to another indirectly vis-a-vis multiple people may be high, and may create incentives for defecting (Bloch et al. 2008). Karlan et al. (2009) assume that transfers can only travel through up to two links. That said, if creating links is also costly, indirect relationships may be a cost-effective way of transferring money without forming new bilateral relationships. Either way, our results on unreciprocated versus reciprocated links are not due to mistakenly ignoring indirect relationships. The main findings of this paper continue to hold for links and rings of all sizes.

6.2 Comparison of Stated and Actual Links

The analysis thus far has defined a link as existing when one household states that it would ask to borrow money from another household in times of need or the other household would ask to borrow from it (a stated link). We also have data on which households the respondents actually borrowed from or lent to in the past year, in addition to transfers of agricultural produce and gifts of money to cover health expenses in the past year.[15]

Ideally we would look only at actual loan data. The gifts in our data may be transfers to help out a household in need, but they may also be gifts to thank or repay a household which helped them out in the past. Unfortunately, for the regressions involving actual transactions, we must combine giving and lending because there are very few pure lending relationships which happen to be reciprocated within the past 12 months. In other words, it is extremely unlikely that both i lends to j and j lends to i in a 12 month period.[16] This is true even

[15]The hypothetical questions were asked at the beginning of the interview, while the actual lending questions were asked towards the end of a 2-3 hour interview.

[16]We ran logit regressions on the determinants of unreciprocated pure lending LU-Links and find that,

though there are quite a few relationships which are reciprocal according to the answer to the hypothetical question. Looking at data on actual loans would not make it obvious whether or not the relationship was reciprocated. We now verify that the hypothetical stated links have economic meaning for daily transactions.

A bit more than half of all gifts and loans in the past year come from households that a household says they would go to or would go to them if they needed help. There are 430 directed links involving gifts and loans over the past year. Of those, 219 (51%) are links which were mentioned by respondents as someone to whom they could go to for help or who would go to them. (There are 736 links which are listed as someone to whom they could go to for help or who would go to them for help, but this does not mean it would have been necessary to do so in the past year.)

The above discussion does not distinguish between reciprocated and unreciprocated relationships. A bit more than half of the gifts and loans which were reciprocated in the past year come from somebody with whom the household states having a reciprocated relationship. Of the unreciprocated gifts and loans, a bit less than a quarter come from a household with whom they state having a reciprocated relationship, and a bit less than a quarter come from a household with whom they state having an unreciprocated relationship. It may be the case that households have potentially reciprocal relationships with one another as mentioned by whom they *would* go to for help, but that in any given year that relationship may not actually be reciprocated. Thus, seemingly unreciprocated transfers in one year may be part of reciprocated relationships. This suggests a disadvantage of empirical work using data on actual rather than potential transfers.

In addition, we can run two types of regressions checking the validity of the hypothetical stated data. We can first check if the predictors of stated links (both reciprocated and unreciprocated) are the same as the predictors of actual links by running regressions with the same regressors as before. The dependent variable describes what type of actual transfers took place between the two households during the previous year. We can then additionally include stated links as independent variables. This allows us to see how much predictive power household characteristics have even after conditioning on stated hypothetical relationships.

These regressions are found in Table 6. The first two columns look at the determinants of giving and lending relationships which were unreciprocated in the past year, while the two after that look at the determinants of giving and lending relationships which were reciprocated in the past year. The final two columns look at the determinants of all directional relationships in the past year, whether or not they were reciprocated.[17]

We find that the results regarding wealth which we found using stated links continue to hold when considering actual links. Unreciprocated actual transfers are more likely to flow from wealthier to poorer households, while reciprocated actual transfers are more likely to

in general, the results are stronger than when considering giving and lending together. But, we can not compare unreciprocated and reciprocated actual pure lending links since there are not enough reciprocated links.

[17]This is not the same as an S-link, since in this case the direction is based on the flow of money, not based on which household mentions the other household.

flow between two wealthy households.[18]

Also, we find that stated links are an extremely significant predictor of actual links. Unreciprocated stated links are stronger predictors of unreciprocated actual transfers, while reciprocated stated links are stronger predictors of reciprocated actual transfers. These variables have significant coefficients even when including all of the other explanatory variables. This suggests that we are not capturing all of the determinants of links, and that these potential links have economic meaning above and beyond simply predicting the characteristics of linked households.

6.3 Risk Aversion versus Altruism

Unreciprocated transfers may be evidence of risk-sharing, altruism, or intergenerational transfers between family members. Models of risk-sharing with inequality such as those constructed by Genicot (2006) and Munshi & Rosenzweig (2009) show that, with decreasing absolute risk aversion, risk-sharing between more equal pairs involves reciprocal transfers when either partner experiences a negative shock. Risk-sharing between unequal pairs involves lending from the wealthier individual to the poorer individual.

We explore whether risk-sharing can explain our results better than altruism or intergenerational transfers. When we restrict our sample to only include dyads which do not involve direct family relationships, all of our previous results continue to hold. This suggests that these unreciprocated transfers are not due to intergenerational transfers.

To explore the distinction between risk-sharing and altruism, we make use of an experiment-based measure of altruism and a survey-based measure of risk aversion. The survey measures the respondents' risk aversion by asking a series of hypothetical risk questions. We use the number of risky choices made as our measure of risk aversion.[19] The 19 percent of respondents who chose a dominated option in the first risk question are dropped from this analysis. Alternatively, we can calculate a minimum coefficient of relative risk aversion (they must be at least so risk averse to have turned down a given gamble) given CES utility. We find an average coefficient of 1.84 with a standard deviation of 1.61. None of the qualitative results change if we include the coefficient of relative risk aversion rather than the number of risky choices made.

After completing the survey, we invited the respondents to participate in economic experiments. One of the experiments was an anonymous dictator game. In this game the player was given 14,000 Gs which he had to decide how to divide between himself and an anonymous recipient. The recipient could be any household in his village and the amount he sent to the recipient was doubled. We use the amount sent as a measure of the player's

[18]The qualitative results in which the dependent variable is the value of the transfers rather than a binary variable indicating whether or not a transfer took place are quite similar.

[19]The question asks them to choose between drawing a bill from a bag with one 50,000 Gs bill and a bag with a 100,000 Gs bill and a 50,000 Gs bill. If they choose the latter, it asks them to choose between the bag with one 50,000 Gs bill and a bag with one 100,000 and one 40,000 Gs bill. For people who choose the latter it goes on to change the second bag to contain 100,000 and 30,000 Gs bills, then 100,000 and 20,000 Gs, and finally 100,000 and 10,000 Gs.

altruism. The 15 percent of respondents who did not participate in the experiments must be dropped from this analysis.

We conduct the analysis on the risk aversion and altruism variables separately because looking at either variable cuts the number of households by 19 and 15 percent respectively and reduces the number of dyads by an even larger amount. In Table 7 we find the results including the measure of risk preferences. Remember that the higher the measure of risk preferences, the *less* risk averse the respondent is. We see from the coefficient on the risk attitude difference that unreciprocated relationships are most likely when the giver is less risk averse than the receiver. This is what a model of risk-sharing with limited commitment would suggest; with unequal agents, risk-sharing relationships end up with the wealthier and/or less risk averse person lending to the poorer and/or more risk averse agent in times of need in return for a higher payback in other periods.

In Table 8 we include the measure of altruism as an additional explanatory variable. Altruism has no effect on unreciprocated relationships which suggests that these relationships are not based on altruism. In the unreciprocated regressions we can use the coefficients on the sum and the difference of altruism to back out what would have been the coefficient on the sender's altruism, but it is also not significant. In the regressions looking at stated links, we find that the more altruistic both agents are, the less likely they are to be linked reciprocally, but this result does not hold for the actual lending and giving. These results provide suggestive evidence that unreciprocated relationships are not due to intergenerational transfers or altruism, but are rather a different form of risk-sharing.

7 Conclusion

We look at lending relationships within social networks and distinguish between unreciprocated relationships in which loans go only from one household to the other, and reciprocated relationships in which loans can go in both directions. We find that the determinants of these two types of relationship are quite different. One-directional loans are more likely to involve flows from wealthier households to less wealthy households while reciprocated relationships are more likely to occur between wealthier households of similar wealth levels.

As two robustness checks we look at indirect links based on the hypothetical loan question and we look at actual lending and giving in the past year. We might worry that a seemingly unreciprocated relationship from household i to household k is actually reciprocated if i lends to k who lends to j who lends back to i again. We thus look more carefully at indirect relationships in addition to direct bilateral relationships. We find that most of the determinants of indirect relationships are the same as the determinants of the direct relationships, and specifically, the results on wealth differences and wealth sums do not change.

We also might worry that stated relationships do not reflect reality, but when looking at actual giving and lending, we again find similar results. This implies that the hypothetical question is meaningful for real-life transactions. A disadvantage of using the actual data is that potential reciprocated risk-sharing relationships may appear to be unreciprocated or a

potential relationship may not appear to be a relationship at all if only one or neither of the households experienced in a negative shock in the past 12 months. Researchers interested in looking at risk-sharing relationships should include questions regarding potential lending relationships on their survey instruments in addition to actual lending relationships.

Using data on risk aversion and altruism, we find suggestive evidence that the unreciprocated relationships are not based on altruism. Our results validate the theory regarding risk-sharing with inequality. The theory shows that risk-sharing between unequal partners will resemble a credit relationship from the rich to the poor. Reciprocated and unreciprocated relationships have distinct styles, and these relationships will influence the impact of many development programs.

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Table 1: Household Statistics

Variable	Mean	Standard Deviation
Household Wealth (in $)	32,655	138,246
Log Household Wealth	8.54	1.89
Years of Education	8.26	3.72
Age of Household Head	53.73	14.53
Agriculture Share	0.62	0.28
Adult Members	2.32	1.16
Disabled Members	0.29	0.56
Days Sick	23.30	45.04
Households	445	
Villages	15	

Wealth is calculated in USD using the exchange rate of 5300 Gs to 1 USD.

Table 2: Link Statistics

	Difference of		Abs Value of Difference		Sum of	
Variable	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Household Wealth (in $)	0	186,791	48,154	180,477	66,821	205,443
Log Household Wealth	0	2.37	1.77	1.58	17.09	3.00
Years of Education	0	5.10	3.96	3.22	16.53	5.42
Age of Household Head	0	20.04	16.01	12.05	107.48	20.98
Agriculture Share	0	0.38	0.30	0.23	1.23	0.40
Adult Members	0	1.61	1.19	1.09	4.65	1.68
Disabled Members	0	0.79	0.47	0.64	0.58	0.79
Days Sick	0	63.80	36.20	52.53	46.51	63.36

Variable	Mean	Std. Dev.
Immediate Family	0.03	0.17
Distance in Km	1.91	1.57
Households	445	
Villages	15	
Possible Links	12762	
Standard Links	653	
Reciprocated Links	312	
Unreciprocated Pairs of Links	212	

Wealth is calculated in USD using the exchange rate of 5300 Gs to 1 USD.

Table 3: Basic Regressions

Variable	S-Link	z-value	LU-Link	z-value	LR-Link	z-value
Immediate Family	1.782***	6.65	1.665***	6.04	2.083***	6.49
Distance in Km	-1.792***	-12.38	-1.409***	-7.85	-2.339***	-11.41
Difference of						
Log Household Wealth	-0.067*	-1.82	0.310***	13.03	-0.163	-1.45
Years of Education	-0.005	-0.28	0.056***	3.77	-0.014	-0.58
Age of Household Head	-0.002	-0.58	-0.012***	-4.32	-0.007	-0.73
Agriculture Share	0.086	0.56	0.104	0.36	0.127	0.20
Adult Members	-0.033	-1.13	-0.023	-0.60	-0.003	-0.04
Disabled Members	0.024	0.34	0.115	1.12	-0.147	-0.54
Days Sick	0.000	-0.19	0.002	1.63	0.004	1.11
Sum of						
Log Household Wealth	0.193***	6.74	0.144***	3.45	0.323***	6.38
Years of Education	0.019	1.39	0.008	0.47	0.039**	2.33
Age of Household Head	-0.008**	-2.22	-0.009**	-2.32	-0.011	-1.61
Agriculture Share	0.527*	1.88	0.410*	1.67	0.655**	2.19
Adult Members	0.101**	2.37	0.066	1.64	0.199**	2.11
Disabled Members	0.197***	2.70	0.245***	2.87	0.351**	2.32
Days Sick	0.000	0.25	0.001	0.48	-0.004	-1.03
Households	445		445		445	
Villages	15		15		15	
Possible Links	12762		12762		12762	
Actual Links	653		312		424	

S-Links are the standard links, LU-Links are unreciprocated lending links, and LR-Links are reciprocated lending links. S-Link regression is estimated using logit, LU-Link and LR-Link are estimated jointly using multinomial logit.
'Absolute Value of Difference' is used instead of 'Difference' for the LR-Link regressions.
Village fixed effects are included in the estimation but not shown. Regressions clustered at the village level. *,**, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 4: Unreciprocated Chains of Size 3, 6, and 9

Variable	LU-Link	z-value	LU-Link	z-value	LU-Link	z-value
Immediate Family	1.123***	4.10	0.431*	1.91	0.577***	2.71
Distance in Km	-0.998***	-12.86	-0.282***	-3.22	-0.226**	-2.55
Difference of						
Log Household Wealth	0.180***	6.01	0.154***	5.16	0.189***	4.53
Years of Education	0.047***	3.78	0.041**	2.54	0.046**	2.10
Age of Household Head	-0.005	-1.37	-0.007*	-1.65	-0.009*	-1.77
Agriculture Share	0.050	0.30	0.018	0.08	0.177	0.58
Adult Members	-0.010	-0.40	0.030	0.51	0.049	0.70
Disabled Members	0.019	0.21	0.102	1.29	0.171	1.49
Days Sick	0.000	-0.28	-0.002	-1.62	-0.002*	-1.83
Sum of						
Log Household Wealth	0.170***	3.13	0.040	0.85	0.025	0.72
Years of Education	0.016	1.06	0.046***	3.41	0.052***	5.33
Age of Household Head	-0.004	-0.98	-0.003	-0.58	-0.001	-0.39
Agriculture Share	0.403	1.47	0.400*	1.65	0.529*	1.78
Adult Members	0.091*	1.82	0.030	0.64	0.000	0.00
Disabled Members	0.053	0.68	0.137	1.34	0.063	0.66
Days Sick	0.000	-0.35	-0.002*	-1.66	-0.002**	-2.48
Households	445		445		445	
Villages	15		15		15	
Possible Links	12762		12762		12762	
Actual Links	1479		2025		1762	
Maximum Ring Size	3		6		9	

LU-Link and LR-Link regressions in Tables 4 and 5 estimate coefficients for rings of the same size jointly using multinomial logit. (This means Tables 4 and 5 contain a total of three regressions rather than six.)
Village fixed effects are included in the estimation but not shown. Regressions clustered at the village level. *,**, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 5: Reciprocated Rings of Size 3, 6, and 9

Variable	LR-Link	z-value	LR-Link	z-value	LR-Link	z-value
Immediate Family	2.251***	7.63	1.804***	5.47	1.562***	4.26
Distance in Km	-2.472***	-14.83	-1.200***	-7.58	-0.666***	-5.45
Absolute Difference of						
Log Household Wealth	-0.148**	-2.48	0.018	0.27	0.001	0.01
Years of Education	-0.033*	-1.85	-0.037	-1.15	-0.065	-1.60
Age of Household Head	-0.010	-1.60	-0.004	-0.52	-0.004	-0.43
Agriculture Share	0.119	0.40	0.377	1.15	0.121	0.45
Adult Members	-0.038	-0.46	-0.018	-0.15	-0.057	-0.46
Disabled Members	-0.017	-0.08	-0.092	-0.71	0.147	1.47
Days Sick	0.003	0.90	0.003	1.39	0.002	0.72
Sum of						
Log Household Wealth	0.320***	5.68	0.237**	2.55	0.166*	1.76
Years of Education	0.032*	1.66	0.060***	2.73	0.071***	3.40
Age of Household Head	-0.010**	-2.12	-0.007	-0.90	-0.007	-0.69
Agriculture Share	0.875***	2.73	0.726**	2.48	0.531*	1.81
Adult Members	0.265***	2.95	0.209**	2.25	0.216**	2.04
Disabled Members	0.196	1.19	0.287	1.58	0.225	1.03
Days Sick	-0.005	-1.04	-0.007***	-3.40	-0.007***	-4.46
Households	445		445		445	
Villages	15		15		15	
Possible Links	12762		12762		12762	
Actual Links	652		2406		3052	
Maximum Ring Size	3		6		9	

LU-Link and LR-Link regressions in Tables 4 and 5 estimate coefficients for rings of the same size jointly using multinomial logit. (This means Tables 4 and 5 contain a total of three regressions rather than six.)

Village fixed effects are included in the estimation but not shown. Regressions clustered at the village level. *,**, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 6: Actual Giving and Lending

Variable	*LU*-Link		*LR*-Link		Any Link	
Immediate Family	1.692***	1.293***	2.679***	2.208***	2.005***	1.561***
	(5.34)	(4.14)	(8.00)	(5.56)	(7.32)	(5.51)
Distance in Km	-1.323***	-1.008***	-2.113***	-1.476**	-1.478***	-1.076***
	(-7.18)	(-6.82)	(-5.51)	(-3.82)	(-9.15)	(-7.98)
Stated *LU*-Link		1.744***		1.568***		1.691***
		(8.09)		(6.27)		(8.46)
Stated *LR*-Link		1.500***		2.440***		1.840***
		(10.67)		(5.13)		(7.23)
Difference of						
Log Household Wealth	0.176***	0.139**	0.091	0.142**	0.141***	0.106**
	(2.89)	(2.30)	(0.93)	(2.01)	(3.16)	(2.24)
Years of Education	0.016	0.009	0.029	0.061	0.012	0.006
	(1.58)	(0.83)	(0.69)	(1.25)	(1.56)	(0.64)
Age of Household Head	-0.012***	-0.011**	-0.005	-0.007	-0.009***	-0.008**
	(-2.87)	(-2.48)	(-0.50)	(-0.64)	(-3.09)	(-2.51)
Agriculture Share	0.300	0.279	1.450*	1.282	0.219	0.194
	(1.04)	(1.07)	(1.74)	(1.41)	(1.01)	(1.02)
Adult Members	0.039	0.043	0.071	0.017	0.030	0.034
	(0.51)	(0.52)	(1.18)	(0.27)	(0.53)	(0.55)
Disabled Members	0.051	0.033	0.788	0.919	0.032	0.015
	(0.28)	(0.17)	(1.36)	(1.50)	(0.23)	(0.10)
Days Sick	-0.000	-0.000	0.010	0.011	-0.000	-0.000
	(-0.12)	(-0.36)	(1.42)	(1.42)	(-0.12)	(-0.35)
Sum of						
Log Household Wealth	0.054*	0.024	0.277***	0.199**	0.098**	0.052
	(1.74)	(0.81)	(3.32)	(2.50)	(2.35)	(1.48)
Years of Education	-0.007	-0.013	-0.064	-0.084**	-0.019	-0.025
	(-0.36)	(-0.67)	(-1.62)	(-2.13)	(-0.84)	(-1.23)
Age of Household Head	0.003	0.005	-0.012**	-0.009	0.000	0.002
	(0.73)	(1.02)	(-2.02)	(-1.59)	(0.08)	(0.53)
Agriculture Share	0.573**	0.460*	0.422	0.259	0.452**	0.326
	(2.21)	(1.83)	(0.92)	(0.64)	(2.00)	(1.54)
Adult Members	0.087**	0.054**	0.212	0.168	0.103**	0.063*
	(2.56)	(2.06)	(1.39)	(1.09)	(2.32)	(1.69)
Disabled Members	0.079	0.038	-0.627	-0.784	0.058	0.008
	(1.28)	(0.53)	(-1.05)	(-1.22)	(0.77)	(0.10)
Days Sick	0.000	0.001	-0.008	-0.009	0.000	0.001
	(0.36)	(0.58)	(-1.22)	(-1.15)	(0.22)	(0.63)
Households	445	445	445	445	445	445
Villages	15	15	15	15	15	15
Possible Links	12762	12762	12762	12762	12762	12762
Actual Links	292	292	138	138	430	430

Any link regression is estimated using logit, *LU*-Link and *LR*-Link are estimated jointly using multinomial logit.
'Absolute Value of Difference' is used instead of 'Difference' for the *LR*-Link regressions.
Village fixed effects are included in the estimation but not shown. Regressions clustered at the village level. *,**, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 7: Stated Links and Actual Giving with Risk Controls

	Basic Regression				Actual Giving and Lending			
Variable	LU-Link	z-value	LR-Link	z-value	LU-Link	z-value	LR-Link	z-value
Immed. Family	1.593***	3.95	2.113***	4.65	1.721***	4.81	2.580***	5.59
Distance in Km	-1.493***	-5.62	-2.400***	-9.30	-1.448***	-5.63	-2.405***	-4.15
Difference of								
Log (Hh Wealth)	0.322***	5.78	-0.252**	-2.09	0.187**	2.43	0.092	0.67
Years of Educ	0.048**	2.09	-0.021	-0.60	0.018	0.95	0.021	0.54
Age of Hh Head	-0.015***	-2.70	-0.006	-0.45	-0.018***	-3.00	-0.008	-0.55
Agric Share	0.065	0.20	0.198	0.37	-0.018	-0.06	0.963	1.18
Adult Members	-0.015	-0.32	0.038	0.26	0.008	0.09	0.038	0.41
Disabled Members	0.230*	1.73	-0.146	-0.46	0.185	1.06	0.754	1.19
Days Sick	0.001	0.71	0.011*	1.96	0.001	0.62	0.002	0.20
Risk Attitude	0.068**	2.01	-0.021	-0.32	0.068***	3.05	0.068	0.48
Sum of								
Log (Hh Wealth)	0.162**	2.50	0.336***	6.31	0.046	1.02	0.129**	2.06
Years of Educ	-0.007	-0.41	0.040**	2.10	-0.028	-1.47	-0.014	-0.26
Age of Hh Head	-0.004	-1.09	-0.011	-1.48	0.003	0.51	-0.013	-1.51
Agric Share	0.398	1.32	0.761**	2.10	0.870***	3.89	0.656	1.09
Adult Members	0.102	1.55	0.214**	2.35	0.154***	3.55	0.161	0.86
Disabled Members	0.071	0.59	0.242	1.27	0.066	0.75	-0.474	-0.71
Days Sick	-0.001	-0.60	-0.012***	-2.94	0.000	0.21	-0.006	-0.74
Risk Attitude	0.019	0.52	0.024	0.38	-0.036	-1.03	-0.073	-1.03
Households	361		361		361		361	
Villages	15		15		15		15	
Possible Links	8406		8406		8406		8406	
Actual Links	183		274		188		90	

Basic regressions use hypothetical lending as the dependent variable. Actual giving and lending uses actual lending or gift-giving in the past 12 months as the dependent variable.
LU-Link and LR-Link regressions are estimated jointly using multinomial logit.
'Absolute Value of Difference' is used instead of 'Difference' for the LR-Link regressions.
Village fixed effects are included in the estimation but not shown. Regressions are clustered at the village level. *,**, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 8: Stated Links and Actual Giving with Altruism Controls

	Stated Link				Actual Giving and Lending			
Variable	LU-Link	z-value	LR-Link	z-value	LU-Link	z-value	LR-Link	z-value
Immed. Family	1.756***	6.97	2.150***	7.13	1.701***	4.66	2.803***	6.52
Distance in Km	-1.514***	-10.51	-2.378***	-8.37	-1.478***	-8.27	-2.076***	-5.22
Difference of								
Log (Hh Wealth)	0.321***	12.26	-0.178	-1.22	0.182***	3.69	0.048	0.34
Years of Educ	0.057***	3.19	-0.007	-0.34	-0.009	-0.55	-0.002	-0.06
Age of Hh Head	-0.014***	-3.14	-0.002	-0.26	-0.009**	-2.10	-0.003	-0.28
Agric Share	-0.028	-0.10	0.127	0.19	0.374	1.23	1.907*	1.92
Adult Members	-0.026	-0.55	-0.045	-0.56	0.095	1.16	0.104	1.51
Disabled Members	0.148	1.20	-0.324	-1.07	-0.004	-0.03	0.638	1.08
Days Sick	0.001	0.70	0.002	0.50	-0.001	-0.70	0.012**	2.13
Altruism	-0.038	-1.61	0.016	0.29	-0.007	-0.21	0.022	0.35
Sum of								
Log (Hh Wealth)	0.155***	3.29	0.338***	4.88	0.059	1.38	0.307***	2.86
Years of Educ	0.000	-0.01	0.020	0.91	-0.027	-1.33	-0.094**	-2.20
Age of Hh Head	-0.012***	-3.00	-0.013**	-2.06	0.006*	1.67	-0.016**	-2.48
Agric Share	0.262	1.06	0.451	1.23	0.721***	3.26	0.269	0.46
Adult Members	0.057	1.04	0.228**	2.40	0.105***	2.64	0.275**	1.97
Disabled Members	0.245**	2.06	0.531***	3.28	0.084	1.63	-0.381	-0.62
Days Sick	0.000	0.27	-0.002	-0.37	0.001	0.72	-0.009	-1.62
Altruism	-0.010	-0.52	-0.045*	-1.77	-0.019	-1.25	0.039	0.90
Households	380		380		380		380	
Villages	15		15		15		15	
Possible Links	9334		9331		9334		9334	
Actual Links	254		334		233		110	

Basic regressions use hypothetical lending as the dependent variable. Actual giving and lending uses actual lending or gift-giving in the past 12 months as the dependent variable.
LU-Link and LR-Link regressions are estimated jointly using multinomial logit.
'Absolute Value of Difference' is used instead of 'Difference' for the LR-Link regressions.
Village fixed effects are included in the estimation but not shown. Regressions are clustered at the village level. *,**, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.