Incentive for risk sharing and trust formation: Experimental and survey evidence from Bangladesh

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Abstract

Using data from a unique household survey and an artefactual field experiment conducted in rural Bangladesh, this study evaluates the impact on trust in community members of incentive for risk-sharing arrangement between villagers. Risk sharing provides a major opportunity for cooperation in rural economies, and the experience of cooperation could facilitate trust. In order to test this hypothesis, this study characterizes the incentive for risk sharing by the patterns of exogenous income shocks in the real world and risk preference, and trust in community members is elicited experimentally. The empirical results from dyadic regression demonstrate that villagers connected by a stronger incentive form a higher level of trust.

JEL Codes: C91, D12

Keywords: Trust formation; risk sharing; experiment; Bangladesh

1. Introduction

Interpersonal trust is an essential element for socioeconomic development, particularly in developing countries. In rural communities, where members often engage in cooperative behavior without a contract enforcement institution, – such as irrigation maintenance, credit transactions, and mutual insurance – trust in the community members, namely *particularized trust*, plays an important role (Bardhan 2000; Bouma et al. 2008; Carter and Castillo 2005; Hayami 2009; Karlan et al. 2009; Wade 1988). Furthermore, trust in strangers, *generalized trust*, also encourages cooperation in one-shot situations (Fukuyama 1995; Yamagishi and Yamagishi 1994). Therefore, it is important for policymakers and researchers to better understand their formation mechanisms.

Previous studies suggest that these two types of trust are accumulated through different processes; particularized trust is formed through repeated interactions between the community members (Banfield 1958; Shapiro et al. 1992), while generalized trust is determined by one's personal predisposition (Platteau 1994a; 1994b; Uslaner 2002; Yamagishi and Yamagishi 1994). However, while various determinants of generalized trust are discussed in the literature,[1] the formation mechanism of particularized trust is less well understood. Some studies find that particularized trust increases with the proximity between individuals, such as ethnicity (Bouckaert and Dhaene 2004), neighborhood (Etang et al. 2011), friendship (Binzel and Fehr 2013), and when low communication costs are involved (Fisman and Khanna 1999).[2] Although these findings are insightful, they do not explain the mechanism of particularized trust formation. This study attempts to address this question by exploiting experiment and survey data collected in rural Bangladesh.

[1] Generalized trust is found to be attributed to the income level of the community and its inequality, political characteristics, market competition, and industrialization (Berggren and Jordhal 2006; Bjornskov 2006; Bohnet and Baytelman 2007; Miguel et al. 2006; Huck et al. 2012).
[2] See Lévy-Garboua et al. (2006) for further review.

One likely explanation for the formation of particularized trust is grounded in the experience of cooperation. Experiencing cooperation with an individual can facilitate particularized trust in him or her by increasing the expectation about his/her trustworthiness, the accuracy of the expectation, and the willingness to take the risk of trusting behavior (Banfield 1958; Shapiro et al. 1992). Previous studies have consistently shown that individuals who experienced collective actions with their community members exhibited higher trust (Durante 2009; Feigenberg et al. 2013; Gneezy et al. 2015; Schechter 2007a; Shoji et al. 2012).

In rural society, risk sharing arrangements for coping with negative shocks, such as income loss and sickness, provide valuable opportunities for cooperation: given the volatility of income and poor access to the formal insurance market, villagers have an incentive to help each other by lending money and providing food (Fafchamps 2010). However, the extent of cooperation among individuals varies with their incentive to share risk (Coate and Ravallion 1993; Fafchamps 1999; Kimball 1988; Kocherlakota 1996; Ligon et al. 2002). This suggests that the incentive for risk sharing could foster particularized trust by facilitating opportunities to cooperate. However, there is also a counterargument: people do not need to trust others if their cooperation is guaranteed by the incentive (Gambetta 1998; Sitkin and Roth 1993; Yamagishi and Yamagishi 1994). Therefore, the impact of incentive on particularized trust is not theoretically unambiguous.

The goal of this study is to test whether two villagers linked by a stronger incentive to share risk form higher particularized trust. I use experimental and survey data of 1,920 dyads, collected from 279 randomly selected households in 16 Bangladeshi villages. The incentive for risk sharing between individuals is characterized by their income correlation over eight agricultural seasons, including a period in which there was a devastating cyclone,

as well as by the trustee's income volatility and risk preference.[3] The cyclone caused damage to agricultural and non-agricultural income at both the community and household levels, providing opportunities to share risks during this period. This study elicits particularized trust by modifying the experimental design of Berg et al. (1995). One distinguishing feature of the current study's design is that the study was conducted under both anonymous and non-anonymous conditions in order to elicit generalized and particularized trust, respectively. The maximum amount of payoff from this game is equivalent to nine days' income in the study area. Furthermore, this study addresses the possibility that behavior in the game is affected by motives other than particularized trust, such as generalized trust, pure altruism, warm glow, risk preference, and the wealth effect.

Since particularized trust was elicited only once after the household survey, this study exploits the cross-sectional variation and regresses the current particularized trust on the incentive for risk sharing, as well as the trustor fixed effects and predetermined dyadic characteristics that could be associated with the baseline particularized trust. In order to address the potential endogeneity issue of income correlation and volatility, this study employs negative weather shocks such as drought and flood as instruments. An underlying assumption for the use of shock variables is that the timing of experiencing shocks is exogenous after controlling for the household fixed effects.

The empirical results obtained through the dyadic regression approach suggest a positive effect of the incentive for risk sharing on particularized trust. Particularized trust is higher when incomes are negatively correlated between the trustor and trustee, and when the trustee faces higher income volatility and is more risk-averse. Although this study cannot directly test the effect of incentive on the risk sharing behavior between the dyads due to the

[3] The negative income correlation between individuals increases the incentive for them to share risks. Similarly, those with higher income volatility face larger incentive to maintain the risk sharing arrangement.

limitation of data, it provides suggestive evidence that individuals are more likely to share risks with someone in the village where there is a higher incentive to do so.

This study closely relates to Gneezy et al. (2015), Durante (2009), and Shoji et al. (2012). Gneezy et al. (2015) conduct an anonymous trust game in two communities: sea fishermen who work in groups and lake fishermen who work individually. The authors find a significantly higher level of trust among the former than among the latter, implying that the experience of group activities facilitates trust in the community members. Durante (2009) finds that weather shocks experienced between the 16^{th} and 18^{th} centuries predict variation in the current generalized trust across European countries, presumably because the repeated experience of risk sharing over the centuries influenced personal predisposition. Shoji et al. (2012) evaluate the causal impact of the incentive for Sri Lankan farmers to contribute to community work—such as participation in community meetings and payment for religious festivals—on trust in villagers. The current study differs from the previous studies in that this study elicits particularized trust toward each community member and examines the dyadic relationship, while previous studies utilize the measures of trust on the whole community. The use of trust measure at the individual level allows us to uncover the underlying mechanism of trust formation in more detail, by exploiting the variation in particularized trust within one trustor across trustees. Furthermore, Durante (2009) and Shoji et al. (2012) elicit trust by using subjective questions; however, other scholars express serious doubts about the strength of such self-reported information (Glaeser et al. 2000). On the other hand, this study uses the experimental approach to quantify particularized trust.

This study attempts to make two further contributions to the literature. First, it is insightful to uncover the relationship between risk and trust in the context of developing countries. Since such countries suffer from poor access to formal insurance and contract

enforcement institutions, both risk sharing and trust are essential to their economic development. However, the findings herein with regard to the positive association between trust and the incentive for risk sharing predict that the introduction of formal insurance—which reduces the incentive for risk sharing—could break down trust. This could be an important contribution to our understanding of the effect of industrialization on social capital: an effect which has long been discussed (Miguel et al. 2006; Polanyi 1944/1957). Second, this study suggests the potentially negative effect of social proximity on trust. While some previous studies find a positive effect of social proximity on trust, there also exist studies that present insignificant effects (Aoyagi et al. 2014; Johansson-Stenman et al. 2009). The findings of this study might in part explain their results: proximity leads to positive income correlation, and therefore reduces the incentive to share risks.

The rest of this paper is organized as follows. Section 2 presents the conceptual framework and establishes the testable hypotheses of this study. Sections 3 and 4 describe the dataset and empirical strategy, respectively. Section 5 demonstrates the impact of incentive for risk sharing on particularized trust, and Section 6 examines the relationship between the incentive for and behavior of risk sharing. Finally, Section 7 concludes.

2. Conceptual Framework

2.1.Risk-Sharing Arrangements in Rural Economies

In developing countries, villagers' income fluctuates over time due to various risks, such as natural disasters, sickness, and unemployment. Given their poor access to formal insurance, they share risk to smooth consumption, by lending money and/or providing food to those who suffer from negative income shocks (Collins et al. 2009; Fafchamps 2010; Fafchamps and Lund 2003; Jack and Suri 2014; Platteau 1994a; 1994b; Udry 1994). Such a risk-sharing arrangement, therefore, plays the role of informal insurance, and it is a major source of

cooperation in the village economy.

Existing studies show evidence of risk-sharing arrangements in the rural economies (Ogaki and Zhang 2001; Park 2006; Townsend 1994); however, it has also been found that limited commitment problems crucially restrict the efficiency of risk sharing (Albarran and Attanasio 2003; Charness and Genicot 2009; Coate and Ravallion 1993; Dubois et al. 2008; Fafchamps 1999; Foster and Rosenzweig 2001; Kimball 1988; Kocherlakota 1996; Kruger and Perri 2006; Laczó 2014; Ligon et al. 2002). Since participation in risk-sharing arrangements is voluntary for the villagers, they can deviate from the arrangement at any time, without incurring any cost; however, such villagers are excluded from future arrangements and end up in an autarky economy. Therefore, efficient risk sharing can be observed only when the extrinsic incentive to maintain the arrangement is sufficiently high for all villagers. The incentive increases with an increase in the lifetime utility under the arrangement and a decrease in the lifetime utility under autarky. The former increases when incomes are negatively correlated between individuals, as it enables them to pool more risk; the latter decreases when income variation over time is high, and this effect becomes especially large for risk-averse individuals.

2.2. Definition of Trust

This study defines trust in line with Coleman (1990) and Fehr (2009): *an individual trusts if she voluntarily places resources at the disposal of another party without any legal commitment from the latter*. Trust therefore is a behavior motivated by a trusting belief and trusting preference (Coleman 1990). A trusting belief indicates a subjective expectation about a trustee's behavior, under the situation where the trustee does not have an extrinsic incentive to behave in a prosocial manner (Ashraf et al. 2006; Barr 2003; Sapienza et al. 2013). Trusting preference, on the other hand, is the willingness to take the risk of trusting behavior.

This social preference is referred to as betrayal aversion (Bohnet and Zeckhauser 2004; Bohnet et al. 2008; Koehler and Gershoff 2003). Trusting behavior is facilitated by three factors: (1) the expected level of trustee's trustworthiness, (2) the accuracy of the expected trustworthiness, and (3) the willingness to take the risk of trusting behavior. For those who exhibit betrayal aversion, an improvement in the accuracy of expected trustworthiness (the reduction of information asymmetries) has a positive effect on the trusting behavior.

Although one could take prosocial behavior by knowing that his or her opponent does not have an incentive to betray him or her, such behavior is not considered trust in the definition used here. Therefore, the definition used here differs from Hardin's (2002) *calculative trust*, which considers trust a rational expectation.[4]

2.3. Trust Formation Mechanism and Testable Hypotheses

Existing studies suggest that the incentive for risk sharing potentially increases the three factors mentioned above (Banfield 1958; Shapiro et al. 1992; Sheppard and Sherman 1998). In particular, Shapiro et al. (1992) claim that particularized trust is formed in three stages, and that the incentive of cooperation is a necessary condition for the first stage. In the first stage, the strong incentive to share risks between individuals enforces their cooperation, which could, in turn, cause them to collude.[5] Therefore, one believes that the probability for his/her opponent to betray him/her is low, given the incentive to share risks. In other words, calculative trust grows during this stage.

In the second stage, the frequent cooperation grounded in the incentive enhances regular communication between individuals. This helps them accumulate knowledge about the trustworthiness and personalities of each other. This knowledge, therefore, improves the

[4] Hardin's definition is in line with what Shapiro et al. (1992) call *deterrence-based trust* and what Yamagishi and Yamagishi (1994) call *assurance*.

[5] This is consistent with the argument of Murgai et al. (2002) and Genicott and Ray (2003).

accuracy of the trusting belief.

Finally, the repeated interactions help both the trustor and trustee form social preference. On the one hand, the trustee behaves in a more trustworthy manner, increasing the trustor's belief about the trustee's trustworthiness. On the other hand, the trustor becomes more willing to take the risk of trusting behavior as these interactions are experienced. Therefore, these studies suggest that even cooperation as a result of a self-interested motive could facilitate social preference toward the opponent.

Given this argument, this study tests the following hypothesis:

Hypothesis:

Individual i should exhibit higher particularized trust in j when:

(a) their incomes are negatively correlated, and

(b) variation in j's income is higher, and this causality becomes larger as j exhibits higher risk aversion.

However, this hypothesis is not theoretically unambiguous. Gambetta (1998), Sitkin and Roth (1993), and Yamagishi and Yamagishi (1994) claim that people do not need to trust others if their cooperation is guaranteed by the extrinsic incentive. If this is the case, we should rather observe the opposite or an insignificant relationship.

3. Data Description and Experimental Design

3.1. Household Survey

The study site is Satkhira district, located in southwest Bangladesh. This area is suitable for examining the incentive for risk sharing and trust formation: since it is located in a river-delta plain, the whole district is vulnerable to floods and cyclones. In particular, this district was

severely affected by cyclone Aila in May 2009. It killed 190 and affected 4 million people in the country. It also caused significant economic loss, destroying around 250,000 acres of cropland and killing 150,000 livestock.[6] The level of cyclone damage varied across villages and even between households within the same village. Therefore, it affected households as both covariate and idiosyncratic shocks, providing opportunities to share risks.

The household survey was conducted in the district in December 2010, 19 months after the cyclone. I employed a multistage stratified random sampling methodology. In the first stage, I selected the three sub-districts (*Upazila*) of Samnagar, Kaliganj, and Ashashoni, based on their economic status and the intensity of the cyclone damage. In the second stage, I randomly sampled two *Unions* from each sub-district.[7] In the next stage, four villages from each *Union* and one cluster (*Para*) from each of the villages were randomly selected. Finally, I selected 18 households from each *Para*.[8] Since five households were unavailable for the survey, I obtained a total of 427 of 432 sample households from 24 *Para*.

The questionnaire covered the magnitude of cyclone damage, evacuation behavior, geographical characteristics, crime incidence, self-reported social capital, demographic characteristics, asset holdings, savings, relief received from the government and non-government organizations, membership of microfinance institutions, food and non-food consumption, labor and non-labor income, experience of unanticipated shocks (floods, pest, asset loss, etc.), and bilateral relationships among the survey households.

The main independent variables are income correlation between trustor and trustee, and income variation of the trustee. In order to elicit this information, retrospective information was collected on household income and experience of weather shocks for eight periods over the January 2007–December 2010 period—namely, the dry and rainy seasons of

[6] Department of Disaster Management, accessed on April 18, 2014, http://www.dmb.gov.bd/pastdisaster.
[7] The *Union* is an administrative unit in Bangladesh; each *Union* contains multiple villages.
[8] In the survey area, the average *Para* size is 72.5 households.

each year. The weather shock variables are self-reported binary variables that take unity if the household experienced the shocks—such as drought or inundation—and zero otherwise. From this retrospective information, I compiled a pseudo-panel dataset. Therefore, eight-period panel data were available to compute variations in and correlations of household income. Since these data are retrospective and self-reported, they are likely to suffer from measurement error; this point is taken up in Section 4.2.

In the bilateral relationship module, the interviewers asked about current relationships with each of the other 17 survey households in the same *Para*. The collected information included the distances between their residences, and whether they attend the same mosque, temple, or church. In cases where the respondents did not know the opponents, they could not answer these questions, and so the dataset includes some missing values.

3.2. Experiment

Eight months after the household survey, the heads of the survey households in Kaliganj and Ashashoni were invited to partake in an economic experiment that used real money.[9] In cases where the household head was not available, the next senior person representing the household (usually the spouse) was recruited, to maintain the sample size. Ultimately, 279 of the 285 households participated in the experiment. The experiment was implemented at the local government office, and each day I conducted the experiment with 36 participants invited from two villages. All 36 participants were first gathered in a room, and they were then randomly allocated to two rooms. Each participant played the take-away game, dictator game, trust game with hidden action, risk preference game, and trust game; however, this study uses the results only from the dictator, risk preference, and trust games. The experimenters were hired in Bangladesh, and since participants had an average of fewer than

[9] The experiment in Samnagar was canceled due to flooding.

six years of schooling (Table 1), the experimenters explained the experimental design slowly and carefully. More details about the experimental procedure and instruction are described in the Online Appendix.

After finishing all the games, each participant rolled two colored dice. Each color represented a decision made during the games, and he/she received his/her payoff from only one randomly selected decision.[10] Therefore, the participants did not know from which decision they received the payoff, and were aware that each participant had earned money from a different decision. This payment process was explained to the participants prior to starting the first game. This process is important for two reasons. First, it alleviates the correlation of choices within participants across games due to the wealth effect. Second, if participants had been able to earn money from all games and discuss the payoffs after the experiment, they might have been able to infer the choices of the other participants. This would have violated participant anonymity and potentially affected their behavior.

3.2.1. Trust Game

This study used the trust game of Berg et al. (1995) to elicit particularized trust. This game is played by a randomly matched pair of participants. These participants are randomly assigned roles—namely, a first mover (trustor) and a second mover (trustee). When the game starts, the experimenter provides the first mover with an endowment of 300 Bangladeshi taka (BDT) and the second mover with nothing. This amount is equivalent to about three days' worth of income in the study area. In the first stage of this game, the first mover decides how much of the BDT300 to send to the second mover and how much to keep. He or she can send BDT300, 250, 200, 150, 100, 50, or none. The amount sent is tripled by the experimenter before it reaches the second mover. In the second stage, the second mover can return some of the

[10] Besides the payoff from the games, I also provided BDT100 as a participation fee. This is the same amount as the median daily wage, as per the survey data.

received amount to the first mover. Thus, the material payoff for the first and second movers is $300 - t + r$ and $3t - r$, respectively, where t and r denote the amount to be sent to the second mover and the amount to be returned to the first mover, respectively. The maximum amount of payoff from this game is BDT900 (to the second mover, when $t = 300$ and $r = 0$). In the study area, this is equivalent to nine days' worth of income.

A feature differentiating my experimental design from that of Berg et al. (1995) is that it is conducted under both anonymous and non-anonymous conditions, in order to elicit generalized and particularized trust, respectively.[11] The first mover first decides how much to send, without knowing to whom he or she is sending the money. After this, the participants make decisions under a non-anonymous condition: I randomly divided the 18 participants from the same *Para* into two groups (nine in each group), and the experimenter shows each participant the name list of the other eight participants in the same group to ask how much to send, if this game were played with each of them. Thus, eight dyadic observations were collected from each participant.

After all participants have made decisions in the role of first mover, they make decisions as the second mover. Again, they are asked how much to return under both anonymous and non-anonymous conditions; the experimenter initially informs each second mover how much he or she actually received from the paired first mover, but does not inform from whom he or she received it. After deciding how much to return under the anonymous condition, they are again shown the name list of the eight participants, and the participants decide the amount to return to each of them.[12]

[11] Although the strategy method has some potential concerns, Brandts and Charness (2011) shows that, based on the results of a large number of previous studies, the results of the strategy and direct-response methods are comparable.

[12] The pair was determined prior to the game, and therefore, the endowment was transferred between the real pair. However, the participants were not informed about the name of the real pair, but only the names of eight potential opponents.

In this game, the second mover has no extrinsic incentive to return money at the second stage. Expecting this, it is rational for the first mover to keep all the money. In other words, calculative trust does not exist for first movers. However, those who still expect trustworthy behavior from the second mover and/or those who are willing to trust him or her will send money. Therefore, the fraction the first mover sends to the second mover, $t/3$, captures trust, and the fraction that the second mover returns to the first mover, $100r/3t$, indicates trustworthiness.

3.2.2. Risk Preference Game

Risk preference is elicited based on the methodology of Schechter (2007b). This game is similar to that involving the first mover of the trust game, but it is played alone. When the game starts, the experimenter provides an endowment of BDT300 and a die. Participants decide how much to bet on the die. They can bet BDT300, 250, 200, 150, 100, 50, or none. After the participant decides how much to bet, he or she rolls the die. The payoff in this game depends on how much he or she bets on the die and the result of the bet, as follows: $300 + z(Odds - 1)$. Here, z denotes the amount participant i bets on the die, and $Odds$ takes 0 if the die lands on 1, 0.5 if the die lands on 2, 1 if the die lands on 3, 1.5 if the die lands on 4, 2 if the die lands on 5, and 2.5 if the die lands on 6. The level of risk aversion is measured by the proportion of endowment to be bet on the die, given that more risk-averse individuals are expected to bet lower amounts.

3.2.3. Dictator Game

This study uses the dictator game to elicit the pure altruism of participants. The experimental design follows that of Forsythe et al. (1994). This game is played anonymously by a randomly matched pair of participants, referred to as the dictator and recipient. When the

game starts, the experimenters provide an endowment of BDT400 to the dictator and nothing to the recipient. The dictator can then allocate BDT400, 350, 300, 250, 200, 150, 100, 50, or none to the recipient. The extent of pure altruism is measured by the proportion of endowment allocated to his or her recipient.[13] This study elicits this preference parameter from all participants by using the strategy method across the roles in the game.

3.3. Summary Statistics

Panel A of Table 1 reports the characteristics of the households that participated in both the household survey and experiment. The main industries in the area are agricultural crops and shrimp farming, but only one-half of the households own their land. With respect to cyclone damage, 32% of the sample households experienced inundation of their residence during cyclone Aila, and its average duration was 0.34 months; they were, however, able to ask 11.9 households in the village for help during that time, if they wished.[14] In fact, 19% of the survey households borrowed from neighbors, friends, or relatives after the cyclone, implying that risk sharing among villagers plays the role of insurance. However, still they could not fully smooth consumption and some households had to skip meals after the cyclone.

Panel B summarizes the retrospective information on household income and binary income shocks over the eight periods. The household income includes income from self-employed (farm and non-farm), employed (farm and non-farm), and rent income. The monthly average was around BDT4,200. In each period, negative income shocks such as inundation and drought occur with a probability of around 10–20%. The correlation coefficient of income among villagers is 0.28, on average.

Finally, Panel C presents the dyadic relationships among households in the same

[13] Since this game was conducted after a take-away game, the rule was explained in this context. See online appendix for details.

[14] The size of the risk-sharing network is quantified by responses to the following question: *How many households in the village could you ask for help, if you were in need?*

Para. The share of dyads connected by friendship is 91%, and the average household has known the other villagers for more than 20 years; additionally, 65% engage in the same occupation category (shrimp, agricultural crops, transportation, shopkeepers, and others).

Figure 1 presents the results of the experiment. Figures 1(a)–(d) depict the results of the trust game under anonymous and non-anonymous conditions. Out of 279 first movers, 64 sent the same amount to all the second movers. It appears that particularized trust is lower than generalized trust on average, and that the difference is statistically significant ($p < 0.01$). The results for trustworthiness also show a similar tendency.[15] Figure 1(e) shows the results of the risk preference game. The participants bet about 50% of their endowment on average; this is slightly higher than that observed in Schechter (2007b), who originally conducted this game in rural Paraguay.[16] Finally, Figure 1(f) shows the results of the dictator game. The average amount of transfer is 46%, which is comparable to the results in the other experiments conducted in developing countries (Cardenas and Carpenter 2008).

4. Empirical Strategy for Determinants of Particularized Trust

4.1.Estimation Model

This study elicits the level of individual *i*'s particularized trust toward individual *j* by employing the proportion of endowment transferred from *i* to *j* in the non-anonymous trust game. Although previous studies employ *i*'s expectation about the amount *j* will return (Barr 2003), this cannot capture the trusting preference or the accuracy of trusting belief, which are also important components of trust. A potential drawback of my measure is, however, that the amount of transfer can be attributed to other motives than particularized trust, such as generalized and particularized altruism, reputation building, risk preference, and generalized

[15] The data on trustworthiness include missing values, since 28 participants received nothing from the first mover.

[16] In Schechter's experiment, the average proportion that was bet was 43%.

trust. However, as I will argue in Section 5.1, these factors cannot fully explain the observed patterns of transfer.

Specifically, this section estimates the following dyadic regression model:

$$Trust_{vij} = \beta_0 + \beta_1 Corr_{vij} + \beta_2 SD_{vj} + \beta_3 SD_{vj} \times Bet_{vj} + \beta_4 Bet_{vj} + Prox_{vij}\beta_5 + X_{vj}\beta_6 + D_{vi} + \varepsilon_{vij}, \quad (1)$$

where $Trust_{vij}$ represents the proportion of endowment transferred from participant i (trustor) to j (trustee) in $Para\ v$; $Corr_{vij}$ denotes the correlation coefficient of incomes between households i and j; SD_{vj} denotes the standard deviation of household j's income;[17] and Bet_{vj} represents j's willingness to take risks, as quantified by the proportion of endowment bet in the risk preference game. The hypothesis predicts that $\beta_1 < 0$, $\beta_2 > 0$, and $\beta_3 < 0$. $Prox_{vij}$ includes social proximity variables such as geographic distance between their houses; two dummy variables representing the relationship between i and j, such as relative and stranger (the reference group is friend/acquaintance); and three dummy variables indicating whether the gender of the participants, the place of worship and occupations of the households are the same, respectively.[18] X_{vj} is j's characteristics, such as the proportion of endowment allocated in the dictator game (pure altruism), proportion returned in the trust game under the anonymous condition (generalized trustworthiness), and

[17] One may suggest the use of coefficient of variation rather than the standard deviation, given that the latter is positively correlated with the income level. However, it is inappropriate to use it, since the household income can take a negative value, particularly during disasters. Therefore, this study isolates the effect of average income by controlling for the holdings of productive assets.

[18] As explained in Section 3, the dyadic data—such as the distance between residences and whether they go to the same mosque/temple/church—are unobserved when individual i considers j as a stranger. In these cases, the missing data are replaced with 0, and a dummy variable for stranger is added to the independent variables (Greene 2011). Thus, the dummy for stranger captures both the social proximity effect and the effect of missing values in the dyadic characteristics.

asset holdings and demographics.[19] Finally, D_{vi} denotes the trustor (household) fixed effects, capturing the trustor's income volatility, generalized trust, risk preference, and socio-economic characteristics.

Given the dyadic structure of the model, the residuals could be correlated over *i* and over *j*. An approach to adjust the correlation of residuals is the use of dyadic standard errors proposed by Fafchamps and Gubert (2007). However, since the residuals may be correlated across households within *Para* as well, I use the clustered standard errors at *Para* level.

4.2. Endogeneity of Income Dynamics

An issue in the estimation of Equation (1) is endogeneity of income correlation ($Corr_{vij}$) and volatility (SD_{vj}). Social capital plays a significant role in the income-earning behavior in developing countries (Fafchamps 2004), and therefore, trust might also affect income correlation and volatility. In order to address this issue, I employ the method of Albarran and Attanasio (2003), which isolates the unanticipated component from the total income by estimating the following equation:

$$Income_{vjt} = \sum_{k=1}^{5} \gamma_k Shock_{vjtk} + D_{vj} + \epsilon_{vjt} \quad t = 1,2,\dots 8, \tag{2}$$

where $Income_{vjt}$ denotes household *j*'s seasonal income per month at period *t*; $Shock_{vjtk}$ takes unity if household *j* experiences exogenous income shock *k* at period *t*, and 0 otherwise; and D_{vj} represents household fixed effects that control for the anticipated component of income. The shock variables include inundation due to cyclones and floods; soil salinization caused by tidal waves; drought; pests, weeds, and animals; and the loss of productive assets. These weather shocks affect agricultural and non-agricultural labor income significantly, and

[19] In line with Schechter (2007a), participant *j*'s generalized trustworthiness is assumed to be exogenous for *i*.

the probability of being affected by the shocks is uncontrollable and unpredictable for households, after controlling for the household fixed effects that capture the geographic characteristics and time-invariant socio-economic characteristics. Therefore, I define the income explained by these shock variables, $\sum_{k=1}^{5} \hat{\gamma}_k Shock_{vjtk}$, as unanticipated income. Finally, I use the unanticipated income to compute the exogenous standard deviation and correlation coefficient. The estimation result of Equation (2) is reported in Table 2. As expected, the inundation of fields significantly affected household income.

The use of weather shocks for the instrument, however, has the following issues that need to be addressed. First, the characteristics of households vulnerable to the weather shocks may be systematically different from those who are not. For example, they work on the riverbank. They are also less concerned about risk management, and therefore do not invest in pump tube-wells or pesticides. However, the occupation and location of the working place are time-invariant, and the ownership of tube-well and input cost for farming do not change across seasons in the dataset.[20] Thus, the heterogeneity across households should be captured by the household fixed effects. After controlling for the fixed effects, the timing of shock should depend on exogenous factors, such as the precipitation in each season and the path of tropical cyclones.

Second, a positive correlation in the experience of shocks between two households may capture their geographic and socio-economic proximity. This has a direct positive effect on particularized trust (Etang et al. 2011). Although this study controls for various dyadic characteristics in Equation (1), the potential of unobserved characteristics leads to the violation of exclusion restriction. However, as long as the estimated impact of income correlation on particularized trust is negative, this issue should not affect the interpretation of results.

[20] The statistics is not reported in the paper but available from the author upon request.

The third issue pertains to reverse causality; an increase in one's trust in a particular neighbor might influence his/her income earning behavior and therefore the probability of being affected by the weather shocks. However, given that the average household can call for help to as many as 11.9 neighbors (Table 1), it is unlikely that the development of trust in a neighbor can be that influential. Nevertheless, for those with a small risk sharing network, this might be possible. Therefore, as a robustness check, in Section 5.2 this study estimates Equation (1) excluding the households that can call for help to fewer than five neighbors.

Fourth, given that the shock variables are self-reported, some households may over-report their hardships more than others, even though their actual damages are comparable, violating the exclusion restriction of the instrument. However, if one's tendency to over-report is time-invariant, the household fixed effects in Equation (2) should be able to mitigate this problem. This assumption is likely to hold, since the data on the shock variables were surveyed only once in December 2010. Therefore, the criteria for reporting the shocks could be the same across the eight periods. Nevertheless, one might still be concerned that the recall bias causes the measurement error in the shocks of the earlier period to be more serious, particularly if the household head is older. Therefore, in Section 5.2, this study estimates the model that excludes households where the head is aged over 60.

Fifth, the correlation and volatility of unanticipated income may affect particularized trust through channels other than the incentive for risk sharing. For example, the dyads that were affected by negative shocks at the same time may feel emotional sympathy, and this facilitates particularized trust even without sharing their risks. Furthermore, those who experience negative shocks more frequently may spend more time on income-earning activities, and have fewer opportunities to communicate with the neighbors, suggesting the negative effect of trustee's income variation on particularized trust (Shoji et al. 2012). However, again, they cannot explain the negative impact of income correlation and the

positive impact of trustee's income volatility.

Sixth, Table 2 shows that the instruments are weak: F-value for the joint significance of the instruments is 4.45. This is presumably because the instruments are self-reported and binary variables, and hence cannot measure the severity of shocks. This measurement error causes the attenuation bias in the first-stage result. Therefore, the coefficients of $Corr_{ij}$ and SD_j in the second stage should be biased to the direction of OLS estimates, and the standard errors become larger. This issue is discussed in the next section by comparing the results of OLS and IV.

Finally, this approach makes the correlation coefficient unidentified for 39% of the dyads; 64 households reported no shocks during the survey periods, causing the variation in unanticipated income to be zero. Therefore, in line with Greene (2011), I replace the correlation coefficient with zero for such dyads and run the regressions with an additional independent variable that takes unity if the correlation is unidentifiable and 0 otherwise. Furthermore, since these 64 households may not have answered the household survey seriously, as a robustness check this study also estimates the model without these households, in Section 5.2.

5. The Impact on Particularized Trust

5.1. Benchmark Result

Table 3 presents the estimation results of Equation (1). The table shows the positive effect of the incentive for the risk-sharing arrangement; particularized trust is high if incomes are negatively correlated between the trustor and trustee. A high standard deviation in the trustee's income is also positively associated with trust, and the impact is larger among risk-averse trustees. In addition, the findings here are robust to the issue of weak instrument; first, the signs of these coefficients are the same in the OLS and IV estimations, and the

absolute values of IV coefficients are larger. Second, the standard errors in the IV estimates are larger, but the coefficients are still statistically significant.

Importantly, however, the dependent variable might be affected by motives other than particularized trust. First, the proportion of transfer is attributed to the trustor's generalized trust, risk preference, generalized pure/impure altruism, and fairness (Ashraf et al. 2006; Cox 2004; Ligon and Schechter 2012; Schechter 2007b). In addition, given that the participants made decisions in front of the experimenter, concerns about their social image in the eyes of the experimenters could have potentially affected their behavior. However, presuming that the impact of these factors does not vary across the eight trustees, the trustor fixed effects, D_i, can capture these effects.

Second, the incentive for risk sharing might increase the transfer through the development of particularized altruism to *j* rather than trust to *j*. However, the table suggests that it cannot fully explain the patterns of transfer. If particularized altruism drives the larger amount of transfer, the trustors should transfer more endowment to the poor and cyclone-affected individuals, who can yield a larger utility gain from the transfer. Therefore, we should observe the negative coefficients of the trustee's asset holdings and education, and the positive coefficient of cyclone damage. Such results are, however, not observed.

Third, if the participants do not perceive the behavior in the experiment to be fully anonymous, they may transfer more to the opponents who they will ask for help in the future (i.e., those with high incentive to share risks), so that they can build reputation. However, if this is the case, they should transfer more to the opponents who they got to know recently too, because the marginal effect of transfer on building reputation is expected to be larger. The table, however, shows the opposite effect.

Regarding the other independent variables, most social proximity variables—such as kinship, gender, occupation, and religion—are insignificant. The coefficient of dummy for

stranger is positive because it captures the influence of unmeasured dyadic characteristics as mentioned in Footnote 18. In addition, the trustor does not necessarily trust a trustworthy and/or altruistic trustee; this finding is consistent with those of Fershtman and Gneezy (2001) and Binzel and Fehr (2013), while it is inconsistent with that of Falk and Zehnder (2013). The result does not change qualitatively when controlling for particularized rather than generalized trustworthiness.[21] This may be because the main motive for the transfer to *j* is high willingness to adopt trusting behavior rather than high expected trustworthiness.

5.2. Robustness Checks

First, as discussed in Section 4.2, this section estimates Equation (1) without the samples of: 1) the households which can ask for help to fewer than 5 neighbors; 2) the households whose heads are aged over 60; and 3) the households which did not report any weather shocks. Table 4 presents the results. They do not change qualitatively, supporting the validity of my identification strategy.

Second, the benchmark specification uses the clustered standard errors at the *Para* level. However, this might not fully adjust the correlation of residuals, given that this dataset contains only 16 *Para*.[22] Therefore, for robustness, I also employ the wild bootstrap clustered standard errors proposed by Cameron et al. (2008). The results are reported in Table 5. The results do not change qualitatively.

Finally, this section also estimates the impact of incentive to share risks on individual *j*'s trustworthiness to *i*. Specifically, the following equation is estimated:

$$Trustworthiness_{vji} = \beta_0 + \beta_1 Corr_{vij} + \beta_2 SD_{vj} + \beta_3 SD_{vj} \times Bet_{vj} + \beta_4 Bet_{vj} + Prox_{vji}\beta_5 + X_{vj}\beta_6 + \beta_7 Receive_{vj} + D_{vi} + \varepsilon_{vji}. \quad (3)$$

[21] The estimation result is not reported in this paper, but is available from the author upon request.
[22] The asymptotic approximation relevant for clustered data relies on a large number of clusters.

The dependent variable is the fraction of the received amount returned to i. This model additionally controls for the proportion of endowment received from the paired trustor, $Receive_{vj}$. Table 6 presents the results. Although the coefficients in the IV estimation are not statistically significant and the income volatility presents the opposite effect, the OLS estimation shows the result in line with the expectation. Pertaining to the other independent variables, particularized trustworthiness is positively correlated with the trustee's altruism, consistent with Ashraf et al. (2006).

6. Incentive and Risk-Sharing Behavior

Thus far, this study assumes that the incentive for risk sharing facilitates risk sharing behavior, such as informal loan transactions among villagers. This section tests the validity of this assumption. It is straightforward to investigate the impact of incentive to share risks between a dyad on their transactions. However, such information is unfortunately unavailable in this dataset, and therefore this study provides suggestive evidence by examining the consumption and borrowing behavior at the household level. Specifically, it tests whether the households in the face of idiosyncratic income loss due to the cyclone: 1) borrow more from community members, and thus 2) smooth consumption more, in the community with higher incentive to share risk with the neighbors than in the community with lower incentive.

It is important to examine both borrowing and consumption behavior because the households may smooth consumption via various coping strategies. The focus on only borrowing behavior ignores other risk sharing behavior such as remittance. While the analysis of consumption helps us understand the overall patterns of consumption smoothing, the drawback is that this may also be attributed to other consumption smoothing devices such as disaster relief from the government.

First, the following borrowing equation is estimated:

$$Borrow_{vi} = \Delta Income_{vi}(\beta_1 + \overline{Corr_{vi}}\beta_2 + \overline{SD_v}\beta_3) + \overline{Prox_{vi}}\beta_4 + X_{vi}\beta_5 + V_v + \varepsilon_{vi} \quad (4)$$

where $Borrow_{vi}$ is the amount of informal loans which household i in *Para* v borrowed from his or her relatives, neighbors, and friends within 12 months after the cyclone in 2009. $\Delta Income_{vi}$ is the first difference of monthly income between the agricultural season before the cyclone and the season after.[23] This variable is instrumented by the specification employed in Equation (2). $\overline{Corr_{vi}}$, $\overline{SD_v}$, and $\overline{Prox_{vi}}$ are the mean of $Corr_{vij}$, SD_{vj}, and $Prox_{vij}$ over the households in the *Para*, respectively. Finally V_v indicates the *Para* fixed effects. In this specification, it is expected that $\beta_1 < 0$, $\beta_2 > 0$, and $\beta_3 < 0$.

The estimation result from a Tobit model is reported in Columns 1 and 2 of Table 7. Column 1 presents that the households in the average community borrow from informal sources in the face of negative income shocks. Particularly, the association between them is larger when the household income is negatively correlated with the neighbors' income, consistent with the expectation (Column 2). The coefficient of interaction between the average income volatility and the income shock is counter-intuitively positive, although the coefficient is statistically insignificant.

Second, this section also estimates the determinants of change in the meal frequency as an approximation of food consumption. Negative shocks cause the members of poor and uninsured households, particularly unproductive members such as females and elders, to skip meals (Behrman and Deolalikar 1990, Shoji 2010). An advantage of exploring the meal frequency rather than the value of food consumption is that it is less likely to be affected by recall bias. Since the frequency could vary across individuals within a household, I compute

[23] The dependent variable does not take the first difference, given that the informal loans were rarely observed in the period before the cyclone.

the average meal frequency over the household members. While all the members in most households took three meals a day before the cyclone, the average frequency went down to 2.75 meals after the cyclone (Table 1). The dependent variable here is the first difference between the season before the cyclone and the season after, and the independent variables are the same as the borrowing equation. It is expected that $\beta_1 > 0$, $\beta_2 > 0$, and $\beta_3 < 0$.

Columns 3 and 4 in Table 7 present the result on the meal frequency, suggesting that the incentive for risk sharing in fact facilitates consumption smoothing. The coefficient of income change is positive and significant, while that of its interaction with income volatility is negatively significant. This is in line with the prediction. Furthermore, although the interaction with the income correlation is statistically insignificant, when the average income correlation with neighbors is -0.3, the significant correlation between income shock and meal frequency disappears. I also estimate an alternative model where the meal frequency of each household member is weighted by the adult equivalent scale. The result is not reported in this paper but does not change qualitatively.

Finally, the determinants of disaster relief from the government and NGOs are analyzed with a Tobit model in Columns 5 and 6, given that the result of meal frequency might be driven by effective disaster relief. It appears that the average income volatility rather reduces the effectiveness of disaster relief as a risk coping device. Therefore, the result in Column (4) cannot be explained by the efficient allocation of disaster relief. Overall, these findings strengthen the validity of underlying assumption of this study.

7. Conclusions

This study shows that the incentive to share risk facilitates particularized trust formation among villagers in rural Bangladesh. It also provides suggestive evidence that the higher trust is caused by the increased opportunities of cooperation. Combining this argument with those

of previous studies suggests the potential of a poverty trap. It has been shown in the literature that an increase in trust helps individuals achieve more efficient risk sharing (Carter and Castillo 2005; Carter and Maluccio 2003; Ligon and Schechter 2012). On the other hand, the findings of this study indicate that a stronger incentive for risk sharing also causes higher trust. Thus, community members with low initial trust might experience a slower growth of trust than those with high initial trust.

Some possible policy implications may be derived, given that the provision of incentive for cooperation is found to facilitate social capital. Improvements to formal institutions so as to help villagers smooth consumption for idiosyncratic shocks can diminish trust among villagers, since it makes them less dependent on informal risk sharing. This in turn offsets returns to programs by lowering the efficiency of risk sharing. Such trust-reducing policies include the introduction of health insurance, an increase in the wages of unskilled labor, and reductions in the transaction costs of livestock sales. On the other hand, participation in microfinance might enhance trust, as it strengthens potential punishments against deviation. In line with this, there is empirical evidence showing the positive effect of microfinance participation on social capital (Feigenberg et al. 2013). Furthermore, job training programs that introduce a new industry in the community may also increase particularized trust, since they cause the income dynamics of villagers to become less correlated, and increase the net gains derived from risk sharing.

Finally, although this study finds an insignificant effect of social proximity on particularized trust, it does not necessarily rule out its importance in a general setting. The participants of this experiment are villagers in rural Bangladesh, and they are closely connected with each other and communicate frequently. Assuming the decreasing marginal effect of proximity on trust formation, the proximity measures used in this study may not fully capture variations in social proximity in such communities.

Additional Supporting information may be found in the online version of this article:

Appendix. Experimental Procedure and Instructions.

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Figure legends

Figure 1: Result of Experiments

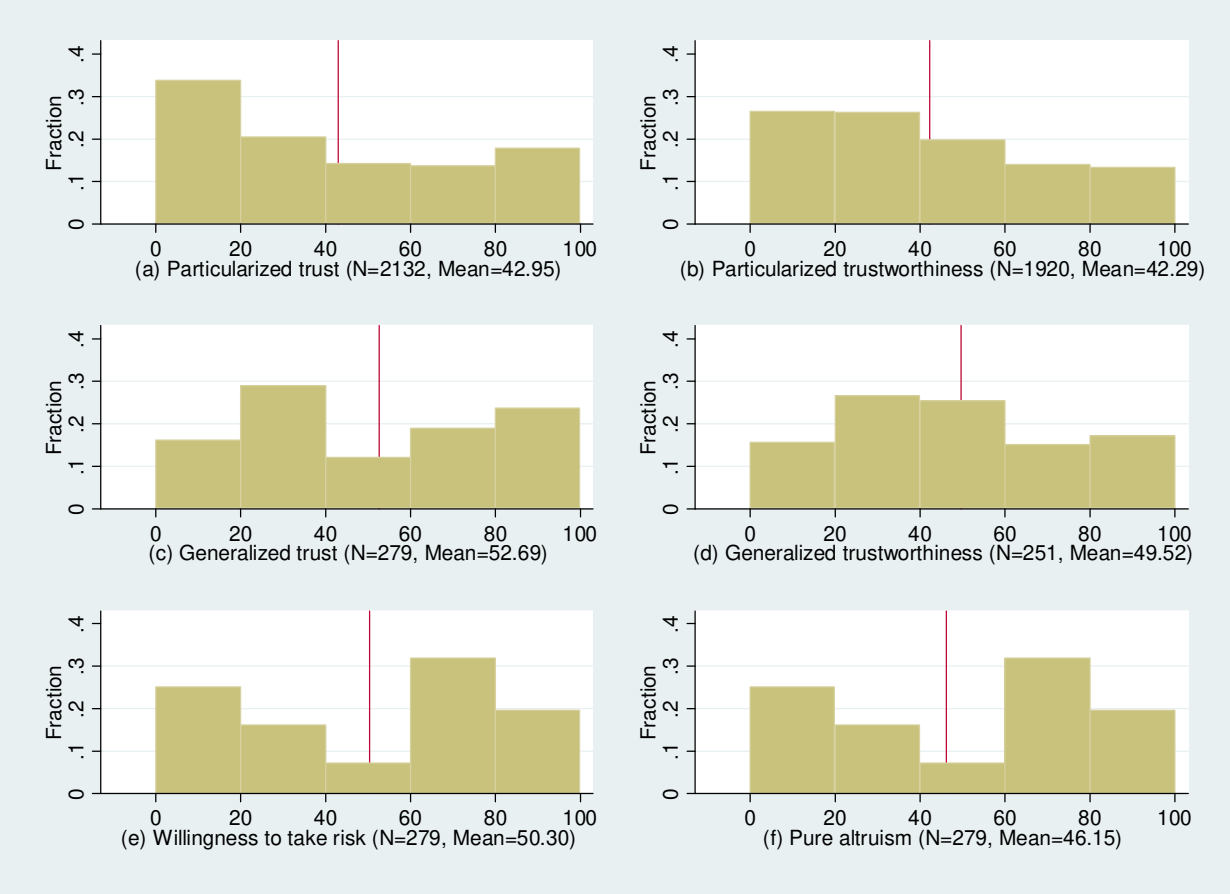

Figure 1: Result of Experiments

Table 1: Summary Statistics

Symbol	Variables	Obs.	Mean	Std. Dev.
Panel A: Household/ individual characteristics				
X	1 if the household engages in farming of crops or shrimp	279	0.76	
X	1 if the household engages in processing of crops or shrimp	279	0.13	
X	Value of land assets (10^6 Tk)	279	0.16	0.39
	1 if land assets > 0	279	0.47	
X	Value of liquid assets (10^6 Tk) [#]	279	0.03	0.06
X	Inundation of residence due to cyclone Aila (months)	279	0.34	0.66
	1 if months of duration > 0	279	0.32	
	The number of households available to ask for helps in the village	279	11.9	11.4
Borrow	The amount of loan from neighbor, friend or relative within 12 months after the cyclone (10^3 Tk)	279	0.002	0.006
	1 if the amount of loans before the cyclone >0	279	0.06	
	1 if the amount of loans after the cyclone >0	279	0.19	
	Average meal frequency over household members before the cyclone	279	2.99	0.10
	Average meal frequency over household members after the cyclone	279	2.75	0.45
X	Age of experiment participant	279	35.81	13.71
X	Schooling years of experiment participant	279	5.84	4.07
Panel B: Retrospective characteristics				
Income	Seasonal income (Tk 1000/month)	2136	4.22	4.20
Shock	1 if experience saline soil	2136	0.14	0.35
Shock	1 if experience inundation	2136	0.13	0.33
Shock	1 if experience drought	2136	0.11	0.31
Shock	1 if experience pest, weed, animals	2136	0.19	0.39
Shock	1 if experience any asset loss	2136	0.10	0.30
SD	Standard deviation of seasonal income (1000 Tk/month)	279	1.45	2.96
Corr	Correlation of labor income between i and j	2132	0.28	0.42
Panel C: Dyadic characteristics				
Proximity	Distance between i and j's houses (km)	2062	0.15	0.15
Proximity	1 if household i considers j as a stranger	2132	0.03	
	1 if household i considers j as a friend/acquaintance (reference)	2132	0.91	
Proximity	1 if i and j are relatives	2132	0.06	
Proximity	Years since i gets to know j	2132	22.68	9.91
Proximity	1 if i and j go to the same mosque/temple/church	2062	0.85	
Proximity	1 if gender of experiment participants are the same	2132	0.62	
Proximity	1 if i and j engage in the same occupation category [##]	2132	0.65	

[#] Liquid assets include livestock, cell phone, grain storage, deposit at the bank account, jewelry, and cash.

[##] It takes unity if both households are included in the same occupation categories, such as shrimp (farming and processing), crops (farming and processing), transportation, and shopkeepers.

Table 2: First Stage Regression
Dependent Variable: Seasonal Income (BDT 1000/month)

	(1)
1 if experience saline soil	-320.545
	(315.641)
1 if experience inundation	-865.569***
	(238.073)
1 if experience drought	11.069
	(335.815)
1 if experience pest, weed, animals	658.050
	(407.153)
1 if experience any asset loss	-73.969
	(329.327)
Observations	3,416
Number of Households	427
H_0: coefficients of shock variables are jointly zero (F-value)	4.45***
Household FE	Yes

Standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 3: The Impact of Incentive on Particularized Trust
Dependent Variable: Fraction of Endowment Transferred from the Trustor to the Trustee

	IV	OLS	IV	OLS	IV	OLS
	(1)	(2)	(3)	(4)	(5)	(6)
Dyadic Characteristics						
Income correlation[#]	-2.328*	-2.110**			-2.318*	-2.383**
	(1.210)	(0.931)			(1.276)	(0.948)
1 if correlation is unidentified	0.829				2.035	
	(1.586)				(2.123)	
Years since knowing	0.335***	0.332***	0.331***	0.334***	0.338***	0.337***
	(0.073)	(0.074)	(0.072)	(0.074)	(0.072)	(0.076)
1 if relative	0.083	-0.118	-0.154	-0.112	0.045	-0.180
	(2.779)	(2.800)	(2.787)	(2.797)	(2.818)	(2.807)
1 if stranger	5.404*	5.299*	5.685*	5.120*	5.646*	4.955*
	(2.618)	(2.605)	(2.736)	(2.563)	(2.693)	(2.520)
1 if the participants' gender are the same	0.927	0.803	0.995	1.022	1.037	0.889
	(1.285)	(1.300)	(1.296)	(1.289)	(1.302)	(1.303)
1 if the same occupation category	-0.001	0.246	0.023	0.016	0.113	0.307
	(1.547)	(1.521)	(1.580)	(1.569)	(1.517)	(1.526)
1 if going to the same mosque	-1.194	-1.287	-1.134	-1.445	-1.148	-1.580
	(2.783)	(2.700)	(2.801)	(2.686)	(2.853)	(2.646)
Distance between houses (km)	1.947	2.246	2.700	2.382	2.138	2.191
	(5.345)	(5.298)	(5.336)	(5.374)	(5.437)	(5.349)
Trustee Characteristics						
S.D. of income			7.573*	0.040	10.160**	-0.005
			(3.891)	(0.057)	(4.612)	(0.055)
S.D. × % bet in the risk preference game			-0.116**	-0.007**	-0.114**	-0.007**
			(0.052)	(0.003)	(0.052)	(0.003)
% bet in the risk preference game	-0.002	-0.001	0.026*	0.011	0.026*	0.010
	(0.014)	(0.014)	(0.015)	(0.014)	(0.014)	(0.014)
Generalized trustworthiness	-0.016	-0.016	-0.014	-0.019	-0.014	-0.020
	(0.013)	(0.013)	(0.012)	(0.014)	(0.012)	(0.014)
% allocated in the dictator game	-0.012	-0.014	-0.013	-0.011	-0.011	-0.010
	(0.016)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)
Age of participant	-0.041	-0.049	-0.051	-0.055	-0.051	-0.064
	(0.035)	(0.038)	(0.036)	(0.037)	(0.034)	(0.040)
Schooling years of participant	-0.075	-0.098	-0.105	-0.075	-0.095	-0.090
	(0.093)	(0.106)	(0.100)	(0.091)	(0.096)	(0.100)
Land holdings	0.048	-0.170	0.010	0.116	0.291	0.204
	(1.347)	(1.338)	(1.287)	(1.490)	(1.287)	(1.507)
Liquid assets	-0.181	0.472	-1.954	0.366	-2.548	1.240
	(11.217)	(11.084)	(11.214)	(10.889)	(11.285)	(10.842)
1 if engaging in farming	1.360	1.082	1.261	1.553	1.058	1.264
	(1.593)	(1.622)	(1.651)	(1.645)	(1.611)	(1.646)
1 if engaging in processing	3.417**	2.827*	2.965**	3.261**	3.254**	2.919*
	(1.340)	(1.429)	(1.350)	(1.355)	(1.308)	(1.417)
Inundation of residence (Months)	-0.194	-0.304	-0.504	-0.246	-0.429	-0.239
	(0.795)	(0.840)	(0.799)	(0.821)	(0.780)	(0.835)
Observations	1,920	1,920	1,920	1,920	1,920	1,920
Number of trustors	279	279	279	279	279	279
Trustor FE	Yes	Yes	Yes	Yes	Yes	Yes

Clustered standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 4: Robustness Checks for Different Sample Restrictions

Sample:	Risk sharing network larger than five		Household head aged 60 or less		Experienced weather shocks at least once	
	IV	OLS	IV	OLS	IV	OLS
	(1)	(2)	(3)	(4)	(5)	(6)
Dyadic Characteristics						
Income correlation	-2.853*	-2.587**	-2.996*	-3.191***	-4.191**	-2.544*
	(1.448)	(1.160)	(1.647)	(0.927)	(1.759)	(1.397)
1 if correlation is unidentified	3.215		2.364			
	(2.196)		(2.481)			
Years since knowing	0.351***	0.345***	0.357***	0.357***	0.248***	0.258***
	(0.086)	(0.091)	(0.079)	(0.080)	(0.071)	(0.076)
1 if relative	-0.553	-0.945	-0.608	-0.943	-0.654	-0.892
	(2.673)	(2.542)	(2.453)	(2.508)	(3.162)	(3.121)
1 if stranger	3.187	2.549	6.524*	5.440*	4.858	4.672
	(3.476)	(3.242)	(3.196)	(3.036)	(4.233)	(4.498)
1 if the participants' gender are the same	1.108	0.887	1.566	1.309	0.065	-0.106
	(1.526)	(1.528)	(1.532)	(1.533)	(1.263)	(1.292)
1 if the same occupation category	0.201	0.381	0.381	0.711	3.838	4.044
	(1.485)	(1.437)	(1.724)	(1.776)	(2.451)	(2.383)
1 if going to the same mosque	-2.540	-2.850	-1.484	-2.026	2.085	1.331
	(3.177)	(2.850)	(2.618)	(2.479)	(1.429)	(1.602)
Distance between houses (km)	1.790	2.273	2.508	2.115	1.036	1.758
	(4.567)	(4.481)	(6.060)	(5.867)	(6.442)	(6.181)
Trustee Characteristics						
S.D. of income	12.822**	-0.011	10.473*	-0.043	16.976***	-0.032
	(5.272)	-0.054	(5.388)	(0.070)	(4.023)	(0.099)
S.D. × % bet in the risk preference game	-0.145**	-0.008**	-0.108	-0.008**	-0.160**	-0.007***
	(0.052)	(0.003)	(0.063)	(0.003)	(0.070)	(0.002)
% bet in the risk preference game	0.027*	0.007	0.023	0.009	0.038	-0.005
	(0.016)	(0.016)	(0.015)	(0.017)	(0.024)	(0.017)
Generalized trustworthiness	-0.018	-0.024	-0.011	-0.017	-0.025	-0.029
	(0.014)	(0.017)	(0.013)	(0.014)	(0.017)	(0.019)
% allocated in the dictator game	-0.004	-0.003	-0.010	-0.009	-0.022	-0.020
	(0.015)	(0.016)	(0.016)	(0.017)	(0.019)	(0.020)
Age of participant	-0.053	-0.066	-0.057	-0.076*	-0.073**	-0.089*
	(0.040)	(0.048)	(0.034)	(0.040)	(0.029)	(0.043)
Schooling years of participant	-0.054	-0.047	-0.127	-0.131	-0.131	-0.147
	(0.087)	(0.096)	(0.116)	(0.125)	(0.119)	(0.116)
Land holdings	1.336	1.126	-0.553	-0.544	1.140	1.064
	(1.525)	(1.708)	(1.152)	(1.291)	(1.388)	(1.661)
Liquid assets	-4.896	-1.091	-4.892	-0.257	-5.046	0.079
	(12.581)	(12.134)	(11.426)	(11.191)	(6.446)	(5.988)
1 if engaging in farming	-0.418	-0.159	1.528	1.693	-1.708	-0.553
	(2.197)	(2.106)	(1.632)	(1.688)	(2.572)	(2.831)
1 if engaging in processing	2.933**	2.450	4.497**	3.994**	1.076	0.972
	(1.373)	(1.479)	(1.577)	(1.653)	(1.526)	(1.680)
Inundation of residence (Months)	-0.241	-0.060	-0.656	-0.477	-0.816	-0.365
	(0.772)	(0.874)	(0.868)	(0.906)	(1.004)	(1.016)
Observations	1,640	1,640	1,716	1,716	1,168	1,168
Number of trustors	238	238	250	250	206	206
Trustor FE	Yes	Yes	Yes	Yes	Yes	Yes

Clustered standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 5: Wild Bootstrap Clustered Standard Errors

	IV	OLS
	(1)	(2)
Income correlation	-2.318*	-2.383**
	(0.096)	(0.032)
1 if correlation is unidentified	2.035	
	(0.42)	
S.D. of income	10.160*	-0.005
	(0.096)	(0.944)
S.D. × % bet in the risk preference game	-0.114**	-0.007*
	(0.044)	(0.096)
Observations	1,920	1,920
Number of trustors	279	279
Trustor FE	Yes	Yes

Wild bootstrap p-values proposed by Cameron et al. (2008) are in parentheses (500 bootstrap replications, with imposing the null hypothesis). *** p<0.01, ** p<0.05, * p<0.1
Since the coefficients are the same as Table 3, only the result on the coefficients of interest is reported.

Table 6: The Impact on Particularized Trustworthiness
Dependent Variable: Fraction of Received Money Returned to the Trustor

	IV	OLS	IV	OLS	IV	OLS
	(1)	(2)	(3)	(4)	(5)	(6)
Dyadic Characteristics						
Income correlation	-0.126	-3.897*			-0.079	-4.272**
	(4.643)	(1.983)			(4.812)	(1.677)
1 if correlation is unidentified	6.838				0.736	
	(5.603)				(7.151)	
Years since knowing	-0.130	-0.152	-0.135	-0.145	-0.133	-0.139
	(0.108)	(0.104)	(0.113)	(0.095)	(0.115)	(0.094)
1 if relative	0.534	0.131	0.272	0.100	0.307	-0.033
	(3.613)	(3.475)	(3.603)	(3.436)	(3.652)	(3.428)
1 if stranger	-13.115**	-13.863**	-12.804*	-14.838**	-12.783*	-15.156**
	(6.030)	(5.916)	(6.215)	(6.173)	(6.221)	(6.094)
1 if the participants' gender are the same	3.154*	3.107*	2.698	3.638*	2.700	3.402*
	(1.736)	(1.723)	(1.606)	(1.728)	(1.602)	(1.769)
1 if the same occupation category	-3.914	-4.232	-4.083	-4.398	-4.020	-3.877
	(3.445)	(3.235)	(3.103)	(3.229)	(3.353)	(3.267)
1 if going to the same mosque	-1.027	-1.214	-1.141	-2.261	-1.143	-2.542
	(4.986)	(4.822)	(4.984)	(5.262)	(4.995)	(5.230)
Distance between houses (km)	-7.657	-7.566	-6.980	-7.209	-7.042	-7.513
	(6.854)	(6.807)	(7.072)	(7.261)	(7.029)	(7.186)
Trustee Characteristics						
S.D. of income			-21.854	0.669**	-21.161	0.585**
			(14.764)	(0.258)	(13.635)	(0.263)
S.D. × % bet in the risk preference game			0.008	-0.033*	0.009	-0.033*
			(0.213)	(0.017)	(0.215)	(0.017)
% bet in the risk preference game	0.055	0.054	0.044	0.107	0.045	0.106
	(0.071)	(0.070)	(0.102)	(0.072)	(0.100)	(0.072)
% allocated in the dictator game	0.280***	0.274***	0.279***	0.281***	0.280***	0.282***
	(0.061)	(0.062)	(0.060)	(0.064)	(0.060)	(0.063)
Age of participant	-0.033	-0.047	-0.025	-0.087	-0.026	-0.105
	(0.102)	(0.107)	(0.106)	(0.094)	(0.106)	(0.098)
Schooling years of participant	0.894*	0.857*	0.907*	0.932*	0.908*	0.905*
	(0.489)	(0.473)	(0.487)	(0.469)	(0.492)	(0.468)
Land holdings	0.124	-0.255	-0.096	0.392	-0.053	0.568
	(4.984)	(5.007)	(5.050)	(5.464)	(4.955)	(5.522)
Liquid assets	-1.071	-3.487	6.152	-2.830	6.172	-1.580
	(34.599)	(37.024)	(31.815)	(35.055)	(31.891)	(34.863)
1 if engaging in farming	4.886	4.326	6.478	5.421	6.430	4.927
	(3.505)	(3.362)	(3.742)	(3.612)	(3.845)	(3.491)
1 if engaging in processing	3.999	2.719	3.652	2.756	3.712	2.136
	(4.455)	(4.205)	(4.249)	(4.679)	(4.290)	(4.548)
Inundation of residence (Months)	3.627	3.110	4.094	3.241	4.119	3.251
	(3.691)	(3.590)	(3.612)	(3.509)	(3.702)	(3.541)
The amount received from trustor (Tk)	-0.036	-0.033	-0.038	-0.032	-0.038	-0.031
	(0.026)	(0.028)	(0.025)	(0.028)	(0.025)	(0.028)
Observations	1,920	1,920	1,920	1,920	1,920	1,920
Number of trustors	279	279	279	279	279	279
Trustor FE	Yes	Yes	Yes	Yes	Yes	Yes

Clustered standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 7: Incentive and Risk Sharing Behavior

Dependent variable:	Informal loans		Meal frequency		Disaster relief	
	IV	IV	IV	IV	IV	IV
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta Income$	-9.57*	-36.12***	0.023	0.365**	1.09	-17.73*
	(5.29)	(11.30)	(0.062)	(0.170)	(2.46)	(9.97)
$\Delta Income$ x $\overline{Corr}$		33.10***		0.073		2.99
		(11.53)		(0.289)		(8.50)
1 if $\overline{Corr}$ is unidentified		1.45		0.089*		2.73
		(7.32)		(0.046)		(4.51)
$\Delta Income$ x $\overline{SD}$		35.74		-1.338**		58.92*
		(29.79)		(0.548)		(31.95)
Household Characteristics						
% bet in the risk preference game	0.06	0.07*	-0.000	-0.001	0.02	0.03
	(0.04)	(0.04)	(0.001)	(0.001)	(0.06)	(0.06)
Generalized trustworthiness	0.06	0.04	0.001	0.001	-0.09	-0.11
	(0.09)	(0.08)	(0.001)	(0.001)	(0.09)	(0.09)
% allocated in the dictator game	-0.02	0.00	-0.001	-0.001	0.01	0.03
	(0.05)	(0.05)	(0.001)	(0.001)	(0.04)	(0.04)
Age of participant	-0.07	-0.07	0.002	0.002	0.30**	0.29**
	(0.16)	(0.17)	(0.002)	(0.002)	(0.13)	(0.13)
Schooling years of participant	0.12	0.09	0.008	0.010	0.40	0.37
	(0.47)	(0.49)	(0.008)	(0.008)	(0.36)	(0.35)
Land holdings	-12.68	-12.77	-0.011	-0.009	-7.55	-7.13
	(12.74)	(13.44)	(0.100)	(0.100)	(7.43)	(7.24)
Liquid assets	62.53***	49.29**	-0.551	-0.380	14.47	1.53
	(23.25)	(23.01)	(0.701)	(0.849)	(44.17)	(50.54)
1 if engaging in farming	-1.91	-3.30	-0.103	-0.118	-0.10	0.13
	(3.16)	(3.30)	(0.137)	(0.133)	(3.17)	(3.15)
1 if engaging in processing	-6.91	-6.77	-0.110	-0.105	-9.59	-8.45
	(6.37)	(6.73)	(0.138)	(0.132)	(6.99)	(6.66)
Inundation of residence (Months)	-6.08	-5.69	-0.114*	-0.111*	1.13	1.11
	(4.38)	(3.56)	(0.059)	(0.060)	(3.92)	(3.98)
Mean dyadic characteristics at the Para level						
Years since knowing	-0.09	-0.09	-0.000	0.000	-0.52*	-0.58*
	(0.23)	(0.22)	(0.005)	(0.004)	(0.27)	(0.31)
1 if relative	-16.70	-9.86	0.112	0.115	10.15	14.51*
	(11.96)	(11.60)	(0.218)	(0.221)	(7.50)	(8.22)
1 if stranger	-158.63**	-147.49**	0.425	0.382	-28.59*	-32.66**
	(61.85)	(62.16)	(0.328)	(0.325)	(16.71)	(15.78)
1 if the same occupation category	-2.70	-3.82	0.419*	0.528**	10.08	9.45
	(8.59)	(8.86)	(0.225)	(0.239)	(8.29)	(8.00)
1 if going to the same mosque	-15.68*	-14.28**	-0.107	-0.141	-14.56**	-13.96**
	(8.79)	(7.22)	(0.098)	(0.108)	(6.85)	(6.91)
Distance between houses (km)	-40.13	-41.79*	0.618	0.646	-41.85	-39.80
	(26.46)	(23.70)	(0.428)	(0.432)	(31.63)	(29.16)
Observations	251	251	251	251	251	251
Uncensored Observations	52	52	-	-	72	72
Para FE	Yes	Yes	Yes	Yes	Yes	Yes

Clustered standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1