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Group Trust in Youth Business Groups: Influenced by Risk Tolerance and Expected Trustworthiness

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Group Trust in Youth Business Groups:

Influenced by Risk Tolerance and Expected Trustworthiness[1]

By

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Abstract

We analyzed lab-in-the-field trust and risk experiment with 1125 youth in 119 youth groups established as primary cooperatives to develop a joint business. The experiments were implemented using classrooms in local schools as field labs. The standard trust game was used with all youth participants playing the roles as trustors as well as trustees. As trustors, they knew that the trustee would be an anonymous member of their own youth group. We hypothesize that this allows trustors to transform uncertainty about trustworthiness into risk such that risk tolerance will influence trusting behavior. The strategy method was used to elicit more detailed information about stated trustworthiness given different amounts received. A proxy measure for risk tolerance was obtained with a separate simple incentivized risk game. Expected trustworthiness in groups was modeled by the first two moments of the average stated and actual within-group trustworthiness. The group level analysis reveals that higher average risk tolerance increases trust and so does expected trustworthiness measured as average stated trustworthiness. Higher expected risk in the trust game, modeled as within-group variability in actual

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trustworthiness, is associated with lower average trust. More risk tolerant groups are also significantly more trustworthy.

Key words: Trust, trustworthiness, risk tolerance, youth groups, primary cooperative, Ethiopia.

JEL codes: C93; D8; D81; D84; D9

Introduction

While there have been a large number of studies of trust and trustworthiness using the standard trust game as well as survey based measures of trust, several issues on how trust is related to preferences and expectations still remain unresolved or inconclusive. The relationship between trust and risk preferences is one of these issues where contradictory evidences exist. Some authors have concluded that risk tolerance to a limited extent influences trust and that betrayal aversion and altruism may be more important (e.g. Bohnet and Zeckhauser 2004; Bohnet et al. 2008; Fehr 2009).

We propose that one reason for low predictive power of risk tolerance on trust is that beliefs about unknown persons' trustworthiness vary greatly and this judgment amounts to uncertainty rather than risk besides the issue of betrayal aversion versus risk aversion. We propose that trustors in the trust game are more able to form realistic beliefs and expectations if the trustee in the game belongs to a group that the trustor knows reasonably well. We have assessed this by playing the trust game among members in youth groups that have been established as primary business cooperatives in Ethiopia. The youth have one to eight years of experience as an organized group with responsibility for a joint business. All members of a group also come from the same municipality (*tabia*), which may enhance trust within groups. Group sizes vary from five to more 35 members but the large majority of groups have sizes of 10-20 members.

The studies with closest similarity to ours are Barr (2003) who played the trust game in 24 small tightly knit villages in rural Zimbabwe, and Schechter (2007) who played risk and trust games with rural villagers in Paraguay. They used within-community trust games. This gives a better basis to form expectations about the trustworthiness of trustees as local cultural norms may influence behavior more strongly than in broader contexts. Like Schechter (2007), we added a simple risk game that had similarities with the first stage of the trust game. However, contrary to

Schechter we played the risk game after the trust game to prevent that the risk game would have a framing effect on the trust game. In addition, we obtained survey-based measures of group trust relative to family trust and community trust. Furthermore, our study utilizes a large sample relative to earlier studies with 1125 respondents distributed over 119 youth groups. This gave more power to our analysis of variations across groups. Finally, our study is part of a broader study assessing the performance of newly formed youth business groups where internal trust potentially plays an important role in relation to their success. The level of group trust may itself be considered a success indicator for youth groups.

We used the standard trust game (Berg et al. 1995) but in our design the trustors in the game were informed that the trustee would be an unknown member of their own youth group. All trustors also played the role as trustees in the game. The strategy method was used to elicit how much trustors would return upon receiving alternative amounts as trustees in the game. After trustors have made their sending decisions and revealed their conditional returning responses, we played a risk tolerance game mimicking the structure of the trust game. They were given the same amount of cash and could decide to invest as much as they wanted of this amount in a risky game where we tripled the amount they invested while there was a 50% probability of winning or losing the tripled amount. We use the amount they invested in this risk game as a measure of their risk tolerance. We also used two questions to elicit group trust relative to trust in the community and in the family of youth group members, both measured at a Likert scale from one to five.

We use youth groups as observation units in the analysis and therefore rely on there being sufficient variation in trust, risk tolerance and trustworthiness across groups. We hypothesize that group members' risk tolerance enhances trusting behavior because group members have prior knowledge about the level of and distribution of trustworthiness within their group and thus the level of risk involved in trusting other members. We test for such knowledge by modeling expectations on average stated and actual trustworthiness revealed through the trust game in each group. The first and second moments of stated and actual trustworthiness are used as proxy measures of expected returns and risk perceptions of these returns. The trustors have no direct knowledge of these stated and actual responses of other group members in the trust game as all members of each group are playing the game simultaneously.

Trust or trust-like behavior is influenced by social preferences as well as risk preferences. We have not attempted to measure different types of social preferences in this experiment but have aimed to assess how much of the trusting behavior may be driven by risk preferences when respondents have a better basis to form expectations about trustworthiness than when the game is played with anonymous trustees. We have assumed that risk tolerance is not closely correlated with social preferences.

We find substantial variation in average trust, average risk tolerance and expected trustworthiness across groups. We find strong evidence that trusting behavior is enhanced by risk tolerance when respondents are able to form expectations about trustworthiness. There is a highly significant (at 0.1% level) positive correlation between average risk tolerance and average trust across groups. Average trust is significantly (at 0.1% level) positively related with the average stated trustworthiness and not significantly related with average actual trustworthiness. We interpret these findings such that respondents form expectations about trustworthiness of other group members based on their stated trustworthiness. Average trust is significantly negatively related (at 5% and 1% level) to the standard deviation of actual trustworthiness in the group also in line with the hypothesis that risk aversion affects trust. It appeared that variation in actual trustworthiness was more important than variation in stated trustworthiness, which was insignificant. We interpret this finding such that at least some group members are able to calculate the risk involved in some members being less trustworthy than they state they are and based on that they invest less in the trust game. Average trust is thus lower in groups where there is more variation in actual trustworthiness. These findings are in line with our key hypothesis about how risk preferences and risk affect trusting behavior. Average trust in groups is also significantly positively correlated with the average survey measure of group trust relative to family trust but it is not significantly correlated with the average survey measure relative to community trust. Finally, we find that average risk tolerance and average actual trustworthiness are positively correlated. This contradicts our hypothesis as the decision to return money in the trust game is not a decision involving risk. One tentative explanation may be that more risk tolerant people are also more optimistic about the trustworthiness of their fellow group members. We leave this for future research.

2. Brief literature review: Trust and risk preferences

A brief literature review follows as a basis for hypothesis formulation. We follow Fehr (2009) and Coleman (1990) and define trust as a form of behavior such as sending behavior of trustors in the standard trust game (Berg et al. 1995). Trust may be influenced by beliefs about the trustworthiness of trustees and risk preferences when the basis for belief formation is sufficient to transform uncertainty into measurable risk (Barr 2003; Fehr 2009). Barr (2003) showed that expected trustworthiness explained more than half of the variation in trust across communities in her study in Zimbabwe. She did not have a measure of risk tolerance in her experiment. Berg et al. (1995) also showed that trustors behave differently in trust games if they know the results of earlier trust games. The pool of subjects from which the anonymous trustee is drawn may thus influence trusting behavior. A more narrow pool may affect social identity and uncertainty/risk perceptions and expectations about trustworthiness. Charness et al. (2011) also found that provision of additional information about the trustworthiness of trustees greatly enhance trust responses. They did not investigate whether this response was related to risk tolerance.

The empirical evidence from lab and field experiments is mixed on the relationship between trust and risk preferences. Quite a few studies found no significant correlation between risk preferences and trusting behavior in the trust game (Ashraf et al. 2003; 2006; Eckel and Wilson 2004; Houser et al. 2010). We suspect that one reason for this could be that trustors had insufficient information about their trustees to transform this uncertainty into risk. Other studies have found significant positive correlation between trust and risk tolerance (Schechter 2007; Sapienza et al. 2013). Schechter (2007) played risk and trust games with rural villagers in Paraguay. The risk game and the trust game had similar designs and the risk game was played before the trust game. Schechter recognizes that the risk game may have contributed to framing the trust game more as a game involving risk.

Another branch of the literature has revealed that trustors may respond differently to risks imposed by nature and risks imposed by behavior of other people (Bohnet and Zeckhauser 2004). The preference related to behavioral risk exposure is called betrayal aversion and was found to be stronger than the risk aversion related to other forms of risk. The first study was with university students in the US. In a follow-up study in six countries (Brazil, China, Oman, Switzerland, Turkey, USA), Bohnet et al. (2008) found evidence of betrayal aversion in four of six countries.

While it is likely that betrayal aversion and risk aversion differ, it is plausible that they are positively correlated (Butler (2013) informed that in his data risk aversion and betrayal aversion were strongly positively correlated (Butler et al. 2016)). Another reason for risk preferences not becoming significant in trust games could be the use of fairly small samples and binary trust choice options that limit the statistical power in combination with uncertainty constraining belief formation (Shields 2013; Sheremeta and Shields 2013).

Few studies have investigated whether risk tolerance is correlated with trustworthiness. Schechter (2007) found that trust and trustworthiness were positively correlated. But she found no significant correlation between risk tolerance and trustworthiness. She argued that this makes sense since the decision on how much to return is not a decision involving risk. However, Qin et al. (2011) found that risk tolerance is positively correlated with trustworthiness in a study of students and community residents in Shanghai, China. Eckel and Wilson (2004) also found that more risk tolerant university students in the US returned larger amounts as trustees in the trust game. The reasons for this seem to be poorly understood.

3. Local context, sampling, implementation and experimental protocol

This study uses a sample of 119 youth groups from a census of 740 such groups in five districts in Tigray region of Ethiopia (Holden and Tilahun 2017). The census was carried out in 2016 and collected a range of baseline information on each youth group.

The groups had been formed in the period 2011-2016 based on a new policy initiative to create new livelihoods for landless and unemployed youth. Youth groups are formalized as primary cooperatives under the Cooperative Law in Ethiopia. They self-organize and elect a board of five members and establish their own bylaw. The members in a group all come from the same community (*tabia*). They are allocated a land area or a mineral resource by the local government. They are given the responsibility to conserve the land they are given while they also are allowed to establish a business activity on that land. Each group must prepare a business plan that has to be accepted by the local government and they are subject to regular auditing.

Groups provided access to a mineral resource are given a temporary right to extract that mineral (e.g. sand, stones) to build up their savings. When a target level of savings is reached the group is graduated and the members can use their savings to establish another form of business. The mineral right for that specific resource is then given to another group.

The youth inclusive land restoration policy in Tigray region received the international Future Policy Gold Award 2017, awarded by the World Future Council in partnership with the UNCCD. Holden and Tilahun (2017) has shown that the youth groups to a large extent comply with Ostrom's Design Principles related to managing their joint resource. A higher compliance with the Design Principles was positively associated with stated level of trust in the youth groups, based on perceptions of group leaders. It is obvious that mutual trust is important for the performance of youth groups in their joint business and in conserving their land. A deeper study of trust within and across groups is therefore not only of academic interest but also of high policy relevance. The sample chosen for our trust and risk preference study was limited to groups that had been allocated a land resource as mineral groups are of temporary character.

A local school was identified for the implementation of the lab-in-the-field experiments in each community. The school holiday period (July-August 2016) was chosen to ensure an undisturbed environment. A team of 12 experimental enumerators and two supervisors were trained by the authors. After having been introduced to the games and survey instrument, they trained on each other. The prototype experimental and survey protocols were translated to the local language, Tigrinya. Pilot testing took place in two out-of-sample communities to provide additional field training to enumerators and supervisors and to test and fine-tune the experimental protocol and survey instrument. A one day per school and community approach was chosen. Up to four groups could be handled in one day. The aim was to have 12 group members from each group if groups were that large. Absence of some group members caused the number to sometimes be lower. If more than 12 members were available, a lottery was used to select members. The groups were organized such that members were not allowed to communicate within groups during the experiment or with members from other groups after they had participated in the games that same day.

Three classrooms were used in a school. School desks were placed one in each corner in the room with the experimental enumerator with the back to the corner and the youth respondent facing the enumerator to minimize communication between youth group members.

The core components of our experimental protocol are presented in Appendix 1. The first part of the trust game was played first, with the strategy method to get a complete picture of stated

responses as trustees. The respondents were given 30 ETB[2] in two 10 ETB notes and two 5ETB notes. They would then decide how much to give to an anonymous person in their own youth group (see Appendix 1 for more details). The amount given was tripled by the enumerator. The supervisors collected the envelopes and organized the random redistribution. The risk game then followed. The respondent was again allocated 30 ETB like in the trust game and were offered to invest some or all of this money in a risky game where the amount invested was tripled by the enumerator and put in an envelope. The respondent would then draw one of two paper notes where one implied win and the other loss[3]. If they were lucky they were given the envelope, if not they had lost the amount invested.

After this, the enumerator carried out the survey interview. The survey interview took about 45 minutes. After this the second part of the trust game was played. Each respondent was given a random envelope from one of the other group members, decided how much to return and how much to retain of this money. After this had been orchestrated by the supervisors, the respondents got back their initial envelope with the returned amount of money. They then signed for all the money they had received and left the room and school without talking with anybody from the groups eventually waiting to participate.

4. Analytical framework and estimation strategy

Building on Barr (2003) we propose that trusting behavior is partly based on expectations. We assume trust to be an endogenous variable (Fehr 2009). We propose that an important reason for this endogeneity comes from expectation formation, which interacts with (stable) preferences such as risk aversion. We propose that risk preferences matter for trusting behavior when the game is played in groups of limited size and where members know each other well. This facilitates conversion of uncertainty about the trustworthiness of an anonymous trustee to known risk. We assume that group members vary in their level of risk tolerance but that the great majority are risk averse. Their willingness to invest in the trust game then depends on their risk tolerance and expected trustworthiness of other members in their group. We assume that their prior knowledge

[2] 30 Ethiopian Birr (ETB) was equivalent to 1.28 US$ at the time of the survey.
[3] We had to avoid the use of a coin for this as it would be associated with gambling and could cause refusal to play the game.

of the other group members enables them to predict the two first moments of the distribution of trustworthiness among other group members:

1) $$t_{gi} = f(r_{gi}, E(w_g)) = \alpha_0 + \alpha_1 r_{gi} + \alpha_2 \overline{w_{gi}} + \alpha_3 \left(\frac{1}{n_g - 1} \sum_{1}^{n_g} \left(w_{gi} - \overline{w_{gi}} \right)^2 \right)^{\frac{1}{2}}$$

where t_{gi} is the share out of 30ETB sent by the group member *I* in group *g*, r_{gi} is the risk tolerance of the group member, $\overline{w_{gi}}$ is the average trustworthiness (share returned to the trustor by the trustees in a group), and the last term represents the standard deviation of this within-group trustworthiness.

We assume this also holds for average trust in groups when we analyze the data at group level:

2) $$\overline{t_{gi}} = \alpha_0 + \alpha_1 \overline{r_{gi}} + \alpha_2 \overline{w_{gi}} + \alpha_3 \left(\frac{1}{n_g - 1} \sum_{1}^{n_g} \left(w_{gi} - \overline{w_{gi}} \right)^2 \right)^{\frac{1}{2}}$$

Based on the theoretical framework stated above we want to test the following hypotheses, using group level data, and separating trustworthiness in stated and actual trustworthiness:

H1. Average trusting behavior in youth groups is positively influenced by average risk tolerance in youth groups.

Schechter (2007) ran the risk game before the trust game and noted that the risk game may have framed the trust game more like a game involving risk. We ran the first part of the trust game before the risk game to make sure that our finding are not influenced by such a possible spillover effect.

H2. Average trusting behavior in youth groups is positively influenced by average trustworthiness (based on the assumption that average trustworthiness can be used as a proxy measure for expected trustworthiness).

H2a. Average trusting behavior in youth groups is positively influenced by average stated trustworthiness (stated trustworthiness enhances expectations)

H2b. Average trusting behavior in youth groups is positively influenced by average actual trustworthiness (in groups where members know each other well members are able to predict other people's stated and actual trustworthiness and based on this form their expectations about trustworthiness of fellow members)

H3. Average trusting behavior in youth groups is negatively affected by variance in within-group trustworthiness (assuming members are on average risk averse and having knowledge about the distribution of trustworthiness in their group)

H3a. Average trusting behavior in youth groups is negatively influenced by the standard deviation in stated trustworthiness within groups

H3b. Average trusting behavior in youth groups is negatively influenced by the standard deviation in actual (revealed) trustworthiness within groups

We have therefore collapsed our data to group level for the analyses. We use average within-group measures of trust, trustworthiness and risk tolerance.

We subdivide trustworthiness in stated trustworthiness, using the responses in the strategy questions, and actual trustworthiness, and use the mean as well as the variance of these measures. In groups where people know each other very well, like in our study, group members may be able distinguish between other members based on their stated as well as actual behavior and take such individual variation into account when forming expectation based on which they decide how much to invest in the within group trust game. We depend on sufficient variation in average risk tolerance, trust, and trustworthiness across groups to be able to test our hypotheses. Barr (2003) estimated a similar trust model using individual as well as aggregated data at village level. She did not include measures of risk tolerance or survey measures of group trust relative to the rest of the community or the families of group members.

We estimate the following model for average trust (amount sent) in groups[4]:

3) $$\overline{t_{gi}} = \alpha_0 + \alpha_1 \overline{r_{gi}} + \alpha_2 \overline{w_{gi}^{S30}} + \alpha_3 \overline{sd(w_{gi}^{S30})} + \alpha_4 \overline{w_{gi}^{A}} + \alpha_5 \overline{sd(w_{gi}^{A})} + \alpha_6 \overline{t_{gi}^{c}} + \alpha_7 \overline{t_{gi}^{f}} + \alpha_8 x_{gc} + \varepsilon_g$$

[4] Simplifying the specification of standard deviations of the trustworthiness variables.

where $\overline{t_{gi}}$ is the average share out of the 30ETB sent by the group members, $\overline{r_{gi}}$ is the average share out of 30ETB invested by group members in the risk game (measure of risk tolerance), $\overline{w_{gi}^{S30}}$ is the average stated share returned to the trustor by the trustees in a group given that the amount received is ETB30 (stated trustworthiness), $\overline{w_{gi}^{A}}$ is the average actual share returned (actual trustworthiness), $\overline{t_{gi}^{c}}$ is the average stated trust level in the group relative to the community (5-level Likert scale), $\overline{t_{gi}^{f}}$ is the average stated trust level in the group relative to their family (parents, siblings) (5-level Likert scale), x_{gc} represents additional controls which will be discussed below, and ε_g is the error term.

Barr (2003) used actual trustworthiness and noted that endogeneity may still be a problem if amount returned depends on amount sent. Our inclusion of stated trustworthiness for a given amount received does not suffer from this problem. The endogeneity problem for actual trustworthiness is not a problem if actual trustworthiness, which is measured as a share of amount received, does not vary with amount received (Barr 2003). We test this with the following model:

4) $$\overline{w_{gi}^{A}} = \beta_0 + \beta_1 \overline{3t_{gi}} + \beta_2 \overline{r_{gi}} + \beta_3 \overline{w_{gi}^{S30}} + \beta_4 \overline{sd(w_{gi}^{S30})} + \beta_5 \overline{t_{gi}^{c}} + \beta_6 \overline{t_{gi}^{f}} + \beta_7 x_{gc} + \upsilon_g$$

The β_1 coefficient assesses the potential endogeneity problem. If it is insignificant, there should be no endogeneity problem. Furthermore, we want to use this model to test the following hypothesis:

H4. Average risk tolerance is uncorrelated with average trustworthiness in groups. The decision to return a share of the money is not a risky decision and should therefore not be correlated with risk tolerance.

This (extended) model[5] is also used to inspect how closely related average stated and actual revealed trustworthiness are. The standard deviation of stated trustworthiness is an indicator of the risk, which may negatively affect actual average trustworthiness given risk aversion, the motivation to reciprocate and good judgment ability of this risk among group members. We also include the survey measures of average group trust relative to community and family. In the

[5] We use a stepwise approach to test the robustness of the first result and further assess factors associated with average actual trustworthiness in groups.

average trustworthiness model, these measures indicate whether these average survey based measures of trust are correlated with average actual trustworthiness.

For further assessment of the robustness of the findings, we included several group level variables. First, in equations 3 and 4 we include the share of male group members in the group. Quite a few studies have found that men are more trusting than women in the trust game (Buchan et al. 2003; Buchan et al. 2008; Burks et al. 2003; Chaudhuri and Gangadharan, 2002; Eckel and Wilson, 2000; Snijders and Keren 1999). Croson and Buchan (1999) found no gender difference in trusting behavior between men and women but women returned a significant higher amount than men in their study in three Asian countries and the US. Schechter (2007) found that males were more trusting than females. But this was explained by females' lower level of risk tolerance and not the lower level of trust per se. By incorporating the share of males in the youth group, we control for possible gender differences in trusting behavior as well as in risk tolerance. Additional controls include district fixed effects and main activity fixed effects. The data are from five districts in Tigray region in northern Ethiopia. Each group has one main income-generating activity. These are animal rearing, beekeeping, forestry, and irrigation/horticulture. We assess the significance of adding these controls in terms of increasing the "explanatory power" (increase in R-square) and the stability and significance of the coefficients for the key variables of interest.

A large share of the groups were able to self-select group members. Self-selection may have enhanced internal trust and there may even have contributed to selection of members with a more uniform risk preferences. We therefore test for potential self-selection bias by including a dummy for groups that were able to self-select their members and the Inverse Mills Ratio from a probit model regressing this dummy for self-selection into a range of group characteristics utilizing the group census data.

Group size may affect trust in groups. We therefore include group size as one of the additional control variables. It may be easier to organize small groups and members may know each other better, and trust each other more, in smaller groups.

Groups that have changed their board of members may have faced difficulties and such changes of leaders in the groups may be correlated with how well groups function and thus affect the level of trust in the groups. We include a dummy for groups that have had a change in their board members including change in group leader.

Groups that have been operational for a longer period of time may have members that know each other better. We have included a variable for their year and month of establishment to control for this.

Distance to market for the groups may affect how they work in various ways. We have no specific idea how it may affect group trust but we have included it as an additional control variable.

6. Results

6.1. Descriptive and non-parametric results

Table 1 provides an overview of the key group level variables. The table demonstrates that there is substantial variation in the key variables across groups. To get a preliminary idea about the relative distribution of some of the key variables we use non-parametric graphs (local polynomial smooth functions). Figure 1a shows the distribution of average trust in youth groups versus average group-level risk tolerance. Figure 1b shows the distribution of average trust versus average stated trustworthiness (stated share returned if receiving 30 ETB in the envelope as a trustee). The non-parametric regression lines indicate a positive correlation in both graphs. Figure 2a allows us to inspect whether endogeneity is a problem in relation to including average actual trustworthiness in the average group trust models. Average actual amounts returned to a small extent vary with amounts received. Endogeneity may therefore not be a serious issue. However, we carry out further inspection of this in the parametric average actual trustworthiness models (Table 4). Figure 2b demonstrates a positive correlation between average actual trustworthiness and average risk tolerance in groups, which is in support of hypothesis H4. Figure 2c demonstrates also a positive correlation between average actual and stated trustworthiness and that actual trustworthiness can be both higher and lower than average stated trustworthiness.

Table 2 gives an overview of additional control variables that were included to further assess the robustness of the key findings

Table 1. Overview of variables at group level

Variable	Obs	Mean	Std. Dev.	Min	Max
Average amount invested in trust game	119	12.153	2.704	6.500	22.500
Average share invested in trust game	119	0.405	0.090	0.217	0.750
Average amount invested in risk game	119	13.283	3.018	7.500	23.333
Average share invested in risk game (risk tolerance)	119	0.443	0.101	0.250	0.778
Average actual share returned (trustworthiness)	119	0.295	0.067	0.139	0.458
St. dev. of actual share returned	119	0.180	0.068	0.046	0.438
Average stated share returned if receive 30ETB	119	0.306	0.071	0.136	0.472
St. dev. stated share returned if receive 30ETB	119	0.185	0.059	0.000	0.333
Average amount received by trustee	119	36.215	8.227	19.500	67.500
Average group trust relative to community	119	4.357	0.260	3.500	5.000
Average group trust relative to family	119	2.071	0.650	1.273	4.000
Share of males in group	119	0.693	0.237	0.000	1.000

Source: Own data

Table 2. Additional control variables for robustness assessment

Variable	Obs	Mean	Std. Dev.	Min	Max
Self-selection into groups, dummy	119	0.824	0.383	0	1
Self-selection, IMR	117	0.316	0.218	0.013	1.302
Establishment year & month	119	2014.164	1.611	2008.462	2016.077
Initial group size	119	16.076	5.955	5	35
Market distance, km	117	8.575	5.884	0.5	30
Change of board, dummy	119	0.361	0.482	0	1
Severe conflict experience	119	0.252	0.436	0	1
Less severe conflict experience	119	0.168	0.376	0	1

Source: Own data

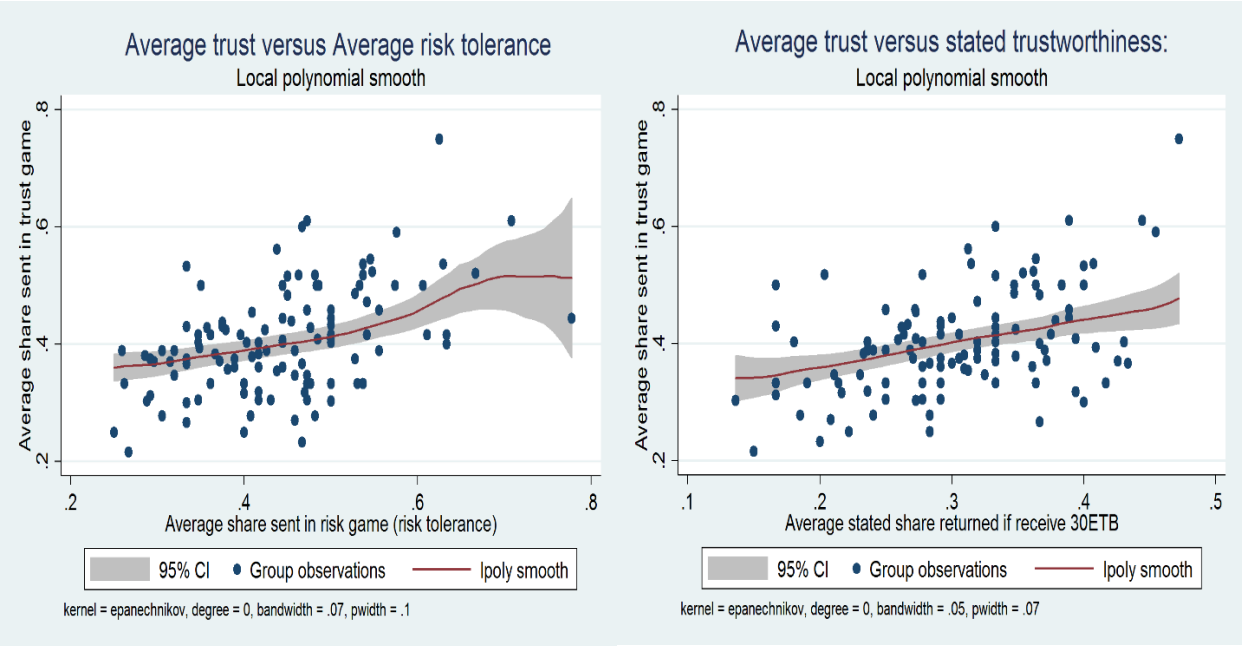
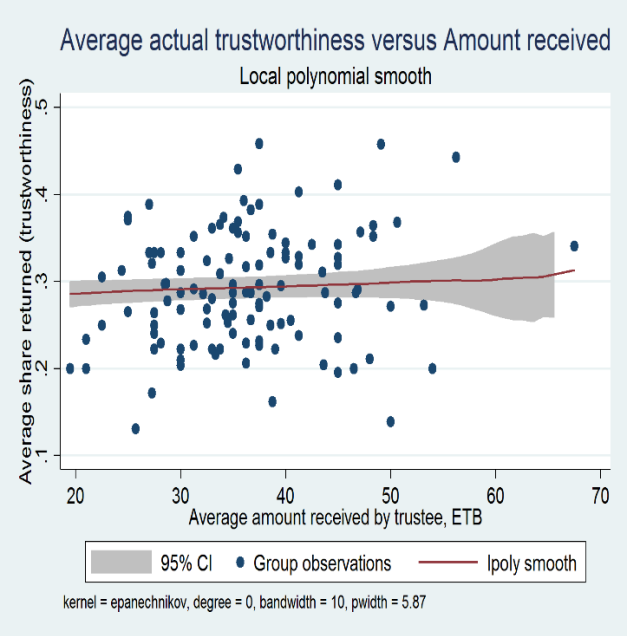
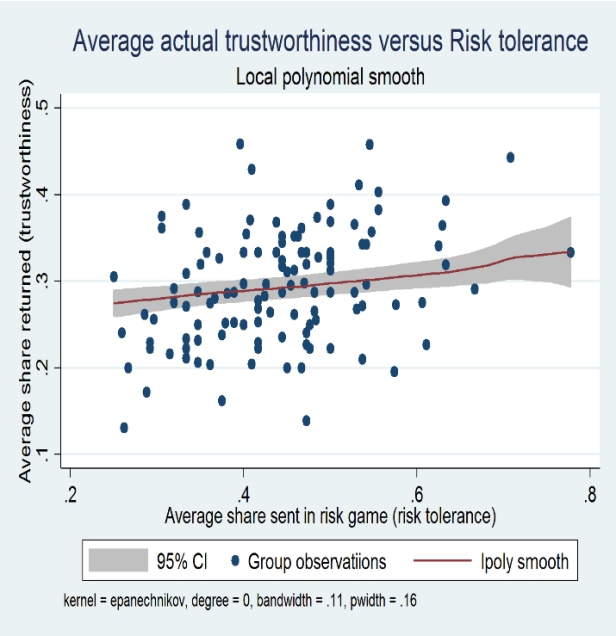
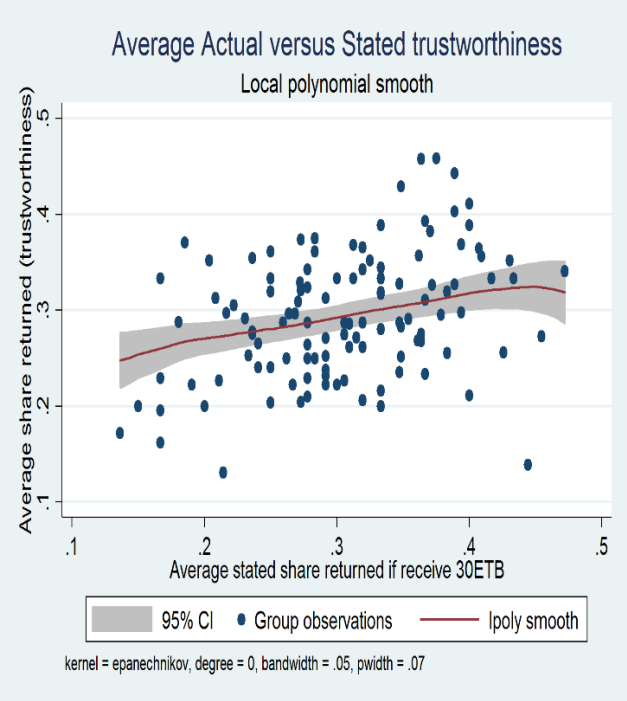


Figure 1a and 1b. Average group trust (share sent) versus risk tolerance (share invested) and versus stated trustworthiness (share returned) in youth groups.







Figures 2a, 2b, 2c. Average actual trustworthiness (average shares returned as trustees by group) versus average shares received, risk tolerance (share invested) and stated trustworthiness (share returned).

6.2. Parametric regression results

Table 3 presents the average trust models. Model Tg1 includes only the average risk tolerance measured in the form of the average invested share of the 30 ETB received in the risk game as explanatory variable. The significance of this variable is a test of hypothesis H1 that average trusting behavior is positively influenced by average risk tolerance in youth groups. The coefficient is highly significant (at 0.001% level). Models Tg2-Tg5 assess the robustness of this result when including additional controls. The strong positive effect and the high level of significance remains across the different models. The size of the coefficient is reduced from 0.46 to about 0.35 after including all controls. The latter figure implies that a 10% increase in risk tolerance contributes to a 3.5% increase in trust. The variation in average risk tolerance explains 23.1% of the variation in average trust across youth groups (model Tg1). This is close to half of the explained variation in average trust when all other variables have been added, explaining 46.8% of the variation (model Tg5).

If risk matters for trust, it is not only risk preferences that matter but also risk expectations. We have proxied trustworthiness expectations by using average stated and actual trustworthiness in groups and standard deviations of these in our modeling approach. These are included in models Tg2-Tg4, first one at the time and then jointly as collinearity could be a problem. These models show that average stated trustworthiness is highly significant (0.001% level) and with a positive coefficient while average actual trustworthiness is insignificant. We therefore reject hypothesis H2b, while we cannot reject hypothesis H2a, which has strong support in the data. Average trust is higher in groups where members on average state to be more trustworthy (stated trustworthiness enhances expectations).

The expected risk associated with trustworthiness in groups is proxied by the standard deviation in stated and actual average trustworthiness variables included in models Tg2-Tg5. The standard deviation in stated trustworthiness variable is insignificant in all models and even with the wrong sign. We therefore reject hypothesis H3a. However, the standard deviation of actual trustworthiness variable is significant (at 1%, 5% and 10% levels) in models Tg3-Tg5 and with a negative sign. We therefore cannot reject hypothesis H3b. Knowledge of variation in actual trustworthiness among group members appears to have reduced average trusting behavior.

Table 3. Factors associated with trust (average share sent in trust game) in youth groups

	Tg0	Tg1	Tg2	Tg3	Tg4	Tg5	Tg6
Average share invested in risk game	0.433****	0.436****	0.327****	0.462****	0.364****	0.351****	0.379****
Avg. group trust rel. to community		-0.031	-0.023	-0.027	-0.021	-0.015	-0.019
Avg. group trust rel. to family		0.021**	0.016	0.029***	0.024**	0.033**	0.033**
Share of males in group		0.018	0.022	0.014	0.019	0.008	-0.003
Avg. stated share returned of 30ETB			0.427****		0.431****	0.455****	0.408***
St.dev. stated share returned of 30ETB			0.043		0.131	0.127	0.116
Avg. actual share returned				0.008	-0.104	-0.178	-0.189
St.dev. actual share returned				-0.270***	-0.274**	-0.225*	-0.185
Self-selection, IMR							-0.069
Establishment year & month							-0.003
Initial group size							0.000
Market distance, km							0.001
Change of board, dummy							-0.018
Severe conflict experience, dummy							-0.002
Less severe conflict experience, dummy							-0.016
District FE						Yes	Yes
Main activity FE						Yes	Yes
Constant	0.213****	0.291**	0.172	0.294**	0.195*	0.169	6.444
F-value	30.792	10.718	10.113	7.766	8.522	5.654	4.58
Prob > chi2	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Number of obs. (groups)	119	119	119	119	119	119	117
R-squared	0.231	0.272	0.38	0.303	0.423	0.468	0.495

Note: Dependent variable: Average share sent in trust game within group (of 30 ETB). Robust standard errors. Significance levels: *: < 0.10, **: < 0.05, ***: < 0.01, ****: < 0.001.

The survey-based questions of trust in youth groups relative to community and family with five-level Likert scale were included to test how these average survey measures of trust correlate with the average trust measure from the trust game. Table 3 shows that only the average trust in groups relative to family was significantly (in four of five models, at 5 and 1% levels) related with average trust in the trust game. Average group trust was generally stated to be at least as high as in the community in all youth groups while only in a part of the youth groups average group trust was stated to be higher than that in the family of group members.

The share of male members in groups was added as a control to ensure that variations in trust, risk tolerance and trustworthiness are not due to the variation in gender composition of the groups. This variable is not significant in any of the models. Additional controls included district dummy variables and main joint business activity dummy variables. The key results were robust to adding these additional controls.

Table 4. Actual trustworthiness models (averages for youth groups)

	ts1	ts2	ts3	ts4	ts5
Average amount received by trustee	0.001*	0.000	-0.001	-0.002*	-0.001
Average share invested in risk game		0.244****	0.230****	0.234****	0.228***
Avg. group trust rel. to community		-0.019	-0.014	-0.012	-0.007
Avg. group trust rel. to family		0.013	0.016*	0.016*	0.018*
Share of males in group		0.004	0.010	0.013	0.010
Avg. stated share returned of 30ETB			0.322****	0.366****	0.345***
St. dev. stated share returned of 30ETB			-0.185**	-0.182**	-0.216**
Self-selection, IMR					-0.018
Establishment year & month					-0.002
Initial group size					0.001
Market distance, km					-0.001
Change of board, dummy					0.007
Severe conflict experience, dummy					-0.024
Less severe conflict experience, dummy					0.001
District FE				Yes	Yes
Main activity FE				Yes	Yes
Constant	0.244****	0.247**	0.192*	0.168	3.609
F-value	2.752	4.268	5.536	4.952	3.985
Prob > chi2	0.100	0.001	0.000	0.000	0.000
Number of observations	119	119	119	119	117
R-squared	0.028	0.143	0.236	0.290	0.326

Note: Dependent variable: Average actual share returned by trustees in trust game within group. Robust standard errors. Significance levels: *: < 0.10, **: < 0.05, ***: < 0.01, ****: < 0.001.

Table 4 presents models on variables correlated with average actual trustworthiness of youth in youth groups. The models serve two purposes. First, they allow us to assess the potential endogeneity of actual trustworthiness in relation to the average trust models in Table 3. Second, we use them to assess hypothesis H4. Table 4 demonstrates that average amount received by trustees in the trust game only marginally influences the average actual trustworthiness. There should therefore be little reason to worry that such bias has distorted the other findings in Table 3.

We then turn to hypothesis H4. Table 4 demonstrates that average risk tolerance is highly significantly (at 0.001% level) and positively correlated with average actual trustworthiness in models Ts2-Ts4. Therefore, we reject hypothesis H4. A 10% increase in average risk tolerance measured as amount invested in the risk game is resulting in a 2.3% increase in average actual amount returned by trustees in the trust game. The finding is consistent with the results of Qin et al. (2011) and Eckel and Wilson (2004) while Schechter (2007) found no such significant relationship even though risk tolerance and trust were significantly correlated in her study.

There could be several explanations for this puzzling result. One suggestion we received is that it is due to variation in cognitive ability in our sample of respondents. We would have believed more in this suggestion if we had a complex instrument for measuring risk tolerance. Our approach was very simple, however, and is no more complex than the basic trust game. Furthermore, the fact that we measure average variables in groups makes it harder to believe that cognitive ability would vary that much across groups unless there is some very strong selection mechanisms for recruitment into groups. We included the Inverse Mills Ratio (IMR) from a probit model for factors associated with self-selection into groups. The dummy dependent variable for the probit model was equal to one if members were able to self-select into groups and zero otherwise. The IMR for self-selection is insignificant and including the IMR does not change results in any significant way (last model in Table 4). The basic results are also robust to adding a number of additional controls including establishment year and month of the group, initial group size, market distance, a dummy for groups having changed their board members and two dummies for groups having experienced severe and less severe disputes. None of these variables is significantly correlated with average actual trustworthiness.

We propose one alternative underlying mechanism. This is that more risk tolerant people are more optimistic in general and therefore more optimistic about other people, including members of their own youth group. They are therefore more trustworthy (generous) as well. Our data do not allow us to test this proposed underlying mechanism and we leave that for future research.

Average stated trustworthiness is strongly positively correlated with actual trustworthiness as would be expected. Standard deviation of stated trustworthiness is significantly negatively correlated with actual trustworthiness. This result also makes sense. Group members in groups where there is more variation in stated trustworthiness may feel less obliged to be trustworthy.

The survey-based measure of average trust relative to the family is significant (at 10% only) and positively correlated with average actual trustworthiness. The share of males in the group has no significant effect on actual trustworthiness. The gender composition of groups therefore seems not to be important for group trust.

Finally, we made an assessment of the endogeneity of our average risk tolerance measure. We regressed it on the self-selection IMR, group size, establishment year and month of group, a dummy for groups having had a change in leadership/board, distance to market, and two dummies for groups having been exposed to severe or less severe disputes. None of these variables is significantly correlated with average risk tolerance in the groups. The variation in average risk tolerance across groups may therefore not be due to self-selection into groups or any of the other included variables.

7. Discussion and conclusions

Our analysis indicates that expectations about trustworthiness and risk tolerance explain a great deal of the variation in trusting behavior. This is contrary to many studies that found that risk preferences were not significantly related to trust in trust games. We have proposed that uncertainty about the behavior of unknown trustees undermine the ability to form realistic expectations. By randomly selecting trustees within a more narrow circle of known persons we have facilitated conversion of this uncertainty to measurable risk. Our results provide strong support for our hypotheses that risk aversion and expected trustworthiness and perceived risk of these expectations strongly influence trusting behavior. By doing the analysis at group level, we

have been able to generate variables for the first two moments of trust expectations and shown that both moments correlated with trust like expected among risk averse respondents. While we recognize that social preferences are important determinants of trust, we have revealed that risk in combination with risk tolerance potentially are important determinants of the endogenous component of trust.

The fact that we in our study found large variation across groups in trust, trustworthiness and risk tolerance is itself fascinating. Our study was carried out in one region of Ethiopia (Tigray) where the sample in four out of five districts comes from one ethnic group with the same religious background (Tigraians belonging to the Coptic Church), the sample in the fifth district originated from another ethnic group (Oromo) long time ago and mostly are Muslims. Our study demonstrates substantial local heterogeneity in trust, trustworthiness and risk tolerance across groups. Surprisingly, this heterogeneity is not closely correlated with the group characteristics that we investigated such as selection into groups, change in group leadership or conflict experiences of groups. Neither is it significantly correlated with group size or the age of the groups. Further research is needed to provide deeper understanding of this heterogeneity and whether such local heterogeneity is common elsewhere.

Further research is also needed to investigate the role of social preferences in explaining the remaining unexplained variation in average group trust and trustworthiness. We have assumed that social preferences are uncorrelated with risk tolerance and believe our key findings are robust to adding such variables to the analysis. Other studies have shown that social preferences such as those associated with reciprocity and altruism affect trust and expected trustworthiness. Our unique contribution is the demonstration that risk tolerance matters for trust within more closely-knit groups.

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Appendix 1.

Research protocol: Trust game with risk tolerance measure

This is an experiment in two stages. We start with the first part of the experiment. It will be finalized with payout at the end of the interview. We start by giving you 30 ETB that you will decide over (split in two 10 ETB notes and two 5 ETB notes). You may decide to keep the whole 30 ETB for yourself or to invest the whole or part of it (as much as you want). The amount you invest will be tripled by us (e.g. if you invest 5 ETB we triple it to 15 ETB or if you invest the whole 30 ETB, we triple it to 90 ETB. We put the tripled amount into an envelope for your investment. The same is done for all group members in your youth group. We will use a lottery for the distribution of the envelope among the members in your group. You will also receive such an envelope at the end of the interview. As a receiver of the envelope, you will see the amount invested and tripled and decide how much to keep, the remaining amount will be returned to the one who made the investment. The amount you have at the end is therefore depending on how much you retained in the beginning and how much you get back of the tripled amount you invested - from the random group member in your own youth group, and the amount you take from a random envelope from another group member.			
8	Amount invested in ETB	Number	
9	Write the number on the envelope where the money is put	Number	
We will now ask you how you would respond as a receiver of a random envelope from another member in your youth group (amount sent back), depending on how big the amount in the envelope you receive is. You know that we have tripled the amount that the other member put in the envelope.			
10	How much will you leave in the envelope (return to the sender who do not know who you are) if the amount in the envelope is 90 ETB?	ETB	
11	How much will you leave in the envelope (return to the sender who do not know who you are) if the amount in the envelope is 75 ETB?	ETB	
12	How much will you leave in the envelope (return to the sender who do not know who you are) if the amount in the envelope is 60 ETB?	ETB	

13	How much will you leave in the envelope (return to the sender who do not know who you are) if the amount in the envelope is 45 ETB?	ETB	
14	How much will you leave in the envelope (return to the sender who do not know who you are) if the amount in the envelope is 30 ETB?	ETB	
15	How much will you leave in the envelope (return to the sender who do not know who you are) if the amount in the envelope is 15 ETB?	ETB	
Now you will decide on another small investment experiment. Again we allocate you 30 ETB (Two 10 ETB notes and two 5 ETB notes). You can decide to use some of this amount for an investment where we triple the amount you invest. We then have a lottery with equal chance of winning and losing (drawing one of two pieces of paper). If it contains a “1” you win, you get the tripled amount. If it contains a “0” you lose and get nothing. E.g. if you decide to invest 5 ETB in the risky game, we triple it to 15 ETB. You then draw a piece of paper, if it contains a “1”, you get the additional 15 ETB on top of the 25 ETB you did not risk. If you draw a “0”, you retain only the 25 ETB that you did not risk. If you invest the whole 30 ETB, we triple it to 90 ETB and if you win the lottery, you get the whole 90 ETB, but if you lose the lottery, you lose the 90 ETB and remain with nothing.			
18	Do you understand the game and agree to play it? 1=Yes, 2=No	Code	
19	Out of the 30 ETB that you can decide to keep safe, how much are you willing to invest in the risky lottery? 1=0 ETB, 2=5ETB, 3=10 ETB, 4=15 ETB, 5=20 ETB, 6= 25 ETB, 7=30 ETB	Code	
You give the amount you decide to risk back to the interviewer who triples the amount. The interviewer then offers you the lottery choice between two paper notes and you choose one. Afterwards you can inspect both paper notes.			
20	Outcome of lottery, 1=Win, 0=Loss	Code	
If the respondent draws "1", the tripled amount is given to the respondent. If s/he draws "0", the interviewer keeps the amount lost in the risky investment by the respondent. Go to the next section (interview)			

Survey questions on trust

97a	How do you rate the level of trust among group members in your youth group? Use the general level of trust in your community (tabia) as a reference level. 1=Much higher, 2=Higher, 3=The same, 4=Lower, 5=Much lower	Code	
97b	How do you rate the level of trust among group members in your youth group? Use the level of trust among members in your own family (parents, brothers, sisters) as a reference level. 1=Much higher, 2=Higher, 3=The same, 4=Lower, 5=Much lower	Code	

Final experimental part

	Final Experiment		
	You will now be given a random envelope from one of the other group members (sender) who has invested and we have tripled the amount. You will see the amount in the envelope and decide how much you take and how much to return to the sender		
1	How big amount did you find in the envelope? 1=0, 2=15, 3=30, 4=45, 5=60, 6=75, 7=90	Code	
2	Envelope number (not to be asked to the respondent but for the enumerator to verify)	Number	
3	How big amount did you take from the envelope to keep for yourself?	Et. Birr	
4	How large amount was in the returned envelope?	Et. Birr	
We would like to thank you for good cooperation and participation in the interview and would like you to at the end sign for the amounts of cash that you have received related to the experiments.			

Appendix Table A1. Endogeneity of risk tolerance test

	Risk tolerance
Self-selection, IMR	-0.0727
	(-1.37)
Establishment year & month	0.00373
	-0.67
Initial group size	0.00134
	-0.78
Market distance, km	-0.000208
	(-0.12)
Change of board, dummy	-0.00207
	(-0.11)
Severe conflict experience, dummy	-0.00204
	(-0.09)
Less severe conflict experience, dummy	0.0199
	-0.67
_cons	-7.075
	(-0.63)
R-sq	0.031
N	117

Source: Own data. Robust standard errors in parentheses.