Norwegian University of Life Sciences (NMBU)

Gender Differences in Risk Tolerance, Trust and Trustworthiness: Are They Related?

Stein T. Holden and Mesfin Tilahun

Norwegian University of Life Sciences
Centre for Land Tenure Studies

Centre for Land Tenure Studies Working Paper 3/18
ISBN: 978-82-7490-267-1

Gender Differences in Risk Tolerance, Trust and Trustworthiness: Are They Related?

By

Stein T. Holden[1, *], Mesfin Tilahun[1,2]

[1]School of Economics and Business, Norwegian University of Life Sciences

Box 5003, 1432 Ås, Norway

[2]Mekelle University, Department of Economics, P. O. Box 451, Mekelle, Ethiopia

*Corresponding author Email: stein.holden@nmbu.no

Abstract

The paper assesses risk tolerance, trust and trustworthiness among male and female youth group members in recently formed primary cooperative businesses in Ethiopia. Male members are found to be more risk tolerant, trusting and trustworthy than females. There is a strong positive correlation between individual risk tolerance and trust for male while this correlation is much weaker for female members. Individual risk tolerance is positively correlated with trustworthiness for males but not for females. Females are more trusting and trustworthy in groups with more risk tolerant members. Females' trustworthiness is more sensitive to group characteristics and experiences. The findings are consistent with social role theory as males appear more instrumental and females more communal in their responses.

Key words: Gender differences, risk tolerance, trust, trustworthiness, youth business group members, social role theory, Ethiopia.

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

1. Introduction

There is mixed evidence regarding gender differences in risk tolerance and trust and how risk tolerance relates to trust. On the one hand, Charness and Gneezy (2012) summarized results from simple investment games and concluded that there is "strong evidence" that women are less risk tolerant than men in financial decisions. These findings are consistent with earlier surveys as well (Eckel and Grossman 2008; Croson and Gneezy 2009). On the other hand, Nelson (2016) reviewed the same studies and found that there is "not so strong evidence" of gender differences in risk taking. The disagreement partly is about how strong is "strong" but also what are the most appropriate measures to use, whether to look at aggregate statistical measures or the degree of individual variation and overlap across genders,

and the extent to which the differences are "fundamental" (biological) or depend on context and culture. Nelson (2015; 2016) found that confirmation bias in published studies has contributed to overstated gender differences in risk tolerance in earlier surveys. Filippin and Crosetto (2016) investigated the gender difference in risk taking based on the Holt and Laury (2002) multiple price list approach to measure risk preferences. Based on a large number of studies utilizing this approach and pooling the data from a large share of these studies, they found that only a small share of the studies detected a significant gender difference. In addition, in the pooled data they found a small but statistically significant difference that they considered to be economically unimportant.

The evidence is also mixed regarding whether risk tolerance and trust are related. Many studies found no significant correlation between risk tolerance and trust even though trusting others is a risky decision (Ashraf et al. 2003; 2006; Eckel and Wilson 2004; Houser et al. 2010). However, there are some exceptions. Schechter (2007), based on a study in Paraguay, found that males were more trusting than females. This was explained by females' lower level of risk tolerance. Quite a few studies have found that men are more trusting than women in the trust game but without assessing how this is associated with their risk preferences (Buchan et al. 2003; Buchan et al. 2008; Burks et al. 2003; Chaudhuri and Gangadharan, 2002; Eckel and Wilson, 2000; Snijders and Keren 1999). Another strand of the literature found that betrayal aversion may be more important than risk tolerance in trust games as people may be more averse to being cheated by other persons than when they play a game with nature (Bohnet and Zeckhauser 2004; Bohnet et al. 2008).

We study members of formal youth business groups that recently were established to create new livelihood opportunities for landless and unemployed youth in Ethiopia. Each group is provided a natural resource and has to organize itself as a primary cooperative and form a sustainable joint business. Females are under-represented as they constitute less than one third of the group members. The broader policy question is whether gender can be ignored or whether a gender dimension of the policy is needed to create a more level playing field in this male-dominated cultural setting. A related study has shown that youth business groups that organize themselves more closely according to Ostrom's design principles for common pool resource management, are characterized by a higher level of trust (Holden and Tilahun 2018). High levels of trust and trustworthiness are likely to be important characteristics of well-functioning youth businesses.

We first inspect the gender differences in risk tolerance, trust and trustworthiness among a sample of 1138 young entrepreneurs in 119 business enterprises. We use lab-in-the-field experiments and the Gneezy and Potter (1997) simple investment game to elicit risk tolerance and the Berg et al. (1995) standard trust game to measure within-group trust and trustworthiness of members of the youth business group. We assess the statistical significance and size of these gender differences and make a comparison

with earlier studies. Next, we assess whether differences in individual and group average risk tolerance can explain differences in individual trust and trustworthiness and whether gender matters.

Our contributions to the literature are;

- We add to the limited literature on risk taking and trust among young entrepreneurs in a developing country setting
- We have a relatively large sample which gives more power to the assessment of gender differences than most studies in the past
- We add to the few studies on the relationship between risk tolerance, trust and trustworthiness with the first study to explicitly assess gender differences in these relationships
- To our knowledge, this is also the first study to study the impact of group-average risk tolerance on trust and trustworthiness.

2. Context

Rural societies in Ethiopia are characterized as patriarchal with men as household heads and breadwinners for the family. There is a strict gender division of labor. Women stay at home and take responsibility for household chores. Men do more of the heavy agricultural work such as ploughing the land with oxen. Men typically occupy all key positions in rural societies. However, recent legal reforms have emphasized women's equal rights. Females are supposed to have equal decision-making rights as males in the youth business groups we study. Still, our data show that many groups allow a gender division of labor where females are exempt from the heaviest tasks while group incomes are still shared equally.

We study youth business groups that have been established in recent years based on a new pilot policy initiative to provide livelihoods for landless and unemployed youth. They establish formal businesses in the form of primary cooperatives based on cooperative law. Each group is allocated a land resource by local authorities and they are required to conserve and protect this resource and to invest in a joint production activity to generate joint income. Many groups have been allocated rehabilitated communal lands. All group members are residents in the community where their group is established. Each group elects a board of five members and make their own bylaw. They have to prepare a business plan that has to be accepted by local authorities. Their accounts are subject to auditing.

We may assume that female youth represent about 50% of the youth population. We find that they are less likely to join youth business groups than males as they represent only about 31% of the youth group members in our sample of youth groups and youth group members.

But how well represented are female members in the board and key positions of the groups? Table 1 gives the distribution for our sample of group members from the 119 groups.

Table 1. Gender distribution by position in the group

Current position		Female	Male	Total
Chairman	Number	7	91	98
	%	1.95	11.68	8.61
Vice chairman	Number	7	66	73
	%	1.95	8.47	6.41
Secretary	Number	23	60	83
	%	6.41	7.7	7.29
Accountant	Number	34	70	104
	%	9.47	8.99	9.14
Treasury	Number	8	30	38
	%	2.23	3.85	3.34
Ordinary member	Number	280	462	742
	%	77.99	59.31	65.2
Total	Number	359	779	1,138
	%	100	100	100

Source: Own survey data. *Note:* Test for gender difference: Pearson chi2(5) = 59.0538, Pr = 0.000

We see that female youth group members are strongly under-represented in the youth group boards also in relative terms. About 78% of them were ordinary members against 59% of the males. The gender difference was even stronger for the leadership position as only 4% of the females were chairman or vice chairman of their group against 20% of the males. Only as accountants were females were equally likely as males to have such a board position.

3. Theory and hypotheses

We draw on several theoretical explanations for gender differences. It is not always easy to separate these as several of them may explain the same phenomenon and several of them may be at play simultaneously and interactively. The theories are classified as follows:

a) Social role theory states that gender differences come from cultural norms that dictate what behavior is appropriate for men and women (Eagly and Wood 1991). The degree of gender segregation in a culture may therefore also affect the degree of difference in behavior between men and women. Social role theory also emphasizes that men are more instrumental or outcome oriented while women are more communal or socially oriented in their behavior (Bakan 1966; Archer 1996; Buchan et al. 2008). This may imply that men are more willing to take risks while women are more trustworthy and reciprocal in their behavior. Buchan et al. (2008) proposes that men are more driven by their expectations due to their instrumental motivations and that women are more driven by their social obligations.

   Eagly et al. (2000) state that their social role theory assumes that gender roles reflect a society's distributions of men and women into breadwinner and homemaker roles and occupations and

that there are power and position differences that imply a gender hierarchy. Social role theory implies that gender differences are influenced by culture and other contextual factors that can affect balances of power and gender divisions of labor. One therefore has to be cautious when assessing the external validity of findings. More cross-cultural and cross-contextual studies are needed to gain further confidence in the predictive power of the theory.

b) Expectation states theory in sociology emphasizes social status and women typically have lower status than men and they may therefore try to enhance their status by being more trusting and trustworthy in their behavior towards men than towards other women (Sell 1997; Ridgeway 2011; Buchan et al. 2008).

c) Evolutionary (biological) theories on risk taking. Males have had to roles of warriors and breadwinners and have therefore been more used to taking risks and this may also have created biological differences between males and females. Trusting behavior may also depend on willingness to take risk as it may be risky to trust people (Ben-Ner and Putterman 2001; Eckel and Wilson 2004). Knowledge of the person is likely to affect the ability to judge the riskiness of trusting her/him. If the person is anonymous this implies less information and uncertainty rather than risk and people may respond differently to uncertainty than to known risk.

d) Theories on the role of overconfidence. Males are more likely to be overconfident than females. This may also be a reason for males to be more willing to take risks (Croson and Gneezy 2009; Lichtenstein, Fischhoff and Phillips 1982; Estes and Hosseini 1988). Overconfidence may affect expectation formation and lead to more optimistic expectations.

e) Theories on the role of emotions. Croson and Gneezy (2009) suggested that differences in emotions might explain gender differences in risk taking as males may feel more anger and anger may trigger optimism and more willingness to take risks. Females may feel more fear and fear may be associated with more pessimism and less willingness to take risks (Brody and Hall 1993; Fujita, Diener and Sandvik 1991; Harshman and Paivio 1987; Lerner et al. 2003; Loewenstein et al. 2001).

f) Selection theories. Several studies have found that the gender differences among managers and entrepreneurs are small (Atkinson, Baird and Frye 2003; Master and Meier 1988; Birley 1989). Gender differences in investment behavior may be due to differences in investment knowledge and wealth constraints (Croson and Gneezy 2009). These findings may follow from selection of more risk tolerant females into managerial and entrepreneur positions but could also be a result of training that affects knowledge, confidence and expectation formation.

We investigate these possible gender and risk tolerance associations with trusting behavior in our analysis of data of individual members of youth business groups. We test the following hypotheses:

H1: Male group members are more risk tolerant than female group members

H2: Male group members are more trusting than female group members (send a larger share as trustors than female group members).

H3. Risk tolerance (share sent in risk game) is positively correlated with trust (share sent in the trust game)

H4: Higher risk tolerance of male group members explain why male group members invest more in the trust game than female members.

Given that expectation formation based on the knowledge about the trustworthiness of other group members may affect trusting behavior, it is also possible that the knowledge of the risk tolerance of other group members affect the beliefs about how much money other group members will send in the game. This may imply that average risk tolerance in the group has a positive effect on individual trust. Based on this we hypothesize:

H5: Average risk tolerance in groups positively affects individual trusting behavior.

Based on social role theory indicating that females are more sensitive to social contexts than males (Eagly and Wood 1991; Archer 1996; Buchan et al. 2008) and theories on emotions indicating that females experience emotions more strongly than males (Harshman and Paivio 1987; Loewenstein 2001; Crozon and Gneezy 2009) we want to test the following hypothesis:

H6: Female group members' trusting and trustworthiness decisions are more sensitive to group characteristics than male members' trusting and trustworthiness decisions are.

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. We assess whether this latter result holds also in our study and test the hypothesis:

H6: Women are more trustworthy (return larger amounts as trustees in the trust game) than men.

We also assess whether variation in risk tolerance is associated with trustworthiness. However, we do not have a specific hypothesis on how risk tolerance may be associated with trustworthiness.

4. Estimation

The model for estimation of individual trust behavior with interaction of individual risk tolerance and gender becomes:

$$t_{gi} = f(s_{gi}, r_{gi}, \overline{r_g}, \int(w_g); g_g, i_{gi}) = \begin{pmatrix} \alpha_0 + \alpha_1 s_{gi} + \alpha_2 r_{gi} + \alpha_3 s_{gi} * r_{gi} + \alpha_4 \overline{r_{g-i}} + \alpha_5 \overline{w_{g-i}} \\ +\alpha_6 sd(\overline{w_g}) + \alpha_7 x_{gc} + \alpha_8 i_{gi} + \varepsilon_{gi} \end{pmatrix} \quad 1)$$

where t_{gi} is the share out of 30 ETB sent by the group member *i* in group *g*, s_{gi} is a dummy representing the gender of individual group members, r_{gi} is the risk tolerance of the group member (measured by the share sent in the risk game), $\overline{r_{g-i}}$ is the average risk tolerance of the other group members in the group, $\overline{w_{g-i}}$ is the average trustworthiness[1] (share returned to the trustors by the trustees in a group), $sd(\overline{w_g})$ is the standard deviation within a group of share returned, x_{gc} represents additional group controls, i_{gi} represents additional individual controls, while ε_{gi} is the error term. The model is also run without the interaction and separately for females and males to further explore the gender differences.

The individual trustworthiness model used to test hypothesis H6 is:

$$2) \qquad w_{gi}^{A} = \beta_0 + \beta_1 s_{gi} + \beta_2 r_{gi} + \beta_3 t_{gj} + \beta_4 t_{gi} + \beta_5 c_{gi}^{D} + \beta_6 \overline{r_{g-i}} + \beta_7 g_g + \beta_8 i_{gi} + \upsilon_g$$

Where w_{gi}^{A} is the actual amount or share returned by trustees, t_{gj} is the amount (or share) received in the trust game by member *i* from another (random) group member, t_{gi} is the amount sent by the trustee as a trustor, c_{gi}^{D} is a dummy for whether member *i* was lucky (=1) in the risk game which was played between the first and second part of the trust game. Luck in the risk game may make trustees more generous. We test hypothesis H6 by inspecting the coefficient on the gender variable s_{gi}. We also run separate models for females and males to inspect the gender-specific correlations between risk tolerance, trust and trustworthiness. We have retained the individual and average group risk tolerance variables as well although the decision to return part of the money is not involving risk.

5. Experimental approach and measurement of gender differences

5.1. Risk tolerance

We use the simple investment game of Gneezy and Potters (1997). The decision maker receives an amount *R* and is asked to choose how much of it, *r*, s/he wishes to invest in a risky option and how much to keep. The amount invested yields a dividend of *kr* (*k*>1) with probability *p* and the invested amount is lost if with probability 1 - *p*. The investor keeps the money not invested. The payoff is *R* - *r* + *kr* with probability *p* and *R* – *r* with probability 1- *p*. We use *k* = 3 and *p* = 0.5. The initial amount *R* = 30 ETB (given as two 10 ETB notes and two 5 ETB notes).

[1] We included stated and actual trustworthiness measures. The stated trustworthiness measure was the share returned conditional on the respondent receiving 30 ETB in the envelope (hypothetical). Actual trustworthiness was the share returned based on the actual amount found in the envelope. Average within-group trustworthiness is used as a proxy for expected return in the trust game and the standard deviation of within group trustworthiness is a measure of the riskiness of expected return. If the trust game is perceived as a risky game group members may form expectations based on their perceptions about the trustworthiness of other members.

5.2. Trust and trustworthiness

We define trust as the amount sent in the standard trust game (Berg et al. 1995) and implement this game as a within group game where all participants in the game play both roles as trustors and trustees. They know that they play with another anonymous person within their own group. Since group members know each other well, they are able to form expectations about the trustworthiness and risk taking behavior of other group members. The first part of the trust game is played before the risk investment game to make sure that playing the risk game does not frame the thinking in the trust game. The trustor initially receive an amount T and is asked to choose how much of this, t, to send to another anonymous group member who receives kt and who decides how much to keep of this amount and how much to return to the trustor. We use k=3, like in the investment game and $T = R = 30$ ETB (given as two 10 ETB and two 5 ETB notes, like in the investment game). Trustworthiness was measured in two ways, stated and actual. Stated trustworthiness was elicited with the strategy method where each respondent was asked for how much s/he would return for each of the potential amounts s/he could receive. Actual trustworthiness was measured as the share returned from the actual amount received from the trustor.

5.3. Measurement of gender differences

First, we do the usual mean comparison and test for statistical significance. Then we compare the distribution pattern by gender graphically.

We use Cohen's *d*, which expresses the difference between means in standard deviation units (Cohen 1988; Nelson 2015; Byrnes et al. 1999). For the case of a male versus female comparison, it is estimated as follows

3) $$d = \frac{\overline{x_m} - \overline{x_f}}{sd_i}$$

where $\overline{x_m}$ is the male mean, $\overline{x_f}$ is the female mean, and sd_i is the pooled standard deviation. This measure has the advantages of being easily compared across studies and of expressing the size of the cross-sex mean difference relative to the degree of within-sex variation. The larger this ratio, the more substantive difference there is between the sexes. Sample size only affects its reliability but not its expected value. Cohen (1988) suggested that a d=0.2 is small, d=0.5 is medium and d=0.8 is large in the type of psychological studies of his concern.

We also use another measure, Common Language Effect Size (CLEF), which is the probability that a randomly chosen male member is higher in a characteristic than a randomly chosen female member.

6. Data

Tables 2 and 3 give an overview of individual and group characteristics used as control variables. The experimental outcome variables are presented in the next section.

Table 2. Individual level variables

Variable	Obs	Mean	Std. Dev.	Min	Max
Male member dummy	1,138	0.685	0.465	0	1
Age	1,138	29.072	9.796	15	74[1]
Education, years	1,138	5.345	3.978	0	17
Number of brothers	1,138	2.716	1.632	0	10
Number of sisters	1,138	2.378	1.483	0	9
Birth rank	1,138	3.105	2.002	0	13
Number of siblings in group	1,138	0.212	0.545	0	5
Group trust vs. Comm. trust	1,138	4.368	0.773	1	5
Group trust vs. Family trust	1,138	2.083	1.037	1	5

Source: Own data. *Note*: [1]In a few groups there are some older members that have been included because they are landless. In some instances, older members are included to share their experiences in running the business activities the groups are involved in.

Table 3. Group level variables, averages by individual for 119 groups

Variable	Obs	Mean	Std. Dev.	Min	Max
Group size in game	1,138	10.202	2.119	3	12
Average risk tolerance	1,138	0.443	0.100	0.222	1
Average trust share	1,138	0.406	0.091	0.167	0.788
Average actual trustworthiness	1,138	0.294	0.068	0.097	0.500
St.dev. Actual trustworthiness	1,138	0.183	0.062	0.064	0.341
Average stated trustworthiness	1,138	0.306	0.074	0.1	0.533
St.dev. stated trustworthiness	1,138	0.188	0.056	0	0.333
Share of males in group	1,138	0.685	0.232	0	1
Relative group trust vs. Comm. trust	1,138	4.368	0.265	3.333	5
Relative group trust vs. Family trust	1,138	2.083	0.680	1	4.2
Self-selected into group, dummy	1,138	0.810	0.392	0	1
Self-selection, IMR	1,128	0.325	0.212	0.013	1.302
Establishment year & month	1,138	2014.2	1.6	2008.5	2016.1
Initial group size	1,138	16.650	6.039	5	35
Market distance, km	1,128	8.677	6.008	0.5	30
Change of board, dummy	1,138	0.361	0.481	0	1
Severe conflict experience, dummy	1,138	0.241	0.428	0	1
Less severe conflict experience, dummy	1,138	0.169	0.375	0	1

Source: Own data

6. Results

6.1. Descriptive analysis

Figures 1a, 1b and 1c show that there are significant gender differences in risk tolerance, trust and trustworthiness in our data with males being on average more risk tolerant, more trusting and more trustworthy towards members of their own business group. Figures 2a and 2b show the distribution of risk tolerance (amounts invested in investment game) and trust (amount sent in trust game). A smaller share of the males invested as little as 10 ETB and a larger share of males (about 12% versus 6% for females) invested the whole sum of 30 ETB implying that they are risk neutral or risk loving. We see a similar but stronger skewed pattern in terms of males investing more in the trust game. Investment levels were substantially higher in the risk investment than the trust investment games out of the same

amount of money. We cannot rule out that this is partly influenced by the fact that the first part of the trust game was played before the risk game. The average shares returned in the trust game (Figure 1c) indicate that trust investments on average gave a negative return.

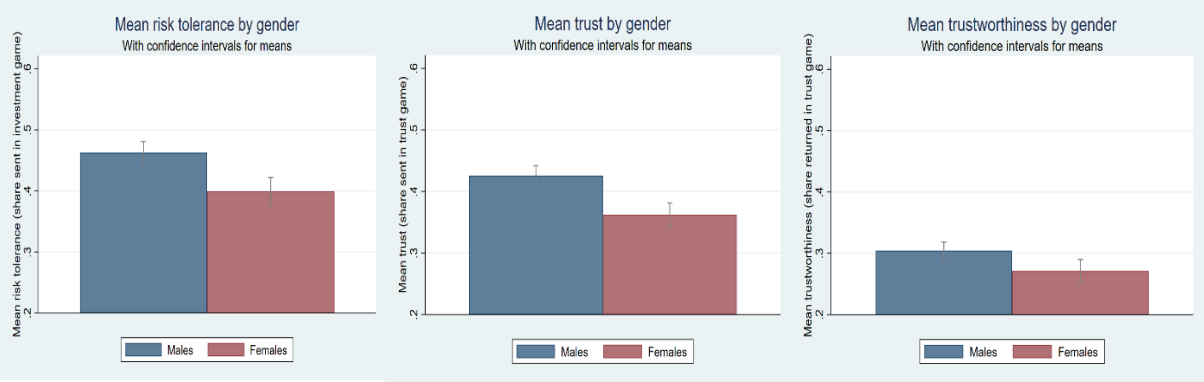

Figure 1. 1a) Risk tolerance, 1b) trust and 1c) trustworthiness by gender

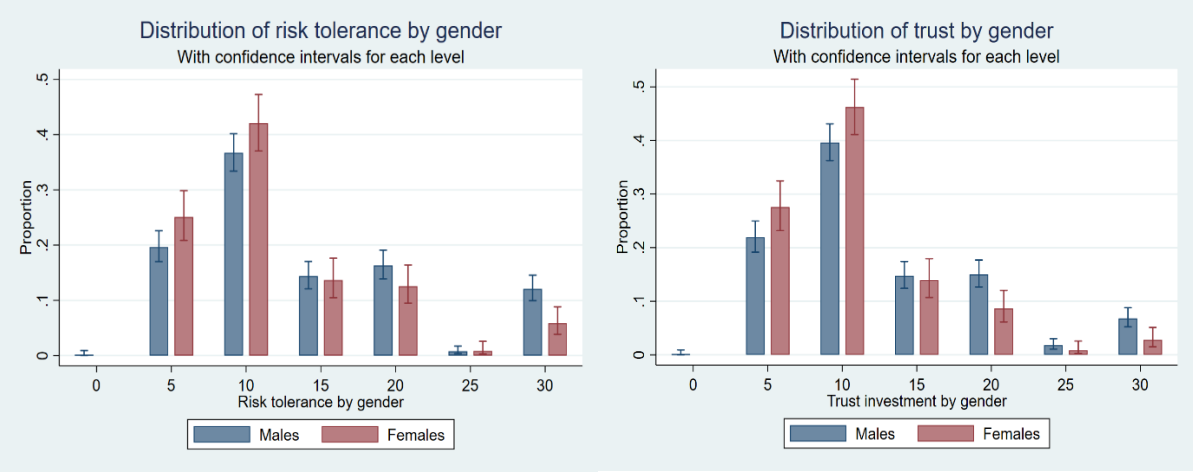

Figure 2. 2a) Risk tolerance by amount sent by gender, 2b) Trust by amount sent by gender

Our findings are in line with earlier reviews by Eckel and Grossman (2008), Croson and Gneezy (2009), and Charness and Gneezy (2012) in terms of finding statistical significant gender differences in risk-taking behavior. In order to inspect the size of the differences more closely, we estimated Cohen's *d* for the three key variables, see Figure 3 and Table 4.

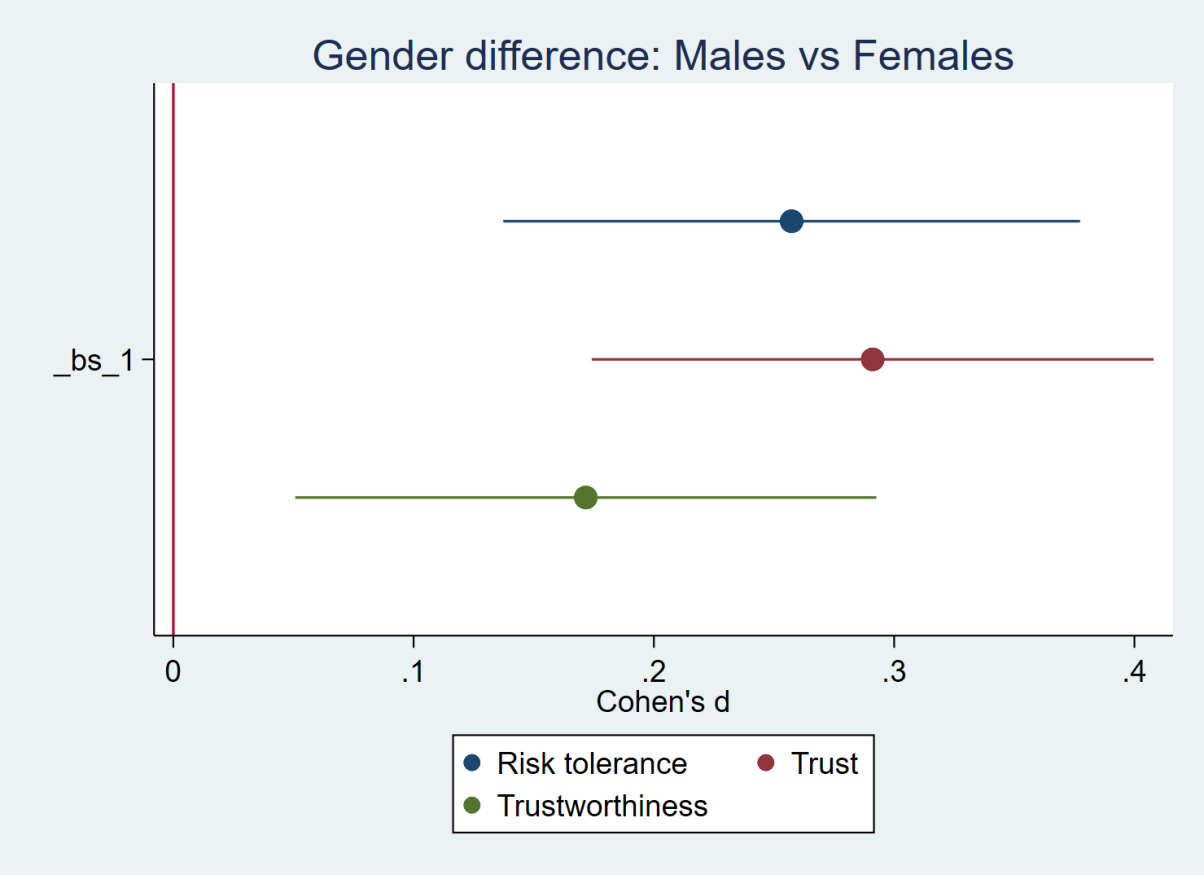

Figure 3. Cohen's *d* with confidence intervals based on bootstrapped standard errors for gender differences for risk tolerance, trust and trustworthiness

Table 4. Gender differences in risk tolerance, trust and trustworthiness, comparison with other studies

Gender difference	Risk tolerance	Trust	Trustworthiness
Cohen's *d*	0.257	0.291	0.172
Two-sample test, bootstrapped st.err.	0.000	0.000	0.004
CLEF[1]	0.566	0.573	0.544
Wilcoxon rank-sum (Mann-Whitney) test	0.0002	0.0000	0.0133

Source: Own data. [1]CLEF=Common Language Effect Size.

Table 5. Individual characteristics by gender

	Females		Males				
	Mean	S.dev.	Mean	S.dev.	St. err. mean	Sign.	Cohen's d
Age	25.992	7.813	30.492	10.283	0.290	****	-0.461
Education, years	5.429	4.151	5.307	3.898	0.118		0.030
Number of brothers	2.582	1.531	2.778	1.673	0.048	****	-0.121
Number of sisters	2.329	1.439	2.401	1.504	0.044	*	-0.047
Birth rank	3.089	1.995	3.111	2.007	0.059		-0.011
Number of siblings in group	0.178	0.514	0.227	0.559	0.016	***	-0.092
Group trust vs. Comm. trust	4.334	0.773	4.384	0.772	0.023	**	-0.060
Group trust vs. Family trust	2.081	1.058	2.085	1.028	0.031		-0.004

Source: Own data.

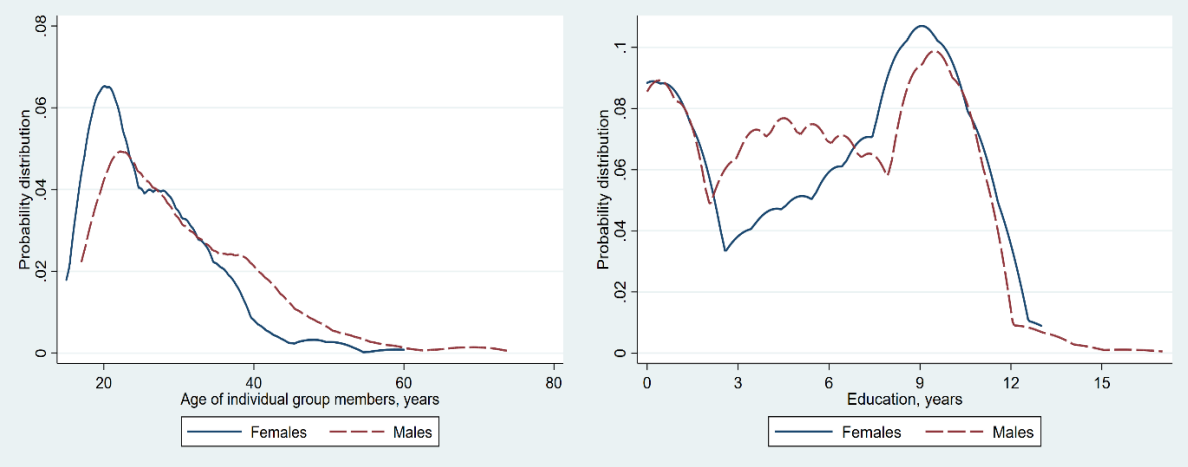

Figure 4. 4a) Age distribution by gender. 4b) Education distribution by gender

6.2. Parametric regression results

6.2.1. Risk tolerance and trust

Table 6 presents the joint models relating risk tolerance and individual level of trust while Table 7 presents separate models for females and males for further inspection of gender differences (see Table A1 in the Appendix for more parsimonious models with group random effects and fixed effects specifications). The two first models with group random effects and fixed effects specifications in Table 6 include the individual gender and risk tolerance variables but no interaction, while the two last models include the gender and risk tolerance interaction variable. The results are very stable and robust to the alternative model specifications. The descriptive statistics (Figures 1a and 1b) show that hypotheses H1 and H2 cannot be rejected. Male group members are on average significantly more risk tolerant and more trusting. Table 6 provides additional strong evidence that male group members are more trusting (Models 1-2). Table 6 also shows that we cannot reject hypothesis H3 that "risk tolerance (share sent in risk game) is positively correlated with trust", as risk tolerance is strongly positively correlated with trusting behavior (significant at 0.1% level in Models 1-2).

Models 3 and 4 in Table 6 are used to test hypothesis H4 that "higher risk tolerance of male group members explains why male members invest more in the trust game". This hypothesis cannot be rejected as the interaction variable between gender and risk tolerance is positive and significant at 1% level in both models. With the inclusion of this interaction variable, the separate gender variables is no longer significant while the risk tolerance variable is significant at 5 and 10% levels. This implies that for males we find a stronger positive and significant correlation between risk tolerance and trust. After controlling for the difference in risk tolerance there seems to be no significant gender difference in trusting behavior. However, this specification assumes that all other coefficients are the same for men and women. We relax this assumption by estimating the models separately for men and women in Table 7. Table 7 demonstrates that the basic finding is robust. Individual risk tolerance affects trust more strongly for men than for women. The coefficient on individual risk tolerance is close to three times as high for men as for women and is significant at 0.1% level for men and significant at 10 and 5% levels for women. The separate regressions show that there are some significant gender differences for group level variables as well as for individual level variables. There is some evidence in support of hypothesis H6 as female members were more sensitive (significant at 0.1% level) to changes in group board members than male members. We leave to the reader to inspect the differences for the individual level controls.

Table 6. Joint individual trust models (share of endowment invested in trust game by trustors)

	Model 1 Group RE	Model 2 Group FE	Model 3 Group RE	Model 4 Group FE
Male member dummy	0.0420***	0.0446***	-0.0455	-0.0351
Risk tolerance	0.248****	0.227****	0.0902**	0.0829*
Male*Risk tolerance			0.210****	0.192***
Group characteristics				
Group size in game	-0.000676		-0.000223	
Average risk tolerance	0.152**		0.156**	
Average stated trustworthiness	0.121		0.133	
Average actual trustworthiness	-0.153		-0.151	
St.dev. Actual trustworthiness	0.155		0.127	
Share of males in group	-0.0357		-0.0323	
Relative group trust vs. Comm. trust	-0.0114		-0.0103	
Relative group trust vs. Family trust	0.02		0.019	
Self-selection, dummy	0.00427		0.00595	
Self-selection, IMR	-0.0877*		-0.0919**	
Establishment year & month	-0.00165		-0.00155	
Initial group size	0.000986		0.000923	
Market distance, km	0.00118		0.00117	
Change of board, dummy	-0.0241*		-0.0232*	
Severe conflict, dummy	0.00432		0.0033	
Less severe conflict, dummy	-0.0159		-0.0174	
Other individual controls				
Age	0.00121*	0.000824	0.0011	0.00063
Education, years	0.00275	0.00268	0.00281	0.00252
Number of brothers	-0.00886**	-0.0102**	-0.00855**	-0.0101**
Number of sisters	0.00633*	0.00592	0.00609	0.00562
Birth rank	0.00754**	0.00889**	0.00792**	0.00920***
Number of siblings in group	-0.0139	-0.0153	-0.0133	-0.0147
Group trust vs. Comm. trust	-0.00547	-0.00228	-0.0041	-0.00133
Group trust vs. Family trust	0.0147*	0.0107	0.0151*	0.0112
District FE	Yes	No	Yes	No
Main activity FE	Yes	No	Yes	No
Group FE	No	Yes	No	Yes
Enumerator FE	Yes	Yes	Yes	Yes
Constant	3.524	0.247****	3.364	0.305****
N	1128	1138	1128	1138
R^2,within	0.160	0.159	0.170	0.168
R^2, between	0.432	0.185	0.441	0.200
R^2, overall	0.209	0.167	0.219	0.177
Wald chi2	385.94		418.18	
F-value		8.90		8.81
P>chi2/P>F	0.0000	0.0000	0.0000	0.0000

Note: Models with cluster robust standard errors used to determine significance levels: * p<0.10, ** p<0.05, *** p<0.01, **** p<0.001. The table presents marginal effects. Cluster robust Hausman tests favored RE models over the FE models, FE models are retained to provide evidence of the robustness of the results.

Table 7. Individual trust models by gender

	Females Group RE	Females Group FE	Males Group RE	Males Group FE
Individual risk tolerance	0.0824*	0.113**	0.295****	0.266****
Group characteristics				
Group size in game	0.00354		0.000156	
Average risk tolerance	0.225*		0.124	
Average stated trustworthiness	0.0615		0.0853	
Average actual trustworthiness	-0.398**		0.00177	
St.dev. stated trustworthiness	0.413*		0.0872	
Share of males in group	-0.022		-0.0354	
Relative group trust vs. Community trust	-0.0173		-0.00777	
Relative group trust vs. Family trust	0.0153		0.0145	
Self-selection, dummy	-0.0358		0.0282	
Self-selection, IMR	0.126		-0.0998**	
Establishment year & month	-0.00789		0.00155	
Initial group size	-0.00173		0.00148	
Market distance, km	0.000796		0.00125	
Change of board, dummy	-0.0648****		-0.0135	
Severe conflict, dummy	0.016		0.0103	
Less severe conflict, dummy	-0.0224		-0.0248	
Other individual controls				
Age	0.00208	0.000913	0.00104	0.000301
Education, years	0.00458	0.00204	0.00299	0.00364
Number of brothers	0.00237	-0.00192	-0.0127***	-0.0131**
Number of sisters	0.00537	0.000731	0.00738	0.00638
Birth rank	0.000686	-0.00356	0.0138****	0.0133***
Number of siblings in group	-0.0406**	-0.0394**	-0.000855	-0.0109
Group trust vs. Community trust	-0.0307**	-0.0283*	0.00936	0.0119
Group trust vs. Family trust	-0.00211	-0.0047	0.0247***	0.0189*
District dummies	Yes	No	Yes	No
Main activity dummies	Yes	No	Yes	No
Group dummies	No	Yes	No	Yes
Enumerator dummies	Yes	Yes	Yes	Yes
Constant	16.35	0.456****	-3.067	0.192**
N	356	359	772	779
R^2, within	0.226	0.237	0.174	0.172
R^2, between	0.380	0.069	0.385	0.240
R^2, overall	0.317	0.198	0.231	0.187
Wald chi2	262.2		460.43	
F-value		7.22		7.12
P>chi2/P>F	0.0000	0.0000	0.0000	0.0000

Note: Models with cluster robust standard errors used to determine significance levels: * p<0.10, ** p<0.05, *** p<0.01, **** p<0.001. The table presents marginal effects. Cluster robust Hausman tests favored RE models over the FE models, FE models are retained to provide evidence of the robustness of the results. Parsimonious models with fewer controls are presented in Appendix Table A1.

Next, we look at the test results for hypothesis H5 that "higher average risk tolerance in the group enhances individual trust in form of amounts sent by individuals in the trust game". Average risk tolerance among other group members is significant (at 5% level) and the parameter estimates are even higher (although not significantly so) than for the individual risk tolerance variable for women in Table

6. It is significant (at 10% level only) for females but not for males as can be seen in Table 7. Table 7 shows that females responded more strongly than males to group risk tolerance in their trusting behavior. This may indicate that group psychology plays a role in these youth business groups even though our experiments prevented interaction among members during the games. This lends some support to hypothesis H6. The last result is more significant (at 0.1% level) in the parsimonious models in Table A1 in the Appendix, giving more weight to the result. The fact that the sample for males is more than double the size of the sample for females may contribute to more variables being significant and some variables being more significant in the models for males in Table 7.

6.2.2. Trustworthiness models

The trustworthiness models are presented in Table 8. Figure 1c revealed that women returned a significantly lower share of the amount they received in the trust game and Table 8 provides further evidence regarding hypothesis H6 that "women are more trustworthy than men". After imposing group and individual controls, the gender dummy variable is insignificant. We find no significant difference in trustworthiness between male and female group members in the pooled models with the gender dummy.

Table 8 provides some other interesting insights. On average, the amount returned is lower than the amount sent and the share returned declines significantly with amount sent. Trusting behavior (amount sent as trustor) of individuals is also uncorrelated with trustworthiness. Furthermore, luck in the risk game significantly stimulated the amounts and shares returned by the trustees. Individual risk tolerance is strongly positively correlated with trustworthiness. This may indicate that more risk tolerant people are more optimistic and therefore more trusting and trustworthy. However, we cannot rule out other mechanisms that can explain these correlations.

To further inspect the gender differences we run separate models for males and females for amounts returned and shares returned with group random effects in Table 9. These models reveal some systematic gender differences in the variables being correlated with trustworthiness. Like risk tolerance was significantly more positively correlated with trust for males than for females in Table 7, it is also significantly (at 1 and 0.1% levels) positively correlated with trustworthiness for males but not for females. This result is robust to alternative specifications as can be seen from the alternative more parsimonious models in Tabel A2 in the Appendix. On the other hand, females were significantly more trustworthy in groups with more risk tolerant group members. It appears that females are more sensitive to group characteristics such as exposure to severe conflicts and average perceptions of group trust relative to family trust. Males' trustworthiness appears to be less sensitive to group characteristics. We cannot therefore reject hypothesis H6. We see that gender disaggregated models give quite different results than pooled models.

Table 8. Individual trustworthiness models for group members

	Amount ret. Group RE	Amount ret. Group FE	Share ret. Group RE	Share ret. Group FE
Amount sent by trustor	0.803****	0.795****	-0.00201**	-0.00222***
Amount sent as trustor	0.0238	0.0197	0.00054	0.000622
Luck in risk game, dummy	1.098**	1.121**	0.0283**	0.0303**
Group characteristics				
Group size in game	0.0443		0.00186	
Average risk tolerance	5.532**		0.120*	
Average share sent in trust	0.808		-0.0554	
Average stated trustworthiness	0.428		0.0502	
St.dev. stated trustworthiness	-1.148		-0.00215	
Share of males in group	-0.0527		-0.000752	
Relative group trust vs. Community trust	-0.117		-0.00449	
Relative group trust vs. Family trust	0.555		0.00568	
Self-selection, dummy	-0.538		-0.0224*	
Self-selection, IMR	0.627		0.00572	
Establishment year & month	0.00821		-0.000831	
Initial group size	0.0431		0.000805	
Market distance, km	0.0351		-0.000443	
Change of board, dummy	-0.0941		-0.00346	
Severe conflict, dummy	-0.83		-0.0250*	
Less severe conflict, dummy	0.313		-0.000155	
Other individual controls				
Male member dummy	0.753	0.789	0.0171	0.0184
Risk tolerance	3.996****	3.336***	0.120****	0.106***
Age	0.00921	0.0092	0.00165**	0.00157*
Education, years	0.0261	0.0354	0.000697	0.001
Number of brothers	0.021	-0.0349	0.0029	0.00089
Number of sisters	0.292	0.267	0.00541	0.0052
Birth rank	-0.00947	0.0248	-0.0000814	0.000835
Number of siblings in group	-0.0364	-0.122	-0.00543	-0.00911
Group trust vs. Comm. trust	-0.081	-0.0664	0.00314	0.00312
Group trust vs. Family trust	0.157	0.0591	0.0138*	0.0119
District dummies	Yes	No	Yes	No
Main activity dummies	Yes	No	Yes	No
Group dummies	No	Yes	No	Yes
Enumerator dummies	Yes	Yes	Yes	Yes
Constant	-23.67	-2.71	1.788	0.151**
N	1127	1137	1127	1137
R^2, within	0.387	0.389	0.133	0.138
R^2, between	0.678	0.613	0.267	0.064
R^2, overall	0.443	0.430	0.150	0.129
Wald Chi2	1237.8		325.0	
F-value		25.90		7.27
P>Chi2 /P>F	0.0000	0.0000	0.0000	0.0000

Note: Models with cluster robust standard errors used to determine significance levels: * p<0.10, ** p<0.05, *** p<0.01, **** p<0.001. The table shows marginal effects. Cluster robust Hausman tests favored the RE models over the FE models, FE models are retained as evidence of the robustness of the results.

Table 9. Trustworthiness models with group random effects, disaggregated by gender

	Amount returned		Share returned	
	Females	Males	Females	Males
Amount sent by trustor	0.687****	0.845****	-0.00134	-0.00236**
Amount sent as trustor	-0.013	0.0146	-0.00264	0.000801
Individual risk tolerance	2.383	4.547****	0.0601	0.140****
Luck in risk game, dummy	0.981	1.155*	0.00916	0.0297*
Group characteristics				
Group size in game	-0.18	0.179	-0.00715*	0.00631
Average risk tolerance	12.15***	2.86	0.335***	0.0514
Average share sent in trust	-6.969	5.099	-0.288**	0.076
Average stated trustworthiness	-10.08*	6.186	-0.039	0.139
St.dev. Stated trustworthiness	-2.427	-0.781	-0.225	0.0216
Share of males in group	-2.838	1.708	-0.0527	0.0272
Relative group trust vs. Comm. trust	-3.600***	0.982	-0.0433	0.00681
Relative group trust vs. Family trust	2.119****	-0.0868	0.0510***	-0.0144
Self-selection, dummy	-0.331	-0.605	-0.0293	-0.0196
Self-selection, IMR	-11.21**	1.705	-0.271**	0.0392
Establishment year & month	0.143	0.0781	0.00156	0.00152
Initial group size	0.220****	-0.0107	0.00497***	-0.00046
Market distance, km	0.0852	0.0158	-0.000848	-0.000421
Change of board, dummy	0.449	-0.452	-0.0126	-0.00253
Severe conflict, dummy	-2.485***	-0.241	-0.0678****	-0.0108
Less severe conflict, dummy	-0.201	0.652	-0.0415	0.0094
Other individual controls				
Age	0.0296	0.0153	0.000781	0.00197**
Education, years	0.101	0.0775	-0.000228	0.00203
Number of brothers	-0.29	0.104	-0.000899	0.00435
Number of sisters	-0.196	0.442**	-0.00547	0.00997**
Birth rank	-0.0465	0.0593	-0.00299	0.00222
Number of siblings in group	-0.678	0.164	-0.0113	-0.0053
Group trust vs. Comm. trust	-0.238	-0.107	-0.00241	0.00314
Group trust vs. Family trust	-0.38	0.4	-0.00124	0.0209**
District dummies	Yes	Yes	Yes	Yes
Main activity dummies	Yes	Yes	Yes	Yes
Enumerator dummies	Yes	Yes	Yes	Yes
Constant	-272.6	-174	-2.557	-3.127
N	356	771	356	771
R^2, within	0.379	0.409	0.157	0.150
R^2, between	0.572	0.623	0.33	0.255
R^2, overall	0.459	0.469	0.223	0.169
Wald Chi2	743.15	720.12	208.83	190.65
P>Chi2	0.0000	0.0000	0.0000	0.0000

Note: Models with cluster robust standard errors used to determine significance levels: * p<0.10, ** p<0.05, *** p<0.01, **** p<0.001. The table presents marginal effects. Parsimonious models (share return models with group RE and group FE specifications) are presented in Appendix Table A2.

7. Discussion

7.1. Risk tolerance

In a review of studies of gender difference in investment in a risky asset, Nelson (2016) found an average d=0.49 with 95% confidence interval [0.40, 0.58]. However, there was large variation across

studies and only 12 out of 37 individual studies had a *d* that was significantly (at 5% level) larger than zero for these studies with moderate sample size. In our study, the Cohen's *d* for the gender difference in risk tolerance based on the investment game is small, as can be seen in Table 4, compared to the average found with the investment game across studies by Nelson (2016). Our estimate is closer to what Filippin and Crosetto (2016) found based on data from a large number of studies using the Holt and Laury (2002) multiple price list approach. Filippin and Crosetto (2016) argued that the Holt and Laury approach may give smaller gender differences than the investment game and this may be associated with the availability of a safe option and an outcome change rather than a probability change in the investment game. They also argue that a Cohen's *d* of about a sixth of a standard deviation is economically unimportant. With our measurement about at the same size, we will inspect this further with our data. Cohen's *d* for trustworthiness is of smaller than for trust and risk tolerance, but all three are in the range of small to medium, based on Cohen's categorization.

The small gender difference in risk tolerance that we find may be due to selection into youth business groups, as less risk tolerant females may have preferred not to join such groups. We inspect whether the gender differences in risk tolerance, trust and trustworthiness can be associated with selection into the groups due to observable individual characteristics. Table 5 compares the basic characteristics for female and male group members. There are significant statistical differences although they are small (except for age) in terms of Cohen's *d*s. Still these differences may contribute to explain the gender differences for the key variables. We used propensity score matching invoking the common support requirement as a way to assess this possible selection bias due to observables. The gender differences remained statistically significant for all three variables (these results are not reported here but are available from the authors upon request). The individual characteristics are included as controls in the more comprehensive parametric regressions that follow.

The distribution of age and education by gender are presented in Figure 4. Males are on average older. The fact that they dominate in numbers and on average are older may matter for the gender balance in groups. The strong dominance of males in leadership positions and most other board member positions is related to the strong patriarchal culture where males are heads of households and traditionally have taken up almost all leadership positions in local communities. However, the education of male members is not better than for female members. Still, we cannot rule out selection towards a smaller gender difference due to unobservables.

7.2. Trust and trustworthiness

We found significant gender difference in trust with males being more trusting than females. This difference was bigger than the gender difference in risk tolerance and trustworthiness. While we found a significant gender difference in trustworthiness in form of Cohen's *d*, this difference was small, and

it became insignificant in the parametric regressions after group and individual controls were included. We will now assess our results in relation to other studies on trust and trustworthiness.

Our results are consistent with many other studies that have found that men are more trusting than women in the trust game (Buchan et al., 2003, Burks et al., 2003, Chaudhuri and Gangadharan, 2002 and Eckel and Wilson, 2000). Snijders and Keren (1999), who conducted a repeated version of the game with each playing the roles as sender and receiver, also found males to be significantly more trusting (sent more).

Contrary to what we found for trustworthiness, several earlier studies have found females to be more trustworthy than males (Croson and Buchan 1999; Snijders and Keren 1999; Eckel and Wilson 2005; Buchan et al. 2008). Barr (2003), however, in her field study in Zimbabwean villages, found females to be less trustworthy than males.

Many trust experiments have used students as respondents and the evidence indicates that students are less trusting and exhibit less trustworthiness than adults (Fehr and List 2004). This may also be associated with students being younger and younger people being less generous than older people (Midlarsky and Hannah 1989; Nichols 1992; Yen 2002). The age distribution in our sample also shows that we have a distribution that is similar to a student sample and this could pull in direction of a lower level of average trust. However, our regressions revealed that age played only a minor role and was weakly significant in only two of eight models in Tables 6 and 7.

Johnson and Mislin (2011) found evidence that subjects send less in trust games in Africa than those in North America. From this one may possibly expect that youth in Africa send even less than students in lab experiments in the West and less than adults in their own continent. Our study is different from most trust experiments where trustors play with anonymous and unknown trustees as our sample plays with anonymous players in their own youth business group. This framing should result in higher levels of trust than when playing with totally unknown trustees. However, Figures 1b and 1c indicate that the mean trust and trustworthiness are even lower than the average means of 0.456 for trust and 0.319 for trustworthiness found in Africa in the review by Johnson and Mislin (2011).

Croson and Buchan (1999) found no gender difference in sending behavior between men and women but women returned a significant higher amount than men in their study in three Asian countries and the US. They proposed two reasons for women returning larger amounts, first that they are more altruistic, second that they are more likely to reciprocate. They found evidence in favor of the second explanation as women felt significantly more obliged to return at least as much as has been sent than men. We also had a question in our survey: “How obliged do you feel to return an amount at least as big as the amount sent?” Females were not responding significantly different from males to this question: 29.0% of the females and 32.6% of the males responded that they felt extremely obliged, 26.5% of the females and 23.1% of the males responded that they did not feel obliged at all.

Croson and Buchan (1999) also found that receivers rewarded trust by returning a higher proportion of what they received, the higher the amount received was. In contrast, we find that the share returned by trustees in our sample significantly reduced as the amount received increased. A recent study in Ethiopia (Bezu and Holden 2015), using dictator games, did not find Ethiopian women to be more altruistic (send more money in the game) than Ethiopian men.

Buchan et al. (2008), using university students in the US as respondents, found that men are more trusting than women and that women are more trustworthy than men. They found that women felt more obliged as senders to send money to the responder and as receivers to return money to the sender. These effects were also significant in regressions, although the latter only weakly so. We may deduce from these variations in the findings across cultures that such obligation feelings and altruism are cultural traits rather than biological gender traits. The review of findings in such studies by Croson and Gneezy (2009, p.459) showed that men were more trusting than women in eleven of twenty studies, while females were more trusting in two studies. Women were more trustworthy than men in seven of twenty studies and men were more trustworthy only in one study. There was no significant gender difference in the remaining studies.

In respect to factors affecting amounts sent in the trust game, Buchan et al. (2008) found that expected returns played an important role for both genders. The effect was stronger for males in line with the social role theory stating that men are more instrumental and output oriented than women. We did not find a significant gender difference in the correlation between amount sent and amount or share returned. Average stated trustworthiness in the group, as a potential measure of expected return, is also unrelated with individual trustworthiness.

We find that individual risk tolerance has a strong and significant effect on trust and trustworthiness of males. Females are more sensitive to some of the group level variables, especially in regard to their trustworthiness and this is in line with social role theory. On the other hand, they are not found to be more altruistic or feel more obliged than males to return money as trustees. The females in our study are fewer in number than males in most groups and tend also to be younger. They may therefore be more sensitive to group characteristics and give less weight to their own preferences.

7.3. Risk tolerance, trust and trustworthiness are related

There exists mixed evidence on how closely risk tolerance and trusting behavior are related. Quite a few studies found no significant correlation between risk tolerance and trust (Eckel and Wilson 2004; Ashraf et al. 2003; Houser et al. 2010). Bohnet and Zeckhauser (2004) proposed that trusting behavior may be more responsive to betrayal aversion than risk aversion and found evidence in this direction. Bohnet et al. (2008) provided further evidence of the importance of betrayal aversion for trusting behavior in their study with data from six countries. We did not investigate the importance of betrayal aversion in our study but found that risk tolerance certainly plays an important role for trusting decisions

among males. Our results are similar to those of Schechter (2007) who ran trust and simple risky investment experiments in 15 villages of rural Paraguay. She found that risk attitudes are highly predictive of play in the trust game and that higher trust among males is due to their higher risk tolerance. Schechter ran the risk game first and noted that this may have influenced behavior in the trust game, which for this reason may have been framed as a gamble as well. In order to avoid such a framing effect from the risk game on the trust game, we played the first part of the trust game before the risk game. Still, we find a strong positive correlation between individual risk tolerance and trust among males. In addition, our study provides evidence on how average group characteristics such as average risk tolerance among other group members, conflict exposure and group size affect individual trustworthiness of females.

Eckel and Wilson (2004) used university students in the US as subjects and ensured that they paired persons that did not know each other. They combined a binary trust game with a Holt and Laury (2002) price list to derive a measure of risk aversion. They found no significant correlation between risk aversion and the binary trusting decisions. On the other hand, surprisingly, they found that more risk tolerant receivers returned smaller amounts to the sender in the trust game. Our results go in the opposite direction with more risk tolerant males being more trustworthy while for females our findings in line with those of Eckel and Wilson (2004) as individual risk tolerance is negatively correlated with trustworthiness.

7.4. Theoretical explanations

Our findings are consistent with social role theory to the extent that we find significant gender differences in risk tolerance, and that individual trust is enhanced by individual risk tolerance among males but not among females. This is consistent with males being more individualistic and instrumental. Our finding that females' trustworthiness responded to the risk tolerance of other members of their own group, , to exposure to conflicts, group size and self-selection into groups. This may be a consequence of their weaker position in the groups, which results in this sensitivity to group characteristics. It could also indicate that females are more socially oriented and less individualistic in line with social role theory. However, we did not find that females were more trustworthy than males, something that has been suggested as another effect of the more social orientation of females.

Our results are also consistent with males being more confident and more optimistic than females on average. However, more work is needed to further investigate the underlying mechanisms.

8. Conclusions

How big must gender differences be for them to be non-trivial and economically important? While several recent studies have found gender differences in risk tolerance to be small on average and with substantial overlap, gender differences remain large in many societies in choice of occupations and distribution of power and income. In our study of youth business group members in Ethiopia we find

males to be significantly more risk tolerant, trusting and trustworthy. Measured in terms of Cohen's *d* the average gender differences in these characteristics are small and with large overlap. Nevertheless, when we analyzed the relationship between these characteristics, larger gender differences became visible. Higher trust among males is driven by or positively correlated with higher individual risk tolerance and so is trustworthiness while there was a weaker but significant correlation between risk tolerance and trust but not for trustworthiness for females. Females are found to be more sensitive to group characteristics. Average risk tolerance of other group members rather than own risk tolerance affected individual trust and trustworthiness of females. These findings seem to fit with social role theory with males being more individualistic and females more communal. The fact that females were on average younger and fewer in number in the youth business groups may also imply that they have weaker power positions in the groups and are more sensitive to the characteristics of other group members. We may therefore conclude that while the gender differences in risk tolerance, trust and trustworthiness may be small on average, their aggregate effects may still be non-trivial and substantially affect group and individual behavior.

References

Archer, J. (1996). Sex differences in social behavior: Are the social role and evolutionary explanations compatible? *American Psychologist*, *51*(9), 909.

Ashraf, N., Bohnet, I., Piankov, N., (2003). Is trust a bad investment? Faculty Research Working Papers Series 03-047, John F. Kennedy School of Government, Harvard University.

Atkinson, S. M., Baird, S. B., & Frye, M. B. (2003). Do female mutual fund managers manage differently? *Journal of Financial Research*, *26*(1), 1-18.

Bakan, D. (1966). The duality of human existence: An essay on psychology and religion. Oxford, England: Rand Mcnally.

Ben-Ner, A., Putterman, L., (2001). Trusting and trustworthiness. *Boston University Law Review* 81, 523–551.

Berg, J., Dickhaut, J., & McCabe, K. (1995). Trust, reciprocity, and social-history. *Games and Economic Behavior* 10(1), 122–142.

Birley, S., 1989. Female Entrepreneurs: Are They Really Any Different? *Journal of Small Business Management* 27(1), 32-50.

Bohnet, I. & Zeckhauser, R. (2004), Trust, Risk and Betrayal. *Journal of Economic Behavior and Organization* 55(4), 467-484.

Bohnet, I., Greig, F., Herrmann, B., & Zeckhauser, R. (2008). Betrayal aversion: Evidence from Brazil, China, Oman, Switzerland, Turkey, and the United States. *American Economic Review*, 98, 294–310.

Brody, L. R., & Hall, J. A. (1993). Gender and emotion. In M. Lewis & J. M. Haviland (Eds.), *Handbook of Emotions* (pp. 447-460). New York, NY, US: Guilford Press.

Buchan, N. R., Croson, R. T., & Solnick, S. (2008). Trust and gender: An examination of behavior and beliefs in the Investment Game. *Journal of Economic Behavior & Organization*, *68*(3-4), 466-476.

Burks, S. V., Carpenter, J. P., & Verhoogen, E. (2003). Playing both roles in the trust game. *Journal of Economic Behavior & Organization* 51, 195–216.

Byrnes, J. P., Miller, D. C., & Schafer, W. D. (1999). Gender differences in risk taking: A meta-analysis. *Psychological Bulletin*, *125*(3), 367.

Charness, G., & Gneezy, U. (2012). Strong evidence for gender differences in risk taking. *Journal of Economic Behavior & Organization*, *83*(1), 50-58.

Chaudhuri, A., Gangadharan, L., 2002. Gender Differences in Trust and Reciprocity. The University of Melbourne Department of Economics Working Paper Number 875.

Cohen, J. 1988. Statistical power analysis for the behavioral sciences. 2nd edition. New Jersey: Erlbaum.

Croson, R., Buchan, N., 1999. Gender and culture: International experimental evidence from trust games. *American Economic Review* 89, 386–391.

Croson, R., & Gneezy, U. (2009). Gender differences in preferences. *Journal of Economic literature*, *47*(2), 448-74.

Eagly, A. H. (2013). *Sex differences in social behavior: A social-role interpretation*. Psychology Press.

Eagly, A. H., & Steffen, V. J. (1984). Gender stereotypes stem from the distribution of women and men into social roles. *Journal of Personality and Social Psychology*, *46*(4), 735-754.

Eagly, A. H., & Wood, W. (1999). The origins of sex differences in human behavior: Evolved dispositions versus social roles. *American Psychologist*, *54*(6), 408.

Eagly, A. H., Wood, W., & Diekman, A. B. (2000). Social role theory of sex differences and similarities: A current appraisal. *The Developmental Social Psychology of Gender*, 123-174.

Eckel, C.C.,Wilson, R.K., (2004). Is trust a risky decision? *Journal of Economic Behavior and Organization* 55 (4), 447–465.

Eckel, C., Wilson, R., (2005). Attractiveness and Trust: Does Beauty Confound Intuition? Virginia Tech University Department of Economics, Working Paper.

Estes, R., & Hosseini, J. (1988). The gender gap on Wall Street: an empirical analysis of confidence in investment decision making. *The Journal of Psychology*, *122*(6), 577-590.

Fehr, E., & List, J. (2004). The hidden costs and returns of incentives—Trust and trustworthiness among CEOs. *Journal of the European Economic Association* 2(5), 743–771.

Filippin, A., & Crosetto, P. (2016). A reconsideration of gender differences in risk attitudes. *Management Science*, *62*(11), 3138-3160.

Fujita, F., Diener, E., & Sandvik, E. (1991). Gender differences in negative affect and well-being: the case for emotional intensity. *Journal of Personality and Social Psychology*, *61*(3), 427.

Gneezy, U., & Potters, J. (1997). An experiment on risk taking and evaluation periods. *The Quarterly Journal of Economics*, *112*(2), 631-645.

Harshman, R. A., & Paivio, A. (1987). "Paradoxical" sex differences in self-reported imagery. *Canadian Journal of Psychology 41*(3), 287.

Holden, S. T. & Tilahun, M. (2018). The importance of Ostrom's Design Principles: Youth Group Performance in Northern Ethiopia. *World Development* 104, 10-30.

Holt, C. A., & Laury, S. K. (2002). Risk aversion and incentive effects. *American Economic Review*, *92*(5), 1644-1655.

Houser, D., Schunk, D., & Winter, J. (2010). Distinguishing trust from risk: An anatomy of the investment game. *Journal of Economic Behavior & Organization*, *74*(1), 72-81.

Johnson, N. D., & Mislin, A. A. (2011). Trust games: A meta-analysis. *Journal of Economic Psychology*, *32*(5), 865-889.

Lerner, J. S., Gonzalez, R. M., Small, D. A., & Fischhoff, B. (2003). Effects of fear and anger on perceived risks of terrorism: A national field experiment. *Psychological Science*, *14*(2), 144-150.

Lichtenstein, S., Fischhoff, B., Phillips, L. D., Kahneman, D., Slovic, P., & Tversky, A. (1982). Judgment under uncertainty: Heuristics and biases. *Judgement under uncertainty: heuristics and biases*. Cambridge University Press, Cambridge.

Loewenstein, G. F., Weber, E. U., Hsee, C. K., & Welch, N. (2001). Risk as feelings. *Psychological bulletin*, *127*(2), 267.

Masters, R., & Meier, R. (1988). Sex differences and risk-taking propensity of entrepreneurs. *Journal of small business management*, *26*(1), 31.

Midlarsky, E., & Hannah, M. (1989). The generous elderly: Naturalistic studies of donations across the life span. *Psychology and Aging*, 4(3), 346–351.

Nelson, J. A. (2015). Are women really more risk- averse than men? A re- analysis of the literature using expanded methods. *Journal of Economic Surveys*, *29*(3), 566-585.

Nelson, J. A. (2016). Not-so-strong evidence for gender differences in risk taking. *Feminist Economics*, *22*(2), 114-142.

Nichols, J. E. (1992). Targeting aging America. *Fund Raising Management* 23(3), 38–42.

Ridgeway, C. L. (2011). *Framed by gender: How gender inequality persists in the modern world*. Oxford University Press.

Schechter, L. (2007). Traditional trust measurement and the risk confound: An experiment in rural Paraguay. *Journal of Economic Behavior & Organization* 62(2), 272-292.

Sell, J. (1997). Gender, strategies, and contributions to public goods. *Social Psychology Quarterly*, 252-265.

Snijders, C., Keren, G., 1999. Determinants of trust. In: Budescu, D., Erev, I., Zwick, R. (Eds.), Games and Human Behavior. Lawrence Erlbaum Associates, Mahwah, NJ, pp. 355–386.

Yen, S. T. (2002). An econometric analysis of household donations in the USA. *Applied Economic Letters* 9(13), 837–841.

Appendix

Table A1. Parsimonious trust models with group random effects (RE) and group fixed effects (FE) by gender

Parsimonious trust models	Males Group RE	Females Group RE	Males Group FE	Females Group FE	Males Group RE	Females Group RE
Individual risk tolerance	0.313****	0.124**	0.278****	0.146**	0.340****	0.254****
Group characteristics						
Group size in game					0.00274	-0.0215
Average risk tolerance					1.057****	1.634****
Average stated trustworthiness					-2.578****	-3.535****
Average actual trustworthiness					0.449*	-0.281
St.dev. actual trustworthiness					0.492	1.629**
Share of males in group					0.0669	0.0948
Relative group trust vs. Community trust					-0.0615	-0.027
Relative group trust vs. Family trust					0.0459	0.0847**
Constant	0.280****	0.313****	0.297****	0.304****	0.711**	0.860**
R-sq, within	0.098	0.029	0.098	0.029	0.685	0.868
R-sq, between	0.202	0.001	0.202	0.001	0.259	0.128
R-sq, overall	0.126	0.021	0.126	0.021	0.011	0.005
Wald chi2	75.86	5.50			230.56	125.12
F			50.50	6.88		
P-value	0.0000	0.019	0.0000	0.010	0.0000	0.0000
N	779	359	779	359	779	359

Note: Models with cluster robust (clustered at group level) standard errors used to determine significance levels: * p<0.10, ** p<0.05, *** p<0.01, **** p<0.001.

Table A2. Parsimonious trustworthiness models (shares returned) with group random effects (RE) and group fixed effects (FE) by gender

	Males Group RE	Females Group RE	Males Group FE	Females Group FE	Males Group RE	Females Group RE
Amount sent by trustor	-0.00180*	-0.00141	-0.00238**	-0.00176	-0.00227**	-0.00131
Amount sent as trustor	0.00193	0.00228	0.00141	0.00386*	0.00163	0.00204
Individual risk tolerance	0.137****	0.0684	0.117****	0.029	0.133****	0.0754
Luck in the risk game, dummy	0.0214	0.00385	0.0253	-0.00206	0.0222	0.00693
Group characteristics						
Group size in game					0.00449	-0.00385
Average risk tolerance					0.121	0.203*
Average stated trustworthiness					0.0267	-0.187
St. Dev. stated trustworthiness					0.00948	-0.137
Share of males in group					0.0152	-0.0668*
Relative group trust vs. Community trust					-0.00352	-0.0563*
Relative group trust vs. Family trust					0.00716	0.0242
Constant	0.225****	0.233****	0.246****	0.239****	0.116	0.495***
R-sq, within	0.043	0.015	0.044	0.019	0.041	0.027
R-sq, between	0.099	0.051	0.091	0.001	0.174	0.088
R-sq, overall	0.053	0.014	0.051	0.011	0.060	0.041
Wald chi2	32.58	5.81			39.59	27.90
F			6.07	1.39		
P-value	0.0000	0.214	0.0002	0.242	0.0000	0.0034
N	778	359	778	359	778	359

Note: Models with cluster robust (clustered at group level) standard errors used to determine significance levels: * p<0.10, ** p<0.05, *** p<0.01, **** p<0.001.