CHAPTER 4
RESULTS

4.1 Descriptive Analysis

4.1.1 Household Characteristics

The interviewed households are from Oromo, Amhara, Gamo, Kembata, Sidama, Wolayita, Gedio and Silti. The pie chart shows the Ethiopian ethnic group from the sample. Gedio are the largest ethnic group (30.64%) in our sample while the Amhara represent the smallest percentage (1.63%). The largest ethnic group in Ethiopia, the Oromo people accounts only 7.15% in our sample. The smallest ethnic group in the southern part of Ethiopia, Silti forms the second largest group in our sample (30.39%) followed by the Kembata people who occupies 13.32%. The Tigrian ethic groups who live in the northern part of Ethiopia are not represented in the study due to the location of the region far from the study area as well as the logistics constraints to reach the people. The overall percentage representation of each ethnic group of the interviewees can be observed from the pie chart as under.

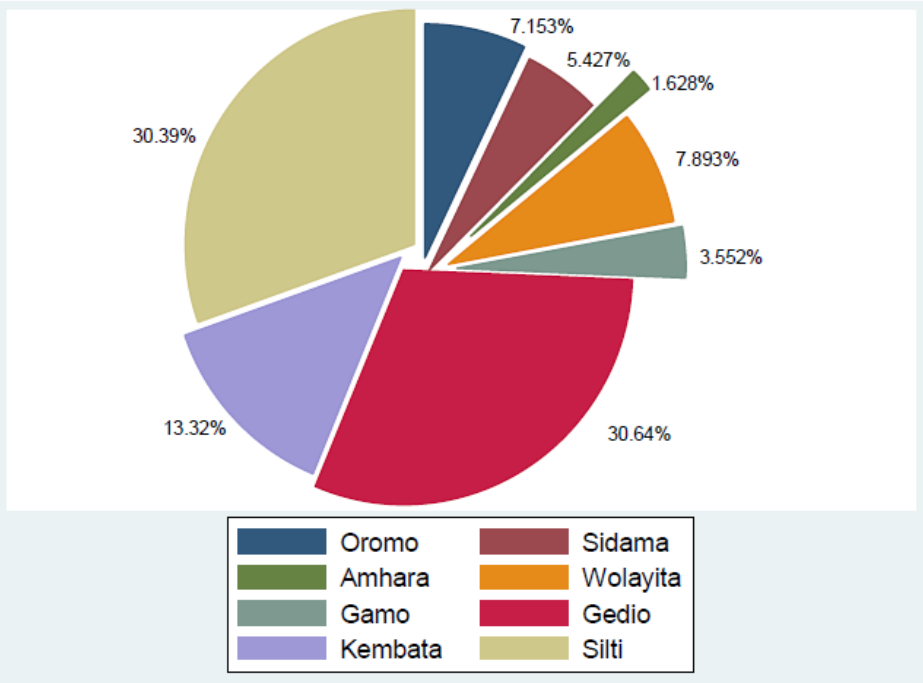

Figure 4 Ethiopian ethnic group in the sample data

The household descriptive summary shown in Table 1, demonstrates that most of the respondents are men. The proportion of male households in our sample is about 85%, and the rest are females. Most of the respondents, more than 95%, receive formal schooling in government institutions and the average education level of the respondents is 3.24 (elementary level). The average age of the respondents is around 44, and most of the respondents are monogamous married. The average time taken from the house to the farm land reaches up to 15 minutes. In rural Ethiopia, the source of information is crucial and our representatives are asked if they have informal sources of information from traditional Baitos[7], local social organizations, relatives and friends. Less than 40% of the households use informal information to solve day to day problems and more than 50% of the individuals use mobile phone to communicate with other people. Besides, the households are visited by the extension agents to receive information that is related to their farm managements such as seasonal planting periods, selection of appropriate fertilizer and pesticide usage. However 30% of the respondents do not get the extension services from the local agricultural institutions.

Majority of the subjects respond moderately to the question of trust in relatives. Even though the Ethiopian social fabric is highly stratified and appreciated for its mutuality and support, as mentioned in the literature review, most of the respondents show that they have average trust in their relatives (56%) based on the scale provided. Similarly if the subjects are in a dire situation where help from someone is necessary, only 21% of the respondents need help which is relatively low figure as compared with the general cultural practice of the Ethiopian society. However the households rely on average more than 9 people for support in case of emergency, problems where the households seek immediate help. Along with their agricultural activities the households engage in other income generating activities such as off-farm activities around the urban areas. The average total income of the household respondents is around 2600 ETB per year. On the other hand more than 80% of the respondents have not taken loan in any form either money, goods or services.

[7] Traditional Baitos is a Tigrinya local language for traditional assembles

The number of shocks that the households experienced is not so high in the southern part of Ethiopia unlike the northern part where the people are afflicted from drought, flooding and diseases. The majority of the respondents said that they did not experience extreme shock phenomenon. However, more than 10% of them say that they had been affected by shocks two times. But in general it can be said that shocks in the southern part of Ethiopia have lower impact as compared to the northern regions.

4.1.2 The Respondents on General Risk Question

This section explains the responses of the general risk question on farm management by the interviewees. The question focuses mainly on the agricultural activities of the people (e.g. crop selection, planting date and application of fertilizers, etc.). The responses of each subject are recorded and a descriptive analysis is conducted and expressed in terms of percentage in Table 1. The respondents were basically given a brief instruction on how they should answer the question and select the scale between 0 and 9 as described in section 4. Graphically the parentage score of the respondents against their willing ess to take risks is depicted in figure 4. The graph shows a considerable range of responses to risk attitude across the sample population. The distribution is skewed to the left where most of the households' choices lie on the modal value 6. Less than 1% of the respondents choose the value 0 that indicates the respondents are fully avoiding taking risks. On the other hand a little more than 20% of them show a strong risk taking attitude with a score 9. Similarly around 20% of the household sample select the scale 6, which is a bit more risk taking attitude. In general we can say that majority of the respondents are risk seekers. Our results differ from other studies in this aspect. For example the study carried out by Dohmen et al. (2011) depicts that risk attitudes vary widely along the scale but most of the choices are concentrated around the modal 5, while in our study the responses are more on modal 6 and 9.

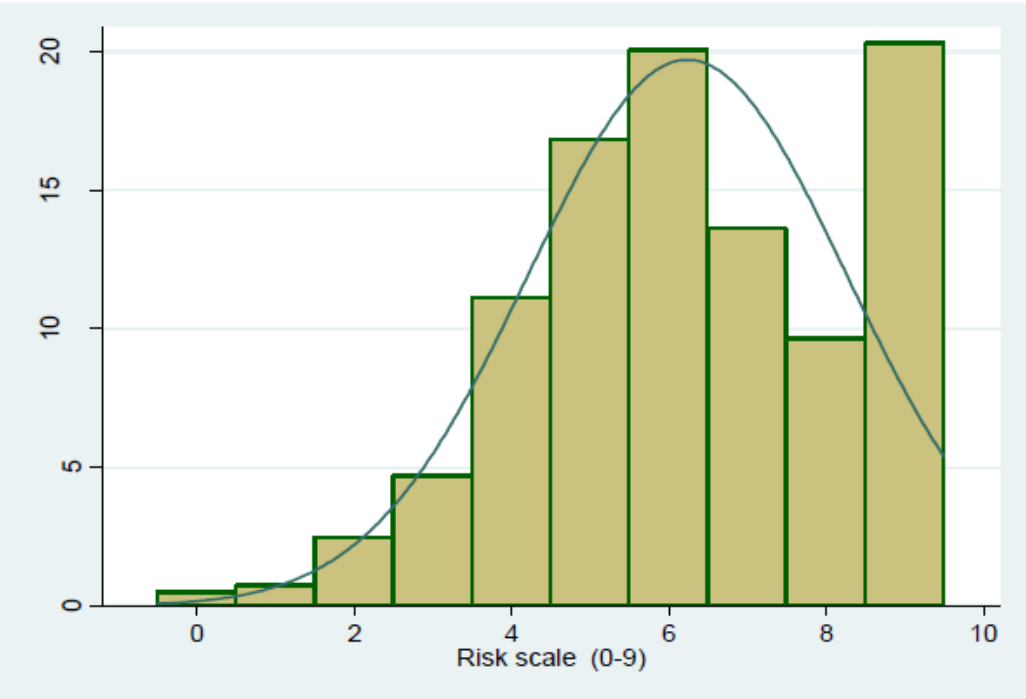

Figure 5 Histogram of the willingness to take risk response in survey

We check the robustness of this result using the experimental lottery. The same people play lottery game with real money at stake, asking them if they are willing to play the lottery game at the safe switching point. The switching point is calculated at 10 ETB bet and that is the point where the risk taking attitude of the subjects is actually measured. The percentage results are illustrated in figure 5. The procedure is explained such that each household has to choose either a fixed amount of money or draw a ball from a mix of 10 colored balls in one bag. The subjects who bet on drawing a ball of a certain color have a 50% chances to win 20 ETB. On the other hand those who prefer a fixed amount of money for each option receive 2 – 20 ETB. Accordingly the households pick their choices and a risk scale is assigned the same way as the general risk question. The value 9 is a modal response to the game where the majority of the subjects choose to continue to play the game at the switching point. Akay et al. (2012) followed similar procedure except that the subjects made 20 choices whereas in our study the respondents are provided with only 10 bet choices. In their study the individuals who prefer to bet on sure payoffs increases from 1 ETB to 20 ETB along the list. But in our case the subjects receive 2 ETB as they ascend along the list to the final figure of 20 ETB. Under such circumstances the subjects are expected to play the game when the

sure payoffs are very small and but to switch later to choose the fixed amount when they think the gains are equal on both options.

In order to carry out a credible study the experimenter was instructing the respondents using the local language and visual support such as hand-outs. Many studies follow similar methodologies to make sure that the participants get the idea of game lottery without doubt. The benefits of visual aids in risk games are to increase the awareness of the players on risky prospects (Carlsson, Johansson-Stenman, & Martinsson, 2004). Overall the percentage choice ascends from risk averse to risk loving attitude in the range of 0 to 9. There are 4% of the respondents who choose to get a fixed amount of 2 EBT, which corresponds to 0 in our risk scale. It shows that the respondents exhibit highly risk aversion attitude. However as we move up along the risk scale, the percentage of respondents increases and at value 4, the percentage suddenly goes up to more than 10%. However the figure dips down to less than 8%, but later rises again steadily. The largest percentage of our sample lies at a risk scale 9, where the figure increases from 16% at scale 8 to 26% at scale 9. This shows that farmers are ready to take risks in order to win the highest paybacks. Therefore according to the statistical analysis, the result reveals that 68% of the subjects are risk seekers and 36% are risk averse while 0.5% of the subjects are excluded from the game due to their inappropriate response to the game. For example some of subjects start with risky bet and then switch to safe bet and then again to risky bet which is not a rational way of choosing the bets. Similarly some of the interviewee chooses the risky choice even though they could get 20 ETB in a safe option. Therefore we concluded that the households do not understand the game fully and we decided to exclude them from our final analysis.

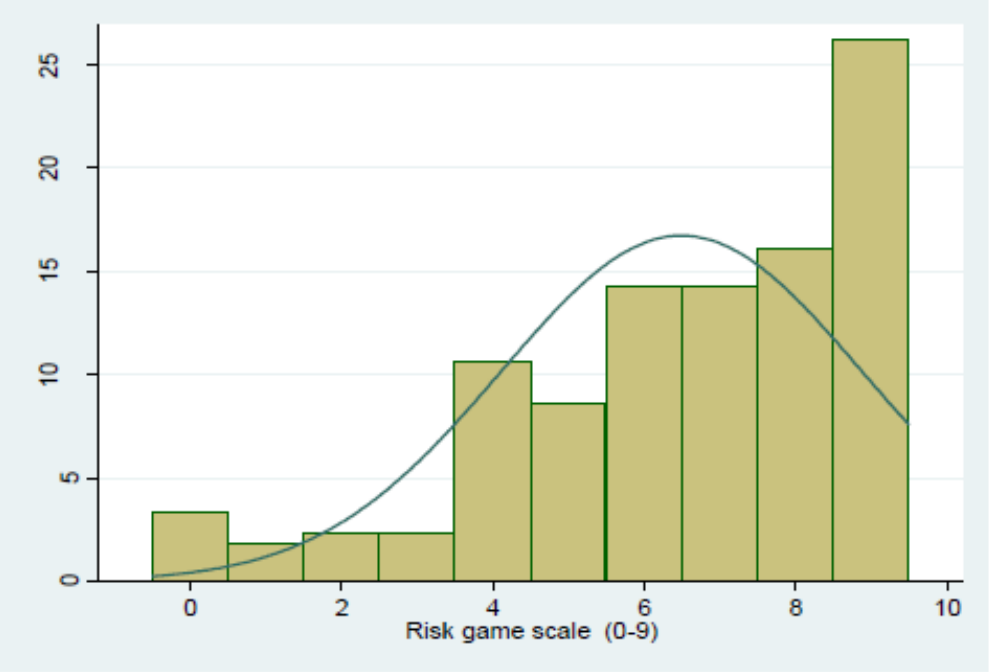

Figure 6 Histogram of risk taking attitude at the switching point using game

4.2 Regression Results and Discussion

This section discusses the interpretation of the different regression results that the Probit and OLS models produce. First we conducted Probit modeling to find out the determining factors of the willingness to take risks in farm management with and without the variable 'trust in relatives'. The Probit modeling does not require the utility function to model ordered data. We can use the underlying latent variable to model the risk taking attitude of the individuals. In other study conducted on the estimation of consumer satisfaction, Probit model is employed during the analysis (Peel, Goode, & Moutinho, 1998). However in order to validate the significance and robustness of the model, we have also tested the analysis using OLS modeling. Even though the Probit and OLS have different assumptions, both of them are popular models in economic analysis.

4.2.1 Survey Findings

4.2.1.1 Results from Probit

After quantifying the percentage of the subjects' choice on a 10 point interval of their willingness to take risks on farm management, the next step proceeds with identifying the factors that affect the risk preference of the individuals. We select plausible independent variables so that a causal interpretation can be drawn from the correlations and model results.

Table 2: Estimation of the risk, illustrates the Probit results of the willingness of the Ethiopian households within the effect of the independent variable 'trust in relatives'. Our dependent variable is dummy variable in Probit analysis. The risk scale 0 to 9 is categorized in to two parts. The scores from 0 to 5 are represented by the value 0 and the scores 6 to 9 as 1. This means the threshold conversion for the binary cutoff lies between the value 5 and 6 based on the risk attitude mean. Similar categorization is also applied to the scores of the independent variable 'trust in relatives'. The interpretation of the significance of each variable in Probit results follows similar procedures as of the OLS estimates. The Probit results are expressed in average marginal, to show causal interpretation. So that the significance test of Probit and OLS regression results can be compared simultaneously, since both of them have identical null hypothesis.

Eight significant variables are identified in Probit results. Four of them are significant at 5% level and the other four variables at 1% level. The independent variable 'number of shocks' is one of the significant variables. Households who are affected by shocks often contain themselves from taking risky decisions that on matters that little known to them. For example the adoption of improved varieties of seeds entails new methods of seed selection, mental and manual labor interactions, evaluation and close assessment of the seed and possible intervention when required. Farmers in rural areas have low access to these crucial knowledges and thus there is little expectation that the farmers would take risk in such circumstances. This can also be related to their level of education. Those who have informal schooling are highly exposed to uncertainty about seed selection, farm management and type of fertilizers applied than those who receive formal schooling. Informal schooling is highly

significant at 1% level. Similarly, farmers who often receive their information informally reveal risk aversion attitude when they are asked about their response to their willingness to take risks. This can be also associated to the level of education they have. It is plausible that households who have formal schooling could access information from different media, books, magazines and processing them for their own benefit. Likewise the independent variable 'informal information' is highly significant at 1%.

Gender gap in developing countries is often used to measure human development index and as a key indicator of decision making process of the households. Based on the risk attitude question, our study indicates that men are highly risk takers than the women in Ethiopia. This is more or less related to the traditional and cultural treatment of women where men are favored over women. Trust in relatives, mobile phone ownership, respondent household and total non-farm incomes are all significant and have a positive correlation with the willingness to take risk of each household on farm management.

Table 2 Estimation of the risk attitude from the survey study using Probit model

Dependent Variable: Willingness to take risk on farm management (planting date, choice of crops, amount of fertilizer)		
Explanatory Variable	**Coefficients**	**Std. Dev.**
Respondent household	0.60***	0.226
Informal Schooling	-1.01***	0.335
Education level	0.02	0.024
Help from someone	-0.20	0.191
Number of people the HH rely upon	-0.004	0.003
Age of the HH respondent	0.004	0.005
Informal information	-0.44***	0.149
Visited by extension agent	-0.16	0.162
Parcel distance	-0.001	0.002
Gender of the HH respondent	0.46**	0.242
Marital status	-0.02	0.045
Number of Shocks (past 5 years)	-0.26**	0.124
Mobile phone	0.34**	0.150
Total non-farm incomes	0.52***	0.173
Whether the HH obtained a loan	0.19	0.219
Trust in relatives	0.23**	0.102
Log likelihood	-229.60	
Pseudo R^2	0.1331	
Observations	404	

Note: *, **, *** depict the significant levels at 10, 5, and 1 percent, respectively.

4.2.1.2 Ordinary Least Square (OLS) Results

Based on the above arguments we conducted an OLS analysis to find out more significant variables in our study and to compare them the significant variables found in Probit model. We run the OLS model two times, with and without the 'trust in relatives' as independent variable to observe its effect on the risk attitude and other explanatory variables.

The OLS model uses the same independent variables used in Probit regression model. The results are displayed in Table 3: The OLS regression results of the general risk question. The significant determining factors of the risk attitude are gender of the subject, respondent household, the number of shocks, whether the respondents took formal schooling or not, informal sources of information, mobile phone ownership, and total non-farm income.

Gender of the household respondent is one of the significant factors on risk attitudes where male heads exhibit higher risk loving behavior than their counterpart females. The difference could be due to the culture that favors males to females on decision makings that is common among many of the Ethiopian households. This is precisely discussed in the literature review above (Yesuf & Bluffstone, 2008). However based on the number of shocks experience prior to five years, both male and female respondents show a risk aversion behavior. For every increase in the number of shocks, the willingness to take risk of the subjects reduces by 0.52. This result corresponds with the aforementioned hypothetical theory that implies the more the natural disaster the people face the more the risk aversion behavior they develop. Yesuf & Bluffstone (2008) argued that the farmers in rural areas of Ethiopia reveal risk aversion attitude could be due to frequent occurrence of higher rates of livestock mortality and erratic rainfall. Even though the people in our study area did not face extreme shocks as much as the people in the northern part of Ethiopia, our regression result supports the theory behind the effect of natural phenomena on the rural people.

Households who had formal schooling have a positive correlation with the willingness to take risk on farm management. Its influence on risk attitude of the individuals is highly significant. Nevertheless the level of education that the

respondents reach has no significance on their risk behavior. This finding contradicts with our hypothesis and the reports of (Jung, 2014). In his report Jung (2014) underlines that as the levels of education of individuals gets higher their risk taking attitude increases as well. However it is important to note that Jung's study was carried out in a developed region, but our study took place in one of the less developed countries, Ethiopia. The culture, tradition and income difference between the two distinct regions could be the result of the unexpected differences. Interestingly enough the households who assemble information from and share with their families, friends and cultural association (E.g. the market price and market value of their products, social and political development, as well as innovations and technologies) exhibit strong risk aversion attitude compared with those who manage to receive information from the government or local administrative offices. In rural Ethiopia farmers often get their information informally from their friends, relatives and local organizations. Our hypothesis is that the households in Ethiopia are more willing to take risks if they receive the required information informally; however the regression result indicates the opposite. Information from government institutions has positive impact on risk attitude of the respondents. Hence it can be plausibly argued that the household's affinity, trust on credible sources and strong beliefs on formal schooling as a way of providing accountable information is important, especially on issues that matter to the community most. Some studies argue that such beliefs and feelings create trust that gradually develops to strong risk seeking behavior of the individuals (Gefen, Karahanna, & Straub, 2003).

Table 3 The OLS regression results of the general risk question

Dependent Variable: Willingness to take risk on farm management (planting date, choices of crops, amount of fertilizer)		
Explanatory Variable	**Coefficients**	**Std. Dev.**
Repondent household	0.86***	0.30
Informal Schooling	-1.05**	0.45
Education level	0.03	0.03
Help from someone	-0.176	0.26
Number of people the HH rely upon	-0.004	0.004
Age of the HH respondent	0.004	0.007
Informal information	-0.98***	0.20
Visited by extension agent	-0.18	0.22
Parcel distance	-0.002	0.003
Gender of the HH respondent	0.89***	0.06
Marital status	-0.003	0.06
Number of Shocks (past 5 years)	-0.53***	0.17
Mobile phone	0.74***	0.20
Total non-farm incomes	0.38***	0.14
Whether the HH obtained a loan	0.22	0.29
Observations	388	
R-squared	0.1955	
Adjusted R-squared	0.1644	

Note: *, **, *** depict the significant levels at 10, 5, and 1 percent, respectively.

Study shows that since the beginning of the last decade the adoption of mobile phones by the rural people is rising rapidly (Sood, 2006). The report says that African countries are the fastest growing subscribers in the world. Apparently mobile phones improve access to market information and reduce the cost of communication. In our hypothesis we predict that mobile technologies are expected to increase farm household income by promoting agricultural commercialization and non-farm job opportunities. Our result illustrates mobile phone ownership is significant and positively correlated with the willingness to take risk. In Table 4:, we have included the independent variable 'trust in relative' to show if there is significant change on the risk attitude of the individuals and other exogenous variables. In a study carried out by Eckel & Wilson (2003), the conclusion underlines that there is no significant correlation between trust and risk preferences of the individuals. The study was conducted in 2003 among the university students of Virginia and Rice institutions, both USA universities. But the social background of the 232 sampled subjects is not explained very well in the experiment that we find it important to discuss in our study to convey a clear idea who

are our subjects and to come up with rational conclusions at the end. On the other hand an Ethiopian researcher Abebe (2008) describes the Ethiopian household and family as a class of highly socialized society within which each member of the family has to contribute for a common cause. Based on this value, the study hypothesized that 'trust in relatives' is significant as a determining factor on risk attitudes. Our result supports the hypothesis that the variable is empirically significant and has positive correlation with the risk taking attitude of the respondents. The result is reasonable, given that the socio-economic performance of the people in the study area is based on social cooperation and reciprocity.

The inclusion of the variable 'trust in relatives' does not change the sign of other independent variables, but it does change the significance of other insignificant variables. For example the independent variable 'Whether the household obtained a loan' becomes significant at 5%. Likewise the independent variable 'number of people the HH rely upon' increases its coefficient and becomes significant at 10% which was insignificant at all. Moreover, the independent variables 'gender of the household respondent' and 'informal schooling' raises their level of significance from 5% to 1%. There is slight change in the coefficients of the other independent variables. This indicates that the trust in relatives as independent variable has important influence in the survey measures. There are some arguments in trust and social capitals concept that support the findings. Many researchers believe that social capitals will not exist without the existence of certain levels of trust (Bourdieu, 1986; Coleman, 1988; Putnam, 1993). This is another school of thought about the relationships between the social capitals, trust and risk. In section 3 of the conceptual framework we demonstrated trust as a bridge between the social, economic and human capitals and the risk taking attitude of individuals. Bourdieu (1986) argues that individuals should base their social connections and economic interactions on trust. Coleman (1988) views trust as an essential element of social capital that encapsulates the grain to decision making abilities. It is further explained that trust between two individuals or trust of the subjects in their relatives maximizes inter-dependency and beliefs that they can help each other during economic or social crises. These thoughts encourage people to take risky decisions such as taking credits, selling assets or temporary migration to mitigate extreme shocks that would otherwise plunge them into permanent poverty. Similarly

Putnam (1993) emphases that the central role of trust in shaping and connecting social capitals to the process of risk decisions. He said that social capital can be measured by the amount of trust and reciprocity in a community or between individuals. For example if one acts faster with a notion of social capital and reciprocity but without negotiating the explicit value of the decision that is taken at that moment is one very good measure of social capitals. The decision of the players in the lottery game is typical example. The subjects do not have to make concessions or weigh the value of taking the risk to play the game. They just have to decide to choose one of the options. Trust can be also considered as the core of social capital, a capital that is used to connect and socially interact with people because of trust. Therefore trust plays an integral part in promoting other social capitals whereby affecting individual's risk taking attitude. Apart from this we can notice that all the independent variables are not strongly correlated to each other in the results. This means the regression results upon adding the independent variable does not show Simpson's paradox. The Simpson's paradox refers to phenomena when two or more variables reverse sign upon the addition of a new variable without considering the value making in the later variable (Pearl, 2014).

Table 4 The OLS results of the survey study including trust in relatives

Dependent Variable: Willingness to take risk on farm management (planting date, choice of crops, amount of fertilizer)		
Explanatory Variable	Coefficients	Std. Dev.
Respondent household	0.81***	0.30
Informal Schooling	-1.10**	0.45
Education level	0.03	0.03
Help from someone	-0.24	0.26
Number of people the HH rely upon	-0.007**	0.004
Age of the HH respondent	0.004	0.007
Informal information	-0.99***	0.20
Visited by extension agent	-0.17	0.22
Parcel distance	-0.002	0.003
Gender of the HH respondent	0.89***	0.34
Marital status	0.004	0.06
Number of Shocks (past 5 years)	-0.54***	0.17
Mobile phone	0.75***	0.20
Total non-farm incomes	0.31**	0.14
Whether the HH obtained a loan	0.31**	0.29
Trust in relatives	0.34***	0.13
Observations	404	
R-squared	0.2085	
Adjusted R-squared	0.1757	

Note: *, **, *** depict the significant levels at 10, 5, and 1 percent, respectively.

4.2.2 Experimental (Lottery game) Findings

The survey findings identified exogenous variables that are determining factors of the willingness to take risks on farm management. Survey experiments are not incentive compatible; therefore there is a general skepticism that the survey results might be unreliable to conclude that it is the real measure of the actual risk taking attitude of the respondents. Due to this uncertainty, it is advisable to conduct experimental studies with real money payoff. There are certain drawbacks to the experimental studies; with increasing number of observations the cost to play the game generally increases and might not be a feasible option for large studies considering the administrative, transportation and logistics expenses. A study shows that individuals who have been gaining wealth are more likely to exhibit risk aversion behavior during experimental studies where money is involved (Yesuf & Bluffstone, 2008). The reason is people tend to look back at their previous wealth status and may not want to take risk as the game advances even if the outcome of the game is positive. The households in

our sample may also show similar behavior, where households who had been affected by the shocks are less likely to take risk decisions during the game.

We selected the same sample size that we used in our survey studies but 18 observations out of the 404 observations were excluded from the analysis due to the inappropriate response of individuals to the game. The individuals are given a brief explanation on how they should play the lottery. The subjects are to select between fixed amount of money and drawing a ball from mix of colored balls in a bag. The choices are recorded and analyzed using Probit and OLS models.

4.2.2.1 Probit Results

The Probit results of the risk attitude measurement using the game lottery are demonstrated in Table 6:. However before we interpret the results of the Probit modeling it is amenable to see the comparison between the survey respondents and the lottery respondents. Table 5 shows the mean and standard deviation of the subjects in most comparable variables. Basically, the exogenous variables that we have used in survey questionnaire are exactly the same as the variables we used in the game lottery. Table 5:, indicates that the numbers of independent variables in both risk measurements are the same.

Based on the descriptive results, percentage of men participated in the game lottery is 83% and 82% in the survey questionnaire. Similarly, the average age of the participants in both measures is nearly the same, 44.37 in survey and 44.31 in the lottery game. Majority of the interviewees have an elementary level of education. The average score for risk preference lies at 6.2 in the survey and 6.5 in the lottery game.

Table 5 The validity of survey risk measure in game experiment, sample comparison of survey and experiment studies

Households in survey			Households in experiment	
	Mean	Std. dev.	Mean	Std. dev.
Respondent household	0.89	0.31	0.89	0.30
Education level	3.4	3.65	3.25	3.66
Gender of the HH respondent	0.83	0.37	0.82	0.38
Risk scale	6.2	2.0	6.5	2.4
Observation	404	404	385	385

When we see the values in education level there is no difference in their mean results. Majority of subjects are male in both measurements. The overall composition of the sample indicates uniform distribution in both measurements.

Table 6 Estimating risk-taking value at switching point using willingness to take risk

Dependent variable: Risk-taking attitude at switching point			
	OLS result1	OLS result 2	OLS result 3
Willingness to take risk	0.38***	0.36***	0.30***
	(0.55)	(0.06)	(0.07)
Controls: Respondent household, Gender and age	No	Yes	Yes
Other controls	No	No	Yes
Constant	4.085***	4.143	3.927
R-squared	0.1009	0.1137	0.1550
Adjusted R-squared	0.0985	0.1043	0.1158
Observations	385	385	385

Notes: The system for the validity test of the survey measure is adopted from Dohmen *et al.* (2011) report. OLS regression is used to estimate the coefficients. Other controls include variables such as marital status, trust in relatives, respondent household, mobile phone ownership, whether the household obtained a loan, help from someone, number of people the HH rely upon, informal information, visit by the extension agent, number of shocks, parcel distance and informal schooling (see Table 1).

Table 6: summarizes the regression results of the risk-taking attitude of the subjects in lottery game using the risk response given in survey measures. Our objective is to prove the validity of survey collected data if they can be utilized to estimate the risk-taking attitude of the interviewed households. As it can be seen from the Table 6: in the first OLS results, the willingness to take risk has positive coefficient and is significant at 1%. In the second and third OLS results we add control variables to check

robustness. The coefficients in both cases are positive and nearly equal having the same level of significance; 1%. Hence, Table 5: and Table 6: prove that the general risk question in survey measures can represent the risk response in the game.

The experimental study based on money incentive shows that about 68% of the respondents are risk lovers. These individuals preferred not to take the safe option of fixed payout until the amount is above 10 ETB. Our findings contradict with the results of the other two previous studies conducted in the northern part of Ethiopia where most of the subjects exhibit strong risk aversion attitude. The most probable reason for the wider difference could be the number of shocks that the southerners had experienced in the past five years that are relatively low when compared to the northerners that have been afflicted from famine, drought and poor arable land along with the lack of credit and insurance markets (Yesuf & Bluffstone, 2008). The risk averse individuals are 32% of the total number of the households who participated in the game lottery. The subjects choose a fixed amount of payment over the risky game even if the prospect payment is below 10 ETB. Study, shows most of the rural people in developing countries exhibit moderate to strong risk aversion behavior especially when the amount of money increases. Nonetheless, the opposite outcome can also occur but rarely. For example, the cotton farmers in three villages of India reveal a risk-loving attitude when an experimental study was conducted to measure their willingness to pay for a bag of cotton seed in riskier outcomes. Surprisingly the study finds that 85% of the people in the sample show their readiness to pay more for a riskier outcome (Maertens et al., 2014). The unusual strong risk-seeking attitude of the farmers in developing countries arise presumably due to the farmer's past experience on economic, social and environmental interactions where positive impacts shape their attitudes. As a result of these exclusive findings, it is worthwhile to pay more attention to the determining factors of the high-risk loving attitude of the households in the southern part of Ethiopia.

Table 7 The Probit results of the experimental study including trust in relatives

Dependent Variable: Risk-taking value at the switching point		
Explanatory Variable	**Coefficients**	**Std. Dev.**
Respondent household	0.27	0.227
Informal Schooling	-0.59**	0.348
Education level	0.01	0.025
Help from someone	-0.08	0.182
Number of people the HH rely upon	-0.01	0.003
Age of the HH respondent	-0.001	0.005
Informal information	-0.05	0.157
Visited by extension agent	0.01	0.168
Parcel distance	-0.002	0.003
Gender of the HH respondent	0.02	0.254
Marital status	-0.05	0.046
Number of Shocks (past 5 years)	-0.17	0.134
Mobile phone	0.58***	0.155
Total non-farm incomes	0.30*	0.160
Whether the HH obtained a loan	-0.11	0.233
Trust in relatives	0.15	0.106
Log likelihood	210.862	
Pseudo R^2	0.0917	
Observations	385	

Note: *, **, *** depict the significant levels at 10, 5, and 1 percent, respectively.

Table 7: illustrates the number of independent variables that influence the risk-taking preference of the subjects. In this case, there are only three variables that affect the decision taken by the farmers on the general risk question. Informal schooling, mobile phone ownership and total non-farm incomes are the determining factors of the risk preference of the respondents. Comparing to the results of the survey collected data analysis which we find eight independent variables as determining factors, the experimental measurement on the other hand reveals only three significant variables. The mobile phone ownership and the total non-farm income variables are positively correlated with the risk-taking attitude, whereas the informal schooling has negative sign on its coefficient. This is interpreted as the households with informal schooling exhibit risk aversion attitude. According to our hypothesis and assumptions, people with informal schooling are more reluctant to make risky decisions. Using similar analogy the same individuals are expected to show risk aversion attitude in an experimental

study. The Probit result meets our hypothesis and it makes sense when the individuals who have informal schooling would try to avoid risky decisions during the game. The mobile phone ownership has 1% significance, indicating that mobile phone ownership is the most determining factor among the sampled subjects. The possession of mobile phone could be related to the amount of wealth the participants have in rural areas of Ethiopia. The households with a substantial amount of wealth can afford to take higher risk to increase their income. This is to say that mobile phone ownership is considered as a proxy of wealth acquired by the subjects. The other two independent variables are significant at 10%. Non-farm activities often improve farmer's livelihoods. As the income of the households rise the farmers may feel confident to take decisions in risky situations. Our assumption in general states that, the households that have additional income from non-farm activities are risk takers. The Probit outcome proves our assumption is right. Surprisingly enough the trust in relatives has no significance in determining the risk attitude of the subjects when we analyze it using the lottery data. The study by Dohmen et al. (2006) states that trust becomes crucial in social interactions when people depend on each other like the Ethiopian society. Trust is basically explained as a self-fulfilling behavior where one values it by being trustworthy to others (Falk & Kosfeld, 2006). Given the social status of the Ethiopian people, trust as a social capital has a profound effect in achieving social goals. However, trust has little impact when money is involved, because money is perceived as the main factor to change the wellbeing of the individuals. Brown, Kaldenberg, & Browne (1992) and Lang & Omori, (2009) argue that the decision to play lottery games increases with lower educational levels and employment status. Our descriptive analysis indicates that the subjects have lower educational level and Ethiopians are among the people with the highest unemployment rate in the world (Serneels, 2007). Given the above realities the respondents have little room for trust when they are confronted with decisions that involve financial matters. This shows that the role of trust in risk attitude is null, which contradicts with aforementioned theories and findings that trust is highly significant in determining the risk attitude of the rural people. From the empirical point of view the original score of 'trust in relatives' was from 1 to 5. But in Probit analysis the scores have to be in the form of binary numbers (0= no and 1=yes). The scores between 1 and 3 are considered as 0 which means no to the question trust in relatives and the scores

between 4 and 5 as 1 that is yes. During this transformation, the medium scores of some subjects are classified into two extremes that they lose their original meaning undermining the effect that they have had before. This means the 'trust in relatives' becomes a dummy variable. Hence, the p-value is changed to 0.168 or 16.8% significance level which is larger than the lowest limit of significance and that shows the variable is insignificant to determine the risk attitude of the subjects.

The next section will discuss the results of OLS model using the same data collected. In this section, we shall continue to explain the determining factors of variables and the significance of each variable on risk attitude.

4.2.2.2 OLS Results

One of the merits of OLS model is that it can be used to analyze a continuous outcome variable. This is different to Probit, which is only used if the outcome is a binary variable. Table 8: hosts the outcomes of an OLS model using the same independent variables we use in Probit modeling. The objective of this analysis is to observe the effects of each exogenous variable on the risk-taking attitude of the subjects.

In the Probit results, we found out three determining factors of the willingness to take risks on farm management (see Table 7:). Similarly, three independent variables affect the risk attitude of the dependent variable in the OLS modeling. The mobile phone ownership is still the most significant exogenous variable at 1% level with a positive correlation to the willingness to take risks on farm management. Table 8: indicates the coefficient of the variable has 0.81. As the number of mobile phone owners increase by one unit the willingness to take risk increases by 0.81. As the total non-farm income rises the willingness to take risk goes up significantly. The OLS regression result indicates that if the subjects in the game lottery are household heads, then the willingness to take risk increases. Gender of the household respondent has no significant influence in experimental study. The results of Probit modeling in Table 7: doesn't show that respondent household is a significant variable in lottery game. The reason could be due to the conversion of the ten scale variable in OLS modeling to dummy variable score in Probit modeling. Under this situation, some variables could be

insignificant in Probit modeling, but significant in OLS or vice versa. The same case happens in OLS that informal schooling is not significant in the game lottery but very significant and positive in Probit results. To the best of our knowledge, there is no a general consensus why the OLS and Probit

models produce different results when the dependent variable is regressed on from the same independent variables. Nevertheless, a study conducted by (Peel, Goode, & Moutinho, 1998) underlines that OLS has less predictive power and has less statistical precision than the Probit and Logit models. In the conclusion the paper says that although the OLS and ordered probability appear to be similar in significance and signs of coefficients, OLS seems to underestimate the potential explanatory variables in the dependent variable. Nevertheless in our case regarding the significance and the value of the coefficients that both the OLS and Probit models produce, the OLS model has higher predictive power than the Probit. This is probably due to the categorization of a ten scale variables into binary scores that may affect the significance of some variables. In addition, it could be due to, the binary form of the Probit modeling that might be more sensitive to specific effects on outlying groups while the OLS regression results would depend more on the factors acting on the whole population. This shows us that it is necessary to employ other alternative models to analyze data sets that may identify more significant variables than the selected models.

The last section of this study includes conclusion and some policy recommendations that would improve the risk-taking attitude of the Ethiopian households.

Table 8 The OLS results of the experimental study including trust in relatives

Dependent Variable: ***Risk-taking value at switching point***		
Explanatory Variable	**Coefficients**	**Std. Dev.**
Respondent household	0.76**	0.38
Informal Schooling	-1.01	0.61
Education level	0.01	0.04
Help from someone	0.23	0.33
Number of people the HH rely upon	-0.006	0.005
Age of the HH respondent	- 0.006	0.009
Informal information	-0.36	0.25
Visited by extension agent	0.06	0.28
Parcel distance	-0.005	0.004
Gender of the HH respondent	0.35	0.42
Marital status	-0.08	0.08
Number of Shocks (past 5 years)	-0.27	0.22
Mobile phone	0.82***	0.26
Total non-farm incomes	0.40**	0.18
Whether the HH obtained a loan	-0.11	0.38
Trust in relatives	0.14	0.18
Observations	385	
R-squared	0.1061	
Adjusted R-squared	0.0673	

Note: *, **, *** depict the significant levels at 10, 5, and 1 percent, respectively.