Coupled Lotteries – A New Method to Analyze Inequality Aversion

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Coupled Lotteries - A New Method to Analyze Inequality Aversion*

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Abstract

We develop and implement a new measure for inequality aversion: two peers are endowed with identical binary lotteries and the only choice they make is whether they want to play out the lotteries independently or with perfect positive correlation (coupling). Coupling has no other effect than preventing outcome inequality. We implement the method in a survey in rural Thailand as well as a supplemental sample in a lab in Germany. As theoretically expected, coupling is related to being more risk averse, to having social status concerns, and to relying more often on formal and informal insurance. However, coupling is not related to giving in the dictator game.

Keywords: Inequality aversion; Correlated risk; Social status concerns
JEL: D63 D91 D81

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1 Introduction

The pure self-interest hypothesis of standard economic theory is refuted by an overwhelming body of evidence from economics and psychology. The respective literature documents that people typically also have other-regarding preferences that include concerns for the resources of others as well as for reciprocity and fairness. One of the most prominent concepts in the literature on other-regarding preferences is inequality aversion. According to the seminal models of Fehr and Schmidt (1999) and Bolton and Ockenfels (2000), the utility of an inequality averse agent is increasing in both the own payoff and the equality of the distribution. The prominence of inequality aversion lies in the fact that it can explain observed behavior, which deviates from the self-interest hypothesis in many experimental settings. Examples include giving in dictator games, the rejection of low offers in ultimatum games, as well as the conditional cooperation and punishment of free riders in public good games. Outside the lab, the degree of inequality aversion might influence individual preferences over tax deductions, insurance take-up and many more aspects of redistribution.

Despite its prominence, the measurement of inequality aversion is still debated. While inequality aversion is intuitively appealing and successful in rationalizing observed behavior in the aforementioned games, it is unclear whether it is indeed inequality aversion or other considerations that are measured in these settings. For instance, Engelmann and Strobel (2004) show that a combination of selfishness, efficiency concerns, and maximin preferences are sufficient to explain behavior in simple distribution experiments. Inequality aversion is not needed to rationalize behavior and, moreover, is at odds with several patterns in their data. In a related paper, Fershtman et al. (2012) conclude that social norms are more successful than inequality aversion in explaining behavior in dictator and trust games. Thus, decisions in games that appear to be based on inequality aversion may actually originate from other preferences. Still, Tricomi et al. (2010) find neural evidence for the existence of inequality aversion in humans using functional magnetic resonance imaging.

Motivated by this literature, the present paper develops and implements a new method to measure inequality aversion, which we term "coupled lotteries." In this method, two players are endowed with two identical binary lotteries (offering amount x with probability $p > 0$ and nothing otherwise) and the only choice they make is whether they want to play out the lotteries independently ("separated") or with perfect positive correlation ("coupled"). This choice only affects *ex post* inequality

in outcomes, i.e., there is no outcome inequality if lotteries are coupled and a $2p(1-p)$ chance of inequality if lotteries are separated. When only monetary payoff over both peers is maximized, not coupling the lotteries is the social planners optimal choice, because risk could be shared *ex post* by reallocating payoffs if one party wins and the other loses. Since coupling the lotteries decreases the chance of inequality for sure and changes nothing except the possibility for *ex post* risk sharing, inequality aversion seems to be the only way to rationalize this choice.

We implement an incentivized version of our coupled lotteries game in a representative survey of about 850 rural households in Ubon Ratchathani, a province in northeastern Thailand. The advantage of using this survey is, first, that we have a more heterogeneous sample than lab experiments with students, second, that we can employ rather high monetary incentives comprising more than a half day's wage and, third, that we can use extensive socioeconomic data for each respondent. Thus, we are able to analyze the share of respondents displaying inequality aversion as well as which personal and socioeconomic characteristics are associated with inequality aversion. We test six hypotheses derived from the literature (mainly based on the structural estimation of Bellemare et al. (2008)): inequality aversion is related to being male, older, less educated, poorer, showing higher risk aversion, and having social status concerns. Additionally, we can directly use our measure to explain real-life behavior: following the theoretical considerations of Friedl et al. (2014), we test the empirical relation between inequality aversion and insurance take-up. Moreover, we investigate whether inequality aversion is related to less risky farming decisions.

We find that almost 40 percent of respondents choose to couple the lotteries versus more than 60 percent who prefer to separate. Regarding the six hypotheses stated above, our evidence supports three of them (while evidence on the three others is not robust): choosing coupled lotteries is significantly related to being male, being more risk averse, and having social status concerns, which is in line with theoretical predictions. Potential *ex post* risk sharing (which might motivate to separate) is not supported by our data, as risk sharing would be related to, for example, trust in the village. This is not compatible with our results, which show that subjects who trust more prefer to couple. Finally, we find that households with inequality averse household heads are more likely to have some kind of formal insurance and are also more likely to diversify crops (if they are farmers), which is a way to diversify risk of crop loss. This is in line with theoretical predictions on insurance take-up.

We opt for a lab-in-the-field experiment as we want to take advantage of the

unique setting: interviews are conducted in each respondent's house and we let them each play coupled lotteries against one of their neighbors, who is not part of the sample. Analyzing inequality aversion within such a close reference group is rare in the economic literature and gives insights into social preferences when social distance is small. It might, however, present an upper bound of inequality aversion (e.g. Bandiera et al., 2005; Charness and Gneezy, 2008). Furthermore, there might be culturally determined differences in the degree of inequality aversion between our relatively poor Thai sample and samples in industrialized countries (see Alesina et al., 2011, for a general discussion on preferences for redistribution). Croson and Gneezy (2009), for example, analyzing various ultimatum and dictator games, conclude that, in general, women seem to be more inequality averse, which contrasts with our finding. However, as highlighted before, these games might not be suited for identifying inequality aversion because they exhibit a trade-off between maximizing efficiency and inequality aversion. In general, we do not have reason to believe that the cultural background affects the external validity of our method itself.

To eventually rule out risk sharing motives completely, we additionally implement our measure in a "more controlled" setting, namely, a lab with students in Germany. The anonymity and structure of a lab experiment inhibits *ex post* risk sharing. Furthermore, we investigate the relationship between coupled lotteries and a still common measure for inequality aversion, the dictator game. We find that the degree of inequality aversion in the German student sample is larger than in the Thai rural sample. This is a bit surprising given the high social distance between lab participants in comparison to neighbors, however, the two samples differ in many respects. Thus, it is comforting that we also find similar results in both samples, such as coupling being related to risk aversion and that we can confirm that women are not more inequality averse than men. However, we do not find any correlation between decisions in the coupled lotteries and the dictator game within this student population. This is in line with our claim that dictator giving is driven by different other-regarding preferences. It also speaks to previous literature that refutes the correlation of inequality aversion parameters derived from the dictator game and other simple distribution games (see Blanco et al., 2011).

Our paper is closely related to the work of Bellemare et al. (2008) who analyze inequality aversion in a representative sample of the Dutch population. Based on observed decisions in the ultimatum game and proposers' elicited expectations of rejection rates, they estimate a structural model of decision making under uncertainty

from which they derive the degree of inequality aversion. Compared to our method, they obtain a metric measure about the degree of inequality aversion and are able to distinguish between advantageous and disadvantageous inequality aversion, while we only obtain a binary measure, i.e., we can detect whether a person is inequality averse or not. However, our method has the potential advantage that we do not need to control for expectations and risk attitudes but can observe inequality aversion directly from choices. It is much easier to implement this method in large scale surveys and to obtain a relatively simple, fast, and still valid measure for the presence of inequality aversion. Furthermore, the game is easy to understand and decreases the concern of confounding preferences with decision errors.

The reason why Bellemare et al. (2008) use structural modeling lies in the aforementioned difficulty of distinguishing inequality aversion from other motives in standard distribution games. So far, probably the most common ways to measure inequality aversion are observing choices in dictator and ultimatum games (see Levitt and List, 2007). However, the literature shows that these choices can also be explained by other considerations. In the case of the ultimatum game, first, it is the fact that giving might depend on the belief a proposer has about the acceptance threshold of the responder. Already Forsythe et al. (1994) concludes that strategic considerations partly drive ultimatum giving as people give more in the ultimatum than in the dictator game. This is confirmed by Bellemare et al. (2008) as their model controlling for individual beliefs fits observations better than a model assuming rational expectations. On the responder side, rejecting an offer can be caused by inequality aversion but also by negative reciprocity (Brandts and Solà, 2001; Falk et al., 2003; Falk and Fischbacher, 2006) or other punishment motives. The active role of the responder and, thereby, the strategic interaction is eliminated in the dictator game. Here, there is especially one motive that competes with inequality aversion in explaining observed choices: (impure) altruism. Andreoni and Miller (2002) show that simple altruistic preferences explain dictator giving extremely well. This work is extended by, among others, Chowdhury and Jeon (2014) and Korenok et al. (2013), who find more support for impure altruism as there is imperfect crowding-out if recipients have own income (Bolton and Katok, 1998). In any case, it is not clear whether dictators derive a higher utility from equalizing payoffs, from the warm glow of giving, or, most likely, from both kinds of motives. This is emphasized by the finding of Engelmann and Strobel (2004) that a combination of preferences explains behavior in standard distribution games better than a single social preference.

Given the previous literature, we approach inequality aversion more directly: we are not investigating whether inequality aversion can explain behavior in an already existing game but we are looking for a game that can give us a consistent measure of inequality aversion.

The design of our game itself is related to a different kind of distribution games that address different correlation structures between the own and the other's risky payoffs, which, however, do not directly address inequality aversion as such. Rohde and Rohde (2011) concentrate on how correlated payoffs affect risk taking and give participants choices between problems with varying risk and correlation structures. However, neither do these choices resemble our coupled lotteries measures nor are they suited to test explicitly for inequality aversion. Bolton and Ockenfels (2010) and Adam et al. (2014) use binary decision problems with (perfect) negative correlation between payoffs to investigate the effect of social comparison on risk taking. Trautmann (2010), relying on binary distribution choices from Broome (1991), discusses how to include fairness into utilitarian welfare models.

Several paper address the empirical relevance of *ex ante* and *ex post* inequality aversion and how inequality aversion translates to risky environments in general (e.g. Brock et al., 2013; Fudenberg and Levine, 2012; Krawczyk and Le Lec, 2010; Saito, 2013). We deliberately only concentrate on *ex post* inequality and ignore *ex ante* inequality by ruling it out with our design. However, we do not neglect the existence or the possibly greater empirical relevance of *ex ante* inequality. Actually, our results support the notion that exact equality in outcomes does not seem to be important for many individuals. Given that equalizing payoffs in our game does not mean foregoing own payoff, it would not even be costly to establish equal outcomes and, still, many persons do not seem to care in both our samples. This is in line with the aforementioned literature, arguing and showing that inequality aversion in outcomes is not the main driver for the observed behavior in standard distribution games. Nevertheless, for some persons exactly equalizing payoffs does matter and we can show this is informative about real-life behavior.

Hence, we not only contribute to the literature by deriving a method to measure inequality aversion in outcomes but also by analyzing who is actually inequality averse and how inequality aversion is related to economic behavior, like insurance take-up or crop portfolio choices. The literature on the relation between inequality aversion and real-life decision making is especially scarce. However, knowing about areas of life that might be affected by inequality aversion and knowing about

who is affected is necessary for deriving an empirically validated microfoundation of inequality aversion. It could inform policy makers thinking about implementing inequality-reducing policies like progressive taxes or social benefits.

The remainder of the paper is organized as follows. The subsequent Section 2 introduces the theoretical background and derives hypotheses. Methods and data are presented in Section 3, while Section 4 provides results. Section 5 illustrates the relation between our coupled lotteries measure and insurance take-up. Section 6 discusses the supplemental lab experiment and the additional insight into the relation between our measure and dictator giving. Robustness checks are shown in Section 7. Section 8 concludes.

2 Theoretical Background

2.1 Coupled Lotteries

Suppose there are two players, i and j, who are both endowed with a lottery L each. With a probability of $p > 0$, this lottery yields x and with a probability of $1 - p$ nothing. The only decision players have to make is whether they want to keep their lotteries separate, where it is independently drawn for each player if she loses or wins, or whether they want their lotteries coupled, in which case a single draw determines if both lose or both win. For simplicity, let us assume that $x = 100$ and $p = 0.5$ (see Figure 1).

[Figure 1 about here]

In standard decision theory, subjects care only about their own payoffs. Therefore, they should be indifferent between coupling and separating their lotteries, as in both cases the chance of winning is 50%. One alternative to this pure self-interest hypothesis is inequality aversion. Like Bellemare et al. (2008), we employ the model of Fehr and Schmidt (1999) to model inequality aversion. Suppose that the payoffs of i and j are given by x_i and x_j respectively. Then, the utility of i, V_i , is given by

$$V_i = x_i - \alpha_i \max\{x_j - x_i, 0\} - \beta_i \max\{x_i - x_j, 0\} \tag{1}$$

where $0 \leq \beta_i < 1$ and $\alpha_i \geq \beta_i$. Inequality aversion implies $0 < \beta_i < 1$ and $\alpha_i \geq \beta_i$.

For coupling the lotteries, we always have $x_i = x_j$. In contrast, when separating, there is a $2p(1-p)$ chance of unequal outcomes.[1] Given our parametrization this means, that coupling yields an expected payoff of

$$E(V_i(coupling)) = 50. \tag{2}$$

Separating entails a 1/4 chance of being better off than the peer as well as another 1/4 chance of being worse off than her. Consequently, we obtain

$$E(V_i(separating)) = 50 - 0.25\alpha_i 100 - 0.25\beta_i 100, \tag{3}$$

This means that inequality averse subjects, whose β and α are strictly greater than 0, should prefer coupling. Note that this conclusion also holds in the case of risk aversion or any non-linearities in the perception of inequality, i.e. we can replace V_i in equation (1) also by the more general form:

$$V_i = u_i(x_i) - \alpha_i v_i(\max\{x_j - x_i, 0\}) - \beta_i v_i(\max\{x_i - x_j, 0\}), \tag{4}$$

where u_i reflects the risk attitude and the strictly increasing v_i with $v_i(0) = 0$ reflects the perception of inequality. Moreover, β_i could be even negative, i.e. the subject actually likes advantageous inequality, as long as its absolute value is less than α (the parameter for disadvantageous inequality). However, in contrast to Bellemare et al. (2008), our method does not separate disadvantageous inequality aversion from an advantageous one.

2.2 Hypotheses

Despite the differences between our method and that of Bellemare et al. (2008), we believe that both methods measure the same preference. Our initial hypothesis is that the correlation structure between sociodemographic characteristics and inequality aversion in our Thai subject pool is similar to that of the Dutch subject pool. Thus,

[1] Note, that, independent of coupling or separating, it is always the case that $E(x_i) = E(x_j)$. That means there is no inequality in opportunity or *ex ante* inequality. Subjects who only care about expected outcomes are hence indifferent between coupling and separating. However, subjects who care about outcome inequality consider the **expected difference** in outcomes. Therefore, we apply the expected utility function on Fehr-Schmidt preferences and not Fehr-Schmidt preferences on expected outcomes. In general, Fehr-Schmidt preferences are not well suited to model *ex ante* and *ex post* fairness for risky outcomes (see Fudenberg and Levine, 2012).

according to the results of Bellemare et al. (2008), we obtain the following hypotheses:

Hypothesis 1: *Male subjects are more inequality averse and, thus, they are more likely to couple.*

In contrast to the previous literature, as for example discussed in Croson and Gneezy (2009), Bellemare et al. (2008) find no significant sex difference in disadvantageous inequality (α), but they find that being male is related to a larger β.

Hypothesis 2: *Older subjects are more inequality averse and, thus, they are more likely to couple.*

Hypothesis 3: *Less educated subjects are more inequality averse and, thus, they are more likely to couple.*

Hypothesis 4: *Poorer subjects are more inequality averse and, thus, they are more likely to couple.*

In addition to those sociodemographic variables analyzed by Bellemare et al. (2008), there is evidence that inequality averse subjects are also risk averse (Carlsson et al., 2005). Thus, we include the following hypothesis:

Hypothesis 5: *More risk averse subjects are more inequality averse and, thus, they are more likely to couple.*

Furthermore, since social status concerns can be a driver of inequality aversion (Shaw and Olson, 2012), a measure for social status concerns is included in the survey. Our last hypothesis reads as follows:

Hypothesis 6: *Subjects with social status concerns are more inequality averse and, thus, they are more likely to couple.*

2.3 Alternative Explanations

***Ex Post* Risk Sharing.** For inequality neutral individuals, there is no payoff gain in coupling the lotteries. However, in our household-survey-setting there might be an individual gain in choosing to separate the lotteries due to the possibility of *ex post* risk sharing. In fact, separating the lotteries is the optimal choice from a social planner perspective as payoffs can be redistributed if one party loses and the other wins. Since our survey participants live next to each other, it is hard to control whether they might share the money afterwards as well. We think that it is a strength of our main analysis that subjects know each other well, implying that the social comparison should have a much stronger impact than in an anonymous laboratory setting. Still, we make sure that after introducing the game, subjects had no opportunity to interact before making their decisions, i.e., they were not able to agree *ex ante* on *ex post* risk sharing. Nevertheless, the possibility of *ex post* risk sharing is a potential confound when analyzing inequality aversion with our survey data. We subsequently address this potential confounding factor by adding variables to the analysis that help us to detect the possible presence of *ex post* risk sharing. Greater trust and social connection between the respondent and her neighbor should increase the incentive for *ex post* risk sharing, thereby increasing the probability of separating. This is because greater trust decreases the level of betrayal aversion (Bohnet et al., 2008; Bolton and Ockenfels, 2010). Bohnet et al. (2008, p. 294) describe betrayal aversion as being, "less willing to take a risk when the source of the risk is another person rather than nature." In our setting nature decides the outcome of the lottery, but the neighbor decides to share the money afterwards or not. Thus, she is a source of risk that induces betrayal aversion. In our additional laboratory experiment (like in any other lab setting), the possibility to share risk *ex post* can be ruled out as participants usually do not know each other, cannot communicate during the session, and leave the laboratory directly after the private payout. This means that inequality neutral subjects should be indifferent between coupling and separating in the lab.

Reciprocity and Altruism. Even if behavior in experimental games cannot fully be rationalized by efficiency or maximin preferences, there might be other social preferences that confound the measurement of inequality aversion, e.g. reciprocity and altruism. Reciprocity is the preference to reward kind and punish unkind actions

(Falk and Fischbacher, 2006). In our setting there is no possibility to behave reciprocally, since respondents neither can influence their own or the probability of their neighbors winning nor can they see the choice their neighbors make (and vice versa). Fehr and Fischbacher (2003, p. 785) define altruism in the behavioral economics sense "as being costly acts that confer economic benefits on other individuals." Except for *ex post* risk sharing, which we discuss extensively in this paper, there is no scope for altruism in our game.

3 Methodology

3.1 Survey Design

The survey including the coupled lotteries game was conducted in rural Thailand in 2014. It is part of an add-on project to a panel survey in rural Thailand and Vietnam starting from 2007 that is now known as the Thailand Vietnam Socio Economic Panel (TVSEP). At the time our game was played, 4 full waves had been completed (2007, 2008, 2010, and 2013).

Each survey wave consists of a household and a village questionnaire. The household questionnaire is tailored to the lives of families in rural areas, largely engaged in agricultural business. It includes comprehensive sections on crop farming, livestock rearing, borrowing/lending as well as saving decisions, health, various socio-economic items for every household member, and, in particular, questions on exposure to shocks and anticipated risks. In some waves, personal opinions on topics such as inequality and trust are sought. The full sample consists of about 4400 rural households in 440 villages over six provinces in Thailand and Vietnam. It is representative for the rural populations in these two countries and deliberately excludes households living in urban areas. The three-stage sampling procedure is described in Hardeweg et al. (2013).

[Figure 2 and 3 about here]

The add-on aims at analyzing individual risk preferences in rural populations in more detail, especially how these preferences vary in different situations and how they interact with skills like numeracy and financial literacy. The corresponding questionnaire is substantially shorter than a full TVSEP survey. Furthermore, it is conducted in only one of the survey provinces in Thailand, Ubon Ratchathani,

which borders Cambodia and Laos (see Figure 2and 3). The province is located in the northeastern part of Thailand ("Isan"), which is the poorest region in the country and where most households engage in agricultural activities. The full sample comprises about 850 individuals/households.

For most specifications, we combine 2014 and 2013 data, as it results in a richer dataset and gives us the variables we are mainly interested in. The 2013 data include measures on trust and social comparison as well as the socio-economic variables we seek to analyze. We do not exploit the panel structure but include variables that we assume to be stable over the two points in time. Thus, we specify our regressions as a one-period model. If we want to exploit information on social comparison and trust, we can only do so if an individual answered the questionnaires in 2014 and in 2013, because this is personal information that cannot be extrapolated from the answers of another household member. Unfortunately, some respondents only answered the 2014 survey. This results in a smaller sample size for some of the regressions; this subsample consists of 521 individuals. Other variables from 2013, like sex and education, are available as long as the 2014 respondent was already part of the household in 2013, which is always the case.[2]

3.2 Coupled Lotteries in the Field

Coupled lotteries is one of four short "games" played toward the end of the survey. The preceding section asks respondents to answer a battery of items that measure their financial literacy. The following and final part of the survey is a quiz to measure numeracy. Thus, the games are surrounded by two tasks that ask for similar cognitive and computational skills. However, the financial literacy and numeracy sections are not designed to assess any sort of preference but are knowledge-based.

Respondents are explicitly asked for consent to participate in the games, which are not part of the general survey (see Appendix Material A.1). Since none of the respondents declines to play, no concern for sample selection into the games is given. In the questionnaire, coupled lotteries is titled "social game" and is played after the three other games.[3] The whole task is incentivized by randomly choosing one game

[2] In most cases the respondent in both years is the household head or their spouse.

[3] The first is a multiple price list to elicit risk preferences following Holt and Laury (2002), the second consists of four multiple price lists to elicit time preferences, and the third one is the "cheating game" by Fischbacher and Föllmi-Heusi (2013). We have no reason to believe that these games themselves prime behavior in our game in any specific way. Importantly, the first

to be implemented for payoff. On average, respondents earn 165 THB (ca. 3.70€) including a participation fee of 30 THB (ca. 0.68€), which is more than a half day's wage.

Coupled lotteries is played out by gaining either 100 THB or 0 THB, each with 50% probability determined by a coin flip (see Appendix Material A.2). The survey respondents are assigned the role of player i, which is a trivial assignment as roles are symmetric. We ask a neighbor of each respondent to join the game as player j. Since the survey is conducted in small villages with mostly about 100 inhabitants, players know each other quite well. However, the neighbors are not part of the survey sample and, therefore, we do not have further data on them.[4] The crucial decision that both players then make is deciding whether their lotteries are played out by one coin flip for each of them or by one coin flip together. Thus, they have to decide whether they want their risk to be perfectly positively correlated to or to be independent of their peer's risk. As explained before, the expected total payoff is equal in both cases, but the correlation structure changes the relative payoff. Both participants, although sitting next to each other, have to indicate their choice secretly on a piece of paper that is collected by the interviewer who then flips the coin(s) and announces the outcome (see Appendix Material A.3).[5] If both players decide to couple, so that only one coin is flipped, both either receive 100 THB or nothing. If both decide to separate, one coin is flipped for each of them and both receive their respective payoff, independently from each other. If they have conflicting preferences meaning one decides to couple and the other to separate, an additional coin is flipped to determine how the lottery is played out (see again Figure 1). To avoid experimenter demand effects, we neither encourage nor discourage participants with respect to *ex post* risk sharing.

3.3 Empirical Approach

Decisions about coupled lotteries are binary and since every participant makes a valid choice, we use a simple logit model to estimate our regressions. Let Y_i denote the decision a participant takes, where $y_i = 0$ means separating the lotteries and

two games are only played out after the coupled lotteries game and reported numbers in the cheating game are uncorrelated to decisions in the coupled lotteries game.

[4] Except for four observations, we could always find a neighbor who agreed to participate.

[5] As mentioned before the respondent is paid for only one of the games, but the neighbor is paid directly after the social game has been played.

$y_i = 1$ means coupling the lotteries. The first regression specification only contains information available for the full sample and reads as follows:

$$Y_i = \alpha + X'_{it}\beta_1 + u_{it} \tag{5}$$

Errors are clustered on the district level and the regressor matrix X'_{it} contains sex, age, education, annual per capita log consumption, district fixed effects, and a measure for risk preference. We use consumption instead of income because, in general, it is believed to be a more reliable measure in this kind of setting. However, our results are also robust to using annual per capita income (see Section 7). As the survey was designed to analyze risk preferences, various measures of risk taking are available. These are correlated with each other but seek to measure risk taking behavior in different situations. We include risk preference measured through the multiple price list method (inspired by Holt and Laury, 2002), which is the only incentivized elicitation method we employed. Education is measured by years of schooling. In one of the regressions we include a first measure to test for *ex post* risk sharing. To do so a proxy for trust or closeness to people in the village is used. We employ a variable that indicates whether respondents receive agricultural advice from their neighbors or relatives.

The second regression specification applies to the subsample of respondents who played the game in 2014 and answered the survey in 2013:

$$Y_i = \alpha + X'_{it}\beta_1 + S'_{it}\beta_2 + u_{it} \tag{6}$$

Besides the same regressor matrix X'_{it} as in 5, matrix S'_{it} is added. S'_{it} contains our measures for social status concerns and a more accurate measure of trust. Respondents are asked whether they compare their standard of living to other persons and to whom. They can choose between 11 different reference groups, where one option is "Neighbors" and another one is "I don't compare myself to anyone." We construct two dummies that equal 1 when respondents choose the respective option and 0 otherwise. Thus, we have a dichotomous measure whether respondents "keep up with the Joneses" (choose their neighbors as main reference group for social comparison) and whether respondents care about social status at all. As indicated, respondents can only choose one reference group. Hence, a 0 in the "neighbor dummy" does not

mean that respondents do not regard their neighbors for social comparison, but that neighbors are not their primary group for social comparison. In that sense our other measure for general social status concerns is cleaner, which is why we primarily focus on whether respondents compare their standard of living at all in the later analysis. A 4-point Likert scale measures how much respondents trust other people living in their village, such that we have a more reliable measure for the possibility of *ex post* risk sharing.

3.4 Descriptive Statistics

Table 1 shows summary statistics of the variables used in the two regression models. We include respondents between the age of 16 and 85 for the analysis. The descriptives are split by whether the respondent is the same in both waves, 2013 and 2014, or not. There are two significant differences between the two subsamples, i.e. age and education. As these two variables are highly correlated in our sample, it is not surprising that there is a significant difference in education given that there is one in age. The difference in age can be explained by the fact that the add-on project in 2014 put less priority on interviewing the household head than did the main project and that other household members are, on average, younger than their head. Nevertheless, the fraction choosing to separate is not significantly different between those respondents who only answer the 2014 questionnaire and those who participate in both 2013 and 2014 (see Appendix Figure A.1). Overall, these statistics indicate that we can concentrate on the latter subsample and still receive valid results for the whole sample.

[Table 1 about here]

From the table, it can be seen that the majority prefers to separate. Given the structure of our sample (more women and small degree of risk aversion), this is not surprising based on our hypotheses. Around 60% of the respondents are female and the fraction of women who choose to separate is significantly higher (two-sided t-test, p ¡ 0.05) than the fraction of men who decide to do so (see Appendix Figure A.2). Furthermore, the rural Thai population seems, on average, to be more risk seeking than the Western populations previously studied. Dohmen et al. (2011), for example, use the same multiple price list in a representative German sample. Not only is the mean for risk taking higher in the Thai sample, but the whole distribution is skewed

to the right with a much higher proportion never switching from the lottery to the safe option (see Appendix Figure A.3). This result is in line with the conclusion of l'Haridon and Vieider (2019) that, on average, persons in poorer countries are substantially more risk tolerant than persons in rich countries. Years of schooling and annual consumption per capita in the Thai rural population are substantially lower than in samples from industrialized countries. Turning to the social comparison variables, almost half of the sample states that the main group they are comparing with are their neighbors. Besides this group, there are around 16% of respondents who do not compare themselves to anyone. Thus, social comparison motives between players have an important role in our setting.

4 Results

For each regression, we report average marginal effects (AME). Hence, for each observation all variables, except the one for which the effect is estimated, are held at their realized level. The AME is obtained by taking the mean over all individual marginal effects. Given the many dummy variables, estimating marginal effects at the means (MEM) would be less meaningful as a dummy value between 0 and 1 cannot be interpreted economically (such as being 80 percent female). Table 2 shows regression results using model specification 1, i.e. analyzing the full sample based on equation 5. First, the variables for testing hypothesis 1-5 are included in two steps and then, in the third regression we add our proxy variable for trust between neighbors to test for the relevance of *ex post* risk sharing.

[Table 2 about here]

The highly significant positive effect on being male is in line with hypothesis 1; on average men are 10 percentage points more likely to couple the lotteries than women. This effect is in line with Bellemare et al. (2008) but stronger than their coefficient for the Dutch population. Consequently, we cannot confirm previous studies that find women to be more inequality averse than men. One explanation could be cultural differences; Croson and Gneezy (2009) mention that cultural biases could cause sex differences in preferences. Still, from this perspective, it may be surprising that the results in Bellemare et al. (2008) point in the same direction as ours. Another explanation could be that, in our game, there is no trade-off between inequality

and efficiency, as in some previous studies. If men prefer efficiency over inequality, this does not automatically mean that they are less inequality averse than women. In general, there might be several confounds in previous studies as to why women appear to be more inequality averse than men. We do not confirm hypotheses 2, 3 and 4. Age is only significant in regression (1) and the effect goes in the opposite direction as hypothesized. Education and consumption are never significant. These insignificances are not related to a possible multicollinearity problem. Preference for risk taking is significant in the expected direction. The effect size is not as small as it seems at first glance given that the risk taking variable takes values between 1 and 21. Going from 1 to 21 decreases the probability of coupling the lotteries by over 17 percentage points. Thus, we confirm hypothesis 5, that risk aversion and inequality aversion are positively related to each other. Another possibility would be that risk taking is not related to less inequality aversion in general, but to favoring advantageous inequality. In our setting, only choosing to separate can lead to advantageous inequality and more risk prone individuals might want to get ahead of the Joneses and are less afraid of falling behind. However, this argument is not supported by our results for social status concerns (see the following paragraphs). Furthermore, there is no significant interaction effect between risk and social comparing.

Regarding *ex post* risk sharing, we clearly find evidence against this alternative explanation. Respondents who are closer to their neighbors are more likely to couple lotteries instead of separating and potentially sharing afterwards. This effect is significant and large.

We now turn to the subsample of 521 individuals for whom we have information about the importance of social status concerns as well as the improved measure of trust. In Table 3, we report results using model specification (2), i.e. equation 6. Regression (1) contains the same variables as regression (2) of Table 2 to check how consistent the model is estimated with the smaller sample. In regressions (2), (3), and (4) social status and trust variables are added. The effect sizes for sex are smaller in all presented regressions but are still large and significant. Age and consumption are insignificant as before, which is intuitive, because possible effects should have already been significant in the larger sample. For education, however, we find significant effects. Due to the significant differences in age and education between the two samples and the small sample size here, we do not want to interpret this as evidence for a sizable effect of education as stated by hypothesis 3. If there

is any effect, more educated individuals seem to be more inequality averse, not the other way around. Unfortunately, the smaller sample size cause the coefficients on risk taking to become insignificant. Still, they do not differ in direction and size from the full sample specification.

[Table 3 about here]

Looking at the measures for social status concerns, we confirm hypothesis 6. Having the neighbors as main reference group for social comparison increases probability of coupling the lotteries while having no social status concerns decreases the probability of coupling. The coefficient for having no social status concerns is large and significant at the 5% level. Moreover, our finding indicates that inequality aversion seems to be stronger if the other person is part of the individual's main reference group for social comparison. We cannot use both variables in the same regression because a substantial part of the sample compares themselves to neighbors, which makes the two dummies per definition highly correlated. Therefore, they are included separately in regressions (2) and (3).

Eventually, we again test for *ex post* risk sharing, this time using the proxy from the 2014 survey and adding a more reliable measure on trust from 2013. Both coefficients depict a sizable effect and are clearly not in favor of *ex post* risk sharing. Respondents trusting other people in the village a lot are 16 percentage points more likely to couple the lotteries than respondents who do not trust other villagers at all. This is in line with inequality aversion is increasing in reduced social distance and that the "comparing with neighbors" dummy turns insignificant if the two variables for trust are added.

5 Inequality Aversion and Field Behavior

In order to test the "predictive power" of our measure for inequality aversion, we estimate the correlation between the measure and actual behavior that theoretically should be related to inequality aversion. More precisely, we run regressions to analyze whether our measure is related to formal insurance take-up as well as means taken to reduce the risk of grown crop portfolios, which could be regarded as some kind of informal insurance take-up. Friedl et al. (2014) show theoretically that insurance take-up reduces inequality among peers facing similar risks as long as risks are not

perfectly positively correlated between them. Therefore, inequality averse subjects should be more prone to insurance take-up, which we want to test in our field setting.

Using the TVSEP 2013 survey data, we construct a dummy indicating whether the household has any kind of voluntary, formal insurance. Furthermore, we run a regression using the Simpson Index of (crop) Diversification as used in Nguyen et al. (2017) for the same households; however, only for those households engaged in own agricultural activities. Crop diversification is interpreted as informal insurance (see Skoufias, 2003), because it diversifies the risk of crop loss, especially if the additionally planted crops are less sensitive to weather shocks or pest infestation. Farmers in Northeastern Thailand traditionally grow glutinous rice, which is also their main staple. Cassava is a crop that yields similar profit and fulfills the conditions to diversify crop loss. Therefore, we estimate separate regressions for growing glutinous rice and cassava to see whether the motives to grow these two differ from each other. Since the decision what risk to insure and which plants to grow are decisions that are usually made at the household level, and not the individual level, in our setting, we only include subjects who are supposed to be the main decision maker in their household, the household heads.

[Table 4 about here]

Table 4 reports the regression results for different kinds of insurance take-up. Our exogenous variable of interest is the decision subjects make in our coupled lotteries game. Additionally, we include controls that are hypothesized to be decisive for each specific take-up (see for example Nguyen et al., 2017), in particular our incentivized measure of risk aversion. As can be seen, respondents who are inequality averse, i.e. those who couple the lotteries, are significantly more likely to have formal insurance in their households and to have an above-average crop diversification index. The above-average diversification seems to be driven by growing cassava which, in contrast to glutinous rice, is significantly correlated with being inequality averse. Thus, we can show that our measure captures real-life decisions that are likely driven by inequality aversion.

6 Supplemental Lab Evidence

To gain further insights, we also ran a lab experiment in Germany including the coupled lotteries game. Our motivation for this experiment is twofold. First, besides

substantially increasing social distance, because lab participants typically do not know each other, unlike neighbors in a small Thai village, and because participants in fact do not know who their counterpart for playing the game will be, taking the game to the lab inhibits *ex post* risk sharing for the very same reasons. Hence, in comparison to the field study, our lab experiment is more controlled as we can fully rule out risk sharing motives. Second, we aim to analyze how decisions in the coupled lotteries game relate to a common (but flawed) measure for inequality aversion by additionally playing the dictator game.[6]

The sessions were conducted at the University of Kiel in March 2019. In total, 76 students participated in 2 sessions. On average the sessions lasted about 35 minutes and participants earned 13€. Besides a questionnaire, the experiment includes four games in fixed order, a dictator game, the coupled lotteries game, and two multiple choice lists eliciting the certainty equivalents of a lottery where you win(lose) 10€ or nothing with equal probabilities. Instructions for the experiment were given on the screen and in written form (see Appendix Material A.5). Participants were invited via hroot (Bock et al., 2014) and the experiment was programmed in oTree (Chen et al., 2016). Descriptive statistics are shown in Table 5.

[Table 5 about here]

Somewhat surprisingly, we find that in contrast to our rural Thai sample, the majority of our German student sample couples the lotteries. About 60% decide to couple the lottery and again the share is statistically significantly different from being random. Furthermore, we find no difference for female and male participants, which might be due to the rather homogeneous student sample in general (see Appendix Table 6 (1)). Still, we again cannot confirm previous findings, which are also mostly based on student samples, that women are more inequality averse than men. We find a significant negative relationship between age and coupling the lotteries, which is similar to the Thai sample. However, given the small age range and the rather small sample size, insight into this relationship is limited. Our elicitation of risk preferences, using a multiple price list similar to the one in Thailand, shows a significant positive relation between risk aversion and coupling. In comparison to Thailand, the relation in Germany is stronger and more robust. Moreover, in the questionnaire, we add a question that asks students whether they regularly receive

[6] In our version of the dictator game, both parties decide how much to give to the other party and a random draw decides whose decision is going to be implemented.

advice concerning their studies from classmates. This question is chosen to mimic the agricultural-advice question in our Thai sample. In line with our previous results, students who regularly receive advice are more likely to couple. Thus, even though social distance in the lab is *ex ante* assumed to be higher, this finding supports the notion that less social distance is related to greater inequality aversion.

[Table 6 about here]

Importantly, we do not find a correlation between decisions in the dictator game and coupled lotteries. Both separators and couplers keep on average about 6.40€ in the dictator game. For us, this is not worrisome, as the main motivation for this paper is that the dictator game is a flawed measure for inequality aversion. Dictator giving is driven by various motives that blur the elicitation of inequality aversion in outcomes, as the literature shows. Blanco et al. (2011), for example, find no correlation between inequality aversion parameters derived from the dictator game and other distribution games. Along the same lines, one motive for donating to charities might be inequality aversion; however, it is probably not the most crucial motive. Similar to charitable (dictator) giving in the lab, the same various motives might drive charitable giving in real life. We elicit donation behavior in our questionnaire and, in fact, we find no evidence for our coupled lotteries measure to be predictive for whether people donate money to charities or not. Dictator giving, however, is significantly positively related to donating at the extensive margin (see Table 6 (2-3)).

7 Robustness Checks

In order to challenge our main results as shown in Section 4, we perform four kinds of robustness tests. (i) In a first step we run regressions focusing on the socio-demographic variables sex and age. (ii) Then, we use different measures for risk preference and income. (iii) Subsequently, we change the level for clustering the error terms from district level to sub-district and village level to see how a less conservative clustering affects the results. (iv) Finally, we control for additional skills that could promote *ex post* risk sharing, namely numeracy and financial literacy.

Socio-demographics. We run regressions separated by sex to check for interaction effects between sex and other independent variables (see Table 7). In the same

table, we narrow the age group we look at. Beside the estimates in Section 4 for respondents between 16 and 85 years, we run a regression for respondents aged 18 to 65 separated by using the two measures for social comparison. Looking at the regressions separated by sex, we do not find new significant results. Risk taking loses its significance in the small subsamples as before. However, the different size of the coefficients indicates that the relation between risk aversion and inequality aversion is mainly driven by the male respondents. Comparing oneself with neighbors is significant for the female sample, however, having no social status concerns is not. For the male sample it is the other way around, suggesting different channels between social status concerns and inequality aversion for women and men in our sample. [7]

[Table 7 about here]

The narrowed age group increases the effect of risk taking on the decision: although sample size is small, it turns significant. All other results are unchanged except for receiving advice from neighbors, which turns insignificant.

Different measures. In this section, we only report regressions using the full sample as all findings can be transferred to the sub-sample. Replacing annual consumption per capita with annual income per capita (see Table 8 (1)) does not change any of the other coefficients. Like consumption, income is not significant. The same holds true if consumption is replaced by the total value of durable assets the household of the respondents owns. Thus, we gain no further insights by using different measures for income or wealth.

[Table 8 about here]

The alternative risk measures we employ are (i) a question for general risk taking on a scale from 0-10 (Dohmen et al., 2011) and (ii) a question in which respondents have to decide how much to invest in a business from a hypothetical lottery prize of 100,000 THB, where the chance is 50% that the investment is doubled and 50% that it is halved. These two measures do not have a significant effect on coupling. Regardless, the multiple price list measure seems to be the more reliable measure

[7] Furthermore, there is another difference between female and male respondents. Whereas trust is positively significant for coupling the lotteries for females, receiving advice from neighbors is no longer significant; with it the other way around for males.

given its more detailed scale[8] and that the multiple price list resembles our game the most.

Clustering. So far, we have clustered at the district level following Cameron and Miller (2015) to cluster at least at the primary sampling unit. They emphasize that clustering on an even higher aggregated level may frequently more suitable. However, in our sample, there is no level above district that we can use for clustering. The only option would be no clustering at all. In that sense our method is the most conservative way to cluster our sample. Nevertheless, we also run regressions clustered at subdistrict and village levels (see Table 9). Effects remain unchanged except for sex and receiving advice from neighbors, which lose their significance in the subsample. This is due to the fact that clustering at a too low level cannot account for correlated error terms within each district. Another point worth mentioning is that the number of district clusters is small and that large-sample assumptions might not hold. However, our main results are robust to re-estimating our regressions using wild cluster bootstrap (results available upon request).

[Table 9 about here]

Skills. As final check, we add indices potentially indicating the comprehension of the concept of *ex post* risk sharing; these indices represent the skills of numeracy and financial literacy (see Table 10). Numeracy is measured by letting respondents answer 6 standard math equations, which gives us an index taking values between 0 and 6. A higher value of numeracy is related to an increased probability of coupling the lotteries and, thus, seems to have a similar effect as education (although education is only significant in the small sample). This result is not driven by a potential multicollinearity problem between education and numeracy.

[Table 10 about here]

For financial literacy, two standard questions from the literature (Lusardi and Mitchell, 2008) and two additionally for this survey designed questions are used. We find a positive effect on separating, which would be in favor of *ex post* risk sharing. However, the coefficient is only significant in the small sample. In order to better

[8] In principle, the investment question allows for a more precise measurement because respondents can choose any integer value between 0 and 100,000. Nevertheless, respondents only made 22 unique choices, with more than 50% of the sample choosing 50,000.

understand potential drivers, we analyze the four items defining the financial literacy index separately. We see that the effect is purely driven by answering the question on inflation correctly, the other questions are not significant. Thus, this might be an artifact of the small sample.

8 Conclusion

Inequality aversion is a well-established concept in the behavioral economics literature, which is also gaining policy relevance due to increasing income inequality in most industrialized countries (Alvaredo et al., 2017). Thus, for sound and evidence-based policy making, it is important to have a better, empirically substantiated, understanding of individual inequality aversion. This is currently hampered by the lack of a simple measure for inequality aversion that can be integrated into large household surveys. Here we propose such a new and simple measure. Due to its simplicity, it is less informative than a measure specified by theoretical models, but has the advantages that (i) it requires no further assumptions on expectations and preferences and (ii) can be implemented at relatively little cost in empirical studies.

We term this new measure "coupled lotteries." It is built on a single decision of individuals; whether they want to separate or couple a predefined lottery with their peers. Here, coupling means that the lotteries of two individuals are perfectly positively correlated, i.e. both receive the same outcome. As expected payoffs are the same for both choices, the decision for coupled lotteries reveals inequality aversion.

We find, in our sample of 850 poor households from rural Thailand, that about 60% of respondents prefer to separate, whereas 40% prefer to couple. As theoretically expected, the latter choice is related to being more risk averse and having social status concerns. In contrast to previous studies, but in line with Bellemare et al. (2008), our results suggest that men are more inequality averse than women and that previous studies might include confounding factors. As a competing explanation of the findings, one may argue that those individuals who prefer to separate are aware of the possibility of *ex post* risk sharing. However, we examine several variables underlying such awareness and expectation, with none supporting this explanation. In addition to these results, we find that our measure is related to real-life choices. Household heads who are inequality averse are more likely to have formal insurance for their household and more likely to diversify the crops they cultivate, which can

be interpreted as a kind of informal insurance.

Our supplemental lab evidence from Germany shows that coupled lotteries and dictator game decisions are not correlated, providing further evidence that dictator and charitable giving are not reliable measures for inequality aversion. Otherwise, we find similar correlations in our German student sample to those we find in our rural Thai sample. Social connectivity seems to be an especially important correlate of inequality aversion in both samples.

Thus, we conclude that our method gives us a robust measure of inequality aversion within our two diverse samples. Future research is needed to show whether this finding has further external validity and holds with various parameterizations.

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Figures and Tables

Player 2 \ Player 1	Separating	Coupling
Separating	A	C
Coupling	C	B

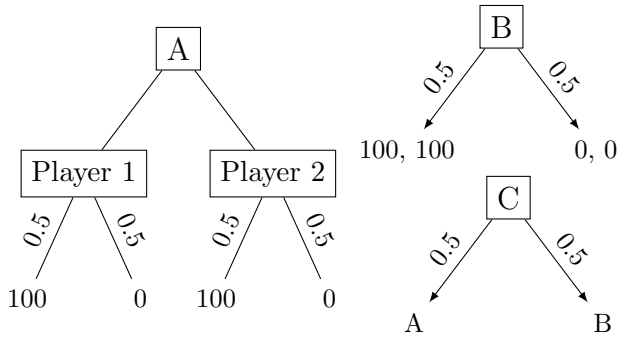


Figure 1: Coupled Lotteries: Decision Matrix and Connected Outcomes

Figure 2: Study Site 2014, Ubon Ratchathani Thailand

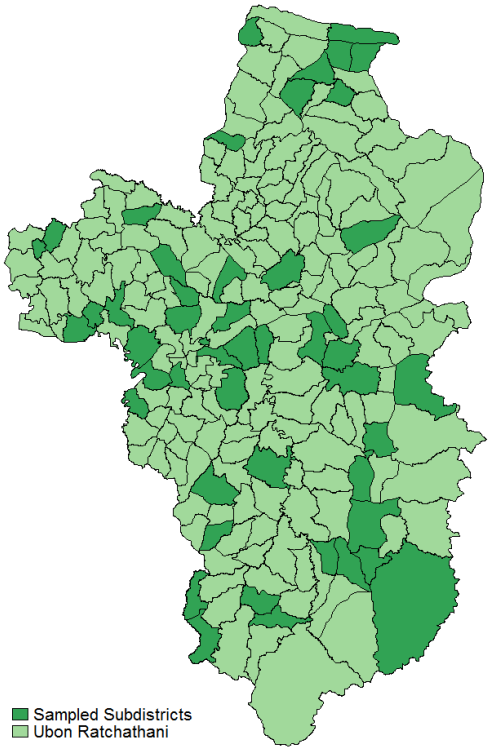


Figure 3: Sampled Subdistricts

Table 1: Descriptive Statistics of the Sample

	Full Sample	2013 and 2014	Only 2014	Difference
Coupling	0.37	0.36	0.39	0.03
Male	0.37	0.35	0.40	0.05
Age	52.97	55.24	49.40	−5.84***
Years of Schooling	5.94	5.48	6.66	1.18***
Ann. Consumption per Cap.	716.57	724.36	703.43	−20.92
Risk Taking, MPL	11.03	10.98	11.11	0.13
Advice from Neighbor	0.14	0.14	0.13	−0.02
Trust in Village		3.12		
Comparing with Neighbors		0.48		
Not Comparing		0.16		
Observations	851	521	330	851

* p < 0.10, ** p < 0.05, *** p < 0.01

Table 2: Logistic Regressions, Full Sample

	(1)	(2)	(3)
Male	0.101***	0.099***	0.099***
	(0.032)	(0.033)	(0.034)
Age	−0.002**	−0.001	−0.001
	(0.001)	(0.001)	(0.001)
Years of Schooling	0.003	0.004	0.005
	(0.005)	(0.005)	(0.005)
Ann. Consumption per Cap. (log)		−0.015	−0.013
		(0.026)	(0.025)
Risk Taking, MPL	−0.004*	−0.004*	−0.004*
	(0.002)	(0.002)	(0.002)
Advice from Neighbor			0.075*
			(0.039)
Observations	849	829	829
Baseline Predicted Probability	0.369	0.367	0.367
McFaddens R-squared	0.046	0.046	0.048

Dependent Var.: Decision to separate (=0) or couple (=1). Average marginal effects reported. SE clustered at district level. District dummies not reported.
* p < 0.10, ** p < 0.05, *** p < 0.01

Table 3: Logistic Regressions, Subsample

	(1)	(2)	(3)	(4)
Male	0.067*	0.068*	0.071**	0.068**
	(0.037)	(0.038)	(0.037)	(0.035)
Age	−0.000	−0.000	−0.000	−0.001
	(0.002)	(0.002)	(0.002)	(0.002)
Years of Schooling	0.015**	0.015**	0.013*	0.013*
	(0.007)	(0.007)	(0.007)	(0.007)
Ann. Consumption per Cap. (log)	−0.031	−0.033	−0.035	−0.032
	(0.034)	(0.034)	(0.034)	(0.033)
Risk Taking, MPL	−0.003	−0.004	−0.004	−0.004
	(0.003)	(0.003)	(0.003)	(0.003)
Comparing with Neighbors		0.060*		
		(0.036)		
Not Comparing			−0.127**	−0.129***
			(0.048)	(0.045)
Advice from Neighbor				0.086*
				(0.048)
Trust in Village				0.059**
				(0.025)
Observations	521	521	521	521
Baseline Predicted Probability	0.359	0.359	0.359	0.359
McFaddens R-squared	0.044	0.047	0.052	0.061

Dependent Var.: Decision to separate (=0) or couple (=1). Average marginal effects reported. SE clustered at district level. District dummies not reported.
* p < 0.10, ** p < 0.05, *** p < 0.01

Table 4: Logistic Regressions, Insurance Demand and Crop Diversity

	Having Insurance	Above Mean Crop Index	Glutinous Rice	Cassava
Inequality Aversion	0.066**	0.102*	−0.078	0.086**
	(0.027)	(0.060)	(0.054)	(0.046)
Male	−0.038	−0.002	0.022	0.000
	(0.032)	(0.084)	(0.053)	(0.048)
Age	0.003	0.002	−0.001	−0.002
	(0.003)	(0.002)	(0.002)	(0.002)
Years of Schooling	0.013	−0.001	−0.008	−0.001
	(0.012)	(0.010)	(0.006)	(0.007)
Ann. Consumption per Cap. (log)	0.079***	−0.047	0.043	−0.056
	(0.028)	(0.056)	(0.033)	(0.043)
Household nucleus size	0.048***	−0.013	0.017	−0.016
	(0.014)	(0.013)	(0.015)	(0.014)
Risk Taking, MPL	−0.000	−0.000	0.001	−0.006*
	(0.003)	(0.003)	(0.003)	(0.003)
Numeracy	−0.002	0.017	0.007	−0.017
	(0.018)	(0.015)	(0.016)	(0.017)
Financial Literacy	0.009	−0.005	−0.012	0.000
	(0.022)	(0.028)	(0.025)	(0.017)
Self-Employed	0.070			
	(0.075)			
HH better off in 5 years	−0.038*			
	(0.021)			
Number Anticipated Risks	−0.007			
	(0.009)			
Number Weather Risks		0.018	0.026	0.018
		(0.036)	(0.022)	(0.019)
Land Size		0.005	0.007**	0.007***
		(0.004)	(0.003)	(0.001)
Number of Tractors		0.091*	0.092***	−0.014
		(0.048)	(0.032)	(0.045)
Number of Waterpumps		−0.021	−0.017	−0.070**
		(0.048)	(0.025)	(0.027)
Observations	418	319	296	288
Baseline Predicted Probability	0.767	0.537	0.774	0.217
McFaddens R-squared	0.123	0.080	0.193	0.334

Dependent Var.: Having insurance, Simpson index of crop-land share diversification above mean and growing glutinous rice and cassava. Average marginal effects reported. District dummies not reported. SE clustered at district level.
* p < 0.10, ** p < 0.05, *** p < 0.01

Table 5: Descriptive Statistics of the Lab-Sample

	Full Lab-Sample	Separators	Couplers	Difference
Male	0.42	0.45	0.40	0.05
Age	24.61	25.68	23.87	1.81*
Risk Taking, MPL	10.46	11.16	9.98	1.18
Advice from Classmate	0.51	0.45	0.56	−0.10
Dictator Keeping	6.41	6.39	6.43	−0.05
Donation Dummy	0.64	0.68	0.62	0.06
Donation Amount	45.11	38.90	49.38	−10.47
Observations	76	31	45	76

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 6: Regressions, Lab Sample

	Coupling	Donating	Donating
Male	−0.042	0.075	0.051
	(0.072)	(0.119)	(0.144)
Age	−0.022***	−0.022**	−0.024***
	(0.006)	(0.009)	(0.003)
Risk Taking, MPL	−0.013**		
	(0.005)		
Advice from Classmates	0.081***		
	(0.002)		
Dictator Keeping	0.012	−0.034*	
	(0.025)	(0.015)	
Inequality Aversion			−0.035
			(0.288)
Relative Income		−0.084	−0.082
		(0.060)	(0.071)
Compare Performance		0.260***	0.239*
		(0.044)	(0.124)
Happiness		0.089	0.084
		(0.103)	(0.122)
Observations	76	76	76
Baseline Predicted Probability	0.592	0.645	0.645
McFaddens R-squared	0.050	0.098	0.084

Dependent Var.: Coupling - Decision to separate (=0) or to couple (=1); Donating - Dummy for making donations to any charity; Average marginal effects reported. SE bootstrapped and clustered at session level.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 7: Logistic Regressions, Split by Sex and Narrower Age Group

	Female	Male	Age 18-65	Age 18-65
Male			0.085**	0.089**
			(0.038)	(0.038)
Age	−0.000	−0.000	0.001	0.000
	(0.003)	(0.003)	(0.002)	(0.002)
Years of Schooling	0.015	0.018	0.017**	0.016**
	(0.010)	(0.014)	(0.007)	(0.007)
Ann. Consumption per Cap. (log)	−0.027	−0.056	−0.027	−0.029
	(0.034)	(0.056)	(0.033)	(0.034)
Risk Taking, MPL	−0.001	−0.007	−0.006**	−0.006**
	(0.004)	(0.005)	(0.002)	(0.002)
Comparing with Neighbors	0.080*		0.014	
	(0.048)		(0.040)	
Not Comparing		−0.261**		−0.104**
		(0.078)		(0.046)
Advice from Neighbor			−0.017	−0.016
			(0.032)	(0.034)
Trust in Village			0.067**	0.066**
			(0.031)	(0.029)
Observations	341	178	414	414
Baseline Predicted Probability	0.343	0.382	0.353	0.353
McFaddens R-squared	0.064	0.095	0.067	0.072

Dependent Var.: Decision to separate (=0) or couple (=1). Average marginal effects reported. SE clustered at district level. District dummies not reported.
* p < 0.10, ** p < 0.05, *** p < 0.01

Table 8: Logistic Regressions, Different Measures for Risk and Income

	Ann. Inc.	Dur. Assets	Risk	Invest
Male	0.097***	0.099***	0.099***	0.098***
	(0.032)	(0.033)	(0.033)	(0.033)
Age	−0.001	−0.001	−0.001	−0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Years of Schooling	0.004	0.003	0.005	0.004
	(0.005)	(0.005)	(0.006)	(0.005)
Ann. Consumption per Cap. (log)			−0.016	−0.016
			(0.026)	(0.026)
Risk Taking, MPL	−0.004*	−0.004**		
	(0.002)	(0.002)		
Ann. Income per Capita	−0.000			
	(0.000)			
Assets Value		0.000		
		(0.000)		
General Risk Taking			−0.003	
			(0.008)	
Hypothetical Investment				−0.000
				(0.000)
Observations	829	829	828	828
Baseline Predicted Probability	0.367	0.367	0.367	0.367
McFaddens R-squared	0.045	0.046	0.044	0.043

Dependent Var.: Decision to separate (=0) or couple (=1). Average marginal effects reported. SE clustered at district level. District dummies not reported.
* p < 0.10, ** p < 0.05, *** p < 0.01

Table 9: Logistic Regressions, Different Levels for Clustering

	Subdistr.	Subdistr.	Village	Village
Male	0.098***	0.067	0.098***	0.067
	(0.034)	(0.045)	(0.035)	(0.045)
Age	−0.001	−0.001	−0.001	−0.001
	(0.001)	(0.002)	(0.001)	(0.002)
Years of Schooling	0.005	0.013*	0.005	0.013
	(0.005)	(0.007)	(0.005)	(0.008)
Ann. Consumption per Cap. (log)	−0.013	−0.032	−0.013	−0.032
	(0.022)	(0.030)	(0.025)	(0.030)
Risk Taking, MPL	−0.004*	−0.004	−0.004	−0.004
	(0.002)	(0.002)	(0.002)	(0.003)
Advice from Neighbor	0.075*	0.086	0.075*	0.086
	(0.046)	(0.055)	(0.044)	(0.057)
Not Comparing		−0.129**		−0.129**
		(0.048)		(0.053)
Trust in Village		0.059**		0.059**
		(0.025)		(0.029)
Observations	829	521	829	521
Baseline Predicted Probability	0.367	0.359	0.367	0.359
McFaddens R-squared	0.048	0.061	0.048	0.061

Dependent Var.: Decision to separate (=0) or couple (=1). Average marginal effects reported. District dummies not reported.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 10: Logistic Regressions, Numeracy and Financial Literacy

	(1)	(2)	(3)
Male	0.095***	0.065*	0.066**
	(0.033)	(0.034)	(0.030)
Age	−0.001	−0.001	−0.001
	(0.001)	(0.002)	(0.002)
Years of Schooling	0.003	0.012*	0.013*
	(0.005)	(0.007)	(0.007)
Ann. Consumption per Cap. (log)	−0.014	−0.032	−0.029
	(0.025)	(0.032)	(0.031)
Risk Taking, MPL	−0.004*	−0.004	−0.004
	(0.002)	(0.003)	(0.003)
Advice from Neighbor	0.081**	0.084*	0.097**
	(0.041)	(0.048)	(0.047)
Not Comparing		−0.127***	−0.127***
		(0.046)	(0.046)
Trust in Village		0.057**	0.062**
		(0.025)	(0.027)
Numeracy	0.030***	0.013	0.016
	(0.010)	(0.015)	(0.016)
Financial Literacy	−0.011	−0.029*	
	(0.013)	(0.017)	
Inflation			−0.124**
			(0.052)
Interest Rates			0.007
			(0.038)
Expected Utility			0.018
			(0.040)
Loan Conditions			−0.023
			(0.037)
Observations	829	521	521
Baseline Predicted Probability	0.367	0.359	0.359
McFaddens R-squared	0.052	0.064	0.074

Dependent Var.: Decision to separate (=0) or couple (=1). Average marginal effects reported. SE clustered at district level. District dummies not reported.

* p < 0.10, ** p < 0.05, *** p < 0.01

A Additional Figures

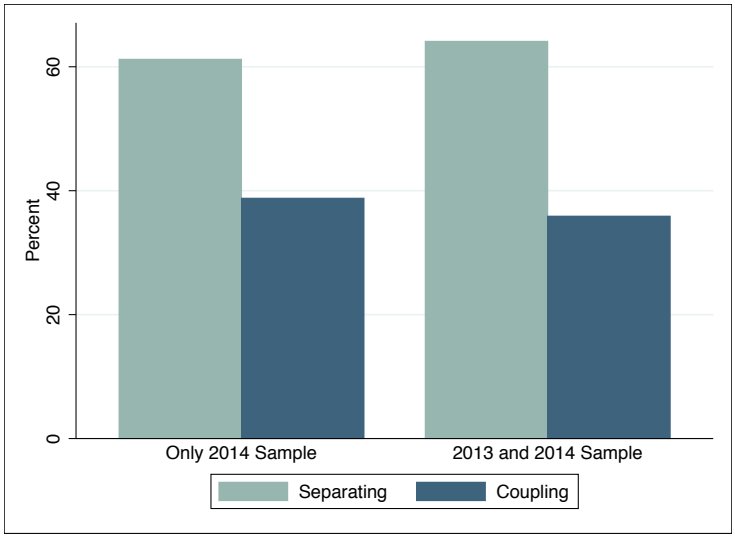


Figure A.1: Share of Respondents Coupling vs Separating by Survey Participation

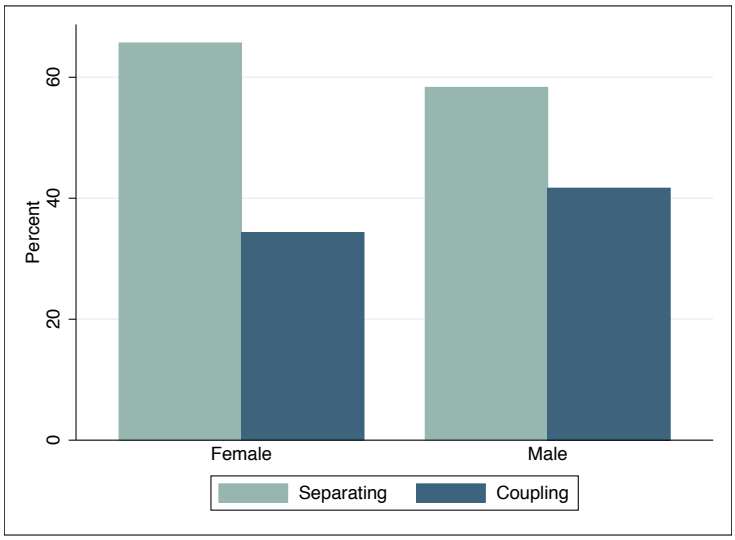


Figure A.2: Share of Respondents Coupling vs Separating by Sex

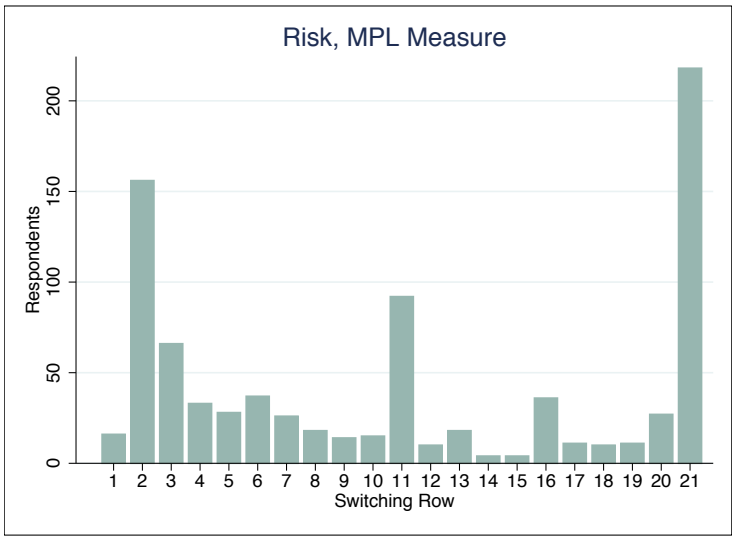


Figure A.3: Switching Row, from Lottery to Safe Amount in Multiple Price List Game

B Material

Material A.1: Introductory Statement for the Games Section of the Survey

SECTION 7 – Risk Games

HOW ARE YOU FEELING NOW?
Very good_____01
Good_____02
Quite ok_____03
Not so good_____04
Bad_____05

General Instructions *(Enumerator: read out)*

Now we would like to invite you to play 4 games. The first game is about choosing a lottery or a safe amount; the second game is about choosing a sooner or a later amount, the third game is about rolling a dice and to memorize the number of eyes; the fourth one is about sharing the benefits together with a neighbor. After you are finished with playing the 4 games, you will play one game for real money. Therefore you are asked to blindly draw one out of four numbers from 1 to 4) to determine which of these 4 games is paid out in real money.

For each of these 4 games we will show you cards that contain all information for you to make decision. (*Enumerator: show participants the 4 show cards*)
We will note your choice for each question in our record sheets.

1 Do you agree to play these games with us?

Yes_____01 (go to section 7.1)
No_____02 (fill in next question and proceed with section 8)

2 In case you decide not to participate in the risk games please tell us why you do not want to participate?

Religion_____01
Bad experience with risk games_____02
Never play games_____03
Others, please specify_____04

Material A.2: Instructions for Coupled Lotteries in the Survey

There is a 50:50 chance to win 100 THB. Do you want to win or lose alone or together? (Enumerator, please tell the respondent that this game is played together with respondent's neighbor. The 50:50 chance to win 100 THB will be determined by a flip of a coin. Ask both the respondent and his neighbor if they like to take the chance to win or lose together or if they like to take the chance to win or lose alone. Pass them the attached extra sheets and let them secretly circle their answer.)

1 Hidden choice (Enumerator, please tick the box according to the hidden choice of the respondent and of the neighbor)

	Like to play alone	Like to play together
Respondent	☐	☐
Neighbor	☐	☐

Material A.3: Decision Sheets for Respondent and Neighbor

Hidden choice: Respondent

Please tick how do you like to play the following game:

The coin decides if you win 100THB ("King") or 0 THB ("Palace")

Do you like to play **alone**? ☐

Or

Do you like to play **together** with your neighbour? ☐

Hidden choice: Neighbour

Please tick how do you like to play the following game:

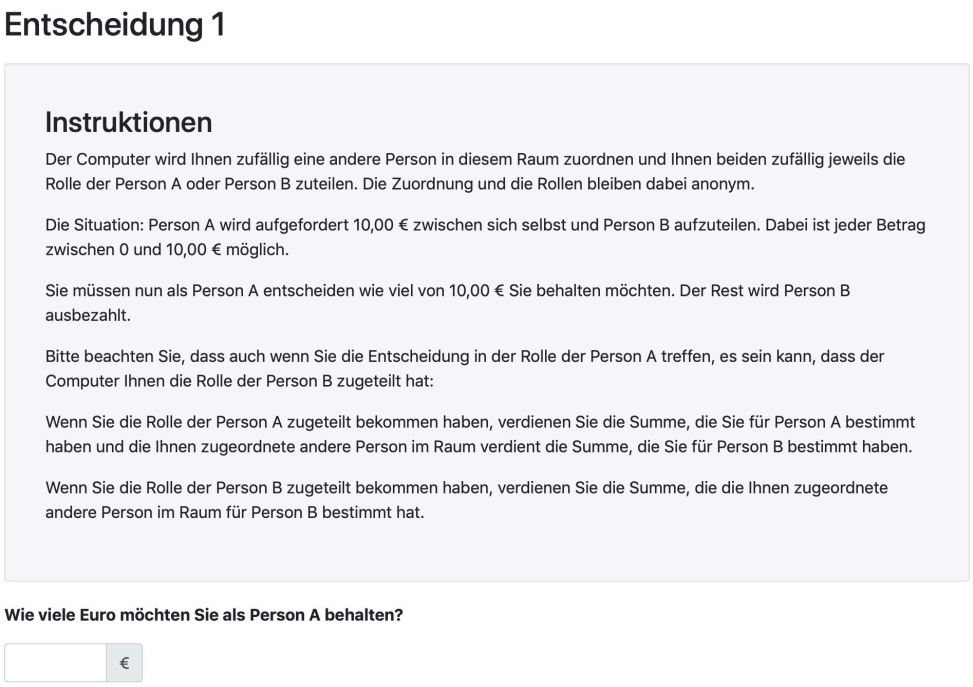
The coin decides if you win 100THB ("King") or 0 THB ("Palace")

Do you like to play **alone**? ☐

Or

Do you like to play **together** with your neighbour? ☐

Material A.4: Instructions for Dictator Game in the Lab



[Translation:] **Decision 1**
The computer will match you to a random person in this room and randomly assign you to the roles of person A or B. The matching and assignment of roles will be kept anonymous.

The setup: Person A will be asked to distribute 10€ between herself/himself and person B. Each amount between 0 and 10€ is possible.

You have to decide now as person A how much of these 10€ you want to keep. The remaining amount is paid to person B.

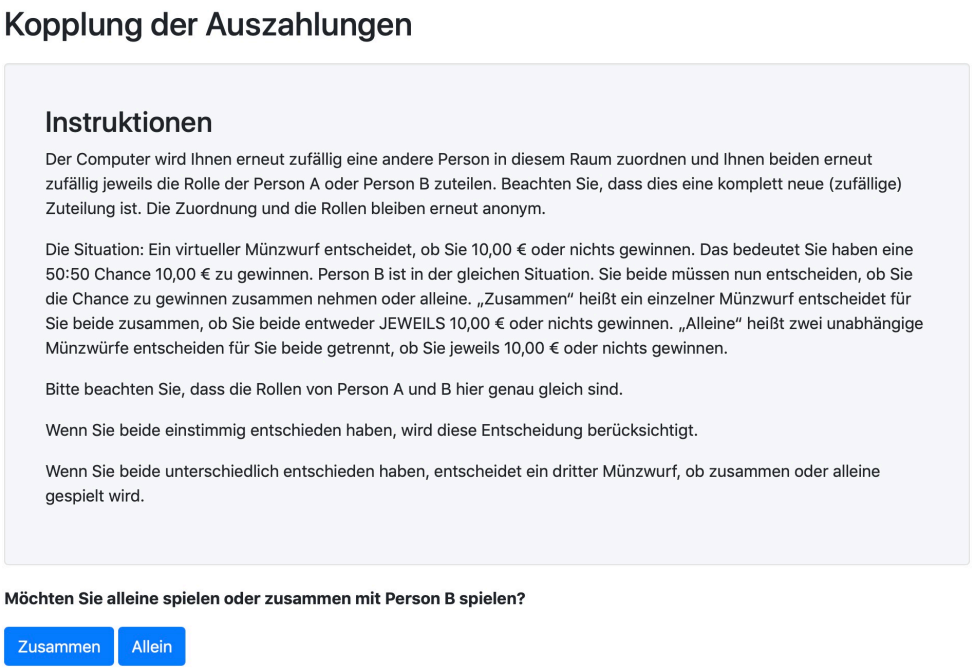
Please note that even though you make the decision as person A now, it might happen that the computer assigns you the role of person B:

If you were assigned the role of person A, you will receive the amount that you assigned to person A and the other person in the room who is matched to you receives the amount you assigned to person B.

If you were assigned the role of person B, you will receive the amount that the other person in the room who is matched to you assigned to person B.

How much do you want to keep as person A?

Material A.5: Instructions for Coupled Lotteries in the Lab



[Translation:] **Coupling of Payoffs**
Again, the computer will match you to a random person in this room and randomly assign you to the roles of person A or B. Please note that this matching is a completely new (and random) matching. Matching and assignment are again anonymous.

The setup: A virtual coin flip will decide whether you will gain 10€ or nothing. This means, you have a 50:50 chance to win 10€. Person B is in the same situation. Both of you have to decide now whether you take the chance to win together or alone. "Together" means a single coin flip will decide for both of you if EACH of you will win 10€ or nothing respectively. "Alone" means that two independent coin flips will decide for each of you separately whether you will win 10€ or nothing.

Please note that the roles of person A and B are exactly the same here.

If you decide unanimously, this decision will be implemented.

If you decide differently, there will be a third coin flip deciding whether it will be played alone or together.

Do you want to play alone or together with person B?

Material A.6: Multiple Price List for Gains - Lab Experiment

Lotterie

Bitte entscheiden Sie nun zwischen zwei Optionen. Entweder bestimmt ein Münzwurf, ob Sie €0 oder 10,00 € erhalten. Oder Sie wählen eine sichere Zahlung mit ansteigenden Beträgen.

	Lotterie			**Sichere Zahlung**
1	50%: 10,00 €; 50%: 0€	◉	○	€0.5
2	50%: 10,00 €; 50%: 0€	◉	○	€1
3	50%: 10,00 €; 50%: 0€	◉	○	€1.5
4	50%: 10,00 €; 50%: 0€	◉	○	€2
5	50%: 10,00 €; 50%: 0€	◉	○	€2.5
6	50%: 10,00 €; 50%: 0€	◉	○	€3
7	50%: 10,00 €; 50%: 0€	◉	○	€3.5
8	50%: 10,00 €; 50%: 0€	◉	○	€4
9	50%: 10,00 €; 50%: 0€	◉	○	€4.5
10	50%: 10,00 €; 50%: 0€	○	◉	€5
11	50%: 10,00 €; 50%: 0€	○	◉	€5.5
12	50%: 10,00 €; 50%: 0€	○	◉	€6
13	50%: 10,00 €; 50%: 0€	○	◉	€6.5
14	50%: 10,00 €; 50%: 0€	○	◉	€7
15	50%: 10,00 €; 50%: 0€	○	◉	€7.5
16	50%: 10,00 €; 50%: 0€	○	◉	€8
17	50%: 10,00 €; 50%: 0€	○	◉	€8.5
18	50%: 10,00 €; 50%: 0€	○	◉	€9
19	50%: 10,00 €; 50%: 0€	○	◉	€9.5

Material A.7: Questionnaire - Lab Experiment

What is your sex?

- Male
- Female

What is your age?

___ years

What is your body-height?

___ cm

What is your body-weight?

___ kg

Are you a person who rather avoids risks or are you rather willing to take risks?

- Mostly avoid risks
- Rather avoid risks
- Rather willing to take risks
- Mostly willing to take risks

Do you frequently take advice from other students, if you have to make decisions regarding your studies?

- Yes
- No

How many persons are so close to you that you can count on them if you are in serious trouble (e.g. illness, lovesickness, stress)?

- No one
- 1 or 2
- 3 - 5
- 6 or more

Generally speaking, would you say that most people can be trusted or that you can't be too careful when dealing with people?

- Most people can be trusted
- You can't be too careful when dealing with people

Do you frequently compare your qualities or performance with other persons?

- Yes
- No

How happy are you with your life in general?

- Very unhappy
- Rather unhappy
- Rather happy
- Very happy

How much money do you have available each month in comparison to other students?

- Much less
- A little bit less
- About the same
- A little bit more
- Much more

And now a question about your donations. We understand donations here as giving money for social, church, cultural, community, and charitable aims, without receiving any direct compensation in return. These donations can be large sums of money but also smaller sums, for example, the change one puts into a collection box. We also count church offerings. Did you donate money last year, in 2017 – not counting membership fees?

- Yes
- No

If yes: How high was the total sum of money that you donated last year?

___ Euro

Suppose you put 100€ into your savings account. The interest rate is 2% per year and you leave this money on your account for 5 years. What do you think: how much money would be in the account after 5 years?

- More than 102€
- Exactly 102€
- Less than 102€
- Don’t know

Suppose the interest rate on your savings account is 1% per year, and the inflation rate per year is 2%. What do you think: after 1 year, can you buy the same, more or less than today?

- More
- Exactly the same
- Less
- Don’t know

Is the following statement true or false?
“Buying a company stock usually provides a safer return than a stock mutual fund. “

- True
- False
- Don’t know

C Description of Independent Variables

Male	Sex of respondent, 0=Female, 1=Male
Age	Age of respondent in years
Years of Schooling	Years respondent went to school
Ann. Consumption per Cap. (log)	Log annual consumption per capita in Thai Baht
Ann. Income per Capity	Annual household income in 2013 USD
Assets Value	Total value of all durable goods in the household in THB
Risk Taking, MPL	Risk preference measured via Multiple price list method, variable indicates the switching row from the lottery to the safe amount, rows from "1"-"21(Never)". The lottery gives 300 THB with 50% chance and 0 THB with 50% chance, the safe amount increases gradually from 0 to 190 THB.
General Risk Taking	Answer to "Are you generally a person who is willing to take risks or do you try to avoid taking risk?", from 0-"Fully unwilling to take risks" to 10-"Fully willing to take risks"
Hypothetical Investment	Amount of money respondents would invest if they would win 100,000 THB and the chance is 50% that the investment is doubled and 50% that it is halved
Comparing with Neighbors	Dummy for neighbors being the main reference group respondents compare their standard of living with
Not Comparing	Dummy for not comparing oneself's standard of living to other persons
Advice from Neighbor	Dummy whether respondents take agricultural advice from neighbors/relatives
Trust in Village	Believe in trustworthiness of other persons in the own village from 1-"Trust them not at all"to 4-"Trust them a lot"

Numeracy	Counts the number of right answers to following questions:
1	What is 45 + 72?
2	You have 4 friends and you want to give each friend 4 sweets. How many sweets do you need?
3	What is 5% of 200?
4	You want to buy a bag of rice that costs 270 Baht, but you only have one 1000 Baht note. How much change will you get back?
5	In a sale, a shop is selling all items at half price. Before the sale, a mattress costs 3000 Baht. How much will the mattress cost in the sale?
6	A second-hand motorbike dealer is selling a motorbike for 12000 Baht. His is two thirds of what a new motorbike costs new. How much did the new motorbike cost?
Financial Literacy	Counts the number of right answers to following questions:
Interest Rates	If today you borrow 10,000 THB, at an interest rate of 2% per month, after 3 months how much do you owe totally (principle + interest)? Less than 10,200 THB More than 10,200 THB Exactly 10,200 THB
Inflation	If you have 10,000 THB in an account, the interest rate on the account is 10% per year, and during this time, the price of goods and services rises by 12% per year, after one year you can buy: Less than you can buy today More than you can buy today Exactly the same as today
Expected Utility	For the same amount of money, a person can enter either one these two lotteries. Lottery A pays a prize of 2,000 THB, and the chance of winning is 5%. Lottery B pays a prize of 100 THB, and the chance of winning is 10%. Which Lottery pays the higher expected amount? Lottery A Lottery B Two lotteries pay the same expected amount
Loan Conditions	Suppose you need to borrow 50,000 THB. Two people offer you two different loans, the first loan you have to pay back 60,000 THB in one month, with the second loan you have to pay back 50,000 THB plus 15% in one month. Which loan is the better option?

Household Nucleus Size	Number of persons living in the household for most time of the year
Self-Employed	Dummy whether the household head is self-employed including being engaged in agriculture
HH better off in 5 years	Answer to "Do you think your household will be better off in 5 years?", from 1-"Much better off" to 5-"Much worse off"
Number Anticipated Risks	Number of household risks a household head thinks will occur in the next 5 years from a predefined list of 17 different risk plus own entries possible
Number Weather Risks	Number of household risks a household head thinks will occur in the next 5 years that are related to weather
Land Size	Size of the area used for cultivating crops in Rai (1600 sqm)
Number of Tractors	Number of tractors in the household
Number of Waterpumps	Number of waterpumps in the household
Advice from Classmate	Dummy whether participants take study advice from classmates
Dictator Keeping	Amount of that participant wants to keep in the dictator game. Can take values between 0 and 10(€).
Relative Income	How much disposable money per month participants think they have in comparison to other students on a scale from 1-"Much less" to 5-"Much more"
Compare Performance	Dummy whether participants often compare their attributes and performance with other persons
Happiness	How happy participants are in their lives from 1-"Very unhappy" to 4-"Very happy"